

**APPENDICES – VOLUME 2 (con't)**

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Appendix BB Case CTS5 Reports, Phase 2  
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## EXECUTIVE SUMMARY

### Introduction

The Warren Rural Electric Cooperative (WRECC) is presently provided wholesale power by the Tennessee Valley Authority (TVA). WRECC has requested power supply and participation as a member of the East Kentucky Power Cooperative (EKPC). The target date for this service is April 2008. TVA presently supplies WRECC, but has declined to “wheel” power to WRECC for EKPC. Therefore, EKPC has contracted with CAI to perform this study to identify the transmission requirements to provide service to WRECC through additions to the transmission system.

The assumptions of this study are:

1. EKPC will provide service to WRECC via a new 161 kV transmission system comprised of new lines from EKPC’s Barren County Substation to WRECC’s substations at Magna, Bristow, GM, East Bowling Green (EBG), Memphis Junction, and Aberdeen, and a new intertie with Big Rivers Electric Corporation (BREC) from Aberdeen to BREC’s Wilson Substation.
2. TVA 161 kV transmission lines that presently serve WRECC loads at Aberdeen and Bristow will be opened.
3. The TVA 161 kV connection to the WRECC system at Memphis Junction will remain closed. The TVA 161 kV tie to WRECC’s GM Substation at East Bowling Green will be modified to loop through WRECC’s EBG Substation, and the existing TVA 161 kV tie to the EBG Substation will be removed.
4. The WRECC 69 kV network between Memphis Junction, East Bowling Green, and Franklin will be operated closed. The present connection with City of Franklin (COF) will remain closed. Discussions are underway with COF with regard to replacing its existing 50 MVA 161-69 kV transformer with a larger transformer (60/100 MVA).
5. WRECC loads served off the LG&E Energy/Kentucky Utilities system (LGEE) will remain connected to the LGEE system.

### Purpose and Scope

The purpose of this report is to document the study results, provide recommendations for transmission system additions to serve the WRECC load from EKPC, and provide the necessary coordination and documentation for decisions by TVA, the Midwest Independent System Operator (MISO), the Kentucky Public Service Commission (KYPSC), and other regulatory proceedings.

The scope of the study includes power flow, short circuit and transient stability analysis as necessary to provide an independent analysis of the transmission system.

## Study Results

The following new 69 or 161 kV substation facilities are recommended to allow EKPC to adequately serve the WRECC system:

1. Magna Substation (2-161 kV CB)
2. GM (3-161 kV CB)
3. Memphis Junction (4-161 kV CB)
4. Aberdeen (2-161 kV CB)
5. East Bowling Green (1-161 kV CB)
6. Barren County (2-161 kV CB)
7. Wilson (BREC) (1-161 kV CB)
8. New 69 kV Switching Station, L28 (3-69 kV CB)
9. New 69 kV Switching Station, K30 (3-69 kV CB)
10. New 69 kV Switching Station, Plano Tap (3-69 kV CB)

The following new 161 kV transmission lines are recommended:

1. Barren County - Magna, 24 miles single circuit 161 kV
2. Magna - Bristow, 1 mile single circuit 161 kV
3. Magna - GM, 2.5 miles single circuit 161 kV
4. GM - BGMU tap, 5 miles single circuit 161 kV
5. Memphis Junction - BGMU tap, 8.4 miles double circuit 161 kV
6. Aberdeen - BGMU tap, 27.0 miles
  - a. 5 miles double-circuit 161 and 69 kV on new right-of-way
  - b. 22 miles single-circuit 161 kV replacing existing 69 kV line
7. Wilson - Aberdeen, 25 miles single-circuit 161 kV

The following 161 kV line upgrades are recommended:

1. East Bowling Green - GM, reconductor 0.15 miles with 954 ACSS conductor
2. Summershade-Barren County 161 kV line (20.1 miles) from 167°F to 212°F

## Estimated Cost of Recommended Facilities

CAI's estimated construction cost of new facilities in 2008 dollars is \$47 million.

## INTRODUCTION

### Background

The Warren Rural Electric Cooperative (WRECC) is presently provided wholesale power by the Tennessee Valley Authority (TVA). WRECC has requested power supply and participation as a member of the East Kentucky Power Cooperative (EKPC). The target date for this service is April 2008.

EKPC is sponsoring the transmission service study. However, a 161 kV transmission interconnection between EKPC and Big Rivers Electric Corporation (BREC) is proposed as part of the transmission service to WRECC, therefore, BREC is also a study participant.

TVA presently supplies WRECC but has indicated that they will not “wheel” power to WRECC. The TVA 161 kV transmission lines that presently serve WRECC will remain in service but the connections to WRECC substations will be opened at Aberdeen and Bristow. The other TVA connections will remain closed.

LG&E Energy/Kentucky Utilities (LGEE/KU) also has transmission in the Warren area. EKPC has provided details of the LGEE/KU system as appropriate for the study. Study results have been discussed with LGEE/KU and the Midwest ISO (MISO). The MISO is conducting an analysis of the impacts of the proposed plan at LGEE/KU’s request.

### Purpose

The purpose of this report is to document the study results, provide recommendations for transmission system additions to serve the WRECC load from EKPC, and provide the necessary coordination and documentation for decisions by TVA and the Kentucky Public Service Commission (KYPSC).

### Scope of Study

The scope of the study includes the following:

- Provide an independent analysis of the transmission facilities needed to serve the WRECC loads from the EKPC system. Conduct necessary power flow analysis to demonstrate the adequacy of the proposed transmission and provide planning level costs of the proposed facilities.
- Provide short-circuit and transient stability calculations for the proposed transmission system.

## SUMMARY OF RESULTS AND CONCLUSIONS

### New 161 kV Substation Facilities

The following new 161 kV substation facilities are recommended for service to WRECC:

1. New 161 kV circuit breakers (two) at Magna  
Magna is a new 2 x 25 MVA, 161/13 kV WRECC substation
2. New 161 kV circuit breakers (three) at GM
3. New 161 kV circuit breakers (four) at Memphis Junction
4. New 161 kV circuit breakers (two) at Aberdeen
5. New 161 kV circuit breaker (one) at East Bowling Green
6. New 161 kV circuit breakers (two) at Barren County
7. New 161 kV circuit breaker (one) at Wilson (BREC)
8. Replace Franklin 161-69 kV transformer with 60/100 MVA

### New 161 kV Transmission Lines

The following new 161 kV transmission lines are required. All of the new lines, except as noted, will be constructed using 954 ACSS conductor. These lines will have a summer normal rating of at least 412 MVA and a summer emergency rating of at least 509 MVA.

1. Barren County - Magna, 24 miles single circuit 161 kV
2. Magna - Bristow, 1 mile single circuit 161 kV (954 ACSR)
3. Magna - GM, 2.5 miles single circuit 161 kV
4. GM - BGMU tap, 5 miles single circuit 161 kV
5. Memphis Junction - BGMU tap, 8.4 miles double circuit 161 kV
6. Aberdeen - BGMU tap, 27.0 miles
  - a. 5 miles double-circuit 161 and 69 kV on new right-of-way
  - b. 22 miles single-circuit 161 kV replacing existing 69 kV line
7. Wilson - Aberdeen, 25 miles single-circuit 161 kV

### 161 kV Facility Upgrades

The following 161 kV line will be reconducted using 954 ACSS conductor:

1. East Bowling Green - GM, 0.15 miles reconductor

The following 161 kV line upgrades are required:

1. Summershade-Barren County 161 kV line (20.1 miles) from 167°F to 212°F

### New 69 kV Switching Stations

The 69 kV transmission between Memphis Junction and Franklin will be operated closed as follows:

1. Woodburn - Anaconda normally closed
2. Franklin - AVL normally closed
3. Greenwood - Hardcastle normally closed
4. Auburn - H23 normally closed

Three 69 kV switching stations are required for operating the 69 kV network closed, as follows:

1. New three breaker 69 kV switching station at K30 (near City of Franklin)
2. New three breaker 69 kV switching station at L28
3. New three breaker 69 kV switching station at Plano-Greenwood-Weyerhauser tap.

A one-line diagram and map of the proposed new facilities are provided as Exhibits 1 and 2, respectively.

### **Proposed Changes to TVA Interconnection**

The following changes are recommended with regard to the present TVA facilities:

1. The present TVA Bristow tap circuit will be maintained but operated normally open. The tap will be available to be closed to service Bristow for outage of the one-mile EKPC 161 kV line between Magna and Bristow.
2. The present TVA Aberdeen tap circuit can be retired.
3. The present TVA 161 kV tie to WRECC Memphis Junction will remain in-service and be operated in parallel with the new EKPC double-circuit 161 kV line to Memphis Junction.
4. The present TVA/City of Franklin 161/69 kV tie to WRECC at Franklin will remain in service.
5. The present TVA 161 kV tie to WRECC GM at East Bowling Green will be modified to loop through WRECC's East Bowling Green (EBG). The existing TVA 161 kV tie to EBG will be removed.

### **Estimated Cost of Recommended Facilities**

EKPC provided an estimated cost of new facilities. CAI reviewed these costs for a second opinion. Comparison of the two estimates is provided as Table 1 and summarized below. CAI's transmission and substation cost estimates are based on generic line costs per mile and generic substation costs per circuit breaker and are intended for order of magnitude comparison only. More accurate cost estimates would require development of preliminary engineering design.

<b>Estimated Construction Costs (Dollars x 1,000)</b>		
	<b>CAI</b>	<b>EKPC</b>
Transmission Lines	31,200	31,600
Substations	<u>10,100</u>	<u>7,100</u>
<b>Total Project 2004 Dollars</b>	<b>41,300</b>	<b>38,700</b>
<b>Escalated to 2008 Dollars</b>	<b>47,400</b>	<b>44,900</b>

CAI and EKPC line costs are comparable. On the basis of CAI's generic cost per circuit breaker, CAI's substation costs are approximately 40% higher than EKPC substation estimates. On the basis of total project, CAI's costs are approximately 7% higher than EKPC estimates. Development of substation design concepts and additional review of substation costs would be needed to bring the CAI and EKPC substation estimates into closer agreement. This effort has not been undertaken at this time.

## **MODELING ASSUMPTIONS AND STUDY SCENARIOS**

### **Power Flow Base Case**

All of the power flow cases are based upon a 2010 summer case from the ECAR 2003 series that was modified to include detailed 69 kV representation of the WRECC, EKPC, and BREC systems. This case was provided to TVA for comment and input into the study.

The WRECC system load, as forecast for 2010 summer, is 447 MW. This load was represented in the case as summarized in Table 2.

### **Short-Circuit and Transient Stability Models**

The short-circuit and transient stability models originated from models prepared by CAI for a previous study of the proposed Thoroughbred generating plant. These models were updated with additional data from EKPC to include a more detailed representation of the EKPC and WRECC service areas.

### **Study Scenarios**

The study was conducted in two phases. In the first effort, the following study scenarios were evaluated. The second phase was based on reviews of the first phase results. The second phase study is discussed in later sections of this report.

Series	Description	Study Case	Sensitivity Cases		
			With Thoroughbred #1	With Thoroughbred #1 & 2	With 7000 MW North-South Transfer Bias
A	Base Case 2010S WRECC Service via TVA	Case A	---	Case A2	Case AT
B	WRECC Service via EKPC	Case B	---	---	---
C	WRECC Service via EKPC with new BREC tie (Wilson to Aberdeen 161 kV)	Case C	Case C1	Case C2	Case CT

#### Case A – 2010 Summer Model with WRECC Service via TVA

The purpose of this case is to establish reference conditions based on the present day supply to WRECC by TVA. As mentioned above, this study is based on the 2010 summer case from the ECAR 2003 series. This case was modified to include detailed 69 kV representation of the WRECC, EKPC, and BREC systems. When the detail WRECC model was added to the case, it was included in the EKPC control area. We then adjusted the interchange schedules between EKPC and TVA to represent the current day situation with TVA supplying the WRECC load. In Cases B and C, described below, we back down TVA generation, adjust the TVA and EKPC interchange schedules, and serve the WRECC load by increasing generation at EKPC JK Smith plant.

Case A includes the following modeling of the TVA and WRECC lines.

1. TVA Aberdeen tap to Aberdeen is closed
2. TVA Bristow tap to Bristow is closed
3. The new Magna substation is served by a new one mile 161 kV line to Bristow
4. The 69 kV transmission between Memphis Junction, Franklin, and East Bowling Green is operated open as follows:
  - a. Woodburn - Anaconda normally open (Switch L26-715)
  - b. E. Franklin - AVL normally open (Switch L30-753)
  - c. Greenwood - Hardcastle normally open (Switch 24-713)
  - d. Auburn - H23 normally open (Switch H26-715)

A one-line diagram of the transmission model in the study area for Case A is provided as Exhibit 3.

#### Case B – 2010 Summer Model with WRECC Service via EKPC

The purpose of Case B is to evaluate the proposed transmission supply to WRECC via EKPC without the new proposed BREC tie. The following lines are modeled in the case:



1. Barren County - Magna 161 kV, 24 miles
2. Magna - Bristow 161 kV, 1 mile
3. Magna - GM 161 kV, 2.5 miles
4. GM - BGMU tap 161 kV, 5 miles
5. Memphis Junction - BGMU tap 161 kV, 8.4 miles
6. Aberdeen - BGMU tap 161 kV, 27 miles

This initial study was conducted with a three terminal line comprised of line sections 4, 5, and 6, as described above. The second phase study, described in the following section, eliminated the three terminal line and replaced it with a GM – Memphis Junction 161 kV line and an Aberdeen – Memphis Junction 161 kV line.

The EKPC generating and transmission capacity was expanded at the J.K. Smith Power Plant as follows:

1. New 268 MW generator plus four 75 MW combustion turbine units connected to the JK Smith 345 kV bus
2. Second JK Smith 580 MVA, 345-138 kV transformer
3. New JK Smith to Tyner 345 kV transmission line
4. New JK Smith to Spencer Road (LGEE) 138 kV transmission line

As explained above, the EKPC and TVA area interchanges were adjusted to properly account for the WRECC load being served via EKPC. Appropriate levels of TVA generators at Johnsonville were turned off to reduce the generation in the TVA system.

The East Bowling Green – GM, 0.15 mile 161 kV line is assumed to be reconducted with 954 ACSS. The proposed Wilson (BREC) – Aberdeen tie line is not included in this case.

The following TVA lines are assumed open:

1. Aberdeen tap - Aberdeen 161 kV
2. Bristow tap - Bristow 161 kV

The TVA-WRECC 161 kV connection at Memphis Junction is assumed to be operated normally closed and in parallel with the new EKPC 161 kV line into Memphis Junction. The 69 kV transmission between Memphis Junction and Franklin is operated closed as follows:

1. Woodburn - Anaconda normally closed
2. Franklin - AVL normally closed
3. Greenwood - Hardcastle normally closed
4. Auburn - H23 normally closed

A one-line diagram of the transmission model in the study area for Case B is provided as Exhibit 4. Note, the one-line diagram was originally drawn with the 161 kV three-terminal line between Aberdeen – Memphis Junction – GM. The diagram has since been modified to show the transmission as two separate lines: Aberdeen – Memphis Junction and Memphis Junction – GM.

### Case C – 2010 Summer Model with EKPC-BREC 161 kV Tie Line

Case C is similar to Case B except an additional 161 kV transmission line is added between BREC Wilson and WRECC Aberdeen 161 kV substations. This tie adds a second source to the Aberdeen substation and creates a new tie line between BREC and EKPC. With this arrangement, the TVA 161 kV tap line to Aberdeen can be retired from service.

A one-line diagram of the transmission model in the study area for Case C is provided as Exhibit 5. Note, the one-line diagram was originally drawn with the 161 kV three-terminal line between Aberdeen – Memphis Junction – GM. The diagram has since been modified to show the transmission as two separate lines: Aberdeen – Memphis Junction and Memphis Junction – GM.

### Case C1 and C2 – 2010 Summer Model with Thoroughbred Energy Center Added

Two cases were developed with the addition of the proposed Thoroughbred Energy Center. Case C1 includes a new 750 MW generating plant connected to the BREC Wilson 345 kV bus. Case C2 includes the same 750 MW plant at Wilson plus another 750 MW plant connected only into the TVA Paradise 500 kV bus. The purpose of these cases is to evaluate the impact of the Thoroughbred Energy Center on the proposed transmission plan to serve WRECC.

The 750 MW of new generation in Case C1 and 1500 MW in Case C2 was dispatched in equal amounts in four directions (north, south, east, and west) to disperse the generation in a neutral manner. The sink systems for the new generation are Southern Company, Allegheny Power, Ameren, and Northern Illinois. The transmission system model is the same as Case C but includes the Thoroughbred generating units and the following additions and modifications:

#### Case C1 – Thoroughbred Unit 1, 750 MW

1. New Thoroughbred generator step-up transformer to 345 kV
2. New Thoroughbred 345 kV station bus
3. Two new Thoroughbred – Wilson 345 kV lines, each 10 miles
4. Interconnection of BREC's existing Wilson – Coleman 345 kV transmission line with LGEE's existing Smith – Hardin Co. 345 kV line at a new switching station called Owensboro.
5. New Wilson (BREC) – Paradise (TVA) 161 kV transmission line, 25 miles.

#### Case C2 – Thoroughbred Units 1 and 2, 1500 MW

1. Thoroughbred Unit 1 and all of the above listed transmission
2. New Thoroughbred generator step-up transformer to 500 kV
3. New Thoroughbred 500 kV station bus
4. One new Thoroughbred – Paradise (TVA) 500 kV line, 8 miles
5. Paradise – Wilson (TVA) 500 kV line, 90 miles

## Case CT – 2010 Summer Model with 7000 MW North to South Transfer

Case CT is similar to Case C (without Thoroughbred) but with a system transfer bias from North to South of 7000 MW. Similarly, Case AT is based on Case A with the same North to South transfer bias. The BREC transmission system, especially the Wilson-Green River transmission line, is sensitive to North to South transfers. The proposed Wilson-Aberdeen 161 kV line may also experience increased loading with North to South transfers across Kentucky. The purpose of these cases was to evaluate change in the sensitivity of the Kentucky transmission in this area to such transfers before and after this project.

The generation source for the transfer was Northern Illinois and the sink was Southern Company.

### **POWER FLOW ANALYSIS – PHASE 1**

#### **Study Contingencies, Monitored Facilities, and Case Comparison**

CAI used the TRANSMISSION 2000<sup>®</sup> Power Flow and Contingency Processor program to automatically perform the power flow analysis and produce summary reports of the results. These reports are included in the Appendices of this report.

Study contingencies were automatically generated to include all transmission lines and transformers in the vicinity of the study area. Approximately 200 contingencies were generated in the following areas:

TVA (area 147)	49 contingencies
LGEE (area 211)	34 contingencies
BREC (area 214)	9 contingencies
EKPC (area 220)	80 contingencies

The detail contingency list is included as one of the Contingency Processor reports in the Appendices. The TVA, LGEE, BREC, and EKPC systems were monitored for overloads and voltage violations.

The TRANSMISSION 2000<sup>®</sup> Contingency Processor Case Compare feature was used to compare contingency results between two cases and provide summary reports. The compare program allows the reviewer to quickly identify differences between two scenarios and, thereby, determine the relative advantages or disadvantages of the two cases. The Case Compare reports are also included in the Appendices and are the primary references for the analysis discussion below.

#### **Case A – 2010 Summer Model with WRECC Service via TVA**

Case A models the WRECC load served from the present day TVA system. The Contingency Processor reports are provided in Appendix A.

### Normal System Observations

The Franklin 161/69 kV transformer is overloaded (109% of 50 MVA normal rating).

### Contingency Observations

The following transmission lines (100 kV and above) exceeded their emergency ratings as follows:

TVA	Bowling Green – Lost City 161 kV	114%
TVA	Paradise – Aberdeen Tap 161 kV,	107%
LGEE	Green River – Ohio Co. #1 138 kV	106%
TVA	Gallatin – Hartsville 161 kV,	105%
LGEE	Ohio Co. – Shrewsbury 138 kV	103%
LGEE	Green River – Ohio Co. #2 138 kV	103%
TVA	Franklin – Portland SS 161 kV	102%
LGEE	Leitchfield – Shrewsbury 138 kV	101%
TVA-EKPC	Summershade – Summershade 161 kV	101%
TVA	Memphis Jct. – S. Bowling Gr. T 161 kV	101%
TVA	Bowling Green – S. Bowling Gr. T 161 kV	100%

Additional overloads are summarized in Table 3.

### **Case B – 2010 Summer Model with WRECC Service via EKPC**

Case B models the WRECC load served from the proposed EKPC system. The Contingency Processor reports are provided in Appendix B.

### Normal System Observations

No significant facilities were noted as overloaded. The Franklin 161/69 kV transformer that was overloaded in Case A is at 83% of rating in Case B.

### Contingency Observations

The following transmission lines (100 kV and above) exceeded their emergency ratings as follows:

TVA	Memphis Jct. – S. Bowling Gr. T 161 kV	127%
TVA	Bowling Green – S. Bowling Gr. T 161 kV	127%
TVA	Bowling Green – Lost City 161 kV	116%
TVA	Paradise – Aberdeen Tap 161 kV,	102%
LGEE	Green River – Ohio Co. #1 138 kV	101%

Additional overloads are summarized in Table 3.

## Case A to B Compare

In Case B, the Franklin 161-69 kV transformer is no longer overloaded for normal peak load conditions but is now overloaded for contingency conditions because the 69 kV network connected to Franklin is closed. The contingencies that cause overloading are summarized below. A possible solution to mitigate this overload is to replace the 50 MVA transformer with a 100 MVA transformer. The transformer is owned by the City of Franklin municipal utility; therefore, the ultimate solution for the transformer overload will need to be jointly developed.

City of Franklin	Franklin 161-69 kV, SE Rating 50 MVA	
	for outage of Memphis Jct – Rockfield 69 kV	111%
	for outage of Plano – Plngrw T 69 kV	107%
	for outage of East Bowling Green TVA - East Bowling Green EKPC 161 kV	106%
	for outage of Memphis Junction - N23a - Weyerhauser 69 kV	104%

The 161 kV lines from Bowling Green - S. Bowling Green Tap - Memphis Junction were at 100% of rating in Case A but load to 127 percent in Case B. The other significant change was the Bowling Green – Lost City 161 kV circuit, which went from 114 percent loading in Case A to 116 percent loading in Case B. The contingencies causing these overloads are:

TVA	Bowling Green-S. Bowling Green Tap-Memphis Junction 161 kV, SE Rating 227 MVA	
	for outage of East Bowling Green (TVA) – EBG (EKPC) 161 kV	127%
TVA	Bowling Green-Lost City 161 kV, SE Rating 180 MVA	
	for outage of Paradise – Bowling Green 161 kV	116%

## East Bowling Green Three Terminal Circuit

Contingency 1020 outages the three terminal circuit connecting the WRECC East Bowling Green (EBG) 161 kV bus into the 161 kV electrical system. With this loss the computer simulation diverges (i.e. - fails to solve) due to the probable collapse of the 69 kV system served by the two 161-69 kV transformers at EBG. Further analysis showed that opening the East Bowling Green 69 kV Breaker serving the Oakland, Park City, Brownsville, and Sweeden Substations (thereby dropping 48 MW of load on this 69 kV circuit) allowed the simulation to solve but showed that the underlying 69 kV system was still in distress with numerous overloads. Opening all of the 69 kV breakers at East Bowling Green (loss of an additional 35 MW of load, for a total of 83 MW lost) solved all of the 69 kV circuit overloads but left the Franklin 161-69 kV transformer overloaded to 110 percent of its summer emergency rating. Finally, by opening the proposed circuit switcher north of Salmons Substation the load on the Franklin transformer was reduced to within its summer emergency capability. This option increased the loading on the Woodburn to Anaconda tap 69 kV circuit to just above its summer emergency rating, 100.5 percent.

In Case A the single contingency loss of service from TVA to the East Bowling Green 161-69 kV transformers resulted in the loss of all 69 kV load which was served radially from the

substation. As a result of networking the 69 kV circuits between East Bowling Green, Memphis Junction, and Franklin a small part of the 69 kV load can be kept in service in Case B (and Case C) that would be lost in Case A when they were fed radially from East Bowling Green.

Based on this analysis EKPC is adding a 161 kV circuit breaker at EBG and, thereby, breaking up the three terminal circuit. This will prevent a single contingency outage from causing loss of both EBG transformers and thereby eliminate the problems described above.

### **Case C – 2010 Summer WRECC via EKPC and BREC Tie In-Service**

Case C models the WRECC load served from the proposed EKPC system as in Case B, except Case C also includes the new BREC – EKPC tie line (i.e., Wilson – Aberdeen 161 kV). The Contingency Processor reports are provided in Appendix C.

#### Normal System Observations

No facilities were noted as being overloaded.

#### Case A to B to C Compare

The Franklin 161/69 kV transformer normal loading for the three cases is summarized below:

*Franklin 161-69 kV Transformer, 50 MVA summer normal rating (SN)*

Case A – 55 MVA, 109% SN

Case B – 42 MVA, 83% SN

Case C – 41 MVA, 82% SN

#### Contingency Observations

Comparison of single contingency overloads on the impacted transmission lines (100 kV and above) for the three cases is summarized below:

*TVA: Bowling Green – S. Bowling Green T – Memphis Junction 161 kV, 227 MVA summer emergency rating*

Case A – 228 MVA, 100% SE

Case B – 289 MVA, 127% SE

Case C – no overload reported

*TVA: Bowling Green – Lost City 161 kV, 180 MVA summer emergency rating*

Case A – 205 MVA, 114% SE

Case B – 209 MVA, 116% SE

Case C – no overload reported

*TVA: Paradise – Aberdeen Tap 161 kV, 350 MVA summer emergency rating*

Case A – 375 MVA, 107% SE

Case B – 355 MVA, 102% SE

Case C – no overload reported

*TVA: Gallatin – Hartsville 161 kV, 371 MVA summer emergency rating*

Case A – 388 MVA, 105% SE

Case B – no overload reported

Case C – no overload reported

*LGEE: Green River – Ohio Co. #1, 138 kV, 171 MVA summer emergency rating*

Case A – 180 MVA, 106% SE

Case B – 172 MVA, 101% SE

Case C – no overload reported

As reported above, the scenario modeled for Case B increased pre-existing overloads on the following two lines:

TVA: Bowling Green – S. Bowling Green T – Memphis Junction 161 kV

TVA: Bowling Green – Lost City 161 kV

However, Case C eliminates these overloads as well as the overloads on the lines listed below:

LGEE: Green River – Ohio Co. #1 138 kV

TVA: Paradise – Aberdeen Tap 161 kV

TVA: Gallatin – Hartsville 161 kV

Both Cases B and C have overloads on the Franklin 161-69 kV transformer.

Based on these initial studies, EKPC has proposed the following additional system improvements:

1. Replace the Franklin 161-69 kV 50 MVA transformer with a 100 MVA unit,
2. Add a 161 kV circuit breaker at EBG to eliminate the three terminal line,
3. Construct two new 161 kV circuits to Memphis Junction: Aberdeen – Memphis Junction and Memphis Junction – GM circuits, rather than the original three-terminal arrangement, and
4. Add three 69 kV switching stations at K30, L28 and Plano-Greenwood-Weyerhaeuser Tap.

### **Cases C1 and C2 – 2010 Summer Model with Thoroughbred Energy Center Added**

As described above, two models were developed to study the proposed Thoroughbred Energy Center. Case C1 includes Thoroughbred Unit #1 (750 MW) connected to the BREC Wilson 345

kV bus. Case C2 includes both Thoroughbred 750 MW generators – Unit #1 connected to the BREC Wilson 345 kV bus, and Unit #2 connected to the TVA Paradise 500 kV bus.

Comparing these cases we found six facilities that were overloaded in either case C1 or C2. All six of these facilities were overloaded to the same level or worse in Case A2. Our conclusion is that these overloads all result from operating the Thoroughbred generating units, and are not worsened by the proposed EKPC plan for serving WRECC.

	Case A			Case C	
	A	A2	C	C1	C2
LGEE: Green River – River Queen Tap 161 kV	104	113	96	112	110
LGEE-EKPC: ETown-Kargle 69 kV	101	107	99	104	101
LGEE-EKPC: Hodgenville-Hodgenville 69 kV	93	108	---	101	99
TVA: Gallatin – Lascass 161 kV	98	103	98	---	103
LGEE: Leitchfield-Millwood 69 kV	113	115	95	100	103
TVA: Huntsville161-69 kV Transformer	120	123	93	115	117

#### Case CT – 2010 Summer Model with 7000 MW North to South Transfer

Case CT is based on Case C (i.e., no Thoroughbred but with the BREC – EKPC tie) and includes a 7000 MW north to south transfer across Kentucky. An additional Case AT models the base case with the same 7000 MW transfer across Kentucky.

Comparing Case CT with Case AT, we identified two lines where Case CT, with the new WRECC/EKPC improvements, showed worse performance under heavy north to south transfer conditions. Both the LGEE Arnold-Delvinta 161 kV line and the EKPC Cooper – Denny 161 kV line are overloaded as shown in the table below.

	Case A		Case C	
	A	AT	C	CT
LGEE: Arnold-Delvinta 161 kV Normal System	---	---	---	137
EKPC: Cooper-Denny 161 kV (Single Contingency)	---	103	---	113

The Arnold – Delvinta 161 kV line is a normal system overload in the transfer case. The Cooper – Denny 161 kV overload is a result of the outage of the Wolf Creek – Wayne Co. 161 kV line. Although they were identified in this study, these overloads are not tied to EKPC’s transmission plan to serve WRECC. These overloads are due to the underlying generation and transmission assumptions made on the EKPC system. Case C includes additional generation at JK Smith and a new JK Smith – Tyner 345 kV line. This line provides additional power flow to the south of the JK Smith plant. Both of the above overloads are impacted by the additional generation at JK Smith and the new 345 kV line to Tyner. These facilities are far removed from the WRECC service area both electrically and geographically. These overloads will need to be studied and evaluated as part of the generation and transmission expansion plan in the JK Smith area.



## POWER FLOW ANALYSIS – PHASE 2

### Base Case Changes to Cases A and C

The Phase 1 power flow results were reviewed by EKPC and comments were received from LGEE. Phase 2 power flow studies were conducted using Cases A and C. The following changes were made to the 2010 Summer models for Cases A and C:

1. The Memphis Junction – Aberdeen – GM three-terminal line was replaced with a Memphis Junction – Aberdeen 161 kV circuit and a Memphis Junction – GM 161 kV circuit.
2. A 161 kV circuit breaker was assumed at EKPC East Bowling Green (EBG), thereby eliminating the three-terminal line between TVA East Bowling Green, EKPC EBG, and GM. This did not change the base power flow model. However, it did eliminate a single contingency causing loss of the entire EBG station.
3. The LGEE Green River Units #1 and #2 were assumed retired and removed from the cases. The 44 MW of power was redispached to the LGEE Brown plant (27021 11BRWNCT). This reduced the generation on the western side of the WRECC system and increased it on the east side.
4. Contingencies were added in the LGEE Louisville area to better test the transmission system in this area. The complete contingency lists used for Phase 2 studies of Cases A and C are included in Appendices G and L, respectively.
5. The following contingencies that were generator step-up transformers, or that islanded part of the system, were removed as follows:  
  
GSU = Contingency No. 10, 12, 15, 17, 137, 140, 142, 275  
Island Network = 45
6. The following rating was changed so facility overloads are not reported frequently for many contingencies:
  - a. Kosmos-Mill Creek 138 kV from 72 to 100 MVA

### Cases AS1 and CS1 – Trimble Unit 2 Not In Service

LGEE noted that the Trimble #2 unit would not be in-service until 2010, whereas the WRECC service via EKPC is scheduled for 2008. A special case was set up with the Trimble #2 unit and its associated transmission removed from Cases A and C. The new cases without Trimble are identified as Cases AS1 and CS1, respectively. The following generation changes were made in conjunction with the removal of Trimble Unit 2:

1. Removed Trimble #2, 732 MW (Bus # 27447)

2. Increased dispatch of Trimble Units 5 – 10 by 155 MW (Bus #27447)  
Net generation change on Bus 27447 is -577 MW
3. Increased dispatch of Brown CT Units 5 – 11, by 430 MW (Bus 27021)
4. LGEE area interchange adjusted by -182 MW and AEP and Cinergy area interchange adjusted by +91 MW each to reflect other parties' ownership in Trimble #2.

The following transmission changes were made in conjunction with removal of Trimble #2:

1. Removed Ghent – Trimble 345 kV (27152-26473)
2. Removed Speed – Trimble 345 kV (25388-26473)
3. Removed Mill Creek – Hardin Co. 345 kV (27280-27178)
4. Removed Tyrone – West Frankfort 138 kV (27450-27461)
5. Removed Higby Mill – West Lexington 138 kV (27188-27467)
6. Added Ghent – Speed 345 kV  
(27152, 25388, 1, 0.0025+j0.0370, 0.4700, SN=598, SE=896)
7. Change Blue Lick – Bullitt County 161 kV (27002-29235) SE=235
8. Change Etown – Hardin Co. 138 kV  
(27114, 27179, 1, 0.0009+j0.0085, 0.0014, SN=202, SE=248)
9. Change Ghent – Owen County Tap 138 kV  
(27153, 27314, 1, 0.0085+j0.0497, 0.0136, SN=224, SE=277)

Comparison of loads, losses, interchange, and generation for Cases A, AS1, C, and CS1 are provided in Tables 5, 6, and 7, respectively.

#### **Cases AS2 and CS2 – TVA Paradise Unit #1 Outage**

These cases are based on Cases A and C, respectively, but with the Paradise Unit #1 outage. A description of the generator outage and dispatch used to replace the outaged unit are listed below:

##### **Outage of TVA Paradise #1**

18259 F1H PARA	344 MW
18260 F1L PARA	297 MW

Total Outage 641 MW

##### **Dispatched TRACTBL Choctaw Plant**

19872 1CHOCTW1	214 MW
18873 1CHOCTW2	214 MW
19874 1CHOCTTS1	214 MW

#### **Cases AS3 and CS3 – BREC Wilson Unit Outage**

These cases are based on Cases A and C, respectively, but with the BREC Wilson Unit outage. Since BREC did not have enough generation to cover the outage, the replacement power was dispatched from TVA, LGEE, and AEP as listed below:

Outage of BREC  
4209 WILSON 420 MW

Dispatch TVA +100 MW  
18214-18223 JVIL 100 MW

Dispatch LGEE +150 MW  
27018 11BRWN N 150 MW

Dispatch AEP +170 MW  
24649 05WOLF 100 MW  
24650 05WOLF 70 MW

### Cases AS4 and CS4 – LGEE Brown Unit #3 Outage

These cases are based on Cases A and C, respectively, but with the LGEE Brown #3 Unit outage. The generation was dispatched as follows:

Outage of LGEE  
27019 11BRWN P 429 MW

Dispatch AEP +429 MW  
22688 05BECNTR 429 MW

### Power Flow Analysis – Phase 2 Case A versus Case C

The power flow results for the Phase 2 studies are provided in Appendices G through P. A summary is provided as Tables 4a, 4b and 4c.

The tables show that Case C (WRECC service via EKPC) outperforms Case A (WRECC service via TVA) in almost all circumstances. The following overloads did increase in Case C over Case A and are listed below for discussion purposes:

#### LGEE Kosmos – Mill Creek 138 kV

Kosmos – Mill Creek 138 kV (This is the circuit that overloaded in almost all the contingencies and therefore its rating was artificially increased from 72 MVA to 100 MVA). The heaviest overload was 114 percent in Case CS1.

#### LGEE Hardin Co. 345-138 kV Transformer

The LGEE Hardin Co. 345-138 kV transformer overloaded for generator outage contingencies AS2, AS3 and AS4 and CS2, CS3 and CS4. The heaviest overload was 106 percent in Case CS3.

### LGEE Bonnieville 138-69 kV Transformer

The LGEE Bonnieville 138-69 kV transformer overloaded in all cases. The heaviest overload was Case CS1 at 120 percent. In most other cases it was at 114 percent.

### LGEE Hardin Co 138-69 kV Transformers

LGEE Hardin Co 138-69 kV transformers #1 and #2 overloaded in almost all cases. The heaviest overload on #2 was 117% in Case.CS1. In other cases, overloads were between 101 and 106 percent.

### **Loss Comparison Case A and Case C**

A comparison of system losses is provided as Table 6 and summarized below. The base case losses are 50 MW less in Case C versus Case A. The largest loss reductions are in TVA and LGEE.

<b>Comparison of Transmission System Losses - MW</b>			
<b>System</b>	<b>Case A Losses</b>	<b>Case C Losses</b>	<b>Difference C-A</b>
TVA (147)	703	679	-24
LGEE (211)	210	191	-19
BREC (214)	21	19	-2
EKPC (220)	<u>108</u>	<u>102</u>	<u>-6</u>
<b>Total</b>	<b>1042</b>	<b>991</b>	<b>-50</b>

### **Power Flow Analysis for Case D – Phase 2**

Case D is an alternative interconnection to BREC via tapping the Paradise (TVA) – New Hardinsburg 161 kV transmission line and extending a new 161 kV circuit from the tap to Aberdeen in place of the Wilson – Aberdeen 161 kV circuit. The advantage of this alternative is that it requires fewer miles of new 161 kV transmission (12 miles from Aberdeen to the Paradise-New Hardinsburg line versus 25 miles from Aberdeen to Wilson). A disadvantage is that it requires a new switching station to be constructed on the Paradise – New Hardinsburg 161 kV line.

A series of power flow models was established with this alternative interconnection, as follows:

- Case D – same as Case C except with the alternative interconnection
- Case DS1 – Case D with Trimble #2 not constructed (same as Case CS1)
- Case DS2 – Case D with outage of Paradise Generation (same as Case CS2)
- Case DS3 – Case D with outage of the Wilson Unit (same as Case CS3)
- Case DS4 – Case D with outage of the Brown Unit (same as Case CS4).

The results of the study are provided in Appendices Q through U. Comparisons of the Case D results with the corresponding Case C results are provided in Tables 5a, 5b, and 5c. Most of the Case D and C results are similar with the following notable exceptions:

### **Newtonville – Cloverport 138 kV**

The SIGE Newtonville – LGEE Cloverport 138 kV circuit overloads for the outage of the Wilson – Green River 161 kV circuit in Case D (and also Case A), whereas it does not overload in Case C. The ratings of this circuit in the 2010 Summer cases are 143 MVA for both normal and emergency. We understand that this line has been rebuilt and terminal facilities upgraded. The new summer ratings per the latest NERC MMWG power flow series are 239/275 MVA. With the corrected ratings, the line would not be overloaded in any of the cases.

### **TVA Gallatin – Hartsville – Lafayette 161 kV**

The TVA Gallatin – Hartsville – Lafayette 161 kV circuit is more heavily loaded in Cases D and A (112 percent) than in Case C (106 percent). These circuits are overloaded for outage of either the E. Gallatin – Fountain 161 kV circuit or the Fountain – Portland SS 161 kV circuit.

### **Additional Testing with 7000 MW Transfer Bias**

BREC reviewed the study results above and noted that the system limitations often show up with north to south system transfers and with outages of the Paradise generating units. Therefore, additional power flow testing was conducted to test the two plans with a 7000 MW system transfer from Northern Illinois to Southern Companies. An additional generation outage case was run with both Paradise units outaged. The additional cases are listed below:

Case CS5 – Case C with outage of both Paradise Generating Units at 161 kV

Case DS5 – Case D with outage of both Paradise Generating Units (same as Case CS5)

Case CTS1 – Case C with Trimble #2 not constructed and 7000 MW N-S Transfer

Case CTS2 – Case C with outage of Paradise Generation and 7000 MW N-S Transfer

Case CTS3 – Case C with outage of the Wilson Unit and 7000 MW N-S Transfer

Case CTS4 – Case C with outage of the Brown Unit and 7000 MW N-S Transfer

Case CTS5 – Case C with outage of both Paradise Generating Units and 7000 MW N-S Transfer

Case DTS1 – Case D with Trimble #2 not constructed and 7000 MW N-S Transfer

Case DTS2 – Case D with outage of Paradise Generation and 7000 MW N-S Transfer

Case DTS3 – Case D with outage of the Wilson Unit and 7000 MW N-S Transfer

Case DTS4 – Case D with outage of the Brown Unit and 7000 MW N-S Transfer

Case DTS5 – Case D with outage of both Paradise Generating Units and 7000 MW N-S Transfer

The results of the study are provided in Appendices V through GG. Comparisons of the Case DT results with the corresponding Case CT results are provided in Tables 5d through 5h and summarized on Table 5i.

The results presented in the summary tables are the highest percent loading over the emergency rating that was reported for a single contingency outage of a line or transformer in conjunction

with the generator being off-line and redispatched. The following conclusions are based on the summary provided as Table 5i.

1. There are trade-offs between the two alternative plans. Some overloads that show up under Plan D do not show up under Plan C and vice versa. To get the results to manageable size, we summarized the results for only overloads on lines and transformers 138 kV and above. We also eliminated overloaded facilities that were overloaded in both the C and D cases if the overload results were within 2.5 percent. This resulted in 15 high voltage facilities that were more heavily overloaded in Case D compared with 9 facilities more heavily overloaded under Plan C. One of the Case D overloaded facilities (Newtonville – Cloverport 138 kV) is not overloaded with the circuit rating adjusted to the correct value.
2. The following facilities showed up as overloaded under one or more generator outages for Plan D that were not overloaded in Plan C:
  - a. Hopkins County – Reid 161 kV loaded to 101-112 percent in Cases DTS1, 2, 4 and 5
  - b. Princ – Cadiz 161 kV loaded to 105 percent in Case DTS5
  - c. River Queen Tap – Earlington North 161 kV loaded to 100 percent in Case DTS2 and 104 percent in Case DTS5
  - d. Mercer County – Danville North 138 kV loaded to about 101 percent in Cases DTS1 and 5
3. The following facilities showed up as overloaded in both Plan C and Plan D but was more heavily loaded in Plan D by 10 percent or more:
  - a. Newtonville – Cloverport 138 kV loaded to 162 percent in Plan D versus 114 percent in Plan C. This is based on the case rating of 143 MVA. As discussed above, this circuit will be rated at 275 MVA emergency rating. Adjusting for the new rating, the loadings become 84 percent and 59 percent respectively.
  - b. New Hardinsburg 161-138 kV transformer loaded to 141 percent in Plan D versus 122 percent in Plan C for Case TS5 only (outage of both Paradise 161 kV generators and 7000 MW N-S transfer).
  - c. Bonnierville 138-69 kV transformer loaded to 122 percent in Plan D versus 111 percent in Plan D for Case TS5 only (outage of both Paradise 161 kV generators and 7000 MW N-S transfer).
4. The Paddys Run 161-138 kV transformers #1 and #2 were overloaded in all five generator outage cases. Plan D cases were 6 percent worse off than the Plan C cases.
5. The following facilities that were not overloaded in Plan D showed up as overloaded under one or more generator outages for Plan C:

- a. Hardin County 138-69 kV transformers #1 and #2 loaded to 107 percent and 121 percent, respectively, and the Rogersville 138-69 kV transformer loaded to 101% percent for Case CTS1 (Trimble #2 not built). These overloads did not show up in the corresponding Case DTS1, and were not noted in any other cases. Evidently, the Trimble #2 transmission included in the other cases mitigated the overload conditions.
  - b. Cooper – Denny 161 kV line and Etown 138-69 kV transformer were loaded 115 percent and 100 percent in Case CTS3 only (outage of BREC Wilson generating unit). These overloads were not noted in any Plan D studies.
  - c. The Coleman – Newtonville 161 kV line loaded to 104 percent and 102 percent in Plan C, Cases CTS3 and CTS5, respectively. This circuit was not overloaded in any Plan D cases.
6. The Henderson 138-161 kV transformer was overloaded in all five generator outage cases for Plan C and three of five in Plan D. The Plan C cases had loadings that were 6 percent higher than the Plan D cases.

In conclusion, the power flow testing indicates that either Plan C or Plan D will provide adequate transmission for EKPC to serve the WRECC load. Plan D would cost about \$3.8M (2008\$) less than Plan C. On the other hand, the studies indicate that more transmission facilities in the region could be overloaded during certain periods if Plan D is adopted. Plan C presently remains the proposed plan. EKPC and BREC will continue to explore the advantages and disadvantages of the two interconnection alternatives. If it is determined that the advantages of constructing the 161 kV line from Aberdeen to Wilson do not outweigh the additional costs, the plan can be modified to construct only to the Paradise-New Hardinsburg 161 kV line.

## SHORT-CIRCUIT STUDY RESULTS

The short-circuit and transient stability models originated from models prepared by CAI for a previous study of the proposed Thoroughbred generating plant. These models were updated with additional data from EKPC to include a more detailed representation of the EKPC and WRECC service areas.

A short circuit study was conducted by constructing short circuit models representing Cases A, B, C, and C2. The short-circuit model originated from models prepared by CAI for a previous study of the proposed Thoroughbred generating plant. These models were updated with additional data from EKPC to include a more detailed representation of the EKPC and WRECC service areas.

The short circuit study was performed by simulating faults on transmission facilities in the vicinity of the WRECC system and determining the resulting fault current levels. The short circuits applied to this model include both three phase and single line to ground faults. A

summary identifying the fault current levels is shown in Table 4. Table 5 shows percent changes in the short circuit results compared to Case A.

These results were reviewed by EKPC. EKPC concluded that there were no EKPC or WRECC facilities that needed to be upgraded based on the expected fault current levels.

## **TRANSIENT STABILITY STUDY**

Transient stability is a study conducted to investigate the dynamic response of generators due to a fault or some other type of system disturbance near a generator. The transient stability model used in this study originated from models prepared by CAI for a previous study of the proposed Thoroughbred generating plant. This model was updated with additional data from EKPC to include a more detailed representation of the EKPC and WRECC service areas. The stability model origin was the 2003 Summer - 2001 Series, NERC/MMWG Base Case Library.

Transient stability models are constructed using generator dynamics parameters. The generator dynamics data is used together with the power flow program to arrive at a solution. Transient stability models were constructed for both Case A2 and Case C2. The transient stability summary results are shown in Exhibit 6. Only a fault at the Wilson 345 kV bus was studied. No instabilities were identified for primary clearing. It is expected that TVA will independently study the stability response of its generator units, so TVA units were not studied here.

We identified the critical clearing time required for the protection system to clear the disturbance from the system. Faults that are not cleared from the transmission system before the critical clearing time will cause the generator to become unstable and eventually tripped off line. The charts in Exhibit 6 show the critical clearing times for the Wilson generator for both Cases A2 and C2.

For the Case A2 and C2 models, Figures 6-1 and 6-3 show stable responses for several generators due to a 345 kV fault at Wilson, which was cleared before reaching the critical clearing time. These figures show a stable response at the critical clearing time of 12 cycles for both Case A2 and C2. Similarly, Figures 6-2 and 6-4 show that beyond the twelve-cycle critical clearing time an unstable response occurs with a 13 cycle clearing time for the same 345 kV fault at Wilson.

The study indicates that the proposed new facilities do not degrade the local area stability.



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**TABLE 1**  
**East Kentucky Power Cooperative**  
**WRECC Transmission System Upgrades**  
**Conceptual Cost Estimates**

954 kcmil 54/7 Cardinal, ACSS except as noted Single pole structures Costs are based on 500 ft. average span lengths		CAI Costs (\$2004)		EKPC Cost Estimates	
	Miles	Cost Per Mile	Total Line Cost	EKPC Cost (2004\$)	EKPC Cost (2008\$)
<b>New Lines</b>					
1. Barren County - Magna 161 kV on new R/W	24.00	322,000	7,728,000	7,800,000	9,052,000
2. Magna - Bristow 161 kV on new R/W, ACSR	1.00	338,000	338,000	325,000	377,000
3. Magna - General Motors 161 kV on new R/W	2.50	338,000	845,000	875,000	1,015,000
4. General Motors - BGMU Tap 161 kV on new & old R/W	5.00	338,000	1,690,000	1,625,000	1,886,000
5. Memphis Junction - BGMU 161 kV D/C on new & old R/W	8.40	527,000	4,427,000	3,570,000	4,143,000
6a. Aberdeen - BGMU 161 kV D/C on new R/W	5.00	527,000	2,635,000	2,125,000	2,466,000
6b. Aberdeen - BGMU 161 kV rebuild	22.00	250,000	5,500,000	7,150,000	8,297,000
7. Wilson - Aberdeen 161 kV on new R/W	25.00	322,000	8,050,000	8,125,000	9,429,000
<b>Subtotal New Lines</b>			<b>31,213,000</b>	<b>31,595,000</b>	<b>36,665,000</b>
<b>Re-conductor or Re-rate</b>					
8. E. Bowling Green - GM 161 kV re-conductor only	0.15	81,000	12,000	12,000	14,000
9. Summersshade-Barren County 161 kV, Upgrade 212 F	20.14	<b>Note 1.</b>	17,000	17,000	18,000
<b>Subtotal Re-Conductor or Re-rate Lines</b>			<b>29,000</b>	<b>29,000</b>	<b>32,000</b>
<b>Subtotal New and Rebuilt Lines</b>			<b>31,242,000</b>	<b>31,624,000</b>	<b>36,697,000</b>
<b>161 or 69 kV Substations</b>					
11. Magna 2-161 kV CB, Line Exits and Relays	2	450,000	900,000	618,000	717,000
12. GM 3-161 kV CB, Line Exits and Relays	3	450,000	1,350,000	869,000	1,008,000
13. Memphis Jct. 4-161 kV CB, Line Exits and Relays	4	450,000	1,800,000	1,112,000	1,290,000
14. Aberdeen 2-161 kV CB, Line Exits and Relays	2	450,000	900,000	618,000	717,000
15. East Bowling Green 1-161 kV CB and Relays	1	350,000	350,000	313,000	363,000
16. Barren County 2-161 kV CB, Line Exits and Relays	2	450,000	900,000	715,000	830,000
17. Wilson 1-161 kV CB, Line Exit and Relays	1	450,000	450,000	251,000	291,000
18. Franklin 100 MVA, 161-69 kV Transformer Change Out	1	750,000	750,000	727,000	844,000
19. K30 3-69 kV CB, Line Exits and Relays	3	300,000	900,000	612,000	710,000
20. L28 3-69 kV CB, Line Exits and Relays	3	300,000	900,000	612,000	710,000
21. Pln-Grwd-Wybrn 3-69 kV CB, Line Exits and Relays	3	300,000	900,000	612,000	710,000
<b>Subtotal Substations</b>			<b>10,100,000</b>	<b>7,059,000</b>	<b>8,190,000</b>
<b>Total Project - 2004 Dollars</b>			<b>41,342,000</b>	<b>38,683,000</b>	<b>44,887,000</b>
<b>Total Project - 2008 Dollars</b>			<b>5.3%</b>	<b>1.148</b>	<b>47,441,000</b>

Notes

1. Based on EKPC estimate

**TABLE 2**  
**WREC Loads - 2010 Summer**

Bus Number	Bus Name	Substation	Source	Base kV	Load P(MW)	Load Q(MVAr)	Shunts Q(MVAr)
63	21-ABD	Aberdeen	Aberdeen	161	16.300	3.000	
29643	21-ABD	Aberdeen	Aberdeen	69	0.000	0.000	
29627	07-MTN	Morgantown	Aberdeen	69	8.674	4.511	
29649	27-PER	Perdue	Aberdeen	69	7.772	2.785	
29634	13-PRN	Prentiss	Aberdeen	69	6.112	1.690	
29655	32-SMT	S. Morgantown	Aberdeen	69	16.066	6.258	
			Subtotal		54.924	18.244	
93	28-BRI	Bristow	Bristow	161	17.400	6.800	
94	MAGNA	Magna	Bristow	161	16.600	5.500	
			Subtotal		34.000	12.300	
29632	11-BRN	Brownsville	E. Bowling Green	69	17.007	6.433	8.16
62	05-EBG	E Bowling Green	E. Bowling Green	161	23.400	7.000	
29625	05-EBG	E Bowling Green	E. Bowling Green	69	11.013	3.708	
91	22-GMC	General Motors	E. Bowling Green	161	16.200	10.400	
29623	04-HRD	Hardcastle	E. Bowling Green	69	12.753	4.254	
29626	06-OAK	Oakland	E. Bowling Green	69	16.558	5.199	
29640	19-PRK	Park City	E. Bowling Green	69	4.314	0.772	
29635	14-WBG	West BG	E. Bowling Green	69	12.862	5.838	
29628	08-SWD		E. Bowling Green	69	9.868	3.274	
29637	16-RVL		E. Bowling Green	69	12.098	3.904	
			Subtotal		136.073	50.782	
78	ANACONDA	Anaconda	Franklin	69	3.337	0.181	
72	02-AUB	Auburn	Franklin	69	10.637	0.404	
84	01-FKN	Franklin	Franklin	69	15.119	0.682	12.25
79	25-SAL	Salmons	Franklin	69	11.988	0.500	
83	20-SFN	South Franklin	Franklin	69	11.581	0.572	
			Subtotal		52.662	2.339	
67	30-BEE	Bee Springs	Leitchfield	69	5.68	1.416	9.184
98	12-CAN	Caneyville	Leitchfield	69	8.676	2.565	
70	15-ELF	E. Leitchfield	Leitchfield	69	9.158	3.162	
71	31-NLF	N. Leitchfield	Leitchfield	69	13.081	5.029	
97	34-PEO	Peonia	Leitchfield	69	6.372	1.836	13.78
99	10-ROS	Rosine	Leitchfield	69	8.137	2.907	
69	09-WLF	W. Leitchfield	Leitchfield	69	12.188	2.955	
			Subtotal		63.292	19.87	
87	24-GRW	Greenwood	Memphis Jct	69	20.509	7.516	
85	18-PLN	Plano	Memphis Jct	69	10.920	3.454	
76	17-RFD	Rockfield	Memphis Jct	69	13.866	4.424	
75	26-SIP	S. Industrial Park	Memphis Jct	69	36.274	11.453	
88	23-WEY	Weyerhauser	Memphis Jct	69	12.583	5.175	
77	03-WBN	Woodburn	Memphis Jct	69	3.035	1.467	
92	35-AVL		Memphis Jct	69	9.318	3.297	
			Subtotal		106.505	36.786	
			Total		447.456	140.321	43.373

**TABLE 3**  
**Contingency Overload Comparison - Initial Study**  
**(percent of emergency rating values)**

	Emerg Rating MVA	Case A	Case B	Case C
<b><u>161 &amp; 138 kV Transmission</u></b>				
TVA: Bowling Green - Lost City 161 kV	180	114	116	97
TVA: Paradise - Aberdeen Tap 161 kV	350	107	102	n/a
LGEE: Green River - Ohio Co. #1 138 kV	171	106	101	91
LGEE: Green River - Ohio Co. #2 138 kV	171	103	98	n/a
TVA: Gallatin - Hartsville 161 kV	371	105	98	n/a
TVA: Franklin - Portland SS 161 kV	227	102	n/a	n/a
LGEE: Ohio Co. - Shrewsbury 138 kV	171	103	98	n/a
LGEE: Leitchfield - Shrewsbury 138 kV	96	101	100	96
TVA-EKPC: Summershade 161 kV	239	101	n/a	n/a
TVA: Memphis Jct - S. Bowling Gr. T 161 kV	227	101	127	n/a
TVA: Bowling Green - S Bowling Gr. T 161 kV	227	100	127	n/a
LGEE: Kosmos - Mill Ck 138 kV	72	96	99	101
<b><u>161 &amp; 138 Transformers</u></b>				
TVA: Huntsville 161-69 kV transfmr	50	120	94	n/a
EKPC: Bonnierville 138-69 kV transfmr	59	115	115	115
TVA-EKPC: Franklin 161-69 kV transfmr	50	109	111	110
LGEE: Leitchfield 138-69 kV transfmr	86	114	112	108
EKPC-LGEE: Taylor County 161-69 kV transfmr	72	100	99	101
LGEE: Ohio Co. 138-69 kV transfmr	86	100	97	91
<b><u>69 kV Transmission</u></b>				
LGEE: Leitchfield - Millwood 69 kV	52	113	107	95
LGEE: Green River - River Queen Tap 69 kV	54	104	110	96
LGEE: Greenville West - River Queen 69 kV	49	103	102	101
LGEE: Caneyville Jct Rosine Jct 69 kV	68	103	98	n/a
LGEE: Echols - Indian Hill 69 kV	56	102	99	93
LGEE: KU Park - Pineville 69 kV	80	101	n/a	n/a
LGEE: Etown - Kargle 69 kV	69	101	99	99
EKPC: Salmon - K30 69 kV	30	n/a	117	117
EKPC: K30 - L30 69 kV	42	n/a	114	114
LGEE: Indian Hill - Peabody West 69 kV	27	99	101	102
LGEE-EKPC: Eastview - Stephensburg 69 kV	41	93	96	102

n/a - below 90% not reported

**TABLE 4a**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 161 and 138 kV Transmission Line Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	kV	Emerg	Case A is Service to WRECC via TVA				Case C is Service to WRECC via EKPC				
							Case A	Case AS1	Case AS2	Case AS3	Case AS4	Case C	Case CS1	Case CS2	Case CS3
18012	18926	1	5PARADIS	5ABERD T	161	350	107.0	105.7	104.8	107.9					
18027	18713	1	5SUMMER	5LAFAYET	161	206				103.1					
18027	29539	1	5SUMMER	20SSHADT	161	239	101.9	101.9	102.5	108.5					
18416	18928	1	5MEMJUNC	5SBOWL T	161	227	100.6	100.7	100.7	100.6				100.7	
18682	19509	1	5EGALLAT	5HOEGANT	161	371			105.5						
18691	18880	1	5BOWL GR	5LOSTCTY	161	180	113.6	112.4	111.2	115.1					101.6
18691	18928	1	5BOWL GR	5SBOWL T	161	227	100.2	100.2	100.3	100.2					101.0
18695	18796	1	5FRNK KY	5SPORT SS	161	227	102.3	102.3	102.3	102.2					
18710	19509	1	5GALTN P	5HOEGANT	161	371			106.3						
18711	19154	1	5GALLATI	5HARTSVI	161	371	104.2	104.3	126.7	107.2			106.7		
18713	19154	1	5LAFAYET	5HARTSVI	161	371			116.8						
26855	27055	1	10NTVL13	11CLVRPR	138	143	111.7	122.1	120.2	116.3					
27061	27062	1	11CN RN6	11CNE RN	138	287	111.6	118.6	110.8	110.4			111.2	118.0	110.5
27158	27317	1	11GR RVR	11OHIO C	138	171	103.5	103.6	102.8	107.3					
27158	27317	2	11GR RVR	11OHIO C	138	171	101.1	101.2	100.4	104.8					
27219	27281	1	11KOSMOS	11MIL CK	138	100	107.3	107.3	100.3	102.6			114.2	107.8	109.3
27237	27412	1	11LEITCH	11SHREWS	138	96				100.1			100.8		
27317	27412	1	11OHIO C	11SHREWS	138	171	104.3			103.1					

**TABLE 4b**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 345, 161 and 138 kV Transformer Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	kV	Emerg	Case A is Service to WRECC via TVA				Case C is Service to WRECC via EKPC				
							Case AS1	Case AS2	Case AS3	Case AS4	Case C	Case CS1	Case CS2	Case CS3	Case CS4
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	109.0	109.0	109.0	109.0	111.3	111.6	120.5	113.5	112.1
18806	19278	1	5HUNT TN	2HUNTSVI	161-69	50	120.0	119.6	119.1	121.5	114.6	114.2	114.2	113.6	116.0
27006	29220	1	11BONNIE	20BONNIE	138-69	59	114.4	119.7	113.7	114.3	114.5	120.7	114.2	113.0	114.3
27157	27158	1	11GR RV	11GR RVR	161-138	120	103.9	103.9	100.1	100.1					
27157	27158	2	11GR RV	11GR RVR	161-138	120	104.1	103.0	100.3	100.3					
27178	27179	1	11HARDN	11HARDN	345-138	370		103.0	103.9	100.3			104.9	106.2	101.6
27179	27180	1	11HARDN	11HARDN	138-69	171	101.5	101.4	102.0	104.7		102.7	100.3	102.0	103.0
27179	27180	2	11HARDN	11HARDN	138-69	138	104.4	104.3	104.9	107.7	102.7	116.5	103.1	104.9	105.9
27237	27238	1	11LEITCH	11LEITCH	138-69	86	111.9	111.3	105.2	112.9	106.7	113.4	105.5		107.8
27317	27318	1	11OHIO C	11OHIO C	138-69	86	101.6	102.1	101.2	103.9					
27384	27385	1	11ROGERS	11ROGERS	138-69	107	102.5	102.4	102.5	104.5	101.3		101.4	102.2	103.3
29226	27009	1	20BOONSB	11BOONSB	138-69	143	114.9	114.7	114.8	114.0					
29542	27437	1	20TAYLOR	11TAYLRC	161-69	72	100.2	101.6	100.2	102.3	100.4	103.0		100.2	102.5

**TABLE 4c**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 69 kV Transmission Line Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	KV	Emerg	Case A is Service to WRECC via TVA				Case C is Service to WRECC via EKPC				
							Case AS1	Case AS2	Case AS3	Case AS4	Case CS1	Case CS2	Case CS3	Case CS4	
18053	27222	1	2KYHYNO1	11KY DAM	69	45	103.3	107.0	101.9	100.9	105.0	103.1	102.1	103.1	101.4
19325	19358	1	2RADNOR	2BATTLEFD	69	139		104.3							
27102	29528	1	11EASTVW	20STEPHN	69	41			107.9			106.4	100.7	108.0	126.4
27103	27413	1	11EASTWO	11SIMPMS	69	57	102.3	100.9			107.7				
27115	29374	1	11ETOWN	20KARGLE	69	69	101.4	102.8	105.6		102.2			104.5	100.5
27116	27371	1	11ETWN 2	11RADCL	69	52	107.4	107.3	107.1		107.8			107.0	107.5
27168	27377	1	11GRNV W	11RIVR Q	69	49	104.6	105.1	104.5		105.3			102.7	101.1
27207	27337	1	11INDIAN	11PBODYW	69	27									103.0
27220	27346	1	11KUPK	11PINEVI	69	80	101.0	100.3	102.2		104.1				
27224	27225	1	11LAGR E	11LAGR P	69	56					103.9				100.0
27238	27286	1	11LEITCH	11MILLWO	69	52	108.3	109.7	107.3		112.9				
27397	29504	1	11SC TAP	20SHLBYC	69	72		102.7	100.7					102.4	
27410	27411	1	11SHLB S	11SHLBYV	69	49	105.6	119.7	111.7		110.1			120.9	106.3
27510	27514	1	11CANYVJ	11ROSI J	69	68			106.5		102.8			103.0	107.2

**TABLE 5a**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 161 and 138 kV Transmission Line Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	kV	Emerg	Case C Includes BREC Wilson - Aberdeen			Case D Includes Tap on Paradise - New Hardinsb.									
							Case C1	Case CS2	Case CS3	Case CS4	Case D	Case DS1	Case DS2	Case DS3	Case DS4				
18416	18928	1	5MEMJUNC	5SBOWL T	161	227		100.7											
18691	18880	1	5BOWL GR	5LOSTCTY	161	180		101.6											
18691	18928	1	5BOWL GR	5SBOWL T	161	227		101											
18711	19154	1	5GALLATI	5HARTSVI	161	371		106.7							111.8				
18713	19154	1	5LAFAYET	5HARTSVI	161	371									103.1				
26855	27055	1	10NTVL13	11CLVRPR	138	143									121.6			118.3	
27061	27062	1	11CN RN6	11CNE RN	138	287		111.2	118	110.4	110.5	110	111.3	113.6	118	121.9	110.7	110.4	
27158	27317	1	11GR RVR	11OHIO C	138	171													110.1
27219	27281	1	11KOSMOS	11MIL CK	138	100		114.2	107.8	109.3				115.5	107.1	111.1			101.5
27237	27412	1	11LEITCH	11SHREWS	138	96		100.8						102.7					



**TABLE 5b**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 345, 161 and 138 kV Transformer Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	kV	Emerg	Case C Includes BREC Wilson - Aberdeen			Case D Includes Tap on Paradise - New Hardinsb.						
							Case C	Case CS1	Case CS2	Case CS3	Case CS4	Case D	Case DS1	Case DS2	Case DS3	Case DS4
18695	90 1	5FRNK KY	5FRNK KY	5FRNK KY	161-69	50	111.3	111.6	120.5	113.5	112.1	112.6	112.8	122.4	113.5	113.3
18806	19278 1	5HUNT TN	2HUNTSVI	2HUNTSVI	161-69	50	114.6	114.2	114.2	113.6	116.0	114.2	113.8	113.7	113.4	115.6
27006	29220 1	11BONNIE	20BONNIE	20BONNIE	138-69	59	114.5	120.7	114.2	113.0	114.3	114.9	119.8	114.6	113.3	114.7
27178	27179 1	11HARDN	11HARDN	11HARDN	345-138	370		104.9	104.9	106.2	101.6	100.2		105.0	106.9	102.1
27179	27180 1	11HARDN	11HARDN	11HARDN	138-69	171		102.7	100.3	102.0	103.0			102.4	101.2	102.2
27179	27180 2	11HARDN	11HARDN	11HARDN	138-69	138	102.7	116.5	103.1	104.9	105.9	102.0		102.4	104.0	105.1
27237	27238 1	11LEITCH	11LEITCH	11LEITCH	138-69	86	106.7	113.4	105.5		107.8	110.4	115.8	109.9		111.5
27317	27318 1	11OHIO C	11OHIO C	11OHIO C	138-69	86										100.3
27384	27385 1	11ROGERS	11ROGERS	11ROGERS	138-69	107	101.3		101.4	102.2	103.3	101.0		101.2	101.8	103.0
29542	27437 1	20TAYLOR	11TAYLRC	11TAYLRC	161-69	72	100.4	103.0		100.2	102.5		101.9		100.1	101.9

**TABLE 5c**  
**EKPC Service to WRECC Power Flow Study Results**  
**Summary of 69 kV Transmission Line Overloads for Contingencies**

FBus	TBus	Ckt	Fbus	To Bus	kV	Emerg	Case C Includes BREC Wilson - Aberdeen			Case D Includes Tap on Paradise - New Hardinsb.		
							Case CS1	Case CS2	Case CS3	Case CS4	Case DS1	Case DS2
18053	27222	1	2KYHYNO1	11KY DAM	69	45	103.1	101.4	103.3	103.0	101.6	
19325	19358	1	2RADNOR	2BATTLEFD	69	139	102.1	104.3	101.1	101.5	122.9	
27102	29528	1	11EASTVW	20STEPHN	69	41	106.4	100.7	126.4	101.5	102.7	
27103	27413	1	11EASTWO	11SIMPSM	69	57	104.5	102.2	101.3	110.6		
27115	29374	1	11EASTWO	20KARGLE	69	69	104.5	113.0	100.5	101.3	110.6	
27116	27371	1	11ETWN 2	11RADCL	69	52	107.1	106.7	107.5	107.1	106.8	107.6
27168	27377	1	11GRNV W	11RIVR Q	69	49	102.7	103.4	103.4	103.8	101.4	104.0
27207	27337	1	11INDIAN	11PBODYW	69	27	103.0	103.0	103.3	103.4	102.5	
27224	27225	1	11LAGR E	11LAGR P	69	56		100.0			100.3	
27238	27286	1	11LEITCH	11MILLWO	69	52			101.4	101.9	101.3	106.1
27397	29504	1	11SC TAP	20SHLBYC	69	72	102.4	102.4	102.9	102.2		
27410	27411	1	11SHLB S	11SHLBYV	69	49	103.0	120.9	106.3	111.9	106.6	108.7

**Table 5d**

Case S1 Has Trimble #2 Removed from the Model  
 Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen  
 The T cases include a 7000 MW NI to SOCO transfer  
 Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 2.5% Difference Not Shown

FBus	TBus	Ckt	FName	TName	kV	Emerg Rating	Contingency Percent of Emergency Rating				Sort		
							Case CS1	Case CTS1	Case DS1	Case DTS1			
27055	27177	1	11CLVRPR	11HARDBG	138	191					103.5	103.5	
27080	27273	1	11DANVIL	11MERCRCR	138	129						101.8	101.8
4083	4131	1	14HOPCO5	REID15	161	265						101.3	101.3
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	111.6			112.8		100.6	100.6
26855	27055	1	10NTVL13	11CLVRPR	138	143			114.1	121.9		161.3	47.2
27237	27238	1	11LEITCH	11LEITCH	138-69	86	113.4		105.2	115.8		109.4	4.2
27234	27273	1	11LEBNON	11MERCRCR	138	179			117.5			121.3	3.8
26966	27088	1	11ARNOLD	11DELVIN	161	110			140.0			142.8	2.8
27329	27328	1	11PADDYS	11PADDYR	161-138	131			126.1			128.7	2.6
27329	27328	2	11PADDYS	11PADDYR	161-138	131			126.1			128.7	2.6
27219	27281	1	11KOSMOS	11MIL CK	138	100	114.2		188.3	115.5		184.3	-4.0
4138	4137	1	14HENDR4	14HENDR4	138-161	224			106.7			101.1	-5.6
27384	27385	1	11ROGERS	11ROGERS	138-69	107			100.6				-100.6
27179	27180	1	11HARDN	11HARDN	138-69	171	102.7		106.5				-106.5
27179	27180	2	11HARDN	11HARDN	138-69	138	116.5		120.7				-120.7

**Table 5e**

Case S2 Has Paradise #1 Outaged from the Model

Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen

The T cases include a 7000 MW NI to SOCO transfer

Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 2.5% Difference Not Shown

FBus	TBus	Ckt	FName	TName	kV	Emerg Rating	Contingency Percent of Emergency Rating				Sort
							Case CS2	Case CTS2	Case DS2	Case DTS2	
4130	4135	1	14N.HAR4	14N.HAR5	138-161	224				114.1	114.1
27055	27177	1	11CLVRPR	11HARDBG	138	191				113.6	113.6
4083	4131	1	14HOPCO5	REID15	161	265				106.4	106.4
27098	27386	1	11EARLN	11RQ TAP	161	182				100.3	100.3
26855	27055	1	10NTVL13	11CLVRPR	138	143		105.4	121.6	153.4	48.0
27329	27328	1	11PADDYS	11PADDYR	161-138	131		120.9		126.4	5.5
27329	27328	2	11PADDYS	11PADDYR	161-138	131		120.9		126.3	5.4
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	120.5	107.7	122.4	111.0	3.3
27234	27273	1	11LEBNON	11MERC	138	179		109.0		112.0	3.0
27219	27281	1	11KOSMOS	11MIL CK	138	100	107.8	155.4	107.1	153.3	-2.1
4138	4137	1	14HENDR4	14HENDR4	138-161	224		107.4			-107.4

**Table 5f**

Case S3 Has BREC Wilson Generator Outaged from the Model

Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen

The T cases include a 7000 MW NI to SOCO transfer

Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 2.5% Difference Not Shown

FBus	TBus	Ckt	FName	TName	kV	Emerg Rating	Contingency Percent of Emergency Rating						Sort
							Case CS3	Case CTS3	Case DS3	Case DTS3	Case DS3	Case DTS3	
27329	27328	1	11PADDYS	11PADDYR	161-138	131		115.6			118.1		2.5
27329	27328	2	11PADDYS	11PADDYR	161-138	131		115.6			118.1		2.5
4138	4137	1	14HENDR4	14HENDR4	138-161	224		117.3			110.9		-6.4
27114	27115	1	11ETOWN	11ETOWN	138-69	171		100.3					-100.3
4133	26857	1	14COLE 5	10NTVL16	161	265		103.6					-103.6
29256	29273	1	20COOPER	20DENNY	161	85		114.8					-114.8

**Table 5g**

**Case S4 Has LGEE Brown Generator Outaged from the Model**

**Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen**

The T cases include a 7000 MW NI to SOCO transfer

**Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 2.5% Difference Not Shown**

FBus	TBus	Ckt	FName	TName	kV	Emerg Rating	Contingency Percent of Emergency Rating				Sort
							Case CS4	Case CTS4	Case DS4	Case DTS4	
4083	4131	1	14HOPCO5	REID15	161	265				105.1	105.1
27237	27238	1	11LEITCH	11LEITCH	138-69	86	107.8		111.5	101.3	101.3
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	112.1		113.3	100.6	100.6
26855	27055	1	10NTVL13	11CLVRPR	138	143		103.4	118.3	149.8	46.4
27329	27328	1	11PADDYS	11PADDYR	161-138	131		115.8		120.2	4.4
27329	27328	2	11PADDYS	11PADDYR	161-138	131		115.8		120.2	4.4
4138	4137	1	14HENDR4	14HENDR4	138-161	224		106.2			-106.2

**Table 5h**

**Case S5 Has TVA Paradise #1 & # 2 Generators Outaged from the Model**

**Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen**

**The T cases include a 7000 MW NI to SOCO transfer**

**Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 1% Difference Not Shown**

FBus	TBus	Ckt	FName	TName	kV	Emerg Rating	Contingency Percent of Emergency Rating				Sort	
							CS5	Case CTS5	DS5	Case DTS5		
4083	4131	1	14HOPCO5	REID15	161	265					111.9	111.9
18953	19213	1	5PRINC T	5CADIZT	161	335					104.7	104.7
27098	27386	1	11EARLN	11RQ TAP	161	182					103.8	103.8
27080	27273	1	11DANVIL	11MERCRCR	138	129					100.9	100.9
26855	27055	1	10NTVL13	11CLVRPR	138	143		110.4	127.8		161.9	161.9
4130	4135	1	14N.HAR4	14N.HAR5	138-161	224		121.5			141.0	141.0
27055	27177	1	11CLVRPR	11HARDBG	138	191		112.4			131.6	131.6
27006	29220	1	11BONNIE	20BONNIE	138-69	59	113.7	111.1	114.2		121.5	121.5
18026	18953	1	5BARKLEY	5PRINC T	161	335		110.7			118.7	118.7
27329	27328	1	11PADDYS	11PADDYR	161-138	131		131.3			137.7	137.7
27329	27328	2	11PADDYS	11PADDYR	161-138	131		131.3			137.7	137.7
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	128.8	117.5	144.7		122.3	122.3
27234	27273	1	11LEBNON	11MERCRCR	138	179		117.4			121.2	121.2
27358	27442	1	11POND C	11TIPTOP	138	179		105.3			101.7	101.7
27219	27281	1	11KOSMOS	11MIL CK	138	100	121.8	171.8	120.8		168.1	168.1
4138	4137	1	14HENDR4	14HENDR4	138-161	224		112.3			100.6	100.6
4133	26857	1	14COLE 5	10NTVL16	161	265		102.2				-102.2

**Table 5i**

Case S1 Has Trimble #2 Removed from the Model  
 Case S2 Has Paradise #1 Outaged from the Model  
 Case S3 Has BREC Wilson Generator Outaged from the Model  
 Case S4 Has LGEE Brown Generator Outaged from the Model  
 Case S5 Has TVA Paradise #1 & # 2 Generators Outaged from the Model  
 Case C - Has Wilson - Aberdeen 161 kV vs Case D - Tap Paradise - New Hardinsburg 161 to Aberdeen  
 The T cases include a 7000 MW NI to SOCO transfer  
 Case C Advantage Sorted to Top, Case D Advantage Sorted to Bottom, Less than 2.5% Difference Not Shown

FBus	TBus	Ckt	FName	TName	kV	E-Rating	Data	Contingency Percent of E-Rating					Diff
								S1	S2	S3	S4	S5	
<b>Case C Advantage</b>													
4083	4131	1	14HOPCO5	REID15	161	265	CT	0.0	0.0		0.0	0.0	111.9
							DT	101.3	106.4		105.1	111.9	111.9
18953	19213	1	5PRINC T	5CADIZT	161	335	CT					0.0	104.7
							DT					104.7	104.7
27098	27386	1	11EARL N	11RQ TAP	161	182	CT		0.0			0.0	103.8
							DT		100.3			103.8	103.8
27080	27273	1	11DANVIL	11MERCRCR	138	129	CT	0.0				0.0	101.8
							DT	101.8				100.9	101.8
26855	27055	1	10NTVL13	11CLVRPR	138	143	CT	114.1	105.4		103.4	110.4	47.8
							DT	161.3	153.4		149.8	161.9	47.8
4130	4135	1	14N.HAR4	14N.HAR5	138-161	224	CT		0.0			121.5	19.5
							DT		114.1			141.0	19.5
27055	27177	1	11CLVRPR	11HARDBG	138	191	CT	0.0	0.0			112.4	19.2
							DT	103.5	113.6			131.6	19.2
27006	29220	1	11BONNIE	20BONNIE	138-69	59	CT					111.1	10.4
							DT					121.5	10.4
18026	18953	1	5BARKLEY	5PRINC T	161	335	CT					110.7	8.0
							DT					118.7	8.0
27329	27328	1	11PADDYS	11PADDYR	161-138	131	CT	126.1	120.9	115.6	115.8	131.3	6.4
							DT	128.7	126.4	118.1	120.2	137.7	6.4
		2	11PADDYS	11PADDYR	161-138	131	CT	126.1	120.9	115.6	115.8	131.3	6.4
							DT	128.7	126.3	118.1	120.2	137.7	6.4
18695	90	1	5FRNK KY	5FRNK KY	161-69	50	CT	0.0	107.7		0.0	117.5	4.8
							DT	100.6	111.0		100.6	122.3	4.8
27237	27238	1	11LEITCH	11LEITCH	138-69	86	CT	105.2			0.0		4.2
							DT	109.4			101.3		4.2
27234	27273	1	11LEBNON	11MERCRCR	138	179	CT	117.5	109.0			117.4	3.8
							DT	121.3	112.0			121.2	3.8
26966	27088	1	11ARNOLD	11DELVIN	161	110	CT	140.0					2.8
							DT	142.8					2.8
<b>Case D Advantage</b>													
27358	27442	1	11POND C	11TIPTOP	138	179	CT					105.3	-3.6
							DT					101.7	-3.6
27219	27281	1	11KOSMOS	11MIL CK	138	100	CT	188.3	155.4			171.8	-4.0
							DT	184.3	153.3			168.1	-4.0
4138	4137	1	14HENDR4	14HENDR4	138-161	224	CT	106.7	107.4	117.3	106.2	112.3	-6.4
							DT	101.1	0.0	110.9	0.0	100.6	-6.4
27114	27115	1	11ETOWN	11ETOWN	138-69	171	CT			100.3			-100.3
							DT			0.0			-100.3
27384	27385	1	11ROGERS	11ROGERS	138-69	107	CT	100.6					-100.6
							DT	0.0					-100.6
4133	26857	1	14COLE 5	10NTVL16	161	265	CT			103.6		102.2	-103.6
							DT			0.0		0.0	-103.6
29256	29273	1	20COOPER	20DENNY	161	85	CT			114.8			-114.8
							DT			0.0			-114.8
27179	27180	1	11HARDN	11HARDN	138-69	171	CT	106.5					-106.5
							DT	0.0					-106.5
		2	11HARDN	11HARDN	138-69	138	CT	120.7					-120.7
							DT	0.0					-120.7



**TABLE 6**  
**Changes to Loads and Losses**

Area	Data	CaseID					Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r5	CaseCS1_r5	CaseAS1_r5			
147	Load	35334	35334	35334	35334	0	0	0	
	Loss	703	701	679	677	-2	-24	-2	
211	Load	8462	8462	8462	8462	0	0	0	
	Loss	210	213	191	195	3	-19	4	
214	Load	1605	1605	1605	1605	0	0	0	
	Loss	21	21	19	19	1	-2	0	
220	Load	2845	2845	2845	2845	0	0	0	
	Loss	108	108	102	102	0	-6	0	
Total Load		48245	48245	48245	48245	0	0	0	
Total Loss		1042	1043	991	994	1	-50	3	

**TABLE 7**  
**Changes to Area Interchange**

Sum of Actual ANO	ACode	CaseID				Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r5	CaseCS1_r5			
146	SOCO	1158	1158	1158	1168	0	0	10
147	TVA	1695	1695	1247	1227	0	-448	-20
201	AP	-830	-830	-830	-820	0	0	10
205	AEP	469	553	469	553	84	0	84
208	CIN	-538	-472	-538	-472	66	0	66
211	LGEE	-532	-682	-532	-682	-150	0	-150
214	BREC	145	145	145	125	0	0	-20
220	EKPC	-348	-348	100	100	0	448	0
356	AMRN	-840	-840	-840	-830	0	0	10
363	NI	92	92	92	102	0	0	10
<b>Grand Total</b>		<b>471</b>	<b>471</b>	<b>471</b>	<b>471</b>	<b>0</b>	<b>0</b>	<b>0</b>

**TABLE 8a**  
**Changes to Generation Dispatch**

Area Number		220		EKPC				
Sum of PGDisp		CaseID						
Bus Number	Bus Name	CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	Case AS1-A	Case C-A	Case CS1-C
29258	20CPR1	116	116	116	116	0	0	0
29259	20CPR2	225	225	225	225	0	0	0
29267	20DALE1	23.5	23.5	23.5	23.5	0	0	0
29268	20DALE2	23.5	23.5	23.5	23.5	0	0	0
29269	20DALE3	80	80	80	80	0	0	0
29270	20DALE4	80	80	80	80	0	0	0
29357	20JKCT1	90	90	90	90	0	0	0
29358	20JKCT2	90	90	90	90	0	0	0
29359	20JKCT3	90	90	90	90	0	0	0
29360	20JKCT4	60	60	54	54	0	-6	0
29361	20JKCT5	60	60	54	54	0	-6	0
29362	20JKCT6	60	60	54	54	0	-6	0
29363	20JKCT7	60	60	54	54	0	-6	0
29364	20JKCT8	60	60	54	54	0	-6	0
29365	20JKCT9	60	60	54	54	0	-6	0
29366	20JKCTA	0	0	54	54	0	54	0
29367	20JKCTB	0	0	54	54	0	54	0
29368	20JKCTC	0	0	54	54	0	54	0
29369	20JKCTD	0	0	54	54	0	54	0
29381	20LAURHY	0	0	0	0	0	0	0
29397	20LOVEHY	42	42	42	42	0	0	0
29519	20SPLK1	325	325	325	325	0	0	0
29520	20SPLK2	524.02	523.59	518.21	518.25	0	-6	0
29521	20EAG3	268	268	268	268	0	0	0
29522	20SPLK4	268	268	268	268	0	0	0
29600	20JKFB1	0	0	268	268	0	268	0
Grand Total		2605.02	2604.59	3047.21	3047.25	0	442	0

**TABLE 8b**  
**Changes to Generation Dispatch**

Area Number		211		LGEE			
Sum of PGDisp Bus Number	Bus Name	CaseID			Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51			
27018	11BRWN N	0	0	0	0	0	0
27019	11BRWN N	429	429	429	429	0	0
27020	11BRWN P	272	272	272	272	0	0
27021	11BRWNCT	544.71	974.55	525.8	956.79	430	-19
27025	11BUCKNR	0	0	0	0	0	0
27033	11CANAL	48	48	48	48	0	0
27061	11CN RN6	240	240	240	240	0	0
27062	11CNE RN	323	323	323	323	0	0
27089	11DIXDAM	0	0	0	0	0	0
27152	11GHENT	1457	1457	1457	1457	0	0
27153	11GHENT	509	509	509	509	0	0
27158	11GR RVR	168	168	168	168	0	0
27159	11GR RVR					0	0
27171	11HAEFLN	0	0	0	0	0	0
27192	11HLCRST	0	0	0	0	0	0
27280	11MIL CK	1485	1485	1485	1485	0	0
27328	11PADDYR	158	158	158	158	0	0
27367	11PRUN2A	0	0	0	0	0	0
27368	11PRUN2B	0	0	0	0	0	0
27416	11SMITH	413	413	413	413	0	0
27447	11TRIMBL	2022	1445	2022	1445	-577	0
27451	11TYRONE	71	71	71	71	0	0
27472	11WATRSD	0	0	0	0	0	0
<b>Grand Total</b>		<b>8139.71</b>	<b>7992.55</b>	<b>8120.8</b>	<b>7974.79</b>	<b>-147</b>	<b>-19</b>

**TABLE 8c**  
**Changes to Generation Dispatch**

Area Number		214		BREC					
Sum of PGDisp Bus Number	Bus Name	CaseID					Case C-A	Case AS1-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseCS1_r5			
4115	SKILMAN5	65	65	65	65	65	0	0	0
4200	COLEMAN1	150	150	150	150	150	0	0	0
4201	COLEMAN2	150	150	150	150	150	0	0	0
4202	COLEMAN3	155	155	155	155	155	0	0	0
4203	GREEN 1	227.27	227.99	225.51	205.96	205.96	1	-2	-20
4204	GREEN 2	223	223	223	223	223	0	0	0
4205	HMP&L 1	154	154	154	154	154	0	0	0
4206	HMP&L 2	161	161	161	161	161	0	0	0
4207	REID 1	65	65	65	65	65	0	0	0
4208	REID CT	0	0	0	0	0	0	0	0
4209	WILSON	420	420	420	420	420	0	0	0
6000	THORBRD	0	0	0	0	0	0	0	0
Grand Total		1770.27	1770.99	1768.51	1748.96	1748.96	1	-2	-20

**TABLE 8d**  
**Changes to Generation Dispatch**

Area Number	147	TVA	Sum of PGDisp	Bus Name	CaseID					Case AS1-A	Case C-A	Case CS1-C
					CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5				
18101	T20	ALLN	50	50	50	50	50	0	0	0		
18102	T19	ALLN	50	50	50	50	50	0	0	0		
18103	T18	ALLN	50	50	50	50	50	0	0	0		
18104	T17	ALLN	50	50	50	50	50	0	0	0		
18105	T13-ALLN		64	64	64	64	64	0	0	0		
18106	T9 -ALLN		64	64	64	64	64	0	0	0		
18107	T5-8ALLN		64	64	64	64	64	0	0	0		
18108	T1-4ALLN		64	64	64	64	64	0	0	0		
18109	F1	ALLEN	266	266	266	266	266	0	0	0		
18110	F2	ALLEN	266	266	266	266	266	0	0	0		
18111	F3	ALLEN	266	266	266	266	266	0	0	0		
18112	H1	CHLHWE	14	14	14	14	14	0	0	0		
18113	H2	CHLHWE	14	14	14	14	14	0	0	0		
18114	H3	CHLHWE	14	14	14	14	14	0	0	0		
18115	H1	CALDW	46	46	46	46	46	0	0	0		
18116	H2	CALDW	45	45	45	45	45	0	0	0		
18117	H3	CALDW	45	45	45	45	45	0	0	0		
18118	H1	CHEOH	24	24	24	24	24	0	0	0		
18119	H2	CHEOH	24	24	24	24	24	0	0	0		
18120	H3	CHEOH	18	18	18	18	18	0	0	0		
18121	H4	CHEOH	18	18	18	18	18	0	0	0		
18122	H5	CHEOH	28	28	28	28	28	0	0	0		
18123	H1	SANTEL	19	19	19	19	19	0	0	0		
18124	H2	SANTEL	19	19	19	19	19	0	0	0		
18125	1	JVILLE	20.9	20.9	20.9	20.9	20.9	0	0	0		
18126	1	REDHILL	482.5	482.5	482.5	482.5	482.5	0	0	0		
18127	H1	APALA	46	46	46	46	46	0	0	0		
18128	H2	BARKL	33	33	33	33	33	0	0	0		
18129	H4	BARKL	33	33	33	33	33	0	0	0		
18130	H3	BARKL	33	33	33	33	33	0	0	0		

Sum of PGDisp		CaseID					Case AS1-A	Case C-A	Case CS1-C
Bus Number	Bus Name	CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5				
18133	H1 BLRDG	17	17	17	17	0	0	0	
18135	N1 BFN	1278	1278	1278	1278	0	0	0	
18136	N2 BFN	1281	1281	1281	1281	0	0	0	
18137	N3 BFN	1215.96	1214.23	1044.18	1022.45	-2	-172	-22	
18138	F1L BRUN	444	444	444	444	0	0	0	
18139	F1H BRUN	467	467	467	467	0	0	0	
18140	H3C HILL	46	46	46	46	0	0	0	
18141	H2C HILL	46	46	46	46	0	0	0	
18142	H1C HILL	46	46	46	46	0	0	0	
18143	H1CHETAM	12	12	12	12	0	0	0	
18144	H2CHETAM	12	12	12	12	0	0	0	
18145	H3CHETAM	12	12	12	12	0	0	0	
18146	H1-2CHER	82	82	82	82	0	0	0	
18147	H3-4CHER	82	82	82	82	0	0	0	
18148	H1 CHICK	38	38	38	38	0	0	0	
18149	H3 CHICK	38	38	38	38	0	0	0	
18150	F1 COLBT	187	187	187	187	0	0	0	
18151	F2 COLBT	187	187	187	187	0	0	0	
18152	F3 COLBT	187	187	187	187	0	0	0	
18153	F4 COLBT	187	187	187	187	0	0	0	
18154	F5ACOLBT	236.5	236.5	236.5	236.5	0	0	0	
18155	F5BCOLBT	237.5	237.5	237.5	237.5	0	0	0	
18156	T1 COLBT	49	49	49	49	0	0	0	
18157	T2 COLBT	49	49	49	49	0	0	0	
18158	T3 COLBT	49	49	49	49	0	0	0	
18159	T4 COLBT	49	49	49	49	0	0	0	
18160	T5 COLBT	49	49	49	49	0	0	0	
18161	T6 COLBT	49	49	49	49	0	0	0	
18162	T7 COLBT	49	49	49	49	0	0	0	
18163	T8 COLBT	49	49	49	49	0	0	0	
18164	H1CORDEL	34	34	34	34	0	0	0	
18165	H2CORDEL	34	34	34	34	0	0	0	
18166	H3CORDEL	34	34	34	34	0	0	0	
18167	F1HL CMB	1325	1325	1325	1325	0	0	0	
18168	F2HL CMB	1327	1327	1327	1327	0	0	0	

Sum of PGDisp	Bus Number	Bus Name	CaseID					Case AS1-A	Case C-A	Case CS1-C
			CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5				
18169	H1DALE H	18	18	18	18	18	0	0	0	
18170	H2DALE H	18	18	18	18	18	0	0	0	
18171	H3DALE H	18	18	18	18	18	0	0	0	
18172	H2 DOUG	45	45	45	45	45	0	0	0	
18173	H3 DOUG	39	39	39	39	39	0	0	0	
18174	H4 DOUG	45	45	45	45	45	0	0	0	
18175	H1FONTAN	93	93	93	93	93	0	0	0	
18176	H2FONTAN	93	93	93	93	93	0	0	0	
18177	H3FONTAN	93	93	93	93	93	0	0	0	
18178	H1-2FTLD	71	71	71	71	71	0	0	0	
18180	H1-2FTPT	38	38	38	38	38	0	0	0	
18181	F1GALTIN	240	240	240	240	240	0	0	0	
18182	F2GALTIN	240	240	240	240	240	0	0	0	
18183	F3GALTIN	281	281	281	281	281	0	0	0	
18184	F4GALTIN	281	281	281	281	281	0	0	0	
18185	T1GALTIN	69	69	69	69	69	0	0	0	
18186	T2GALTIN	69	69	69	69	69	0	0	0	
18187	T3GALTIN	69	69	69	69	69	0	0	0	
18188	T4GALTIN	69	69	69	69	69	0	0	0	
18189	H1-2GFAL	37	37	37	37	37	0	0	0	
18190	H1 GUNTR	28	28	28	28	28	0	0	0	
18191	H2 GUNTR	36	36	36	36	36	0	0	0	
18192	H3 GUNTR	36	36	36	36	36	0	0	0	
18193	H2 CHICK	38	38	38	38	38	0	0	0	
18194	H4 GUNTS	28	28	28	28	28	0	0	0	
18195	1ARPR&CH	0	0	0	0	0	0	0	0	
18196	1LENZING	25	25	25	25	25	0	0	0	
18197	H1 DOUG	38	38	38	38	38	0	0	0	
18198	H1HIWASE	78	78	78	78	78	0	0	0	
18199	H2HIWASE	91	91	91	91	91	0	0	0	
18200	F1 J SEV	187	187	187	187	187	0	0	0	
18201	F2 J SEV	187	187	187	187	187	0	0	0	
18202	F3 J SEV	187	187	187	187	187	0	0	0	
18203	F4 J SEV	187	187	187	187	187	0	0	0	
18204	F5 JVILL	109	109	109	109	109	0	0	0	



Sum of PGDisp		CaseID					Case AS1-A	Case C-A	Case CS1-C
Bus Number	Bus Name	CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5				
18205	F6 JVILL	109	109	109	109	0	0	0	
18206	F7 JVILL	143	143	143	143	0	0	0	
18207	F8 JVILL	143	143	143	143	0	0	0	
18208	F9 JVILL	143	143	143	143	0	0	0	
18209	F10JVILL	143	143	143	143	0	0	0	
18210	F1 JVILL	99	99	99	99	0	0	0	
18211	F2 JVILL	99	99	99	99	0	0	0	
18212	F3 JVILL	99	99	99	99	0	0	0	
18213	F4 JVILL	99	99	99	99	0	0	0	
18214	T1 JVIL	50	50	0	0	0	-50	0	
18215	T2 JVIL	50	50	0	0	0	-50	0	
18216	T3 JVIL	50	50	0	0	0	-50	0	
18217	T4 JVIL	50	50	0	0	0	-50	0	
18218	T5 JVIL	50	50	0	0	0	-50	0	
18219	T6 JVIL	50	50	0	0	0	-50	0	
18220	T7 JVIL	50	50	50	50	0	0	0	
18221	T8 JVIL	50	50	50	50	0	0	0	
18222	T9 JVIL	50	50	50	50	0	0	0	
18223	T10 JVIL	50	50	50	50	0	0	0	
18224	T11 JVIL	50	50	50	50	0	0	0	
18225	T12 JVIL	50	50	50	50	0	0	0	
18226	T13 JVIL	50	50	50	50	0	0	0	
18227	T14 JVIL	50	50	50	50	0	0	0	
18228	T15 JVIL	50	50	50	50	0	0	0	
18229	T16 JVIL	50	50	50	50	0	0	0	
18230	1KYHY H1	43	43	43	43	0	0	0	
18231	1KYHY H2	43	43	43	43	0	0	0	
18232	1KYHY H4	43	43	43	43	0	0	0	
18233	F4KINGST	129	129	129	129	0	0	0	
18234	F1KINGST	129	129	129	129	0	0	0	
18235	F2KINGST	129	129	129	129	0	0	0	
18236	F3KINGST	129	129	129	129	0	0	0	
18237	F5KINGST	168	168	168	168	0	0	0	
18238	F6KINGST	168	168	168	168	0	0	0	
18239	F7KINGST	168	168	168	168	0	0	0	

Sum of PGDisp Bus Number	Bus Name	CaseID					Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseCS1_r5			
18240	F8KINGST	168	168	168	168	0	0	0	
18241	F9KINGST	168	168	168	168	0	0	0	
18242	H1MELT H	41	41	41	41	0	0	0	
18243	H2MELT H	41	41	41	41	0	0	0	
18244	H13-WILS	56	56	56	56	0	0	0	
18245	H1 CHATU	14	14	14	14	0	0	0	
18246	H12 NICK	53	53	53	53	0	0	0	
18247	H34 NICK	50	50	50	50	0	0	0	
18248	H1NORRIS	60	60	60	60	0	0	0	
18249	H2NORRIS	60	60	60	60	0	0	0	
18250	H1-2WILS	50	50	50	50	0	0	0	
18251	H1-3OCO1	15	15	15	15	0	0	0	
18252	H1-2OCO2	20	20	20	20	0	0	0	
18253	H1 OCO3	32	32	32	32	0	0	0	
18254	H1-2OHIC	50	50	50	50	0	0	0	
18255	H3-4OHIC	50	50	50	50	0	0	0	
18256	F3ABPARA	1036	1036	1036	1036	0	0	0	
18257	F2H PARA	343.5	343.5	343.5	343.5	0	0	0	
18258	F2L PARA	322.5	322.5	322.5	322.5	0	0	0	
18259	F1H PARA	344.5	344.5	344.5	344.5	0	0	0	
18260	F1L PARA	324.5	324.5	324.5	324.5	0	0	0	
18261	1LAGN T1	80	80	80	80	0	0	0	
18262	1LAGN T2	80	80	80	80	0	0	0	
18263	H1 PICWK	43	43	43	43	0	0	0	
18264	H2 PICWK	43	43	43	43	0	0	0	
18265	H3 PICWK	43	43	43	43	0	0	0	
18266	H4 PICWK	43	43	43	43	0	0	0	
18267	H5 PICWK	43	43	43	43	0	0	0	
18268	H6 PICWK	43	43	43	43	0	0	0	
18269	1PERCY P	27	27	27	27	0	0	0	
18270	P1 RACCN	429	429	429	429	0	0	0	
18271	P2 RACCN	429	429	429	429	0	0	0	
18272	P3 RACCN	429	429	429	429	0	0	0	
18273	P4 RACCN	429	429	429	429	0	0	0	
18274	N2 SQN	1207.22	1207.22	1207.22	1207.22	0	0	0	

Sum of PGDisp Bus Number	Bus Name	CaseID										Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5			
18275	N1 SQN	1204.22	1204.22	1204.22	1204.22	1204.22	1204.22	1204.22	1204.22	1204.22	1204.22	0	0	0
18276	F10 SHAW	131	131	131	131	131	131	131	131	131	131	0	0	0
18277	F9 SHAW	141	141	141	141	141	141	141	141	141	141	0	0	0
18278	F8 SHAW	141	141	141	141	141	141	141	141	141	141	0	0	0
18279	F7 SHAW	141	141	141	141	141	141	141	141	141	141	0	0	0
18280	F6 SHAW	141	141	141	141	141	141	141	141	141	141	0	0	0
18281	H1WATAGA	32	32	32	32	32	32	32	32	32	32	0	0	0
18282	H2WATAGA	32	32	32	32	32	32	32	32	32	32	0	0	0
18283	H1HOLSTN	42	42	42	42	42	42	42	42	42	42	0	0	0
18284	H1-3WILB	3	3	3	3	3	3	3	3	3	3	0	0	0
18285	H4 WILB	9	9	9	9	9	9	9	9	9	9	0	0	0
18286	H1TIM FD	38	38	38	38	38	38	38	38	38	38	0	0	0
18291	H1WATT B	41	41	41	41	41	41	41	41	41	41	0	0	0
18292	H2WATT B	41	41	41	41	41	41	41	41	41	41	0	0	0
18293	H3WATT B	41	41	41	41	41	41	41	41	41	41	0	0	0
18294	H4WATT B	41	41	41	41	41	41	41	41	41	41	0	0	0
18295	H5WATT B	41	41	41	41	41	41	41	41	41	41	0	0	0
18297	N1 WBN	1204.1	1204.1	1204.1	1204.1	1204.1	1204.1	1204.1	1204.1	1204.1	1204.1	0	0	0
18298	H1-2WHEL	72	72	72	72	72	72	72	72	72	72	0	0	0
18299	H3-4WHEL	72	72	72	72	72	72	72	72	72	72	0	0	0
18300	H5-6WHEL	67	67	67	67	67	67	67	67	67	67	0	0	0
18301	H7-8WHEL	62	62	62	62	62	62	62	62	62	62	0	0	0
18302	H9- WHEL	117	117	117	117	117	117	117	117	117	117	0	0	0
18303	H1-2WOLF	84	84	84	84	84	84	84	84	84	84	0	0	0
18304	H3-4WOLF	84	84	84	84	84	84	84	84	84	84	0	0	0
18305	H5-6WOLF	84	84	84	84	84	84	84	84	84	84	0	0	0
18306	F1 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18307	F2 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18308	F3 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18309	F4 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18310	F7HWIDCK	267.5	267.5	267.5	267.5	267.5	267.5	267.5	267.5	267.5	267.5	0	0	0
18311	F7LWIDCK	251.5	251.5	251.5	251.5	251.5	251.5	251.5	251.5	251.5	251.5	0	0	0
18312	F5 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18313	F6 WIDCK	113	113	113	113	113	113	113	113	113	113	0	0	0
18314	F8AWIDCK	249.5	249.5	249.5	249.5	249.5	249.5	249.5	249.5	249.5	249.5	0	0	0

Sum of PGDisp		CaseID					Case AS1-A	Case C-A	Case CS1-C
Bus Number	Bus Name	CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5				
18315	F8BWIDCK	234.5	234.5	234.5	234.5	0	0	0	
18316	H15-WILS	56	56	56	56	0	0	0	
18317	1EMG1-11	20	20	20	20	0	0	0	
18318	1GALLGT5	80	80	80	80	0	0	0	
18319	H9- WILS	56	56	56	56	0	0	0	
18320	H11-WILS	56	56	56	56	0	0	0	
18321	H17-WILS	56	56	56	56	0	0	0	
18322	H19 WILS	59	59	59	59	0	0	0	
18323	H20 WILS	59	59	59	59	0	0	0	
18324	H21 WILS	59	59	59	59	0	0	0	
18325	1LAGN T3	80	80	80	80	0	0	0	
18326	1LAGN T4	80	80	80	80	0	0	0	
18327	H1 BARKL	33	33	33	33	0	0	0	
18328	H1 NOTLY	19	19	19	19	0	0	0	
18329	F5 SHAW	141	141	141	141	0	0	0	
18330	F4 SHAW	141	141	141	141	0	0	0	
18331	F3 SHAW	141	141	141	141	0	0	0	
18332	F2 SHAW	141	141	141	141	0	0	0	
18333	F1 SHAW	141	141	141	141	0	0	0	
18334	1GALLGT6	80	80	80	80	0	0	0	
18335	1GALLGT7	80	80	80	80	0	0	0	
18336	1GALLGT8	80	80	80	80	0	0	0	
18337	H2 APALA	38	38	38	38	0	0	0	
18338	H4 CHICK	38	38	38	38	0	0	0	
18339	T17 JVIL	78	78	78	78	0	0	0	
18340	H4-5OCO1	10	10	10	10	0	0	0	
18341	H3-4WILS	50	50	50	50	0	0	0	
18342	H5-6WILS	73	73	73	73	0	0	0	
18343	H7-8WILS	68	68	68	68	0	0	0	
18344	T18 JVIL	78	78	78	78	0	0	0	
18348	T19 JVIL	78	78	78	78	0	0	0	
18349	T20 JVIL	78	78	78	78	0	0	0	
18350	1LAGN T5	80	80	80	80	0	0	0	
18351	1LAGN T6	80	80	80	80	0	0	0	
18352	1LAGN T7	80	80	80	80	0	0	0	

Sum of PGDisp Bus Number	Bus Name	CaseID					Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseCS1_r5			
18353	1LAGN T8	80	80	80	80	80	0	0	0
18354	1BED1-11	20	20	20	20	20	0	0	0
18355	M1 LEAKE	0	0	0	0	0	0	0	0
18356	T1-2MIDL	5.2	5.2	5.2	5.2	5.2	0	0	0
18360	1AEG1-12	22.2	22.2	22.2	22.2	22.2	0	0	0
18362	1KYHY H3	43	43	43	43	43	0	0	0
18363	1KYHY H5	43	43	43	43	43	0	0	0
18364	1KFG1-11	20	20	20	20	20	0	0	0
18365	H1BOONE	34	34	34	34	34	0	0	0
18366	H2BOONE	32	32	32	32	32	0	0	0
18367	H3BOONE	38	38	38	38	38	0	0	0
18377	1AMUBDSL	4	4	4	4	4	0	0	0
18378	1HY3FTLD	40	40	40	40	40	0	0	0
18379	1HY4FTLD	47	47	47	47	47	0	0	0
18380	1LAGN T9	78	78	78	78	78	0	0	0
18381	1LAGN 10	78	78	78	78	78	0	0	0
18382	1LAGN 11	78	78	78	78	78	0	0	0
18383	1LAGN 12	78	78	78	78	78	0	0	0
18384	1KEMPER1	78	78	78	78	78	0	0	0
18385	1KEMPER2	78	78	78	78	78	0	0	0
18386	1KEMPER3	78	78	78	78	78	0	0	0
18387	1KEMPER4	78	78	78	78	78	0	0	0
19702	1CHEATT1	190	190	190	190	190	0	0	0
19703	1CHEATT2	190	190	190	190	190	0	0	0
19704	1CHEATS3	270	270	270	270	270	0	0	0
19705	1CHEATT4	190	190	190	190	190	0	0	0
19706	1CHEATT5	190	190	190	190	190	0	0	0
19707	1CHEATT6	270	270	270	270	270	0	0	0
19708	1COLBT 2	190	190	190	190	190	0	0	0
19709	1COLBT 3	190	190	190	190	190	0	0	0
19710	1COLBT 4	270	270	270	270	270	0	0	0
19712	1HARTVT1	113	113	113	113	113	0	0	0
19713	1HARTVT2	113	113	113	113	113	0	0	0
19714	1HARTVS3	226	226	226	226	226	0	0	0
19722	1FRANKT1	190	190	190	190	190	0	0	0

Sum of PGDisp Bus Number	Bus Name	CaseID					Case AS1-A	Case C-A	Case CS1-C
		CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5	CaseAS1_r5			
19723	1FRANKT2	190	190	190	190	0	0	0	
19724	1FRANKS3	270	270	270	270	0	0	0	
19725	1UNION 1	190	190	190	190	0	0	0	
19726	1UNION 2	190	190	190	190	0	0	0	
19727	1UNION 3	270	270	270	270	0	0	0	
19801	1BRNVLG1	0	0	0	0	0	0	0	
19802	1BRNVLG2	0	0	0	0	0	0	0	
19803	1BRNVLG3	0	0	0	0	0	0	0	
19804	1BRNVLG4	0	0	0	0	0	0	0	
19811	1CALEDG1	0	0	0	0	0	0	0	
19812	1CALEDG2	0	0	0	0	0	0	0	
19813	1CALEDG3	0	0	0	0	0	0	0	
19814	1CALEDG4	0	0	0	0	0	0	0	
19815	1CALEDG5	0	0	0	0	0	0	0	
19816	1CALEDG6	0	0	0	0	0	0	0	
19863	1MEC-CT3	0	0	0	0	0	0	0	
19864	1MEC-STG	0	0	0	0	0	0	0	
19865	1MEC-CT1	0	0	0	0	0	0	0	
19866	1MEC-CT2	0	0	0	0	0	0	0	
19867	1DEC-CT1	113.1	113.1	113.1	113.1	0	0	0	
19868	1DEC-CT2	0	0	0	0	0	0	0	
19869	1DEC-CT3	0	0	0	0	0	0	0	
19870	1DEC-STG	0	0	0	0	0	0	0	
19872	1CHOCTW1	0	0	0	0	0	0	0	
19873	1CHOCTW2	0	0	0	0	0	0	0	
19874	1CHOCTS1	0	0	0	0	0	0	0	
19881	1MAGNLT1	0	0	0	0	0	0	0	
19882	1MAGNLS1	0	0	0	0	0	0	0	
19883	1MAGNLT2	0	0	0	0	0	0	0	
19884	1MAGNLS2	0	0	0	0	0	0	0	
19885	1MAGNLT3	0	0	0	0	0	0	0	
19886	1MAGNLS3	0	0	0	0	0	0	0	
19887	1WILLIAM	0	0	0	0	0	0	0	
19889	1SHAV G1	0	0	0	0	0	0	0	
19890	1SHAV S1	0	0	0	0	0	0	0	

Sum of PGDisp		CaseID				Case AS1-A	Case C-A	Case CS1-C
Bus Number	Bus Name	CaseA_r5	CaseAS1_r5	CaseC_r51	CaseCS1_r5			
19891	1SHAV G2	0	0	0	0	0	0	0
19892	1SHAV S2	0	0	0	0	0	0	0
19893	1SHAV G3	0	0	0	0	0	0	0
19894	1SHAV S3	0	0	0	0	0	0	0
19900	1RELI-C1	0	0	0	0	0	0	0
19901	1RELI-C2	0	0	0	0	0	0	0
19902	1RELI-C3	0	0	0	0	0	0	0
19903	1RELI-ST	0	0	0	0	0	0	0
Grand Total		37731.4	37729.67	37259.62	37237.89	-2	-472	-22

**TABLE 9  
East Kentucky Power Cooperative System Study  
Short Circuit Analysis**

#	Bus		Case A		Case B		Case C		Case C2	
	Name	kV	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps
62	East Bowling Green	161	12082	6818	14377	8220	15937	9135	16108	9219
63	Aberdeen	161	5797	3354	3347	1848	6991	4055	7172	4104
64	Memphis Junction	161	9109	5057	11691	6591	12801	7228	12911	7281
91	General Motors	161	11917	6725	14270	8158	15840	9079	16006	9161
93	Bristow	161	10920	6168	10933	6189	11763	6665	11848	6705
94	Magna	161	10079	5675	11931	6781	12927	7355	13030	7405
4081	Wilson	161	19805	21203	19806	21203	21621	22703	31953	31586
18012	Paradise	161	30573	21805	30939	22036	31362	22291	37260	26239
18027	Summer	161	13612	8904	14620	9543	14859	9684	14888	9698
18029	Wolf Creek	161	12730	12903	12949	13075	12997	13112	13006	13119
18416	Memphis Junction	161	9139	5066	11712	6597	12820	7234	12931	7288
18476	Sullivan	161	22175	13801	22175	13801	22176	13801	22180	13802
18691	Bowling Green	161	12636	7216	13487	7734	14478	8305	14702	8415
18692	E. Bowling Green	161	12283	6922	14490	8280	16036	9188	16211	9274
18695	Franklin Ky	161	7980	4321	8800	4833	9102	4995	9136	5009
18697	Scottsville	161	7538	4024	7719	4123	7928	4225	7953	4234
18796	Portland Switching Station	161	10151	5590	10535	5826	10745	5932	10777	5943
18842	N. Bristol	161	5923	3806	5923	3806	5923	3806	5923	3806



#	Bus		Case A			Case B		Case C		Case C2	
			kV	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground
				amps	amps						
18926	Aberdeen Tap	161	10722	5971	11019	6129	11242	6237	11628	6398	
18928	S. Bowling Green Tap	161	10504	5939	11889	6748	12820	7277	12962	7347	
19006	Glasgow Tap	161	7473	4366	7582	4437	7764	4541	7783	4550	
19007	Bristow Tap	161	11024	6224	12541	7158	13619	7784	13738	7842	
19031	S. Scotsville	161	7595	4055	7743	4137	7938	4231	7961	4240	
19156	Westmoreland	161	8454	4652	8498	4686	8619	4744	8636	4750	
19578	Blount Tap	161	9799	6141	9799	6141	9799	6141	9800	6141	
27157	Green River	161	18771	10869	18772	10869	19513	11053	22707	11923	
29205	Barren Co.	161	4809	2733	7703	4376	7869	4466	7886	4473	
29537	Summer Shade	161	13550	8864	14570	9508	14807	9649	14836	9662	
27006	Bonnieville	138	5152	1635	5177	1637	5178	1637	5195	1732	
27158	Green River	138	21776	2685	21778	2685	22196	2689	23859	2854	
27317	Ohio County	138	10216	2231	10220	2231	10279	2233	10546	2351	
27412	Shrewsbury	138	5249	1652	5258	1652	5259	1653	5287	1731	
65	Memphis Junction	69	12002	8375	15333	10761	16083	11449	16156	11505	
72	Auburn	69	1717	1109	3739	2206	3771	2226	3775	2228	
77	Woodburn	69	4561	2963	6625	4334	6737	4425	6748	4432	
78	Anaconda	69	2550	1900	5683	3848	5755	3909	5762	3914	
79	Salmons	69	2801	2126	5825	4011	5900	4075	5907	4080	
85	Plano	69	4685	2694	6980	3962	7123	4049	7137	4055	

#		Bus		Case A		Case B		Case C		Case C2	
				Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps
			kV								
87	Greenwood	69	4211	2397	7634	4367	7802	4470	7818	4478	
88	Weyerhaeuser	69	8944	5713	11674	7344	12098	7655	12138	7680	
90	Franklin Ky	69	3948	3356	5798	4589	5865	4661	5872	4667	
27007	Bonnieville	69	4604	1011	4609	1012	4609	1012	4627	1013	
27207	Indian Hill	69	8558	1353	8559	1354	8580	1354	8666	1356	
27238	Leitchfield	69	7182	2075	7201	2083	7201	2086	7222	2087	
27259	Ohio County	69	8871	1376	8873	1378	8891	1379	8979	1380	
29206	Barren Co.	69	6922	1609	7773	1638	7813	1640	7818	1640	
29220	Bonnieville	69	6361	1614	6435	1618	6438	1619	6450	1619	
29249	Coburg	69	2368	1498	2374	1499	2375	1500	2375	1500	
29250	Coburg Jct	69	4063	2035	4080	2038	4082	2039	4083	2040	
29255	Columbia	69	3918	2003	3936	2006	3939	2007	3939	2007	
29303	Fox Hollow	69	5684	1790	5959	1809	5978	1810	5980	1810	
29314	Goodnight	69	6025	1617	6551	1641	6578	1643	6582	1643	
29315	Gorin Park Jct.	69	5585	1723	5890	1743	5909	1744	5911	1744	
29321	Green County	69	8521	1751	8591	1754	8602	1755	8610	1755	
29339	Horse Cave KU	69	5525	1523	5935	1543	5953	1544	5957	1545	
29352	JB Galloway Jct.	69	5183	1815	5248	1820	5257	1822	5259	1822	
29354	Temple Hill	69	5686	1882	5868	1896	5884	1897	5887	1898	
29379	Knoblick	69	4383	1605	4421	1609	4426	1610	4428	1610	

Bus		Case A		Case B		Case C		Case C2	
#	Name	kV	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps	Line-Ground amps	Three Phase amps
29418	McKinney's Corner Jct	69	5453	1612	5489	1614	5495	1615	5497
29427	Munfordville EKPC	69	4826	1505	4946	1514	4950	1515	4955
29428	Munfordville KU	69	4748	1482	4900	1492	4906	1493	4909
29454	Parkway	69	4527	1553	4700	1567	4711	1568	4713
29455	Patton Road Jct.	69	6264	1970	6512	1987	6533	1989	6535
29538	Summer Shade	69	11165	2668	11554	2683	11608	2686	11615
29539	Summershade Jct.	69	10939	2642	11319	2657	11371	2660	11378
29557	Upton Junction	69	4700	1718	4719	1721	4719	1722	4732
29623	Hardcastle	69	5442	3306	8196	4823	8383	4946	8401
29625	E. Bowling Green	69	11760	8987	14221	10731	14767	11330	14820
29635	W. Bowling Green	69	3393	2018	4612	2716	4665	2750	4670
29666	H23	69	1783	1048	3579	2094	3609	2113	3612

**TABLE 10**  
**East Kentucky Power Cooperative System Study**  
**Short Circuit Analysis - Percent Change from Case A**

#	Bus		Case A		Case B		Case C		Case C2	
	Name	kV	Three Phase amps	Line-Ground amps	Three Phase % change	Line-Ground % change	Three Phase % change	Line-Ground % change	Three Phase % change	Line-Ground % change
62	East Bowling Green	161	12082	6818	19.0%	20.6%	31.9%	34.0%	33.3%	35.2%
63	Aberdeen	161	5797	3354	-42.3%	-44.9%	20.6%	20.9%	23.7%	22.4%
64	Memphis Junction	161	9109	5057	28.4%	30.3%	40.5%	42.9%	41.7%	44.0%
91	General Motors	161	11917	6725	19.7%	21.3%	32.9%	35.0%	34.3%	36.2%
93	Bristow	161	10920	6168	0.1%	0.3%	7.7%	8.1%	8.5%	8.7%
94	Magna	161	10079	5675	18.4%	19.5%	28.3%	29.6%	29.3%	30.5%
4081	Wilson	161	19805	21203	0.0%	0.0%	9.2%	7.1%	61.3%	49.0%
18012	Paradise	161	30573	21805	1.2%	1.1%	2.6%	2.2%	21.9%	20.3%
18027	Summer	161	13612	8904	7.4%	7.2%	9.2%	8.8%	9.4%	8.9%
18029	Wolf Creek	161	12730	12903	1.7%	1.3%	2.1%	1.6%	2.2%	1.7%
18416	Memphis Junction	161	9139	5066	28.1%	30.2%	40.3%	42.8%	41.5%	43.9%
18476	Sullivan	161	22175	13801	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18691	Bowling Green	161	12636	7216	6.7%	7.2%	14.6%	15.1%	16.4%	16.6%
18692	E. Bowling Green	161	12283	6922	18.0%	19.6%	30.6%	32.7%	32.0%	34.0%
18695	Franklin Ky	161	7980	4321	10.3%	11.9%	14.1%	15.6%	14.5%	15.9%
18697	Scottsville	161	7538	4024	2.4%	2.5%	5.2%	5.0%	5.5%	5.2%
18796	Portland Switching Station	161	10151	5590	3.8%	4.2%	5.9%	6.1%	6.2%	6.3%
18842	N. Bristol	161	5923	3806	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

#	Bus		Case A		Case B		Case C		Case C2	
	Name	kV	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground
			amps	amps	% change	% change	% change	% change	% change	% change
18926	Aberdeen Tap	161	10722	5971	2.8%	2.6%	4.8%	4.5%	8.4%	7.2%
18928	S. Bowling Green Tap	161	10504	5939	13.2%	13.6%	22.0%	22.5%	23.4%	23.7%
19006	Glasgow Tap	161	7473	4366	1.5%	1.6%	3.9%	4.0%	4.1%	4.2%
19007	Bristow Tap	161	11024	6224	13.8%	15.0%	23.5%	25.1%	24.6%	26.0%
19031	S. Scotsville	161	7595	4055	2.0%	2.0%	4.5%	4.3%	4.8%	4.5%
19156	Westmoreland	161	8454	4652	0.5%	0.7%	2.0%	2.0%	2.2%	2.1%
19578	Blount Tap	161	9799	6141	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27157	Green River	161	18771	10869	0.0%	0.0%	4.0%	1.7%	21.0%	9.7%
29205	Barren Co.	161	4809	2733	60.2%	60.1%	63.7%	63.4%	64.0%	63.7%
29537	Summer Shade	161	13550	8864	7.5%	7.3%	9.3%	8.9%	9.5%	9.0%
27006	Bonnieville	138	5152	1635	0.5%	0.1%	0.5%	0.1%	0.8%	5.9%
27158	Green River	138	21776	2685	0.0%	0.0%	1.9%	0.2%	9.6%	6.3%
27317	Ohio County	138	10216	2231	0.0%	0.0%	0.6%	0.1%	3.2%	5.4%
27412	Shrewsbury	138	5249	1652	0.2%	0.0%	0.2%	0.0%	0.7%	4.8%
65	Memphis Junction	69	12002	8375	27.8%	28.5%	34.0%	36.7%	34.6%	37.4%
72	Auburn	69	1717	1109	117.8%	98.8%	119.7%	100.7%	119.8%	100.8%
77	Woodburn	69	4561	2963	45.3%	46.3%	47.7%	49.3%	47.9%	49.6%
78	Anaconda	69	2550	1900	122.9%	102.6%	125.7%	105.8%	126.0%	106.0%
79	Salmons	69	2801	2126	108.0%	88.6%	110.6%	91.6%	110.9%	91.9%
85	Plano	69	4685	2694	49.0%	47.1%	52.1%	50.3%	52.3%	50.5%

#	Bus		Case A		Case B		Case C		Case C2	
	Name	kV	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground	Three Phase	Line-Ground
			amps	amps	% change	% change	% change	% change	% change	% change
87	Greenwood	69	4211	2397	81.3%	82.2%	85.3%	86.5%	85.6%	86.8%
88	Weyerhauser	69	8944	5713	30.5%	28.6%	35.3%	34.0%	35.7%	34.4%
90	Franklin Ky	69	3948	3356	46.8%	36.8%	48.5%	38.9%	48.7%	39.1%
27007	Bonnieville	69	4604	1011	0.1%	0.1%	0.1%	0.1%	0.5%	0.2%
27207	Indian Hill	69	8558	1353	0.0%	0.1%	0.3%	0.1%	1.3%	0.2%
27238	Leitchfield	69	7182	2075	0.3%	0.4%	0.3%	0.5%	0.6%	0.6%
27259	Ohio County	69	8871	1376	0.0%	0.1%	0.2%	0.2%	1.2%	0.3%
29206	Barren Co.	69	6922	1609	12.3%	1.8%	12.9%	1.9%	13.0%	1.9%
29220	Bonnieville	69	6361	1614	1.2%	0.3%	1.2%	0.3%	1.4%	0.3%
29249	Coburg	69	2368	1498	0.2%	0.1%	0.3%	0.1%	0.3%	0.2%
29250	Coburg_Jct	69	4063	2035	0.4%	0.1%	0.5%	0.2%	0.5%	0.2%
29255	Columbia	69	3918	2003	0.5%	0.2%	0.5%	0.2%	0.5%	0.2%
29303	Fox Hollow	69	5684	1790	4.8%	1.0%	5.2%	1.1%	5.2%	1.1%
29314	Goodnight	69	6025	1617	8.7%	1.5%	9.2%	1.6%	9.2%	1.6%
29315	Gorin Park Jct.	69	5585	1723	5.5%	1.1%	5.8%	1.2%	5.9%	1.2%
29321	Green County	69	8521	1751	0.8%	0.2%	1.0%	0.2%	1.0%	0.2%
29339	Horse Cave KU	69	5525	1523	7.4%	1.3%	7.8%	1.4%	7.8%	1.5%
29352	JB Galloway Jct.	69	5183	1815	1.2%	0.3%	1.4%	0.4%	1.5%	0.4%
29354	Temple Hill	69	5686	1882	3.2%	0.7%	3.5%	0.8%	3.5%	0.8%
29379	Knoblick	69	4383	1605	0.9%	0.2%	1.0%	0.3%	1.0%	0.3%

Bus		Case A		Case B		Case C		Case C2		
#	Name	kV	Three Phase amps	Line-Ground amps	Three Phase % change	Line-Ground % change	Three Phase % change	Line-Ground % change	Three Phase % change	Line-Ground % change
29418	McKinney's Corner Jct	69	5453	1612	0.7%	0.2%	0.8%	0.2%	0.8%	0.2%
29427	Munfordville EKPC	69	4826	1505	2.5%	0.6%	2.6%	0.6%	2.7%	0.6%
29428	Munfordville KU	69	4748	1482	3.2%	0.7%	3.3%	0.8%	3.4%	0.8%
29454	Parkway	69	4527	1553	3.8%	0.9%	4.1%	1.0%	4.1%	1.0%
29455	Patton Road Jct.	69	6264	1970	4.0%	0.8%	4.3%	0.9%	4.3%	0.9%
29538	Summer Shade	69	11165	2668	3.5%	0.6%	4.0%	0.7%	4.0%	0.7%
29539	Summershade Jct.	69	10939	2642	3.5%	0.6%	3.9%	0.7%	4.0%	0.7%
29557	Upton Junction	69	4700	1718	0.4%	0.2%	0.4%	0.2%	0.7%	0.3%
29623	Hardcastle	69	5442	3306	50.6%	45.9%	54.0%	49.6%	54.4%	49.9%
29625	E. Bowling Green	69	11760	8987	20.9%	19.4%	25.6%	26.1%	26.0%	26.7%
29635	W. Bowling Green	69	3393	2018	36.0%	34.6%	37.5%	36.3%	37.7%	36.5%
29666	H23	69	1783	1048	100.7%	99.8%	102.4%	101.6%	102.6%	101.8%

## EXHIBITS

- Exhibit 1 Proposed EKPC/Warren Transmission Additions  
Dwg Tol04, Rev. 4
- Exhibit 2 Transmission Map
- Exhibit 2a Insert A – Bowling Green
- Exhibit 3 Case A One-Line Diagram
- Exhibit 4 Case B One-Line Diagram
- Exhibit 5 Case C One-Line Diagram
- Exhibit 6 Transient Stability
  - 6-1 Case A2, 12 cycle – stable
  - 6-2 Case A2, 13 cycle – unstable
  - 6-3 Case C2, 12 cycle – stable
  - 6-4 Case C2, 13 cycle – unstable







**Proposed WREC Transmission Supply**  
**East Kentucky Power Cooperative**  
 Revised December 1, 2004  
 Scale: 1" = 6 miles (1:380,160)

**Note:** The routes for proposed lines have not been determined. The routing of the proposed lines is for conceptual purposes only.

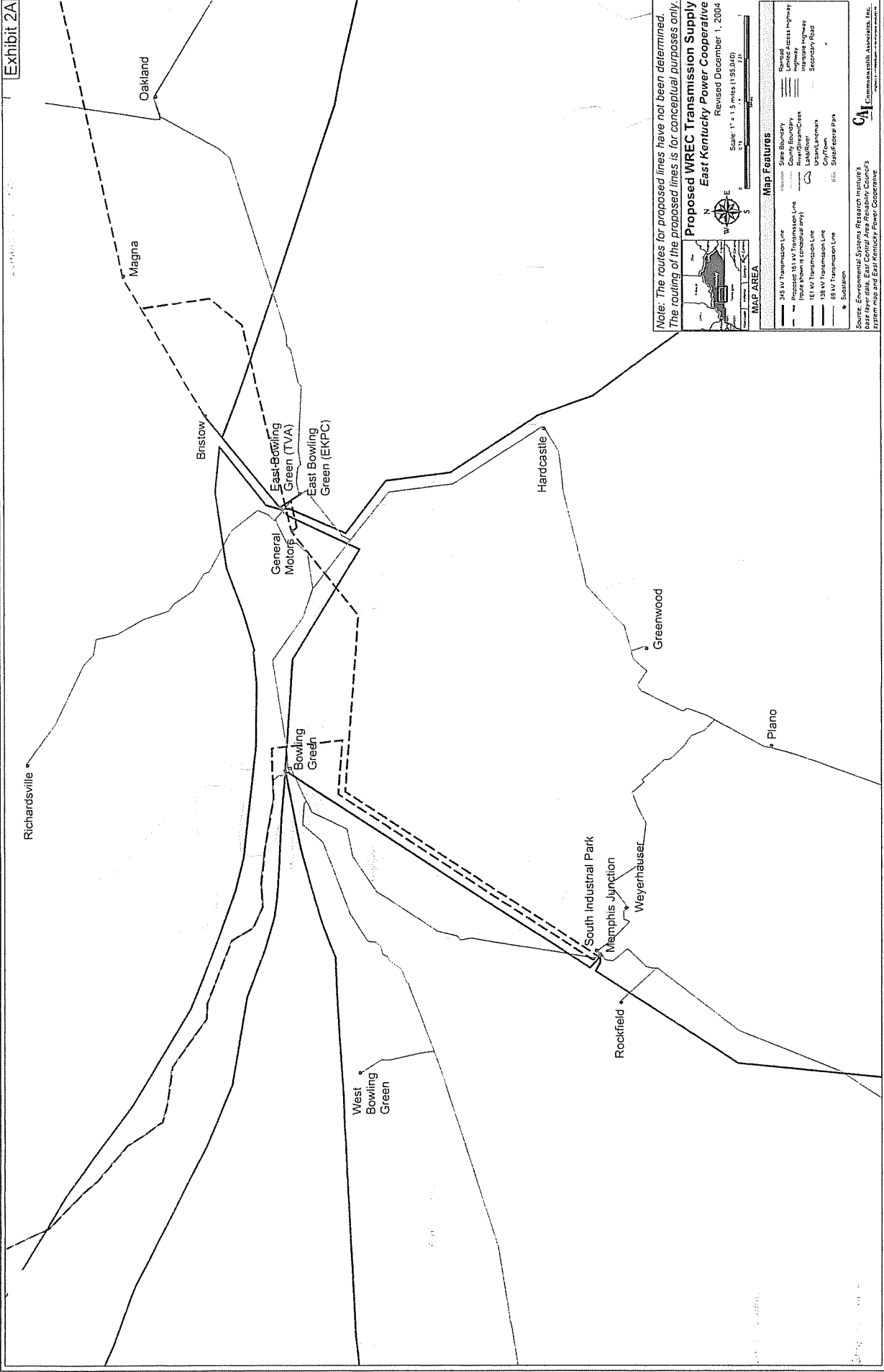
**MAP AREA**

**Map Features**

- 138 kV Transmission Line
- 151 kV Transmission Line (route shown is conceptual only)
- 161 kV Transmission Line
- 69 kV Transmission Line
- Station
- State Boundary
- County Boundary
- River/Stream/Creek
- Levee/Barrier
- City/Town
- State/Federal Park
- Revised
- Unrevised
- Access Highway
- Interstate Highway
- Primary Highway
- Secondary Road

Source: Environmental Systems Research Institute's base layer data, East Central Area Reliability Council's System map and East Kentucky Power Cooperative.

**CAI**  
 COMMERCIAL INSURANCE ASSOCIATION, INC.



Note: The routes for proposed lines have not been determined. The routing of the proposed lines is for conceptual purposes only.

**Proposed WREC Transmission Supply**  
**East Kentucky Power Cooperative**  
 Revised December 1, 2004

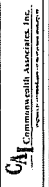
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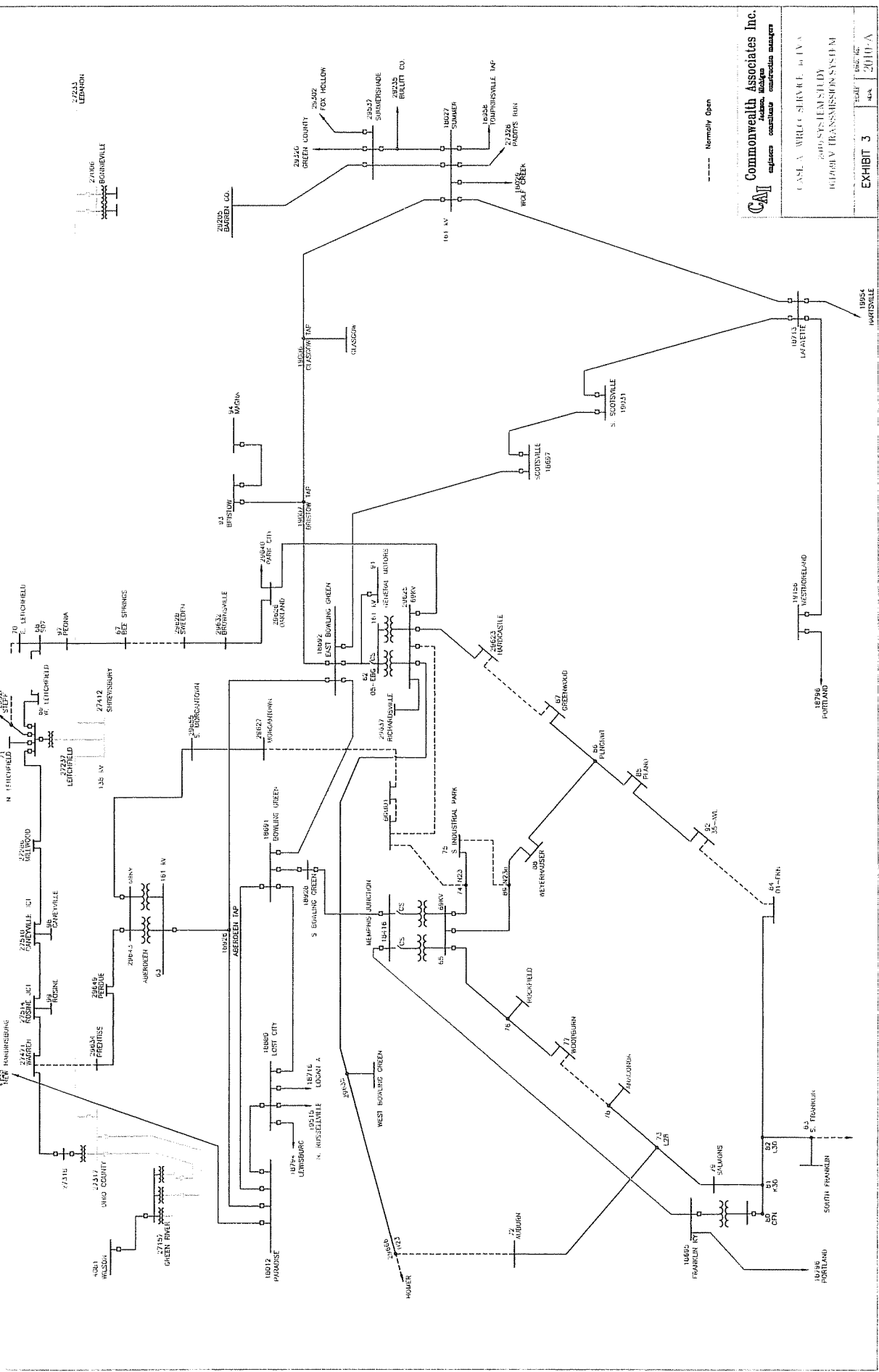
**MAP AREA**

**MAP FEATURES**

345 kV Transmission Line	State Boundary
Proposed 161 kV Transmission Line	United States Highway
Proposed 138 kV Transmission Line	Highway
Proposed 69 kV Transmission Line	County Boundary
Substation	Water
	Lake/River
	Drainage
	State/Federal Park

Source: Environmental Systems Research Institute's base layer data, East Central Area Reliability Council's system map and East Kentucky Power Cooperative.

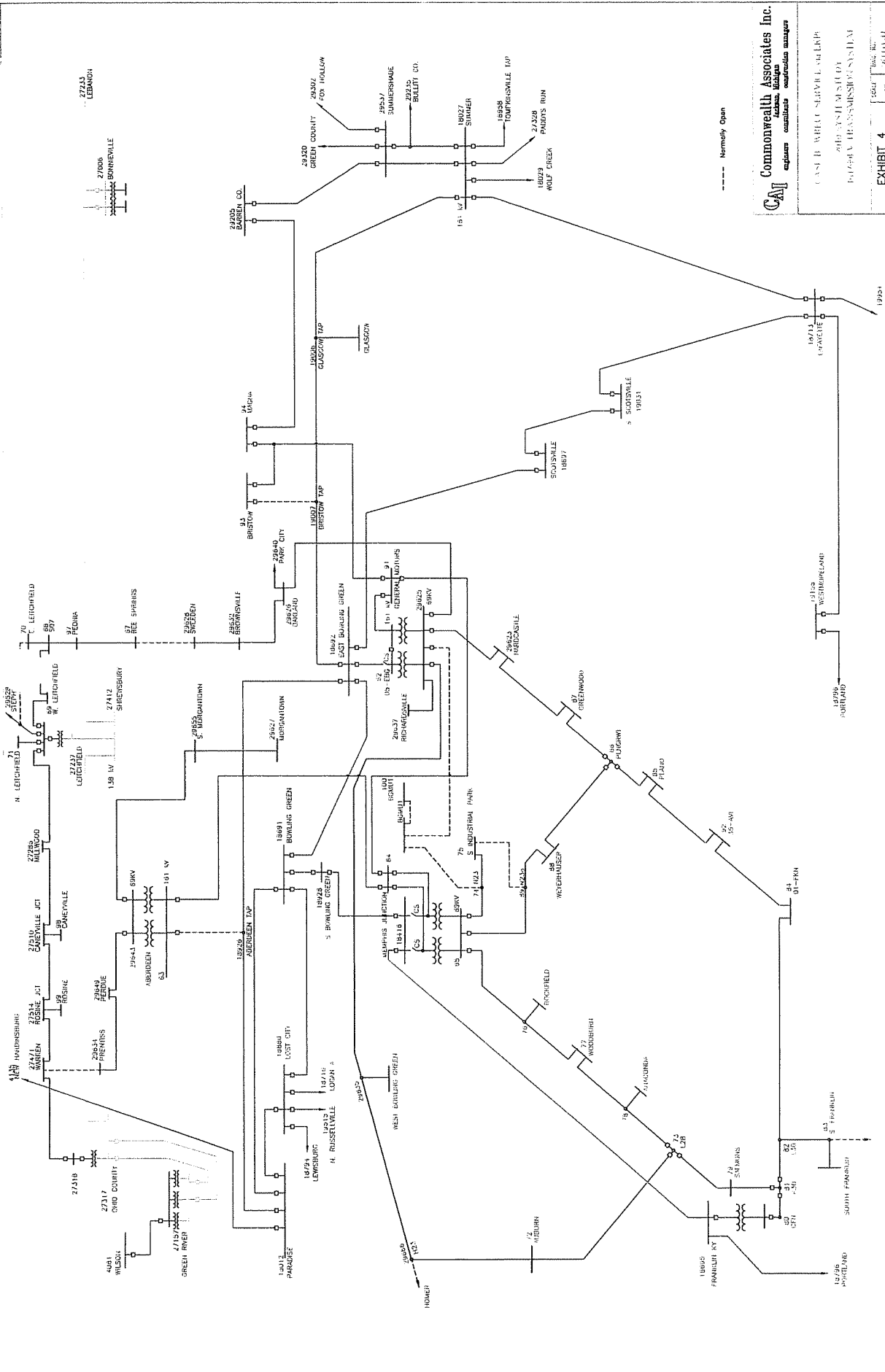




**CAI** Commonwealth Associates Inc.  
 electrical construction manager

CASLA WRECC SERVICE BY A  
 TRANSMISSION SYSTEM  
 16100 V TRANSMISSION SYSTEM

Scale: 1" = 1000'  
 Date: 12/01/04  
 Job No: 2010-A

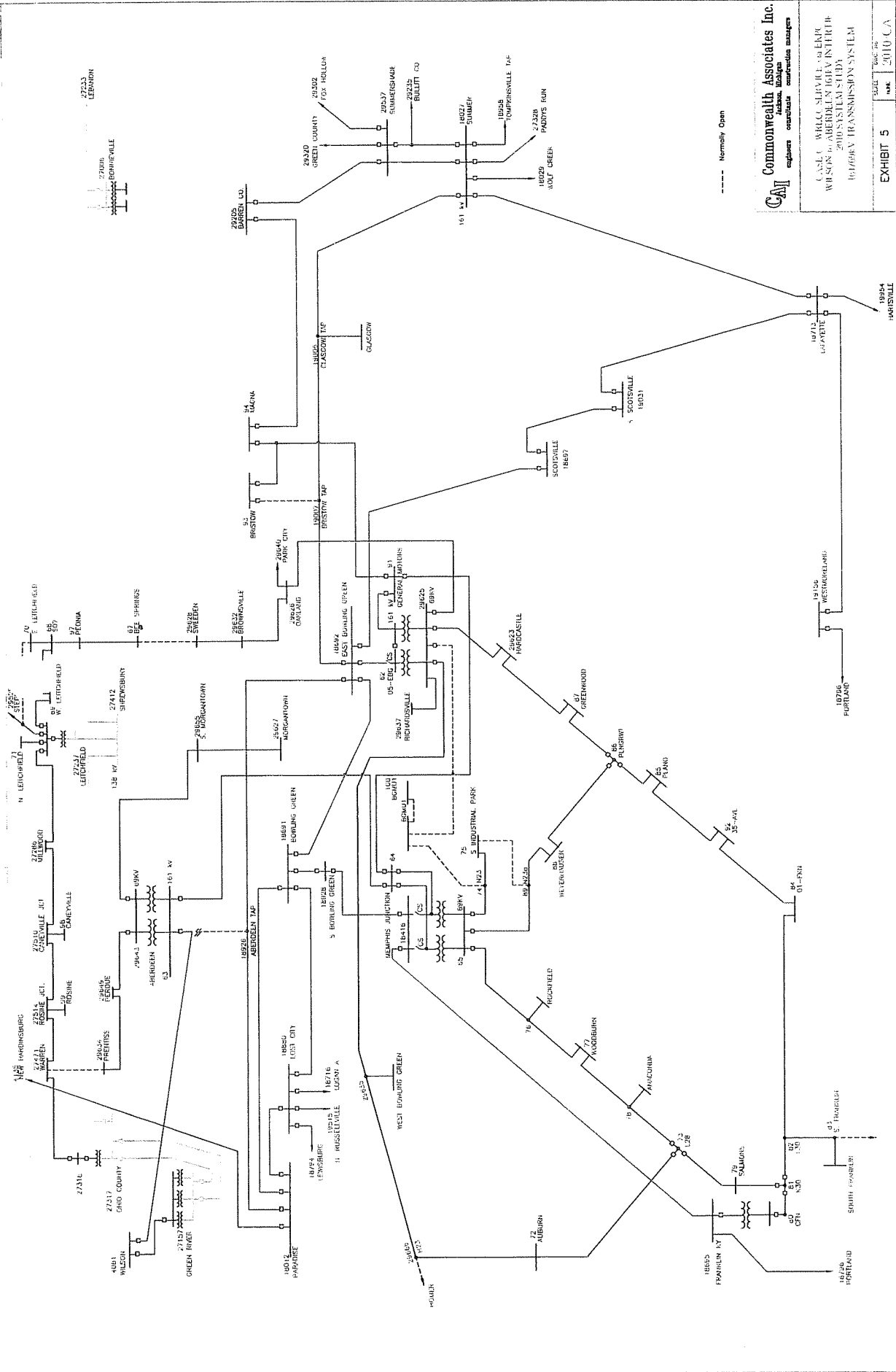


--- Normally Open

**Commonwealth Associates Inc.**  
*Electric Engineers*  
 engineers electricians construction managers

CASE B WHELO SURVEILLANCE  
 2007 SYSTEM STUDY  
 10/25/04 TRANSMISSION SYSTEM

**EXHIBIT 4**  
 CASE NO. 2010 E  
 DATE 12/29/04



--- Normally Open

**Commonwealth Associates Inc.**  
 engineers consultants construction managers

CASE: WELLS SERVICE CENTER  
 WELLS IN ABERDEEN HIGH INTERMEDIATE  
 2000 SYSTEM STUDY  
 167096 X TRANSMISSION SYSTEM

EXHIBIT 5  
 DATE: 12/09/04  
 DRAWING NO: 31104-C/A

Figure 6-1a  
 CASE A2 - WREC Service via TVA with Thoroughbred Energy Center  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles

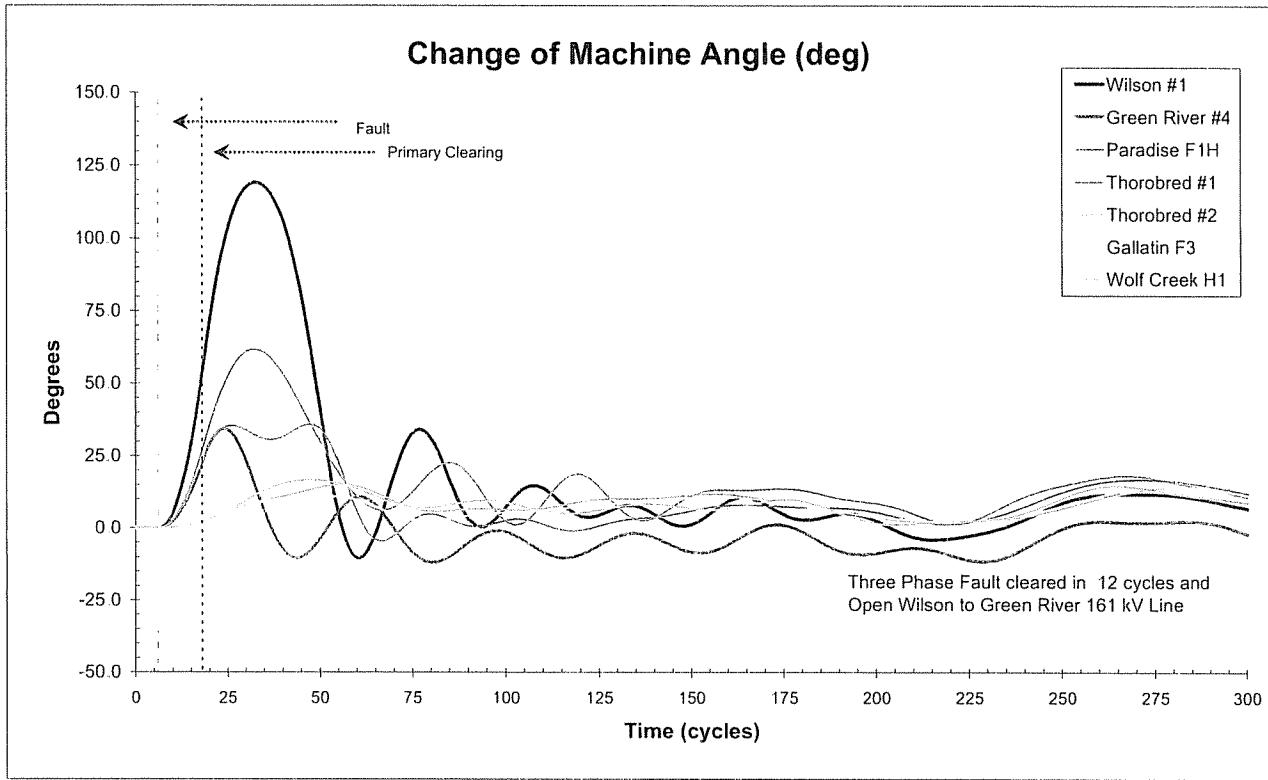
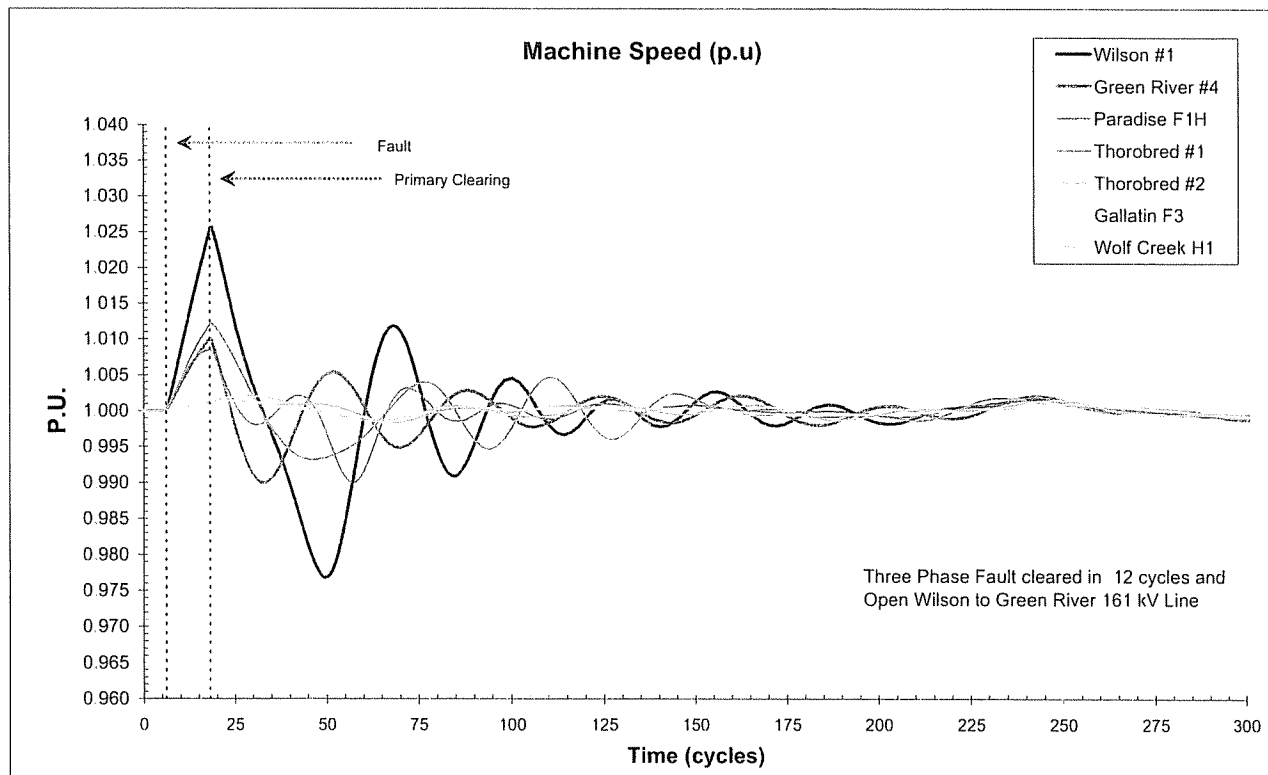
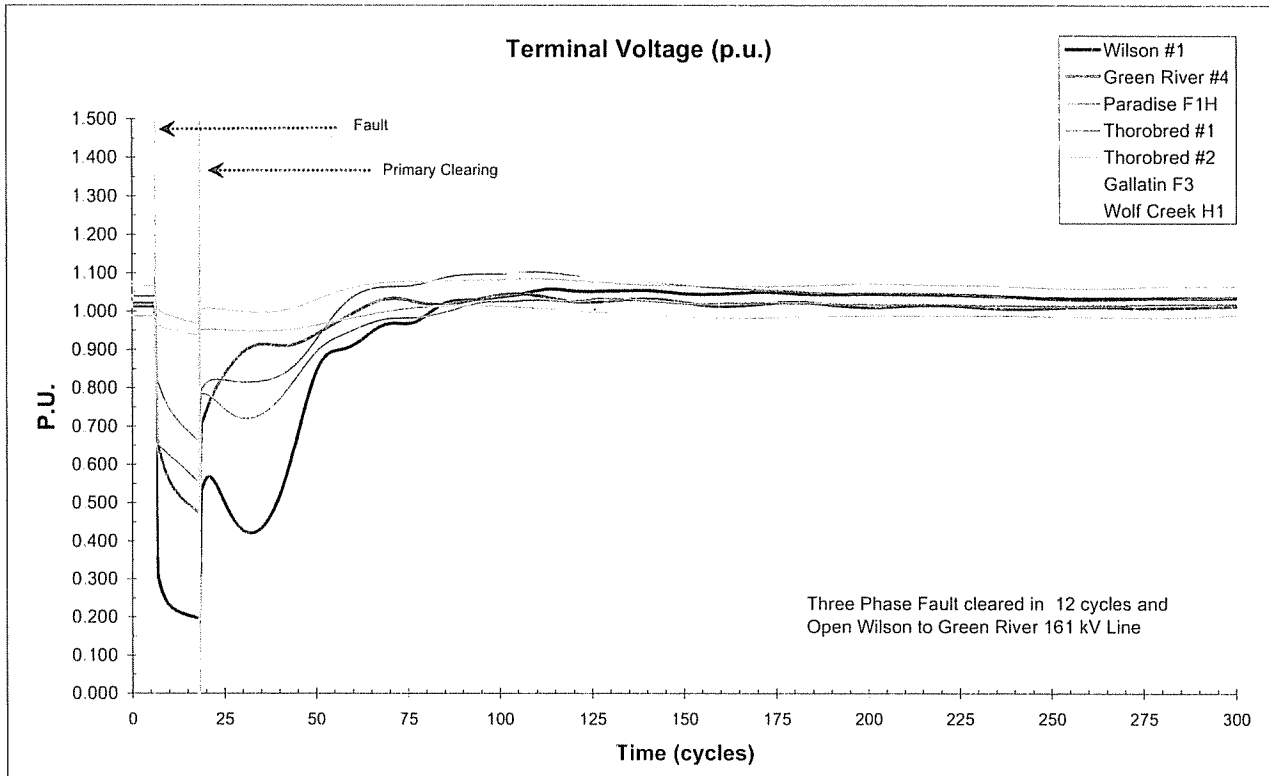


Figure 6-1b  
 CASE A2 - WREC Service via TVA with Thoroughbred Energy Center  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles



**Figure 6-1c**  
**CASE A2 - WREC Service via TVA with Thoroughbred Energy Center**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles**



**Figure 6-1d**  
**CASE A2 - WREC Service via TVA with Thoroughbred Energy Center**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles**

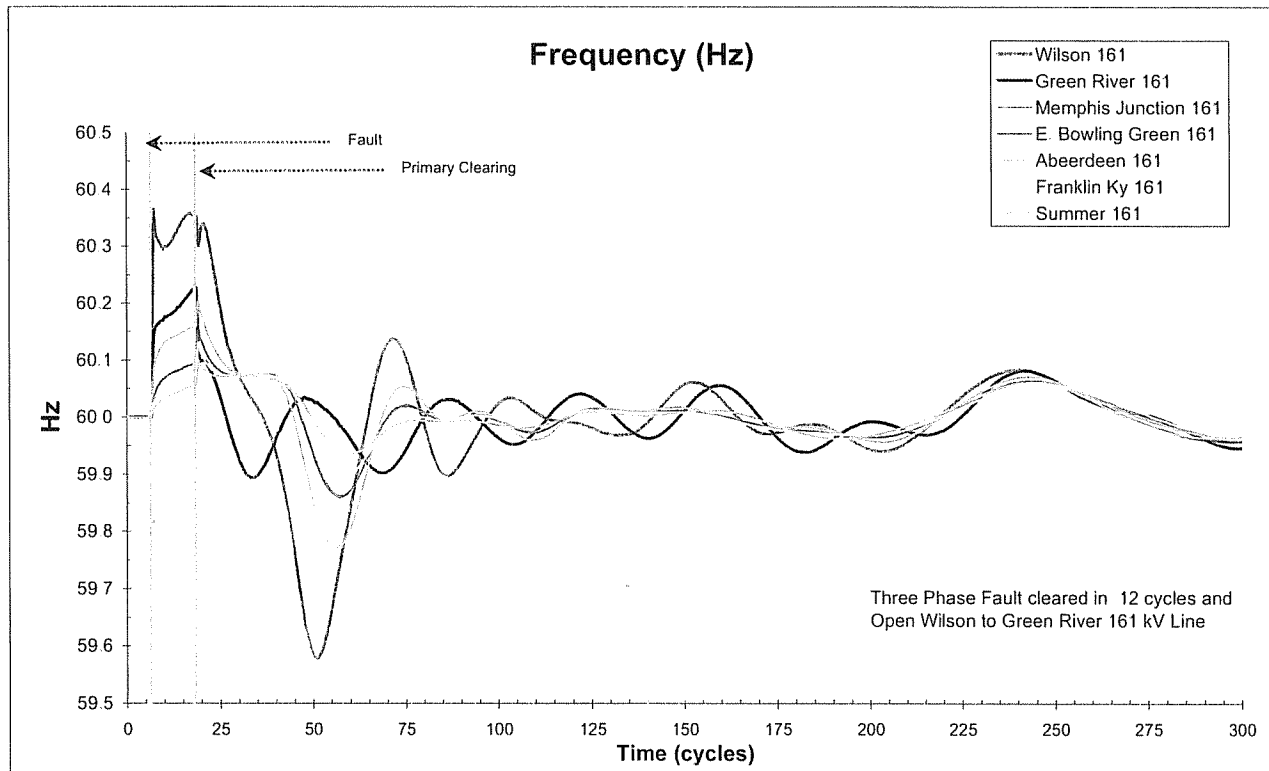




Figure 6-2a  
 CASE A2 - WREC Service via TVA with Thoroughbred Energy Center  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles

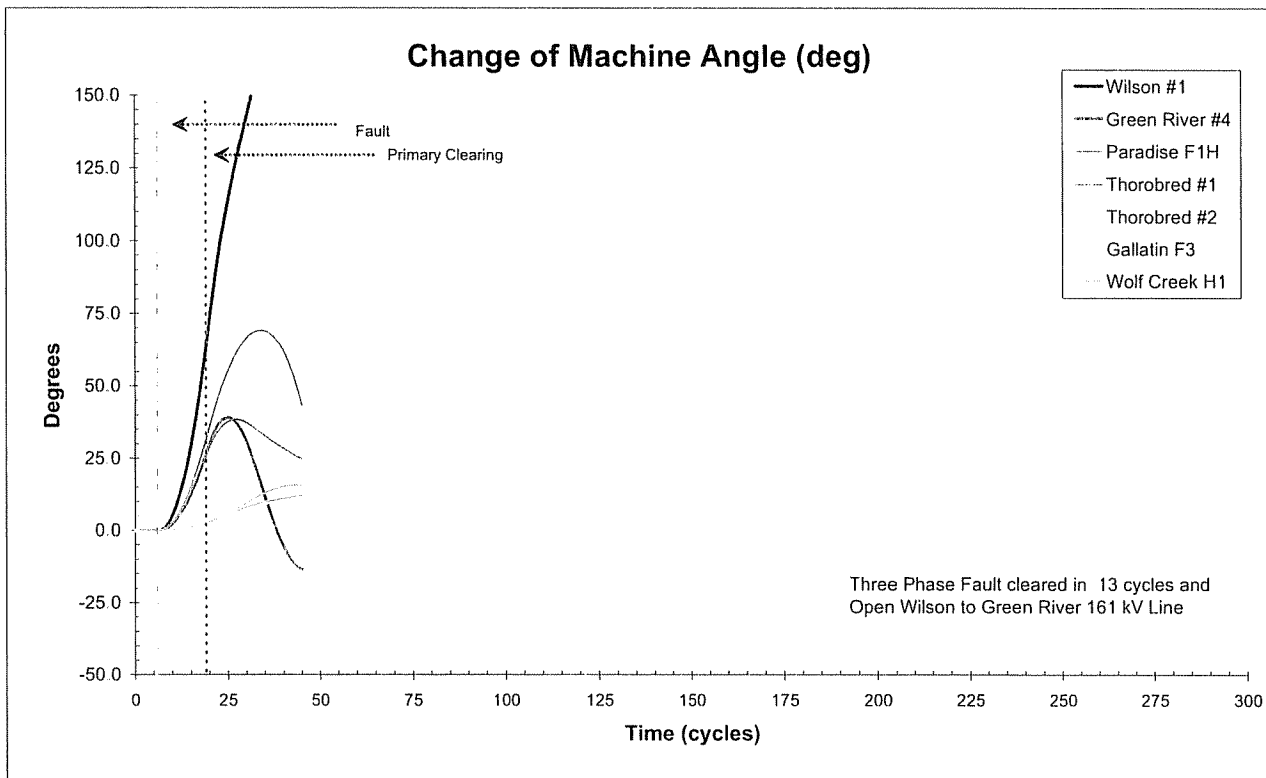
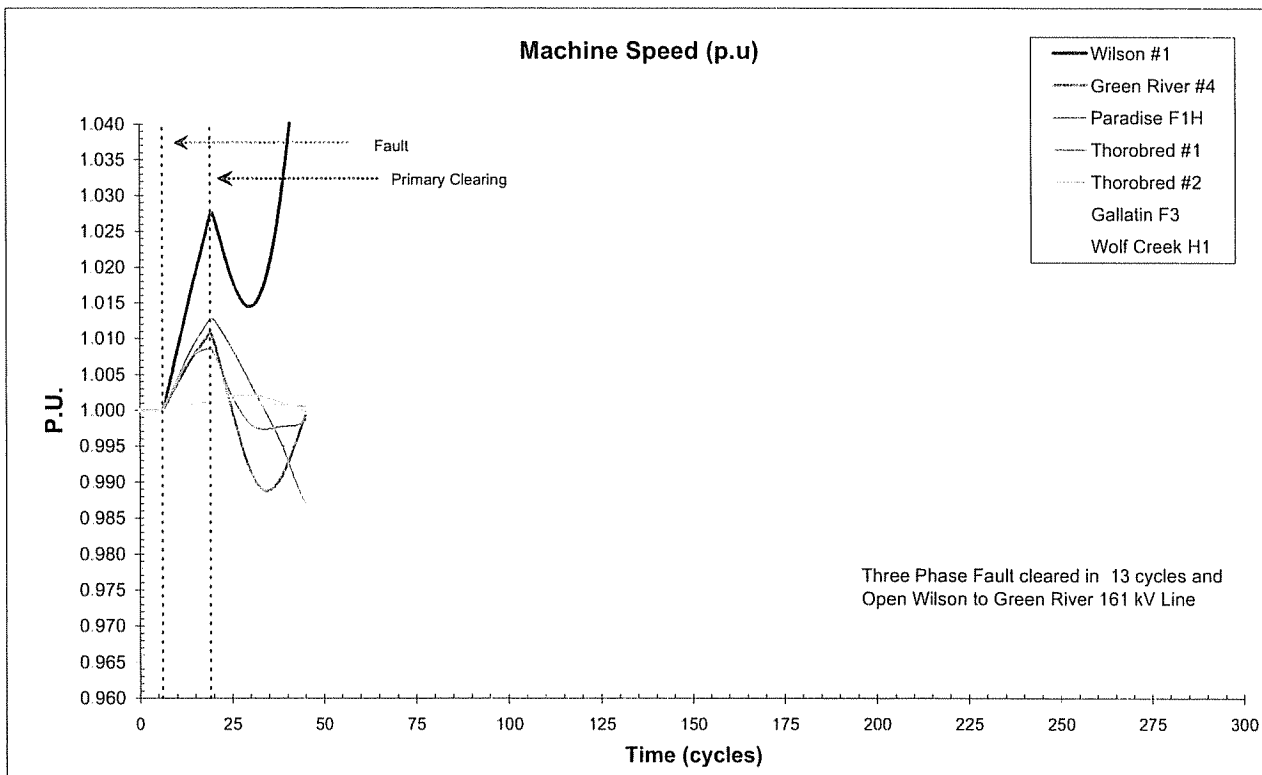
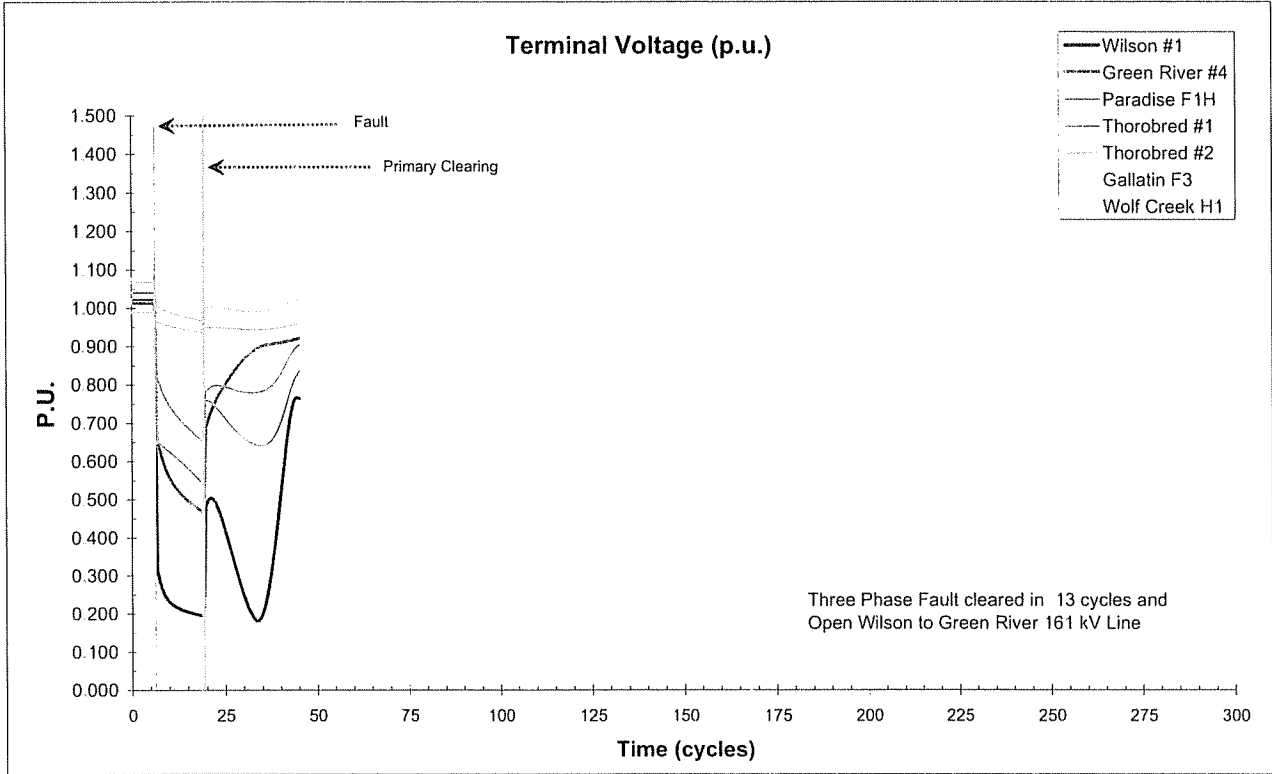


Figure 6-2b  
 CASE A2 - WREC Service via TVA with Thoroughbred Energy Center  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles



**Figure 6-2c**  
**CASE A2 - WREC Service via TVA with Thoroughbred Energy Center**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles**



**Figure 6-2d**  
**CASE A2 - WREC Service via TVA with Thoroughbred Energy Center**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles**

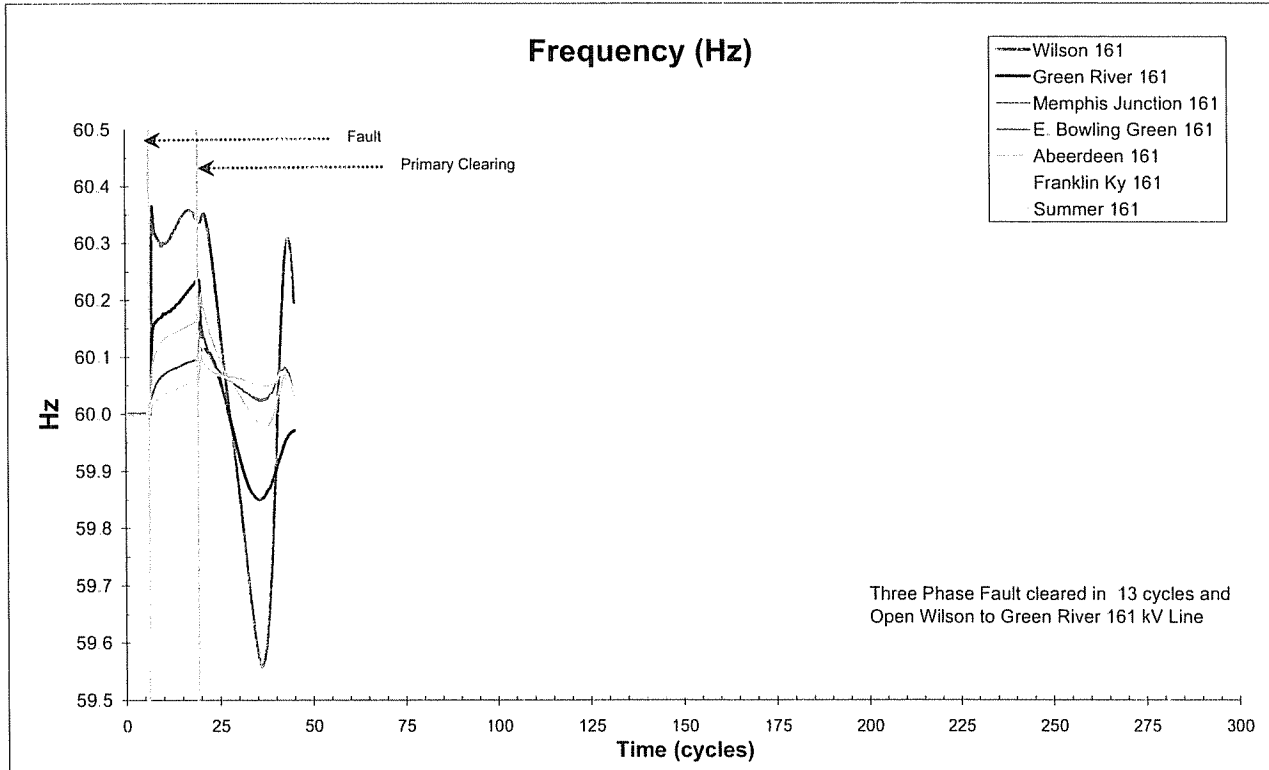


Figure 6-3a  
 CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles

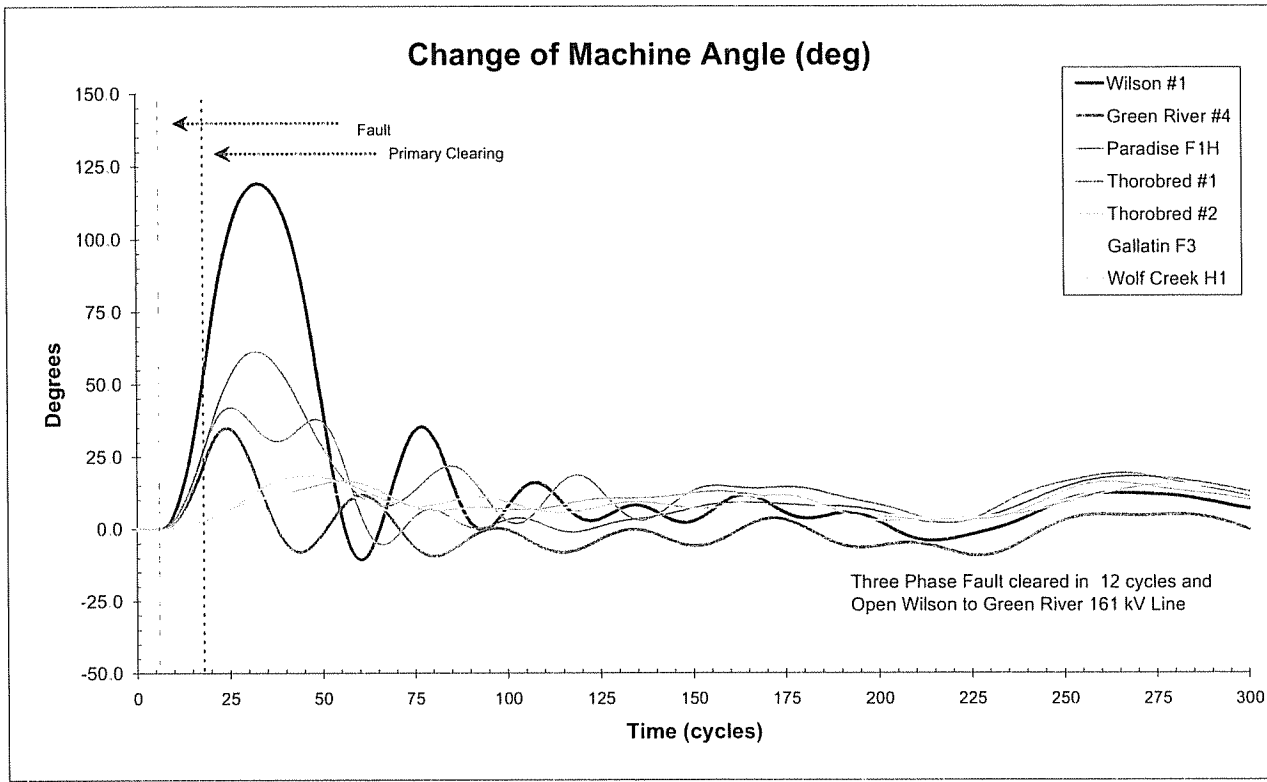
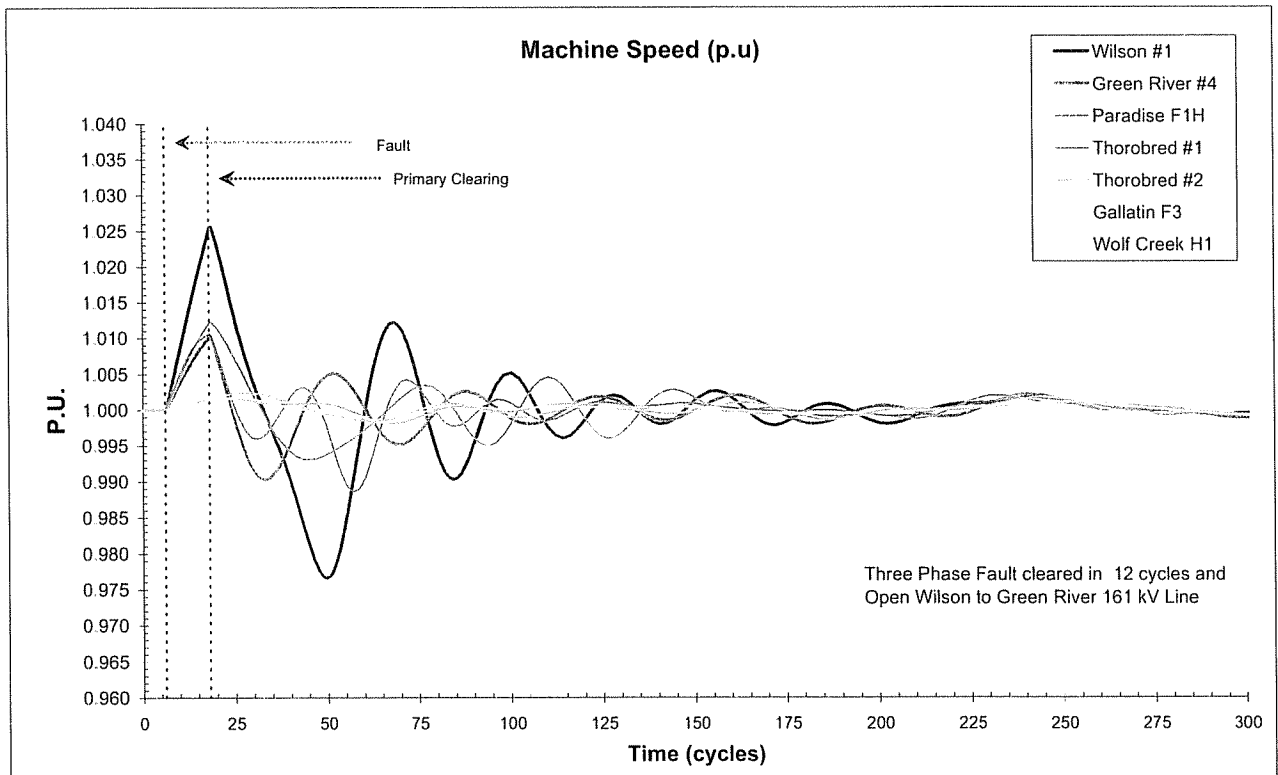
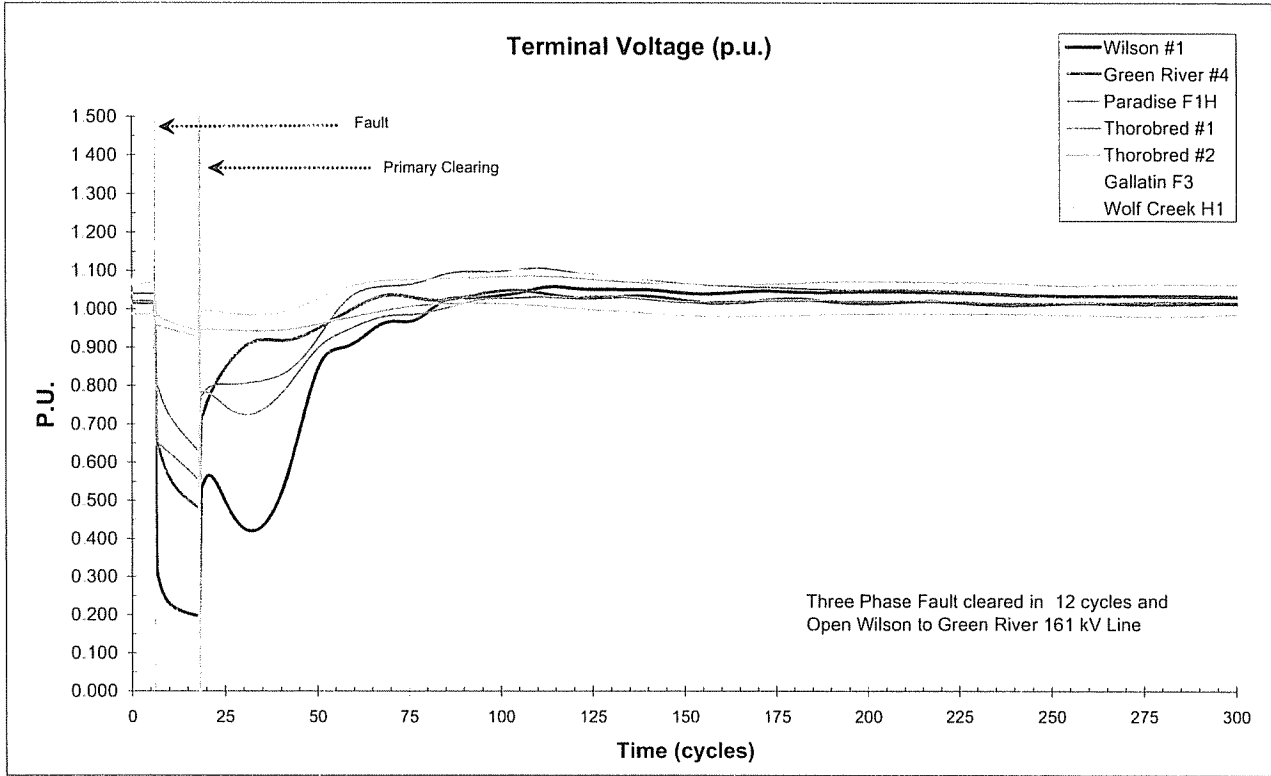


Figure 6-3b  
 CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles



**Figure 6-3c**  
**CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles**



**Figure 6-3d**  
**CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 12 cycles**

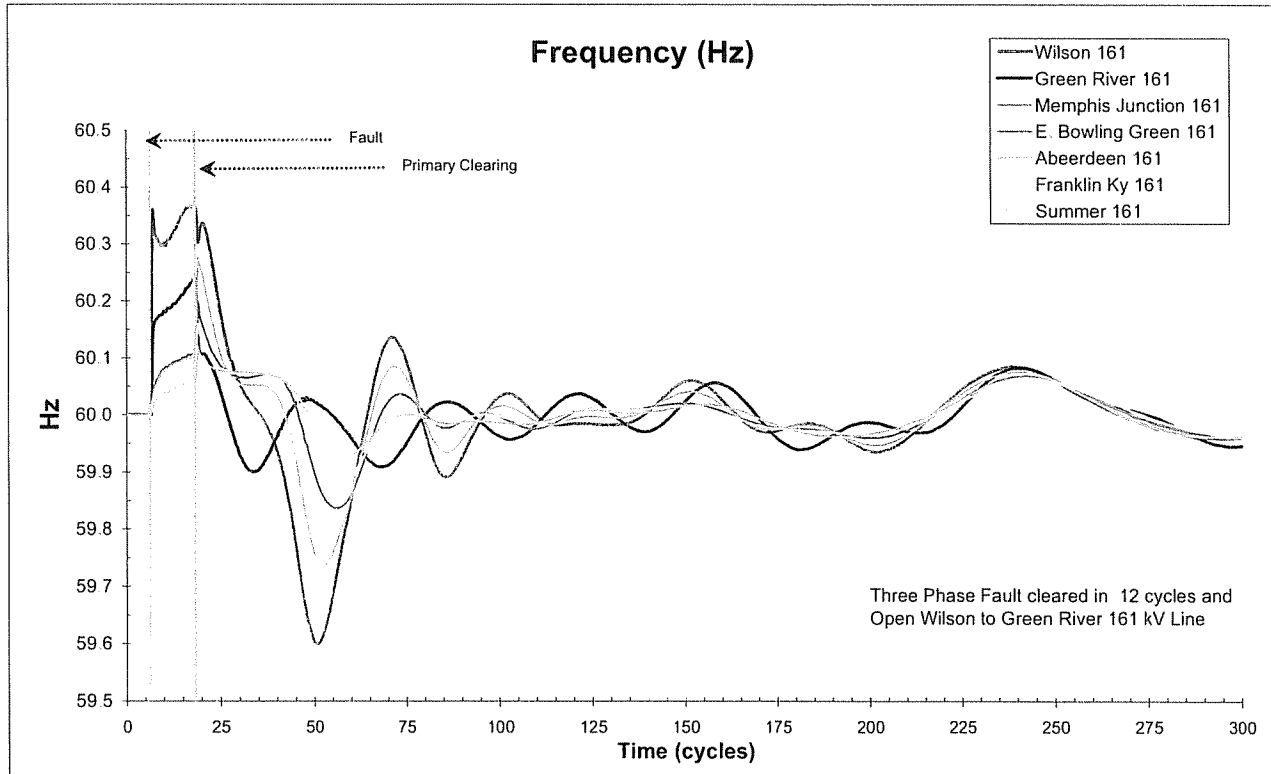


Figure 6-4a  
 CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles

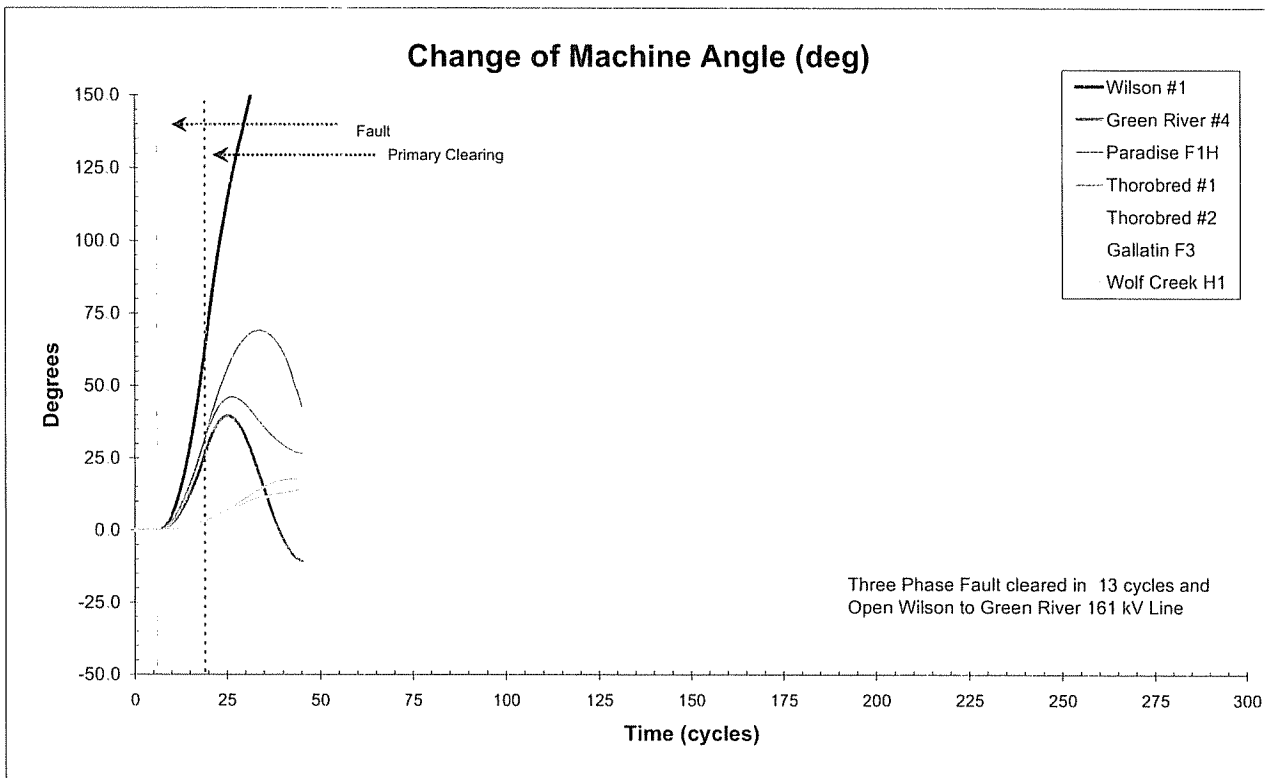
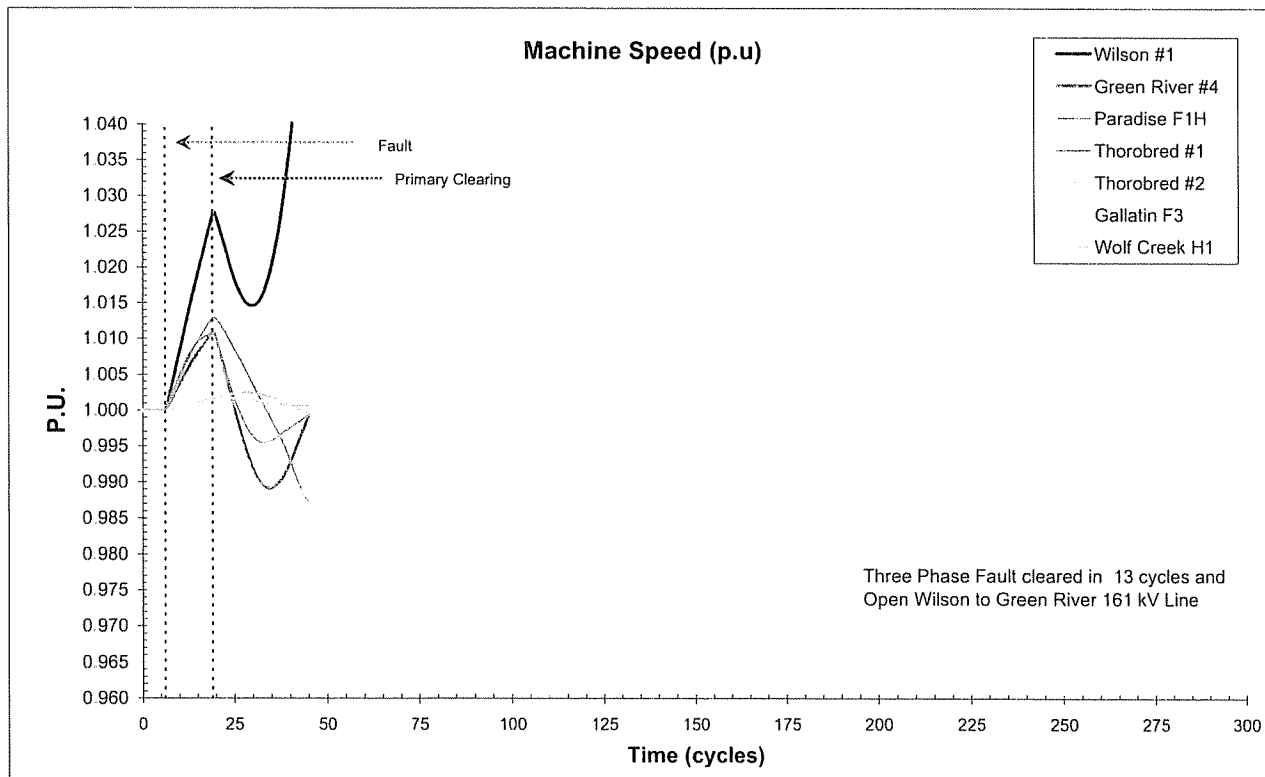
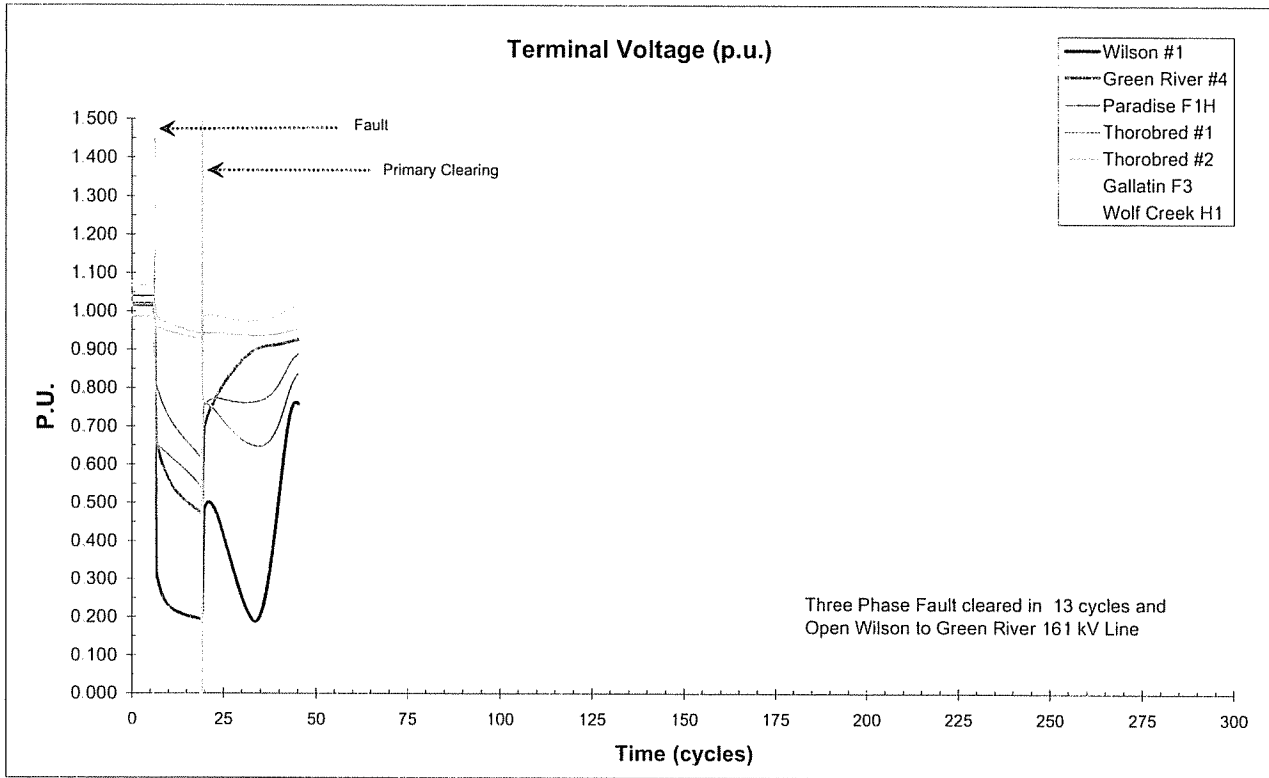


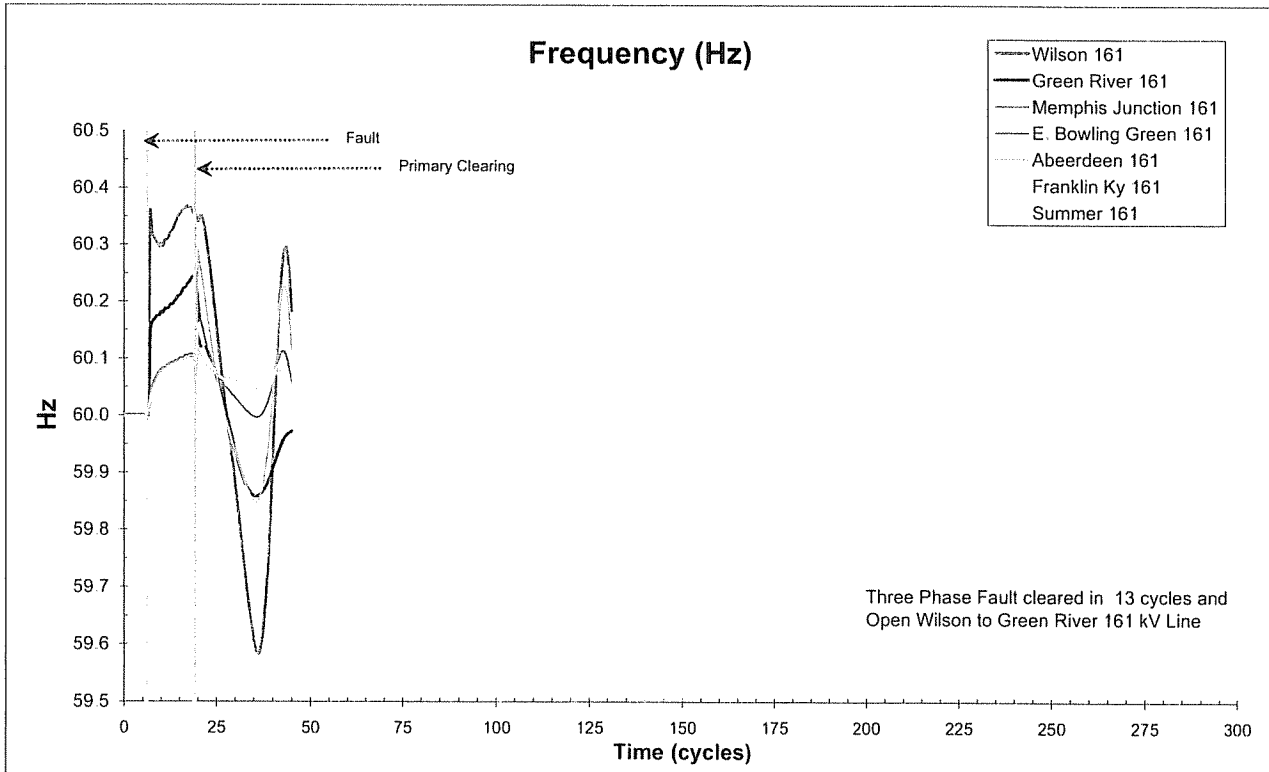
Figure 6-4b  
 CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC  
 Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles



**Figure 6-4c**  
**CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles**



**Figure 6-4d**  
**CASE C2 - WREC Service via EKPC with Thoroughbred Energy Center & Tie to BREC**  
**Three Phase Fault on Wilson to Green River 161 kV - Total Clearing, 13 cycles**





**ADDENDUM STUDY**

**TRANSMISSION SERVICE TO  
WARREN RURAL ELECTRIC COOPERATIVE**

Prepared for



Prepared by:

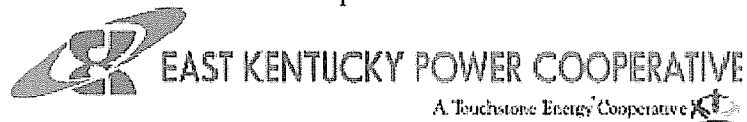




**ADDENDUM STUDY**

**TRANSMISSION SERVICE TO  
WARREN RURAL ELECTRIC COOPERATIVE**

Prepared for

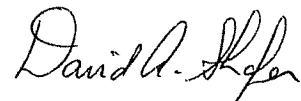


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R.S. Smith

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P.O. Box 1124  
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May 26, 2005  
324001/403

Approved for submittal:



David A. Shafer, P.E.  
Manager, Electrical Systems

## TABLE OF CONTENTS

INTRODUCTION .....	1
SUMMARY OF RESULTS AND CONCLUSIONS .....	2

### EXHIBITS

Exhibit 1	Transmission Map
Exhibit 2	Case C Rev. 6 One-Line Diagram

### APPENDIX A

Case C Rev. 6 Reports
-----------------------

## **INTRODUCTION**

### **Background and Purpose**

The Warren Rural Electric Cooperative (WRECC) is presently provided wholesale power by the Tennessee Valley Authority (TVA). WRECC has requested power supply and participation as a member of the East Kentucky Power Cooperative (EKPC). The target date for this service is April 2008.

Commonwealth Associates, Inc. (CAI) prepared a transmission service study to evaluate transmission requirements. A report summarizing the study was completed on January 27, 2005. Since that time minor changes have been proposed to the transmission system. The purpose of this addendum is to document and evaluate these changes.

### **Transmission System Modifications**

The transmission system changes are listed below and shown on the attached one-line.

1. Change Barren County-Magna 161 kV line length from 24 miles to 26 miles.
2. Upgrade the existing East Bowling Green-Oakland 69 kV line with a new 69 kV line consisting of 954 ACSS conductor. This new line will have a length of approximately 8.5 miles. The new ratings are 143/143 MVA summer normal/emergency.
3. Add a circuit breaker at the EKPC East Bowling Green station to eliminate the three-terminal line between TVA EBG-EKPC EBG-GM. Put one transformer on each side of the breaker at EKPC's EBG.

Note: This change was studied and included in the January report – Phase 2, Case C.

4. Eliminate the BGMU Tap-Memphis Junction 161 kV line and instead loop the line from GM and Aberdeen through Memphis Junction. The distances are as follows:
  - a. GM-Memphis Junction 161 kV – 13.5 miles
  - b. Memphis Junction-Aberdeen 161 kV – 28 miles

Note: This change was studied and included in the January report – Phase 2, Case C.

5. Open the Warren 69 kV connection with the City of Franklin. Install a 161-69 kV, 100 MVA transformer at Salmons. Connect the Salmons 161 kV bus to the TVA Franklin-Memphis Junction 161 kV line at a point 2.2 miles from the Franklin bus. Add a second Salmons-L28 circuit to loop the lines from Anaconda and Auburn into the Salmons substation.
6. The 69 kV three-breaker station that was identified at PLNGRWT in the January 27 report will instead be built at Plano. A second PLNGRWT-Plano 69 kV line will be built

(1.1 miles) using 556 MCM ACSR conductor to loop the lines from Memphis Junction and East Bowling Green through the new Plano station. The new ratings are 90/111 MVA summer normal/emergency.

7. The existing East Bowling Green-West Bowling Green 69 kV line will be eliminated. A new 69 kV line from Memphis Junction to West Bowling Green will be constructed (3.5 miles) using 556 MCM ACSR conductor. The new ratings are 90/111 MVA summer normal/emergency.
8. Add an Aberdeen-Morgantown 69 kV line (5 miles) using 556 MCM ACSR conductor. Open the existing Morgantown-South Morgantown 69 kV line. The new ratings are 90/111 MVA summer normal/emergency.
9. Remove the Franklin 69 kV capacitor.

## **SUMMARY OF RESULTS AND CONCLUSIONS**

### **Power Flow Base Case**

The above-listed changes were incorporated into the study base case. The new case is labeled Case C, Rev. 6. The same contingencies used in the original study (modified where necessary because of the configuration changes) were used to test the proposed system. Results are provided in Appendix A.

### **Comparison of Case C and Case C Rev. 6**

The contingency testing of the new case Case C Rev. 6 produced almost identical results to the Case C as summarized in the January report, with the following exceptions:

1. The City of Franklin 50 MVA transformer overload is eliminated in Case C Rev. 6.
2. A new overload is observed on the Salmon-K30 69 kV line (summer normal and emergency ratings 31/37 MVA)
  - a. 118 percent of summer emergency for outage of Memphis Jct.-N23A or outage of N23A-N23Weyerhauser 69 kV line sections, or
  - b. 102 percent of summer emergency rating for outage of 18-PLN-35-AVL 69 kV line section.

### **Conclusions**

1. The new transformer and connections to the WRECC 69 kV network at Salmons eliminate the overload condition reported on the City of Franklin 50 MVA 161-69 kV transformer.
2. The new transformer at Salmon increases loading on the Salmon-K30 69 kV line for the three above-listed contingencies. For the worst condition, i.e., the outage of the

Memphis-N23 or N23-Weyerhauser 69 kV line sections, the 118 percent overload can be mitigated to 102 percent by opening the 35-AVL circuit breaker at Plano. This reduced the overload condition to 102 percent at peak load. A better solution is to upgrade the Salmon-K30 section of line to higher capacity.

3. The proposed changes primarily affect the WRECC 69 kV network and in general do not significantly change the power flow patterns on the 161 kV bulk power transmission network. The power flow contingency testing confirmed that almost identical results are obtained for Case C and the new Case C Rev. 6. Therefore, we conclude that the results of the sensitivity studies and generator outage studies as summarized in the January report would directly apply to this new case and no additional power flow testing is necessary at this time with regard to these conditions.

**Exhibit 1**  
**Transmission Map**



**Exhibit 2**

**Case C Rev. 6 One-Line Diagram**





**APPENDIX A**

**Case C Rev. 6 Reports**

# Case Summary

# EKPC\_CaseC\_R61

*Project Name* EKPC 2010 Summer  
*Title1* WREC Service Via EKPC  
*Title2* Case C (Rev 6)  
*Case Date* 5/23/2005

*Power Flow File* M:\PROJ\EKPC\324001\301PF\Addendum\EKPC\_CaseC\_R61.bin

## Power Flow Controls

<i>Area Control</i>	<input checked="" type="checkbox"/>	<i>SmoothStep</i>	<input checked="" type="checkbox"/>
<i>Remote Control</i>	<input checked="" type="checkbox"/>	<i>XfrmVcon</i>	<input type="checkbox"/>
<i>GenVar Control</i>	<input checked="" type="checkbox"/>	<i>XfrmFcon</i>	<input type="checkbox"/>
<i>Solve Method</i>	DSOLVE		

## Case Settings

<i>Overload</i>	<input checked="" type="checkbox"/>	<i>VlimMin</i>	0.9	<i>RateFactor</i>	1
<i>VLimit</i>	<input checked="" type="checkbox"/>	<i>VlimMax</i>	1.1	<i>AmpFactor</i>	1
<i>VChange</i>	<input checked="" type="checkbox"/>	<i>VlimChange</i>	0.1	<i>RatingNumber</i>	2
<i>Monitored Set</i>	Monit	1469 Buses			

## Contingency

<i>Contingencies loaded from file M:\PROJ\EKPC\324001\301PF\Addendum\CaseC.con</i>		260 Bus
321 contingencies		

EKPC 2010 Summer  
 WREC Service Via EKPC  
 Case C (Rev 6)  
 5/23/2005

Contingency Description	Ckt	kV	Zone	Area	Voltage Violations				Not Solved
					Over load	UnderV	OverV	Change	
135 Line Wolf Creek to Wayne Co 161 kV	1	161	167	147	1	0	0	0	
215 Line Leitchfield to Shrews 138kV	1	138	211	211	2	1	0	8	
230 Line Green River to 27298 11MUHLNB 69 kV	1	69	211	211	1	0	0	0	
250 Line Ohio County to Warren 69 kV	1	69	211	211	1	0	0	0	
252 Line Caneyville Jct to Rosine Jct 69 kV	1	69	211	211	1	0	0	0	
255 Line Rosine Jct to Warren 69 kV	1	69	211	211	1	0	0	0	
262 Line Greensburg to Green Co. 69 kV	1	69	211-220	211-220	1	0	0	0	
387 Line 18-PLN to 35-AVL 69kV	1	69	901	220	1	0	0	0	
393 Line PLANO to 23-WEY 69 kV	1	69	901	220	1	0	0	0	
395 Line 23-WEY to N23A 69 kV	1	69	901	220	1	0	0	0	
397 Line N23A to Memphis Junction 69 kV	1	69	901	220	1	0	0	0	
405 Line Barren Co. to Horse Cave KU 69 kV	1	69	220	220	1	4	0	3	
422 Line Coburg Jct to Columbia 69 kV	1	69	220	220	0	3	0	0	
617 outage of 24952 06CLIFTY to 27447 11TRIMBL	1	345	206-211	206-211	2	0	0	0	
622 outage of 25181 07RAMSY5 to 25388 08SPEED	1	345	207-281	207-208	8	0	0	0	
625 outage of 25388 08SPEED to 25515 08SPEED	1	345-138	281	208	3	7	0	0	
635 outage of 27001 11BLUE L to 27002 11BLUE L	1	345-161	211	211	1	0	0	0	
637 outage of 27001 11BLUE L to 27003 11BLUE L	1	345-138	211	211	1	2	0	0	
670 outage of 27280 11MIL CK to 27331 11PADDYW	1	345	211	211	1	2	0	0	
725 outage of 26974 11ASHBY to 27281 11MIL CK1	1	138	211	211		0	0	0	
742 outage of 27003 11BLUE L to 27296 11MUD LA	1	138	211	211	0	1	0	0	
830 outage of 27218 11KNOB C to 27358 11POND C	1	138	211	211	0	5	0	0	
850 outage of 27326 11P WEST to 27328 11PADDYR	1	138	211	211	1	0	0	0	
855 outage of 27002 11BLUE L to 29235 20BLIT C	1	161	211-220	211-220	1	0	0	0	
865 outage of 29235 20BLIT C to 29271 20DARWJ	1	161	220	220	1	0	0	0	
870 outage of 29241 20CASEY C to 29409 20MARION	1	161	220	220	0	0	0	0	I
930 outage of 27114 11ETOWN to 27179 11HARDN	1	138	211	211	2	0	0	0	
940 outage of 27179 11HARDN to 27384 11ROGERS	1	138	211	211	1	0	0	0	
1010 N2 - ABD-Wilson 1 161kV & EBG-E.Bowl.Gr 1 161					2	0	0	0	
<b>Totals:</b>					38	25	0	11	1

**Notes:**

- Overloads are based on 100% of Rating 2
- Undervoltage Limit is 0.90 (pu)
- Overvoltage Limit is 1.10 (pu)
- Voltage Change Limit is 0.10 (pu)

**Not Solved Codes:**

- D - Diverged
- I - Interrupted
- F - Failed, One or More Contingency Commands Failed in PFlow

Area	Area Name	Zone	Zone Name	Contingency Buses	Monitored Buses
147	TVA	165	TVAWEST	0	2
		166	TVA_CENT	40	187
		167	TVAEAST	3	31
				43	220
205	AEP	250	AEP-AP	0	18
		251	AEP-OP	0	19
		252	AEP-IM	1	53
		253	AEP-CS	0	12
		254	AEP-KP	0	2
		256	AEP-IM-I	0	1
				1	105
206	OVEC	206	OVEC	5	10
				5	10
207	HE	207	HE	1	40
				1	40
208	CIN	280	CGE	0	96
		281	PSI ENER	4	114
		283	ULHP	0	4
		284	CIN/DENA	0	1
		286	CGE GENS	0	10
		290	PSI GENS	0	10
		291	HE IN PS	0	6
		292	PSI IND	0	3
				4	244
209	DPL	209	DPL	0	25
				0	25
210	SIGE	210	SIGE	1	31
				1	31
211	LGEE	211	LGEE	107	412
				107	412
213	HMP&L	13	HMP&L	0	5
				0	5
214	BREC	1	PJM500KV	7	43
		2	EGYPTIAN	0	3
		3	SOUTHEAS	1	2
		10	PN 13KV	0	9
		20	HEND-UNI	0	5
		30	GREEN RI	0	9
		40	MEADE CO	0	16
				8	87

Area	Area Name	Zone	Zone Name	Contingency Buses	Monitored Buses
216	IPL	216	IPL	0	18
				0	18
220	EKPC	220	EKPC	50	211
		901	WARREN O	32	41
		902	WARREN O	8	8
				90	260
221	AEWC	221	IMPA	0	1
				0	1
226	IPRV	226	IPRV	0	2
				0	2
227	DELO	227	DELO	0	1
				0	1
356	AMRN	323	EASTERN	0	3
				0	3
361	SIPC	352	SEIEC	0	1
				0	1
363	NI	335	345KV	0	2
		338	TR MIDPT	0	2
				0	4
				260	1469

EKPC 2010 Summer  
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<u>Overloaded Facility</u>										<u>Normal System Overloads</u>		
From	Name	To	Name	Circuit	Base kV	Area	Zone	Ratings		MVA	Norm (%)	Emer (%)
								Norm	Emer			
25387	08GIBSON	26557	08DUFF	1	345	208	281	400	420	834	208	199
25107	07G-TOWN	25814	08N ALB	1	69	207-208	207-281	44	44	66	149	149
25820	08MILTWN	99974	mid pt	1	69-138	208	281	25	25	30	121	121
25894	08BCKJD4	25888	08BKJ135	1	18-138	208	286	180	180	203	113	113

**Notes:**

1. Overloads are based on 100% of Rating 1
2. Normal System Conditions - No Outages
3. Minimum Reporting Level is 100%

## EKPC 2010 Summer

WREC Service Via EKPC

Case C (Rev 6)

5/23/2005

Overloaded Facility								Normal System				Overloads	
From	Name	To	Name	Circuit	Base kV	Area	Zone	Ratings Norm	Emer	MVA	Norm (%)	Count A / B	Max (%)
25387	08GIBSON	26557	08DUFF	1	345	208	281	400	420	833.9	208	3 / 0	200
25820	08MILTWN	99974	mid pt	1	69-138	208	281	25	25	30.3	121	2 / 0	173
25526	08MILLTO	99974	mid pt	1	138	208	281	25	25	22.5	90	1 / 1	134
18691	5BOWL GR	18928	5SBOWL T	1	161	147	166	227	227	78.1	34	1 / 0	130
18416	5MEMJUNC	18928	5SBOWL T	1	161	147	166	227	227	78.1	34	1 / 0	129
79	25-SAL	81	K30	1	69	220	901	31	37	25.8	83	2 / 2	118
25819	08PSIRAM	25820	08MILTWN	1	69	208	281	39	39	31.4	81	1 / 0	116
25031	07RAMSEY	25819	08PSIRAM	1	69	207-208	207-281	44	44	35.6	81	1 / 0	116
25031	07RAMSEY	25817	08SALISJ	1	69	207-208	207-281	100	100	73.9	74	1 / 0	115
18806	5HUNT TN	19278	2HUNTSVI	1	161-69	147	167	50	50	45.5	91	1 / 0	115
27006	11BONNIE	29220	20BONNIE	1	138-69	211-220	211-220	44	59	31.6	72	1 / 0	115
25168	07MAUKPT	25171	07ELIZBH	1	69	207	207	23	36	19.9	87	1 / 0	111
27061	11CN RN6	27062	11CNE RN	1	138	211	211	287	287	252.2	88	1 / 3	111
25167	07DOGWOD	25168	07MAUKPT	1	69	207	207	46	46	29.5	64	1 / 0	109
27116	11ETWN 2	27371	11RADCL	1	69	211	211	52	52	13.1	25	1 / 0	107
27237	11LEITCH	27238	11LEITCH	1	138-69	211	211	75	86	65.0	87	2 / 1	107
27102	11EASTVW	29528	20STEPHN	1	69	211-220	211-220	41	41	1.7	4	1 / 0	107
27410	11SHLB S	27411	11SHLBYV	1	69	211	211	49	49	15.4	31	0 / 3	103
27179	11HARDN	27180	11HARDN	2	138-69	211	211	120	138	90.2	75	0 / 1	103
27168	11GRNV W	27377	11RIVR Q	1	69	211	211	49	49	27.2	56	0 / 1	103
27115	11ETOWN	29374	20KARGLE	1	69	211-220	211-220	57	69	46.9	82	0 / 1	102
27384	11ROGERS	27385	11ROGERS	1	138-69	211	211	93	107	84.6	91	0 / 1	101
29542	20TAYLOR	27437	11TAYLRC	1	161-69	220-211	220-211	72	72	51.2	71	0 / 1	100
25484	08BATESV	25716	08BATE N	99	138-69	208	281	50	50	49.2	98	0 / 1	100
												22 / 16	200

**Notes:**

- Overloads are based on 100% of Rating 2
- NS = Normal System Conditions (No Outages)
- Minimum Reporting Level is 100%
- Statistical Information (A/B Stats and Maximum Overload)
  - A = Serious Overload > 105%
  - B = Overloaded Facility between 100% and 105% of Rated Capability



EKPC 2010 Summer  
 WREC Service Via EKPC  
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Overloaded Facility	Contingency									Overloads				
	From	Name	To	Name	Circuit	Base kV	Area	Zone	Ratings	Norm	Emer	MVA	(%)	(%)
25387	08GIBSON	26557	08DUFF		1	345	208	281	400	420	NS	834	208	199
	625	outage of 25388 08SPEED to 25515 08SPEED			1	345-138	208	281				789	197	188
	617	outage of 24952 06CLIFTY to 27447 11TRIMBL			1	345	206-211	206-211				739	185	176
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				537	134	128
												3 / 0		200
25820	08MILTWN	99974	mid pt		1	69-138	208	281	25	25	NS	30	121	121
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				43	173	173
	625	outage of 25388 08SPEED to 25515 08SPEED			1	345-138	208	281				35	139	139
												2 / 0		173
25526	08MILLTO	99974	mid pt		1	138	208	281	25	25	NS	23	90	90
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				33	133	134
	625	outage of 25388 08SPEED to 25515 08SPEED			1	345-138	208	281				26	105	105
												1 / 1		134
18691	5BOWL GR	18928	5SBOWL T		1	161	147	166	227	227	NS	78	34	34
	1010	N2 - ABD-Wilson 1 161kV & EBG-E Bowl.Gr 1 16										294	130	130
												1 / 0		130
18416	5MEMJUNC	18928	5SBOWL T		1	161	147	166	227	227	NS	78	34	34
	1010	N2 - ABD-Wilson 1 161kV & EBG-E Bowl.Gr 1 16										293	129	129
												1 / 0		129
79	25-SAL	81	K30		1	69	220	901	31	37	NS	26	83	70
	395	Line 23-WEY to N23A 69 kV			1	69	220	901				44	141	118
	397	Line N23A to Memphis Junction 69 kV			1	69	220	901				44	141	118
	393	Line PLANO to 23-WEY 69 kV			1	69	220	901				38	122	102
	387	Line 18-PLN to 35-AVL 69kV			1	69	220	901				38	122	102
												2 / 2		118
25819	08PSIRAM	25820	08MILTWN		1	69	208	281	39	39	NS	31	81	81
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				45	116	116
												1 / 0		116
25031	07RAMSEY	25819	08PSIRAM		1	69	207-208	207-281	44	44	NS	36	81	81
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				51	116	116
												1 / 0		116
25031	07RAMSEY	25817	08SALISJ		1	69	207-208	207-281	100	100	NS	74	74	74
	622	outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				115	115	115
												1 / 0		115
18806	5HUNT TN	19278	2HUNTSVI		1	161-69	147	167	50	50	NS	46	91	91
	135	Line Wolf Creek to Wayne Co 161 kV			1	161	147	167				57	115	115
												1 / 0		115
27006	11BONNIE	29220	20BONNIE		1	138-69	211-220	211-220	44	59	NS	32	72	54
	405	Line Barren Co. to Horse Cave KU 69 kV			1	69	220	220				68	153	115
												1 / 0		115

<u>Overloaded Facility</u>		<u>Contingency</u>								<u>Overloads</u>			
From	Name	To	Name	Circuit	Base kV	Area	Zone	Ratings		Norm	Emer		
								Norm	Emer	MVA	(%)	(%)	
25168	07MAUKPT	25171	07ELIZBH	1	69	207	207	23	36	NS	20	87	55
	622 outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				40	174	111
											1 / 0		111
27061	11CN RN6	27062	11CNE RN	1	138	211	211	287	287	NS	252	88	88
	670 outage of 27280 11MIL CK to 27331 11PADDYW			1	345	211	211				319	111	111
	850 outage of 27326 11P WEST to 27328 11PADDYR			1	138	211	211				299	104	104
	637 outage of 27001 11BLUE L to 27003 11BLUE L			1	345-138	211	211				294	102	102
	725 outage of 26974 11ASHBY to 27281 11MIL CK			1	138	211	211				290	101	101
											1 / 3		111
25167	07DOGWOD	25168	07MAUKPT	1	69	207	207	46	46	NS	30	64	64
	622 outage of 25181 07RAMSY5 to 25388 08SPEED			1	345	207-208	207-281				50	109	109
											1 / 0		109
27116	11ETWN 2	27371	11RADCL	1	69	211	211	52	52	NS	13	25	25
	940 outage of 27179 11HARDN to 27384 11ROGERS			1	138	211	211				56	107	107
											1 / 0		107
27237	11LEITCH	27238	11LEITCH	1	138-69	211	211	75	86	NS	65	87	76
	250 Line Ohio County to Warren 69 kV			1	69	211	211				92	122	107
	255 Line Rosine Jct to Warren 69 kV			1	69	211	211				92	122	107
	252 Line Caneyville Jct to Rosine Jct 69 kV			1	69	211	211				87	116	102
											2 / 1		107
27102	11EASTVW	29528	20STEPHN	1	69	211-220	211-220	41	41	NS	2	4	4
	215 Line Leitchfield to Shrews 138kV			1	138	211	211				44	106	107
											1 / 0		107
27410	11SHLB S	27411	11SHLBYV	1	69	211	211	49	49	NS	15	31	31
	635 outage of 27001 11BLUE L to 27002 11BLUE L			1	345-161	211	211				50	103	103
	855 outage of 27002 11BLUE L to 29235 20BLIT C			1	161	211-220	211-220				50	103	103
	865 outage of 29235 20BLIT C to 29271 20DARWJ			1	161	220	220				50	101	101
											0 / 3		103
27179	11HARDN	27180	11HARDN	2	138-69	211	211	120	138	NS	90	75	65
	930 outage of 27114 11ETOWN to 27179 11HARDN			1	138	211	211				142	118	103
											0 / 1		103
27168	11GRNV W	27377	11RIVR Q	1	69	211	211	49	49	NS	27	56	56
	230 Line Green River to 27298 11MUHLNB 69 kV			1	69	211	211				50	103	103
											0 / 1		103
27115	11ETOWN	29374	20KARGLE	1	69	211-220	211-220	57	69	NS	47	82	68
	215 Line Leitchfield to Shrews 138kV			1	138	211	211				70	123	102
											0 / 1		102
27384	11ROGERS	27385	11ROGERS	1	138-69	211	211	93	107	NS	85	91	79
	930 outage of 27114 11ETOWN to 27179 11HARDN			1	138	211	211				108	117	101
											0 / 1		101
29542	20TAYLOR	27437	11TAYLRC	1	161-69	220-211	220-211	72	72	NS	51	71	71
	262 Line Greensburg to Green Co. 69 kV			1	69	211-220	211-220				72	100	100
											0 / 1		100

Overloaded Facility	Contingency										Overloads							
	From	Name	To	Name	Circuit	Base kV	Area	Zone	Ratings		Norm	Emer						
									Norm	Emer			MVA	(%)	(%)			
25484	08BATESV	25716	08BATE N	99	138-69	208	281	50	50	NS	49	98	98					
	617 outage of 24952 06CLIFTY to 27447 11TRIMBL										1	345	206-211	206-211		50	100	100
																0	1	100
																22	16	200.4

**Notes:**

1. Overloads are based on 100% of Rating 2
2. NS = Normal System Conditions (No Outages)
3. Minimum Reporting Level is 100%
4. Statistical Information (A/B Stats and Maximum Overload)
  - A = Serious Overload > 105%
  - B = Overloaded Facility between 100% and 105% of Rated Capability

EKPC 2010 Summer  
WREC Service Via EKPC  
Case C (Rev 6)  
5/23/2005

Contingency	Overloaded Facility									Overloads		
	From Name	To Name	Ckt	Base kV	Area	Zone	Ratings		MVA	Norm (%)	Emer (%)	
							Norm	Emer				
135	Line Wolf Creek to Wayne Co 161 kV		1	161	147	167						
	18806 5HUNT TN	19278 2HUNTSVI	1	161-69	147	167	50	50	57.3	115	115	
215	Line Leitchfield to Shrews 138kV		1	138	211	211						
	27102 11EASTVW	29528 20STEPHN	1	69	211-220	211-220	41	41	43.6	106	107	
	27115 11ETOWN	29374 20KARGLE	1	69	211-220	211-220	57	69	70.0	123	102	
230	Line Green River to 27298 11MUHLNB 69 kV		1	69	211	211						
	27168 11GRNV W	27377 11RIVR Q	1	69	211	211	49	49	50.3	103	103	
250	Line Ohio County to Warren 69 kV		1	69	211	211						
	27237 11LEITCH	27238 11LEITCH	1	138-69	211	211	75	86	91.7	122	107	
252	Line Caneyville Jct to Rosine Jct 69 kV		1	69	211	211						
	27237 11LEITCH	27238 11LEITCH	1	138-69	211	211	75	86	87.4	116	102	
255	Line Rosine Jct to Warren 69 kV		1	69	211	211						
	27237 11LEITCH	27238 11LEITCH	1	138-69	211	211	75	86	91.7	122	107	
262	Line Greensburg to Green Co. 69 kV		1	69	211-220	211-220						
	29542 20TAYLOR	27437 11TAYLRC	1	161-69	220-211	220-211	72	72	72.3	100	100	
387	Line 18-PLN to 35-AVL 69kV		1	69	220	901						
	79 25-SAL	81 K30	1	69	220	901	31	37	37.8	122	102	
393	Line PLANO to 23-WEY 69 kV		1	69	220	901						
	79 25-SAL	81 K30	1	69	220	901	31	37	37.8	122	102	
395	Line 23-WEY to N23A 69 kV		1	69	220	901						
	79 25-SAL	81 K30	1	69	220	901	31	37	43.7	141	118	
397	Line N23A to Memphis Junction 69 kV		1	69	220	901						
	79 25-SAL	81 K30	1	69	220	901	31	37	43.7	141	118	
405	Line Barren Co. to Horse Cave KU 69 kV		1	69	220	220						
	27006 11BONNIE	29220 20BONNIE	1	138-69	211-220	211-220	44	59	67.5	153	115	
617	outage of 24952 06CLIFTY to 27447 11TRIMBL		1	345	206-211	206-211						
	25387 08GIBSON	26557 08DUFF	1	345	208	281	400	420	739.0	185	176	
	25484 08BATESV	25716 08BATE N	99	138-69	208	281	50	50	50.1	100	100	
622	outage of 25181 07RAMSY5 to 25388 08SPEED		1	345	207-208	207-281						
	25820 08MILTWN	99974 mid pt	1	69-138	208	281	25	25	43.2	173	173	
	25526 08MILLTO	99974 mid pt	1	138	208	281	25	25	33.4	133	134	
	25387 08GIBSON	26557 08DUFF	1	345	208	281	400	420	537.4	134	128	
	25819 08PSIRAM	25820 08MILTWN	1	69	208	281	39	39	45.4	116	116	
	25031 07RAMSEY	25819 08PSIRAM	1	69	207-208	207-281	44	44	50.8	116	116	
	25031 07RAMSEY	25817 08SALISJ	1	69	207-208	207-281	100	100	115.1	115	115	
	25168 07MAUKPT	25171 07ELIZBH	1	69	207	207	23	36	40.1	174	111	
	25167 07DOGWOD	25168 07MAUKPT	1	69	207	207	46	46	50.0	109	109	
625	outage of 25388 08SPEED to 25515 08SPEED		1	345-138	208	281						
	25387 08GIBSON	26557 08DUFF	1	345	208	281	400	420	788.7	197	188	
	25820 08MILTWN	99974 mid pt	1	69-138	208	281	25	25	34.7	139	139	
	25526 08MILLTO	99974 mid pt	1	138	208	281	25	25	26.1	105	105	
635	outage of 27001 11BLUE L to 27002 11BLUE L		1	345-161	211	211						
	27410 11SHLB S	27411 11SHLBYV	1	69	211	211	49	49	50.5	103	103	
637	outage of 27001 11BLUE L to 27003 11BLUE L		1	345-138	211	211						
	27061 11CN RN6	27062 11CNE RN	1	138	211	211	287	287	294.0	102	102	
670	outage of 27280 11MIL CK to 27331 11PADDYV		1	345	211	211						
	27061 11CN RN6	27062 11CNE RN	1	138	211	211	287	287	319.3	111	111	
725	outage of 26974 11ASHBY to 27281 11MIL CK		1	138	211	211						
	27061 11CN RN6	27062 11CNE RN	1	138	211	211	287	287	289.7	101	101	
850	outage of 27326 11P WEST to 27328 11PADDYR		1	138	211	211						

Contingency	Overloaded Facility									Overloads			
	From Name		To Name		Ckt	Base kV	Area	Zone	Ratings		MVA	Norm (%)	Emer (%)
									Norm	Emer			
	27061	11CN RN6	27062	11CNE RN	1	138	211	211	287	287	298.8	104	104
855	outage of 27002 11BLUE L to 29235 20BLIT C												
	27410	11SHLB S	27411	11SHLBYV	1	69	211	211	49	49	50.4	103	103
865	outage of 29235 20BLIT C to 29271 20DARWJ												
	27410	11SHLB S	27411	11SHLBYV	1	69	211	211	49	49	49.6	101	101
930	outage of 27114 11ETOWN to 27179 11HARDN												
	27179	11HARDN	27180	11HARDN	2	138-69	211	211	120	138	141.8	118	103
	27384	11ROGERS	27385	11ROGERS	1	138-69	211	211	93	107	108.4	117	101
940	outage of 27179 11HARDN to 27384 11ROGERS												
	27116	11ETWN 2	27371	11RADCL	1	69	211	211	52	52	55.7	107	107
1010	N2 - ABD-Wilson 1 161kV & EBG-E.Bowl.Gr 1 161kV												
	18691	5BOWL GR	18928	5SBOWL T	1	161	147	166	227	227	294.2	130	130
	18416	5MEMJUNC	18928	5SBOWL T	1	161	147	166	227	227	292.9	129	129

**Notes:**

1. Overloads are based on 100% of Rating 2

**EKPC 2010 Summer**  
 WREC Service Via EKPC  
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Undervoltage		Base kV	Area	Zone	Normal System Voltage (pu)	Voltage Violations	
Bus	Name					A / B	Min (pu)
29339	20HCAVKU	69	220	220	0.9898	1 / 0	0.7729
29428	20MUNFKU	69	220	220	0.9799	1 / 0	0.8048
29427	20MUNFVL	69	220	220	0.9805	1 / 0	0.8194
27496	11FAIRMN	69	211	211	0.9229	1 / 1	0.8775
27320	11OLINCO	69	211	211	0.9726	0 / 1	0.8802
29252	20COLKU2	69	220	220	0.9706	0 / 1	0.8808
29251	20COLKU1	69	220	220	0.9747	0 / 1	0.8853
29255	20COLUMB	69	220	220	0.9781	0 / 1	0.8891
27497	11SMYRNA	69	211	211	0.9351	0 / 1	0.8903
27237	11LEITCH	138	211	211	0.9831	0 / 1	0.8913
25810	08HNRJ J	69	208	281	0.9081	0 / 2	0.8916
25806	08SPEDB2	12.47	208	281	0.9115	0 / 2	0.8922
27439	11TIPT 1	69	211	211	0.9822	0 / 1	0.8934
25827	08RADIOJ	69	208	281	0.9099	0 / 1	0.8950
25805	08SPEDB1	12.47	208	281	0.9146	0 / 1	0.8955
99977	mid pt	138	208	281	0.9154	0 / 1	0.8963
99978	mid pt	138	208	281	0.9155	0 / 1	0.8964
29220	20BONNIE	69	220	220	0.9949	0 / 1	0.8965
27441	11TIPT M	99	211	211	0.9893	0 / 1	0.8966
25811	08SPEED	69	208	281	0.9157	0 / 1	0.8967
27442	11TIPTOP	138	211	211	0.9824	0 / 1	0.8968
27358	11POND C	138	211	211	0.9941	0 / 1	0.8969
						4 / 21	0.7729

**Notes:**

1. Minimum Voltage Limit 0.90 (pu)
2. NS = Normal System Conditions (No Outages)
3. Maximum Reporting Level is 90%
4. Statistical Information (A/B Stats and Minimum Voltage)
  - A = Serious Undervoltage < 0.88 (pu)
  - B = Low Voltages between 0.88 and 0.90 (pu)

**EKPC 2010 Summer**  
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OverVoltage Bus	Voltage Violations
No Overvoltage Violations	

**EKPC 2010 Summer**  
 WREC Service Via EKPC  
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VChange Bus Name	Base kV	Area	Zone	Normal System Voltage (pu)	Voltage Violations	
					A / B	Max (pu)
29339 20HCAVKU	69	220	220	0.9898	1 / 0	-0.2175
29428 20MUNFKU	69	220	220	0.9799	1 / 0	-0.1759
29427 20MUNFVL	69	220	220	0.9805	1 / 0	-0.1620
67 30-BEE	69	220	902	1.0390	0 / 1	-0.1114
97 34-PEO	69	220	902	1.0308	0 / 1	-0.1096
70 15-ELF	69	220	902	1.0190	0 / 1	-0.1075
68 S07	69	220	902	1.0205	0 / 1	-0.1074
71 31-NLF	69	220	902	1.0133	0 / 1	-0.1064
69 09-WLF	69	220	902	1.0174	0 / 1	-0.1060
27238 11LEITCH	69	211	211	1.0173	0 / 1	-0.1059
27236 11LEIT C	69	211	211	1.0159	0 / 1	-0.1045
					3 / 8	-0.2175

**Notes:**

1. Voltage Change Limit is 0.10 (pu)
2. NS = Normal System Conditions (No Outages)
3. Minimum Reporting Level is 10%
4. Statistical Information (A/B Stats and Maximum Voltage Change)
  - A = Serious Voltage Change > 0.12 (pu)
  - B = Excessive Voltage Change between 0.1 and 0.12 (pu)



EKPC 2010 Summer  
WREC Service Via EKPC  
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No.	Contingency	Ckt	Base kV	Area	Zone
20	Line Paradise to Hopkinsville 161kV #1	1	161	147	166
22	Line Paradise to Hopkinsville 161kV #2	2	161	147	166
25	Line Paradise to Bowling Green 161 kV	1	161	147	166
27	Line Paradise to Crosspin 161 kV	1	161	147	166
30	Line Paradise to Lost City 161 kV	1	161	147	166
32	Line Paradise to Aberdeen Tap 161 kV	1	161	147	166
35	Line Paradise to Elkton Tap 161 kV	1	161	147	166
37	Line Summer to Lafayette 161 kV	1	161	147	166
40	Line Summer to Tompkin Tap 161 kV	1	161	147	166
42	Line Summer to Glasgow Tap 161 kV	1	161	147	166
45	Line Memphis Junction to SALMONS 161 kV	1	161	147	166
46	Line SALMONS to Franklin Ky 161 kV	1	161	147	166
50	Line Memphis Junction to S. Bowling Green Tap 161 kV	1	161	147	166
52	Line E. Gallatin to Foutain Head 161 kV	1	161	147	166
55	Line Hopkinsville to Lewisburg 161 kV	1	161	147	166
57	Line Hopkinsville to Superior Graphite Tap 161 kV	1	161	147	166
60	Line Hopkinsville to Cadiz Tap 161 kV	1	161	147	166
62	Transformer Hopkinsville	1	161-1	147	166
65	Line Russellville Ky to N. Russellville 161 kV	1	161	147	166
67	Line Bowling Green to E. Bowling Green 161kV	1	161	147	166
70	Line Bowling Green to Lost City 161kV	1	161	147	166
72	Line Bowling Green to S. Bowling Green Tap 161kV	1	161	147	166
75	Line Bowling Green to S. Bowling Green SW 161 kV	1	161	147	166
77	Line E. Bowling Green to Scottsville 161kV	1	161	147	166
80	Line E. Bowling Green to Aberdeen Tap 161kV	1	161	147	166
82	Line E. Bowling Green to Bristow Tap 161kV	1	161	147	166
85	Line Franklin Ky to Portland SS 161 kV	1	161	147	166
87	Line Portland to Portland SS 161 kV	1	161	147	166
90	Line Scottsville to S. Scottsville 161kV	1	161	147	166
92	Line Gallatin to Hartsville 161kV	1	161	147	166
95	Line Lafayette to S. Scottsville 161kV	1	161	147	166
97	Line Lafayette to Hartsville 161kV	1	161	147	166
100	Line Lafayette to Westmoreland 161kV	1	161	147	166
102	Line Springfield to Logan Aluminum 161 kV	1	161	147	166
105	Line Logan Aluminum to Lost City 161kV	1	161	147	166
107	Line Goodlet to Crosspin 161 kV	1	161	147	166
110	Line Lewisburg to Lost City 161kV	1	161	147	166
112	Line Portland SS to Fountain Head 161 kV	1	161	147	166
115	Line Portland SS to Westmoreland 161 kV	1	161	147	166
117	Line Lost City to N. Russellville 161 kV	1	161	147	166
120	Line Dunbar Cave to Elkton Tap 161 kV	1	161	147	166

No.	Contingency	Ckt	Base kV	Area	Zone
122	Line Glasgow Tap to Bristow Tap 161 kV	1	161	147	166
125	Line Tompkinsville to Summer 69 kV	1	69	147	166
127	Line Tompkinsville to Dale 69 kV	1	69	147	166
130	Line Summer to Dale 69 kV	1	69	147	166
132	Line Summer to Wolf Creek 161kV	1	161	147	166-167
135	Line Wolf Creek to Wayne Co 161 kV	1	161	147	167
145	Line Wolf Creek to Huntsville 161 kV	1	161	147	167
147	Line Wolf Creek to Tompkinsville Tap 161 kV	1	161	147	167-166
150	Line Summer to Paddys Run 161kV	1	161	147-211	166-211
152	Line Paradise to New Hardinsburg 161 kV	1	161	147-214	166-3
155	Line Summer to Summer Shade 161 kV	1	161	147-220	166-220
157	Line Summer to Summer Shade Tap 161kV	1	161	147-220	166-220
160	Transformer Franklin KY 161/69 kV #1	1	161-69	147-220	166-901
161	Transformer Salmons 161/69 kV Xfm	1	161-69	147-220	166-901
162	Line Wolf Creek to Russell 161 kV	1	161	147-220	167-220
165	Line Corydon Tap to Green River 161 kV	1	161	211	211
167	Transformer Green River 161/138 kV #1	1	161-138	211	211
170	Transformer Green River 161/138 kV #2	2	161-138	211	211
172	Transformer Green River 161/138 kV #3	3	161-138	211	211
175	Line Green River to River Queen Tap 161 kV	1	161	211	211
177	Transformer Paddys Run 161/138 kV #1	1	161-138	211	211
180	Transformer Paddys Run 161/138 kV #2	2	161-138	211	211
182	Transformer Bonnieville 138/69 kV #1	1	138-69	211	211
185	Line Bonnieville to Lebanon West 138 kV	1	138	211	211
187	Line Bonnieville to Shrews 138 kV	1	138	211	211
190	Line Cloverport to Green River Steel 138kV	1	138	211	211
192	Transformer Green River 138/69 kV #1	1	138-69	211	211
195	Transformer Green River 138/69 kV #2	2	138-69	211	211
197	Line Green River to Green River Steel 161 kV	1	138	211	211
200	Line Green River to Ohio County 161kV #1	1	138	211	211
202	Line Green River to Ohio County 161kV #2	2	138	211	211
205	Transformer Green River Steel 138/69 kV	1	138-69	211	211
207	Line Green River Steel to Smith 138 kV	1	138	211	211
210	Line Lebanon West to Lebanon 138 kV	1	138	211	211
215	Line Leitchfield to Shrews 138kV	1	138	211	211
217	Transformer Ohio County 138/69 kV #2	1	138-69	211	211
220	Line Ohio County to Shrews 138kV	1	138	211	211
222	Line Bonnieville to 27417 11SONORA 69 kV	1	69	211	211
225	Line Eastview to Leitchfield C 69 kV	EQ	69	211	211
227	Line 27154 11GIBRLT to Green River 69 kV	1	69	211	211
230	Line Green River to 27298 11MUHLNB 69 kV	1	69	211	211
232	Line Green River to River Queen Tap 161kV	1	69	211	211
235	Line Green River to 27407 11SHAVR 69 kV	1	69	211	211
237	Line Greenburg to Green River Plaza 69 kV	EQ	69	211	211
240	Line Leitchfield C to Leitchfield 69 kV	1	69	211	211

No.	Contingency	Ckt	Base kV	Area	Zone
242	Line Leitchfield to Millwood 69 kV	1	69	211	211
245	Line Millwood to Caneyville Jct 69 kV	1	69	211	211
247	Line Ohio County to Riverview 69 kV	1	69	211	211
250	Line Ohio County to Warren 69 kV	1	69	211	211
252	Line Caneyville Jct to Rosine Jct 69 kV	1	69	211	211
255	Line Rosine Jct to Warren 69 kV	1	69	211	211
257	Transformer Bonnieville 138/69 kV #1	1	138-69	211-220	211-220
260	Line Eastview to Stephenburg 69 kV	1	69	211-220	211-220
262	Line Greensburg to Green Co. 69 kV	1	69	211-220	211-220
265	Transformer Wilson 345/161 kV #1	1	345-161	214	1
267	Transformer Wilson 345/161 kV #2	2	345-161	214	1
270	Line Wilson to Reid 345 kV	1	345	214	1
272	Line Wilson to Coleman 345 kV	1	345	214	1
277	Transformer New Hardinsburg 69/161 kV #1	1	69-161	214	1-3
280	Transformer New Hardinsburg 69/161 kV #2	2	69-161	214	1-3
282	Line Meade Co to New Hardinsburg 161 kV	1	161	214	1-3
285	Transformer New Hardinsbuurg 138/161 kV	1	138-161	214	1-3
287	Line Wilson to Green River 161 kV	1	161	214-211	1-211
290	Line New Hardinsburg to Cloverport 138 kV	1	138	214-211	1-211
292	Line 62 05-EBG to 91 22-GMC 161 kV	1	161	220	901
293	Line GMC-EBG 161 kV & Xfm EBG 161-69 kV #2		161-69	220	901
296	Line Aberdeen to Memphis Jct 161 kV	1	161	220	901
297	Transformer Memphis Jct 161/69 kV #1	1	161-69	220	901
300	Transformer Memphis Jct 161/69 kV #2	2	161-69	220	901
305	Line 22-GMC to Magna 161 kV	1	161	220	901
308	Line 22-GMC to Memphis Jct 161 kV	1	161	220	901
310	Line 28-BRI to Magna 161 kV	1	161	220	901
312	Line Barren Co. to Magna 161 kV	1	161	220	220-901
315	Transformer Barren Co. 161/69 kV #1	1	161-69	220	220
317	Line Barren Co. to Summersshade 161 kV	1	161	220	220
320	Line Bullitt Co. to Summersshade Tap 161 kV	1	161	220	220
322	Transformer Fox Hollow 161/69 kV #1	1	161-69	220	220
325	Line Fox Hollow to Summersshade 161 kV	1	161	220	220
327	Transformer Green Co. 161/69 kV #1	1	161-69	220	220
330	Line Green Co. to Summersshade 161 kV	1	161	220	220
332	Line Green Co. to Tayctp 161 kV	1	161	220	220
335	Transformer Summersshade 161/69 kV #1	1	161-69	220	220
337	Line Summersshade to Summersshade Tap 161 kV	1	161	220	220
340	Line Memphis Jct to 17-RFD 69 kV	1	69	220	901
342	Line 30-BEE to 34-PEO 69 kV	1	69	220	902
345	Line S07 to 09-WLF 69 kV	1	69	220	902
347	Line S07 to 15-ELF 69 kV	1	69	220	902
351	Line 02-AUB to SALMONS 69 kV	1	69	220	901
353	Line ANACONDA to 25-SAL 69 kV	1	69	220	901
355	Line N23 to Memphis Jct 69 kV	1	69	220	901

No.	Contingency	Ckt	Base kV	Area	Zone
357	Line N23 to 26-SIP 69 kV	1	69	220	901
360	Line 17-RFD to 03WBN 69 kV	1	69	220	901
362	Line 03-WBN to Anaconda 69 kV	1	69	220	901
367	Line 25-SAL to K30 69 kV	1	69	220	901
372	Line CFN to Franklin KY 69 kV	1	69	220	901
375	Line K30 to L30 69 kV	1	69	220	901
377	Line L30 to 20-SFN 69 kV	1	69	220	901
380	Line L30 to 01-FKN 69 kV	1	69	220	901
382	Line 01-FKN to 35-AVL 69 kV	1	69	220	901
385	Line 18-PLN to PLNGRWT 69kV	1	69	220	901
387	Line 18-PLN to 35-AVL 69kV	1	69	220	901
393	Line PLANO to 23-WEY 69 kV	1	69	220	901
395	Line 23-WEY to N23A 69 kV	1	69	220	901
397	Line N23A to Memphis Junction 69 kV	1	69	220	901
400	Line 34-PEO to S07 69 kV	1	69	220	902
402	Line Barren Co. to Goodnight 69 kV	1	69	220	220
405	Line Barren Co. to Horse Cave KU 69 kV	1	69	220	220
407	Line Bonnieville to Munfordville 69 kV	1	69	220	220
410	Line Bonnieville to Upton Jct. 69 kV	1	69	220	220
412	Line Burks Jct to Snow Jct 69 kV	1	69	220	220
415	Line Burks Jct to Summersshade 69 kV	1	69	220	220
417	Line Coburg to Colburg Jct 69 kV	1	69	220	220
420	Line Coburg to Green Co 69 kV	1	69	220	220
422	Line Coburg Jct to Columbia 69 kV	1	69	220	220
425	Line Coburg Jct to Sewellton Jct 69 kV	1	69	220	220
427	Line 29251 20COLKU1 to Columbia 69 kV	1	69	220	220
432	Line Columbia to W. Columbia 69 kV	1	69	220	220
435	Line Fox Hollow to Gorin Park Jct 69 kV	1	69	220	220
440	Line Fox Hollow to Patton Road Jct 69 kV	1	69	220	220
442	Line Glendale to Stephensburg 69 kV	1	69	220	220
445	Line Goodnight to Gorin Park Jct 69 kV	1	69	220	220
447	Line Green Co to Greensburg 69 kV	1	69	220	220
450	Line Green Co to Summersville 69 kV	1	69	220	220
452	Line Greensburg to McKinneys Corner Jct 69 kV	1	69	220	220
455	Line Horse Cave KU to Munfordville KU 69 kV	1	69	220	220
457	Line JB Galloway to Knoblick 69 kV	1	69	220	220
460	Line JB Galloway to Summersshade 69 kV	1	69	220	220
462	Line Kargle to Stephensburg 69 kV	1	69	220	220
465	Line Knoblick to McKinneys Corner Jct 69 kV	1	69	220	220
467	Line Magnolia to Summersville 69 kV	1	69	220	220
470	Line Munfordville to Munfordville KU 69 kV	1	69	220	220
472	Line Patton Road Jct to Temple Hill 69 kV	1	69	220	220
475	Line Russell Springs Jct to Sewellton Jct 69 kV	1	69	220	220
477	Line Salem Jct to Sewellton Jct 69 kV	1	69	220	220
480	Line SSPJTH Tap to Summersshade 69 kV	1	69	220	220

No.	Contingency	Ckt	Base kV	Area	Zone
482	Line SSPJTH Tap to Temple Hill 69 kV	1	69	220	220
485	Line Stephensburg to Upton Jct 69 kV	1	69	220	220
487	Line Summersshade to W. Columbia Jct 69 kV	1	69	220	220
490	Line W. Columbia to W. Columbia Jct 69 kV	1	69	220	220
492	Line 05-EBG to E. Bowling Green 161 kV	1	161	220-147	901-166
493	Line E. Bowling Green-EBG 161 kV & Xfm EBG 161-69 kV #1		161-69	220-147	901-166
497	Line 09-WLF to Leitchfield 69 kV	1	69	220-211	902-211
500	Line 31-NLF to Leitchfield 69 kV	1	69	220-211	902-211
502	Line 12-CAN to Caneyville Jct 69 kV	1	69	220-211	902-211
505	Line 10-ROS to Rosine Jct 69 kV	1	69	220-211	902-211
507	Line Aberdeen to Wilson 161 kV	1	161	220-214	901-1
510	Line Auburn to H23 69 kV	1	69	220	901
512	Line H23 to W. Bowling Green 69 kV	1	69	220	901
516	Line W Bowling Green to Memphis Junction 69 kV	1	69	220	901
517	Line E. Bowling Green to Hardcastle 69 kV	1	69	220	901
520	Line Hardcastle to Greenwood 69 kV	1	69	220	901
522	Line E. Bowling Green to 06-Oak 69 kV	1	69	220	901
525	Line E. Bowling Green to 16-Rvl 69 kV	1	69	220	901
600	outage of 22667 05JEFRSO to 24952 06CLIFTY	1	765-345	205-206	252-206
602	outage of 24952 06CLIFTY to 24953 06CLIFTY	1A	345-138	206	206
605	outage of 24952 06CLIFTY to 24953 06CLIFTY	1B	345-138	206	206
607	outage of 24952 06CLIFTY to 24959 06DEARB1	1	345	206	206
610	outage of 24952 06CLIFTY to 24960 06DEARB2	2	345	206	206
612	outage of 24952 06CLIFTY to 24962 06PIERC2	1	345	206	206
615	outage of 24952 06CLIFTY to 24962 06PIERC2	2	345	206	206
617	outage of 24952 06CLIFTY to 27447 11TRIMBL	1	345	206-211	206-211
620	outage of 24953 06CLIFTY to 27310 11NORTHS	1	138	206-211	206-211
622	outage of 25181 07RAMSY5 to 25388 08SPEED	1	345	207-208	207-281
625	outage of 25388 08SPEED to 25515 08SPEED	1	345-138	208	281
627	outage of 25388 08SPEED to 27447 11TRIMBL	1	345	208-211	281-211
630	outage of 26473 08TRIMBL to 27447 11TRIMBL	1	345	208-211	281-211
632	outage of 25520 08GALAGH to 27326 11P WEST	1	138	208-211	281-211
635	outage of 27001 11BLUE L to 27002 11BLUE L	1	345-161	211	211
637	outage of 27001 11BLUE L to 27003 11BLUE L	1	345-138	211	211
640	outage of 27001 11BLUE L to 27276 11MIDDLT	1	345	211	211
642	outage of 27001 11BLUE L to 27280 11MIL CK	1	345	211	211
645	outage of 27025 11BUCKNR to 27276 11MIDDLT	1	345	211	211
647	outage of 27025 11BUCKNR to 27447 11TRIMBL	1	345	211	211
650	outage of 27276 11MIDDLT to 27277 11MIDDLT	1	345-138	211	211
652	outage of 27276 11MIDDLT to 27277 11MIDDLT	2	345-138	211	211
655	outage of 27276 11MIDDLT to 27277 11MIDDLT	3	345-138	211	211
657	outage of 27276 11MIDDLT to 27277 11MIDDLT	4	345-138	211	211
660	outage of 27276 11MIDDLT to 27280 11MIL CK	1	345	211	211
662	outage of 27276 11MIDDLT to 27447 11TRIMBL	1	345	211	211
665	outage of 27280 11MIL CK to 27281 11MIL CK	1	345-138	211	211

No.	Contingency	Ckt	Base kV	Area	Zone
667	outage of 27280 11MIL CK to 27281 11MIL CK	2	345-138	211	211
670	outage of 27280 11MIL CK to 27331 11PADDYW	1	345	211	211
672	outage of 27309 11NORTHS to 27310 11NORTHS	1	345-138	211	211
675	outage of 27309 11NORTHS to 27331 11PADDYW	1	345	211	211
677	outage of 27331 11PADDYW to 27326 11P WEST	1	345-138	211	211
680	outage of 27447 11TRIMBL to 27448 11TRIMBL	1	345-138	211	211
687	outage of 26941 113832 T to 26972 11ASHBOT	1	138	211	211
690	outage of 26941 113832 T to 27062 11CNE RN	1	138	211	211
692	outage of 26941 113832 T to 27353 11PLSRDG	1	138	211	211
695	outage of 26942 113842 T to 27277 11MIDDLT	1	138	211	211
697	outage of 26942 113842 T to 27473 11WATTRS	1	138	211	211
700	outage of 26943 113870 T to 26986 11BEARGR	1	138	211	211
702	outage of 26943 113870 T to 27277 11MIDDLT	1	138	211	211
705	outage of 26943 113870 T to 27352 11PLAINV	1	138	211	211
707	outage of 26954 11ALGNQU to 27090 11DIXIE	1	138	211	211
710	outage of 26964 11APPLPA to 26972 11ASHBOT	1	138	211	211
712	outage of 26964 11APPLPA to 27112 11ETHEL	1	138	211	211
715	outage of 26964 11APPLPA to 27277 11MIDDLT	1	138	211	211
717	outage of 26972 11ASHBOT to 27062 11CNE RN	1	138	211	211
720	outage of 26972 11ASHBOT to 27162 11GRADE	1	138	211	211
722	outage of 26972 11ASHBOT to 27266 11MANSLI	1	138	211	211
725	outage of 26974 11ASHBY to 27281 11MIL CK	1	138	211	211
727	outage of 26974 11ASHBY to 27353 11PLSRDG	1	138	211	211
730	outage of 26982 11BARDST to 27021 11BRWNCT	1	138	211	211
732	outage of 26986 11BEARGR to 27257 11LYNDON	1	138	211	211
735	outage of 26986 11BEARGR to 27310 11NORTHS	1	138	211	211
737	outage of 26994 11BG PKW to 27200 11HRSTBR	1	138	211	211
740	outage of 26994 11BG PKW to 27277 11MIDDLT	1	138	211	211
742	outage of 27003 11BLUE L to 27296 11MUD LA	1	138	211	211
745	outage of 27011 11BRCKNG to 27112 11ETHEL	1	138	211	211
747	outage of 27011 11BRCKNG to 27200 11HRSTBR	1	138	211	211
750	outage of 27014 11BRDGHE to 27061 11CN RN6	1	138	211	211
752	outage of 27014 11BRDGHE to 27281 11MIL CK	1	138	211	211
755	outage of 27019 11BRWN N to 27021 11BRWNCT	1	138	211	211
757	outage of 27019 11BRWN N to 27022 11BRWNT1	1	138	211	211
760	outage of 27019 11BRWN N to 27023 11BRWNT2	1	138	211	211
762	outage of 27020 11BRWN P to 27022 11BRWNT1	1	138	211	211
765	outage of 27020 11BRWN P to 27023 11BRWNT2	1	138	211	211
767	outage of 27020 11BRWN P to 27128 11FAWKES	1	138	211	211
770	outage of 27020 11BRWN P to 27273 11MERCER	1	138	211	211
772	outage of 27020 11BRWN P to 27458 11W CLIF	1	138	211	211
775	outage of 27020 11BRWN P to 27458 11W CLIF	2	138	211	211
777	outage of 27021 11BRWNCT to 27022 11BRWNT1	1	138	211	211
780	outage of 27021 11BRWNCT to 27023 11BRWNT2	1	138	211	211
782	outage of 27021 11BRWNCT to 27080 11DANVIL	1	138	211	211

No.	Contingency	Ckt	Base kV	Area	Zone
785	outage of 27031 11CAMPGR to 27062 11CNE RN	1	138	211	211
787	outage of 27031 11CAMPGR to 27328 11PADDYR	1	138	211	211
790	outage of 27032 11CANAL to 27326 11P WEST	1	138	211	211
792	outage of 27044 11CENTRF to 27277 11MIDDLT	1	138	211	211
795	outage of 27044 11CENTRF to 27448 11TRIMBL	1	138	211	211
797	outage of 27048 11CLARK to 27128 11FAWKES	1	138	211	211
800	outage of 27061 11CN RN6 to 27062 11CNE RN	1	138	211	211
802	outage of 27062 11CNE RN to 27328 11PADDYR	1	138	211	211
805	outage of 27080 11DANVIL to 27273 11MERCRC	1	138	211	211
807	outage of 27090 11DIXIE to 27328 11PADDYR	1	138	211	211
810	outage of 27127 11FAWK T to 27128 11FAWKES	1	138	211	211
812	outage of 27131 11FERNVL to 27162 11GRADE	1	138	211	211
815	outage of 27131 11FERNVL to 27319 11OKOLON	1	138	211	211
817	outage of 27131 11FERNVL to 27473 11WATTRS	1	138	211	211
820	outage of 27144 11FORD to 27277 11MIDDLT	1	138	211	211
822	outage of 27200 11HRSTBR to 27352 11PLAINV	1	138	211	211
825	outage of 27218 11KNOB C to 27219 11KOSMOS	1	138	211	211
827	outage of 27218 11KNOB C to 27281 11MIL CK	1	138	211	211
830	outage of 27218 11KNOB C to 27358 11POND C	1	138	211	211
832	outage of 27219 11KOSMOS to 27281 11MIL CK	1	138	211	211
837	outage of 27234 11LEBNON to 27268 11MARION	1	138	211	211
840	outage of 27234 11LEBNON to 27273 11MERCRC	1	138	211	211
842	outage of 27257 11LYNDON to 27277 11MIDDLT	1	138	211	211
845	outage of 27266 11MANSLI to 27281 11MIL CK	1	138	211	211
847	outage of 27296 11MUD LA to 27319 11OKOLON	1	138	211	211
850	outage of 27326 11P WEST to 27328 11PADDYR	1	138	211	211
855	outage of 27002 11BLUE L to 29235 20BLIT C	1	161	211-220	211-220
857	outage of 27268 11MARION to 29409 20MARION	1	138-161	211-220	211-220
860	outage of 27127 11FAWK T to 29292 20FAWKES	1	138	211-220	211-220
862	outage of 27128 11FAWKES to 29292 20FAWKES	1	138	211-220	211-220
865	outage of 29235 20BLIT C to 29271 20DARWJ	1	161	220	220
867	outage of 29241 20CASEYC to 29390 20LIBERT	1	161	220	220
870	outage of 29241 20CASEYC to 29409 20MARION	1	161	220	220
872	outage of 29271 20DARWJ to 29503 20SHLBYC	1	161	220	220
875	outage of 29409 20MARION to 29410 20MAR IJ	1	161	220	220
877	outage of 29410 20MAR IJ to 29498 20SALOMJ	1	161	220	220
910	outage of 26855 10NTVL13 to 27055 11CLVRPR	1	138	210-211	210-211
912	outage of 27018 11BRWN N to 27178 11HARDN	1	345	211	211
915	outage of 27178 11HARDN to 27179 11HARDN	1	345-138	211	211
917	outage of 27178 11HARDN to 27179 11HARDN	2	345-138	211	211
920	outage of 27178 11HARDN to 27415 11SMITH	1	345	211	211
925	outage of 27055 11CLVRPR to 27177 11HARDBG	1	138	211	211
927	outage of 27055 11CLVRPR to 27442 11TIPTOP	1	138	211	211
930	outage of 27114 11ETOWN to 27179 11HARDN	1	138	211	211
932	outage of 27177 11HARDBG to 27179 11HARDN	1	138	211	211

No.	Contingency	Ckt	Base kV	Area	Zone
935	outage of 27179 11HARDN to 27180 11HARDN	1	138-69	211	211
937	outage of 27179 11HARDN to 27180 11HARDN	2	138-69	211	211
940	outage of 27179 11HARDN to 27384 11ROGERS	1	138	211	211
945	outage of 4130 14N.HAR4 to 27177 11HARDBG	1	138	214-211	1-211
947	outage of 25388 08SPEED to 26473 08TRIMBL	1	345	208	281
948	outage of 26473 08TRIMBL to 27152 11GHENT	1	345	208-211	281-211
949	outage of 27178 11HARDN to 27280 11MIL CK	1	345	211	211
950	outage of 27188 11HIGBY to 27467 11W LEXN	1	138	211	211
951	outage of 27450 11TYRONE to 27461 11W FRNK	1	138	211	211
1010	N2 - ABD-Wilson 1 161kV & EBG-E.Bowl.Gr 1 161kV				





COMMONWEALTH OF KENTUCKY  
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE APPLICATION OF EAST KENTUCKY )  
POWER COOPERATIVE, INC. FOR A CERTIFICATE )  
OF PUBLIC CONVENIENCE AND NECESSITY FOR ) **CASE NO**  
FOR THE CONSTRUCTION OF A 161 kV ELECTRIC ) **2005-00207**  
TRANSMISSION LINE IN BARREN, WARREN, )  
BUTLER, AND OHIO COUNTIES, KENTUCKY )

**AFFIDAVIT OF DAVID G. EAMES**

Comes the Affiant, David G. Eames, and states after first being duly sworn as follows:

1. That the Affiant is employed by the Applicant in the position of Vice President of Finance and Planning, and in that capacity, directs and supervises Applicant’s activities related to the Applicant’s financial condition including, without limitation, the financing of and the monitoring of all capital outlays for projects such as the Barren, Warren, Butler and Ohio Counties Transmission Line (“the Project”).

2. That this Project will initially be funded by the Applicant’s available general funds. Subsequently, the Applicant proposes to finance this project with a long-term loan from the Rural Utilities Service.

3. That this project does not involve a sufficient capital outlay to materially affect the existing financial condition of the Applicant.

Further Affiant Sayeth Not

*David G. Eames*  
\_\_\_\_\_  
DAVID G. EAMES

STATE OF KENTUCKY )  
 )  
COUNTY OF CLARK )

Subscribed and sworn before me by Frank J. Oliva on this 30th day of June 2005.

My Commission expires: December 20, 2008

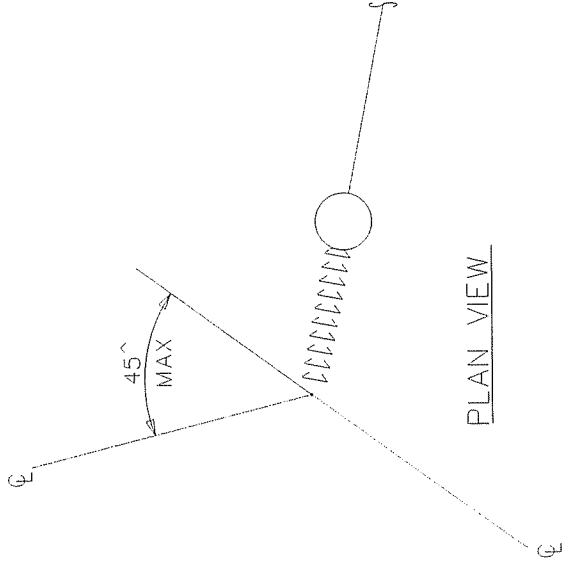
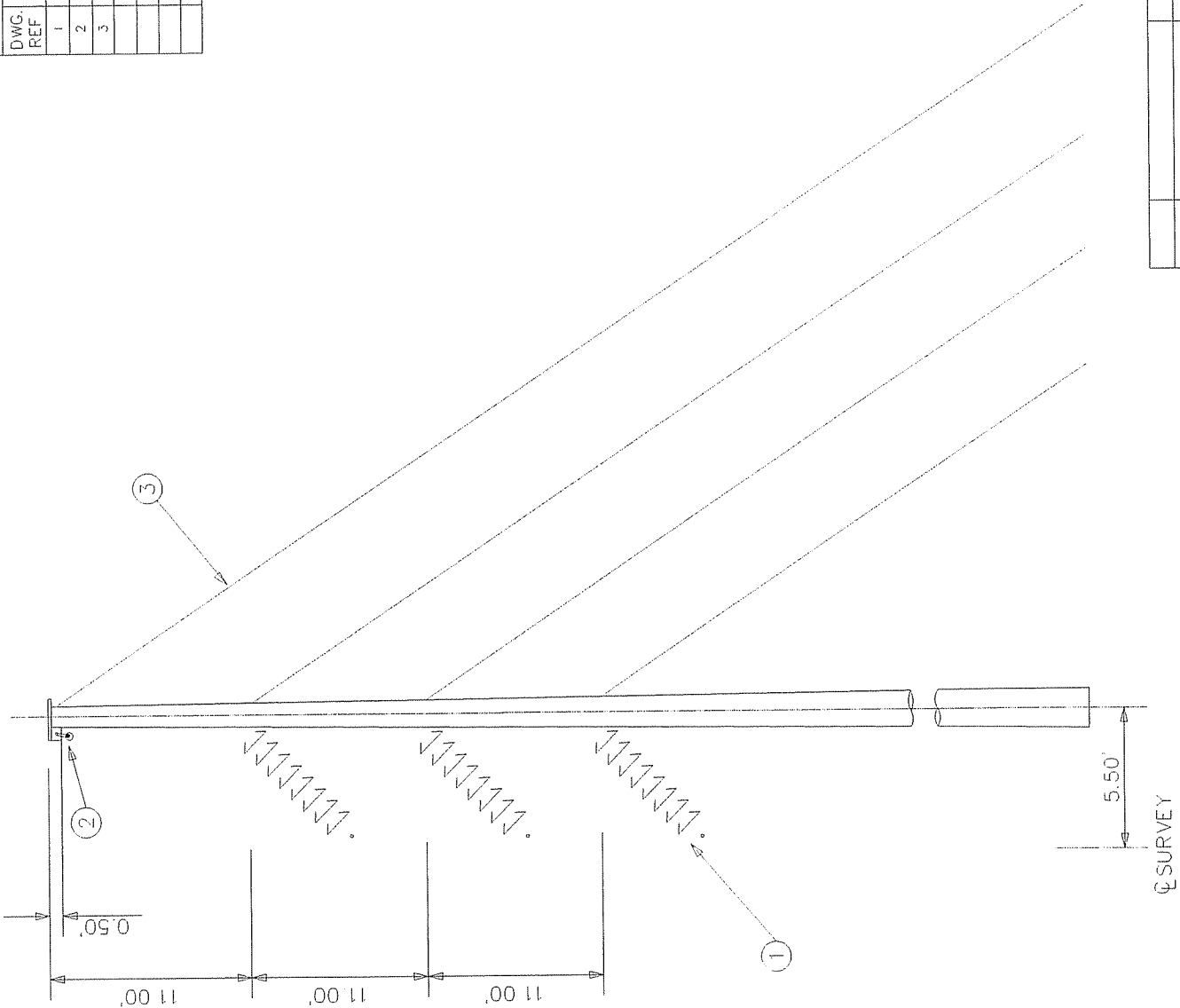
Terri K. Isaacs  
Notary Public



LIST OF MATERIALS

TS-4S-161

DWG. REF	QTY	DESCRIPTION	ITEM	DET.	CODE
1	3	INSULATOR ASS'Y TANGENT		TM-1C-161	
2	1	OPGW SUSPENSION ASSEMBLY		TM-SD	
3	4	GUY ATTACHMENT ASSEMBLY		TG-21A	



PLAN VIEW

# EXHIBIT 8-1

TRANSMISSION LINE STEEL STRUCTURE

VERTICAL MEDIUM ANGLE

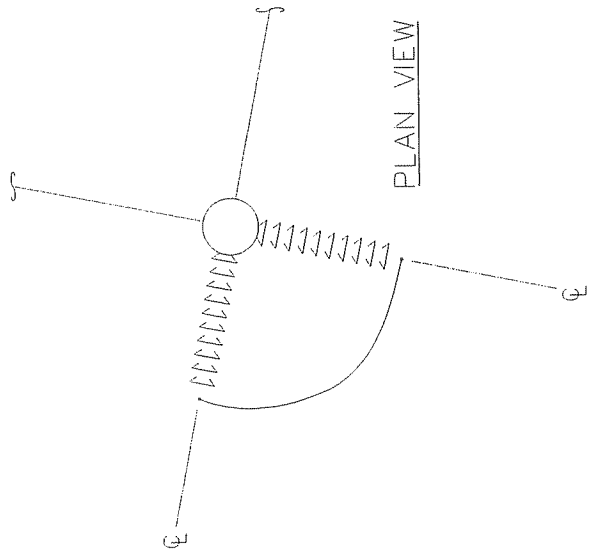
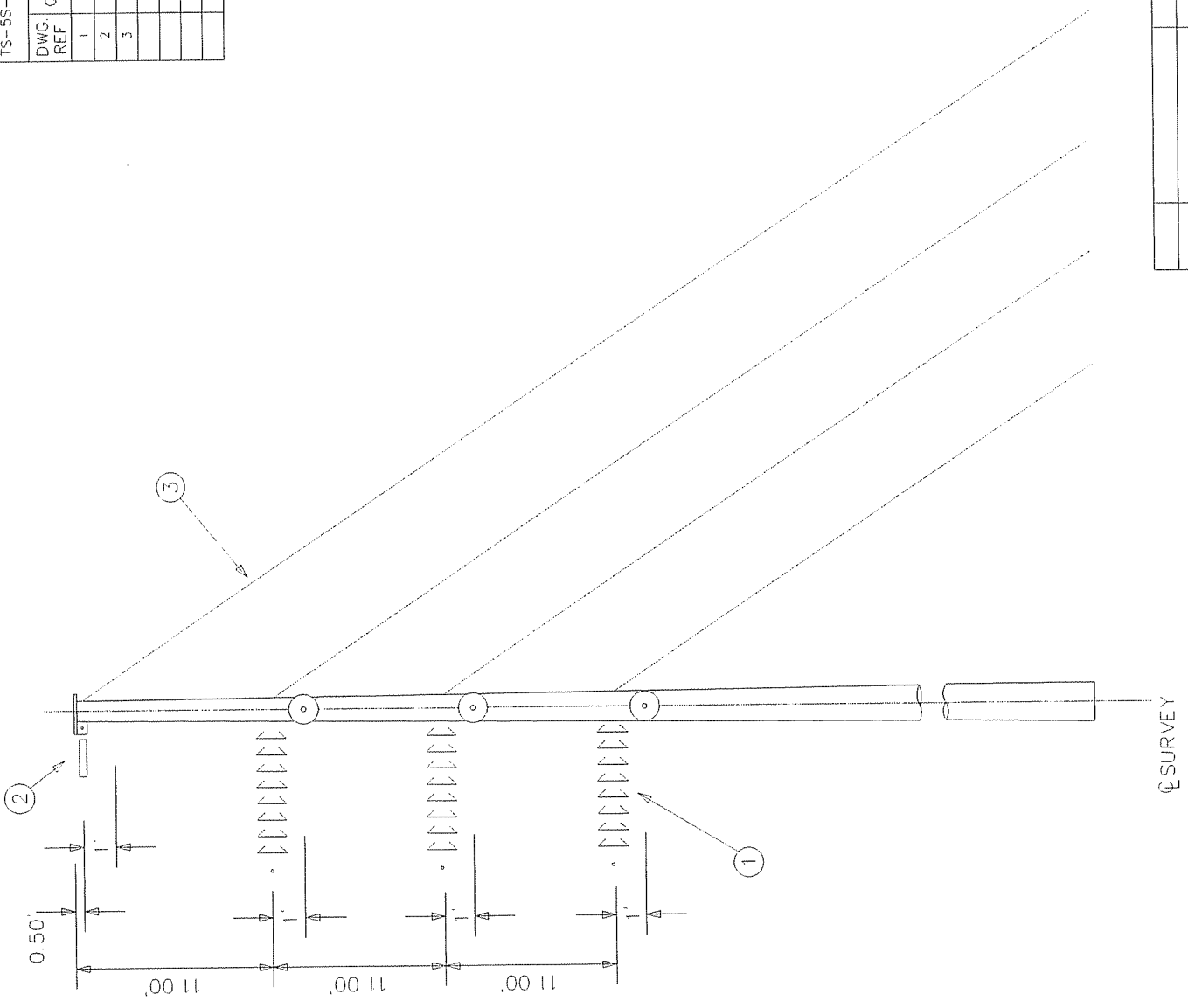
NO.	REVISION	DATE

DWR	T. MUMM
DATE	6/22/05
CHECKED	G. HARVEY

TS-4S-161

LIST OF MATERIALS

DWG. REF	QTY	DESCRIPTION	ITEM	DET.	CODE
1	6	DEADEND INSULATOR ASSEMBLY		TM-ID-161	
2	1	OPGW DEADEND ASSEMBLY		TM-DE2	
3	8	GUY ATTACHMENT ASSEMBLY		TC-21A	



# EXHIBIT 8-2

TRANSMISSION LINE STEEL STRUCTURE

VERTICAL DOUBLE DEADEND

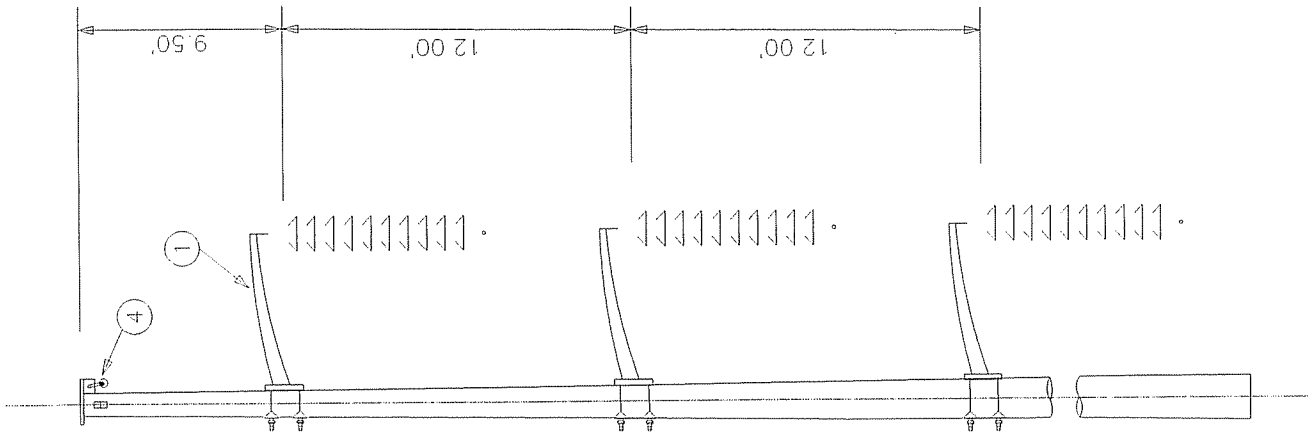
DWG. NO.	REVISION	DATE	DWG. T. NUMBER
			6/24/05
			CHECKED G. HARVEY

TS-5S-161

LIST OF MATERIALS

TU-1AAS-161

DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 10 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	DPGW ASSEMBLY, TANGENT		TM-S	



# EXHIBIT 8-3

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

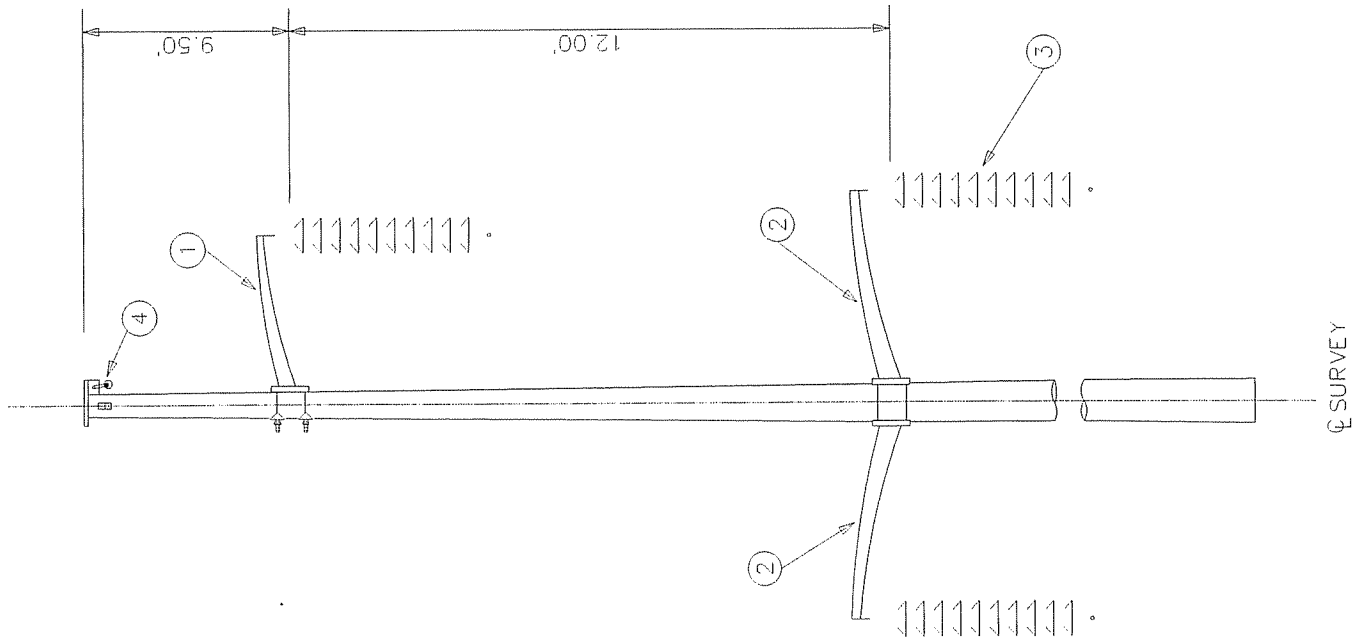
DWR	T. MUMM
DATE	6/24/05
CHECKED	G. HARVEY
NO.	
REVISION	
DATE	

TU-1AAS-161

LIST OF MATERIALS

TU-1AS-161

DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 8 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	



# EXHIBIT 8-4

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

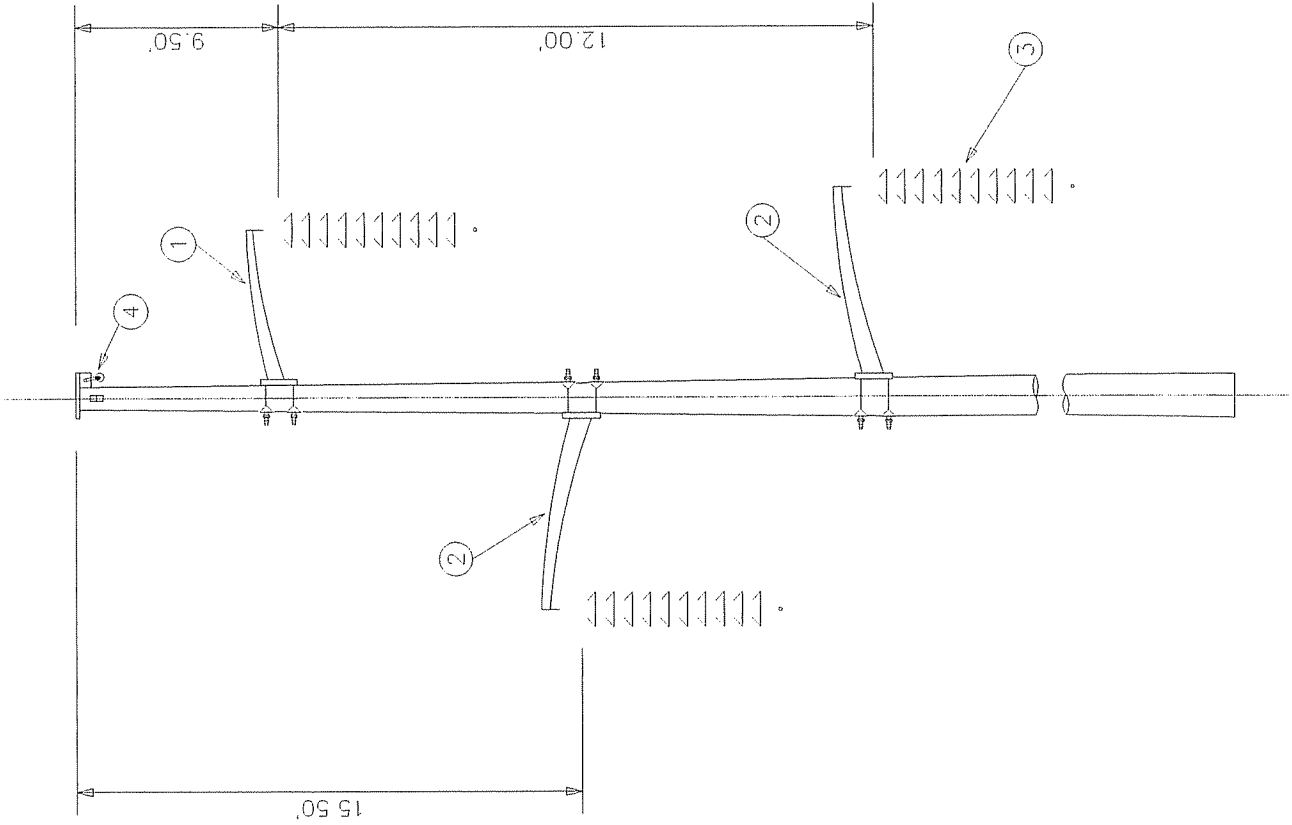
DWN	T. HUBBARD		
DATE	6/24/05		
CHECKED	C. HARVEY		
NO.	REVISION	DATE	TU-1AS-161



LIST OF MATERIALS

TU-1S-161

DWG. REF	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 8 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	



☉ SURVEY

# EXHIBIT 8-5

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

DWG. NO.	T. NUMBER	DATE	CHECKED BY
		5/23/05	G. HARVEY

NO.	REVISION	DATE

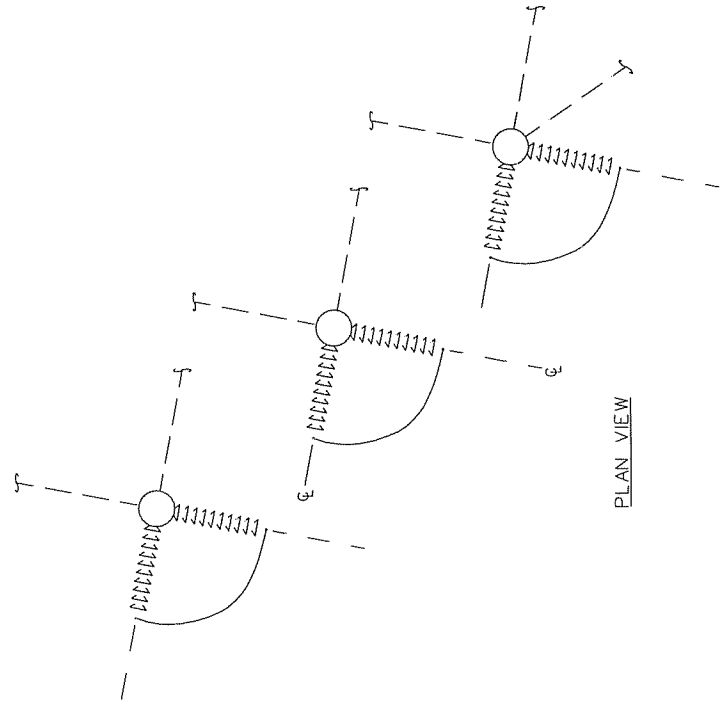
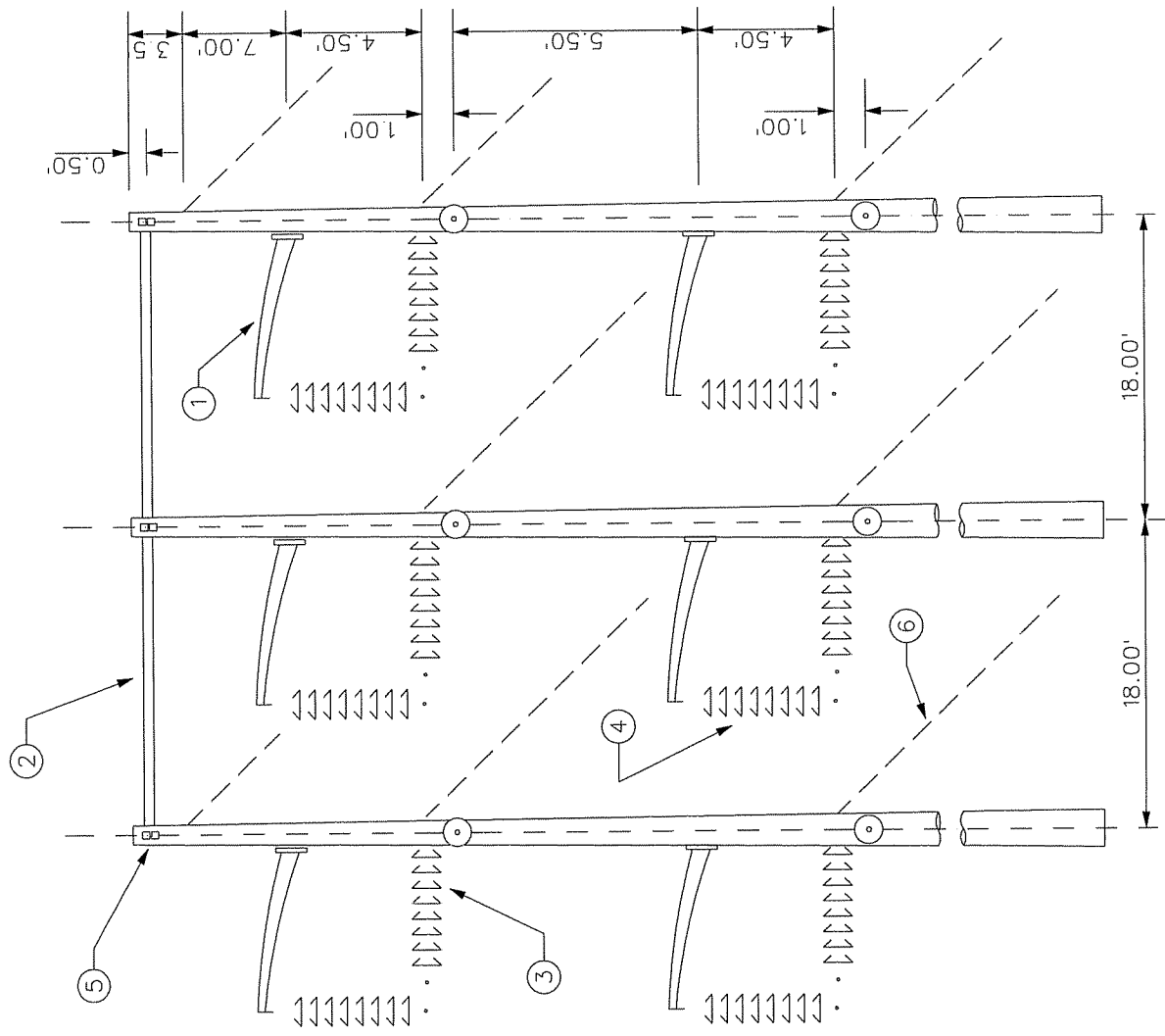
TU-1S-161





LIST OF MATERIALS

DWG. QTY REF.	DESCRIPTION	ITEM	DET.	CODE
1 6	STEEL ARM ASSY, HEAVY DUTY, 7 FT		TM-15C	
2 2	POLE TIE, 4 X 4 X 3/4 X REQ. LENGTH			
3 12	DEADEND INSULATOR ASSY		TM-1D-161	
4 6	INSULATOR ASSY TANGENT		TM-1B-161	
5 1	OPGW DEADEND ASSEMBLY		TM-DE2	
6 17	GUY ASSEMBLY		TG-21A	



# EXHIBIT 9-2

TRANSMISSION LINE STEEL STRUCTURE  
 3 POLE, DOUBLE CIRCUIT DEADEND

DWN	R. TERRILL
DATE	6/24/05
CHECKED	T. NUMM
NO.	REVISION
DATE	

THD-15S-161

LIST OF MATERIALS

DWG. QTY	DESCRIPTION	ITEM	DET.	CODE
1	INSULATOR ASSY TANGENT		TM-1C-161	
3	OPGW SUSPENSION ASSEMBLY		TM-50	
5	GUY ASSEMBLY		TG-21A	
4	SWING ANGLE BRACKET (HUGHES 3822.8 OR EO)			
5	TIE GUY ASSEMBLY		TG-21D	

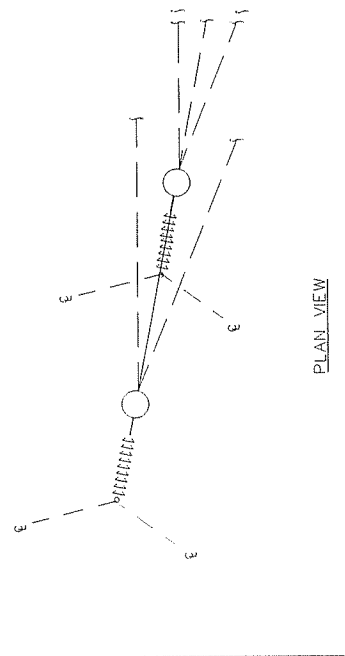
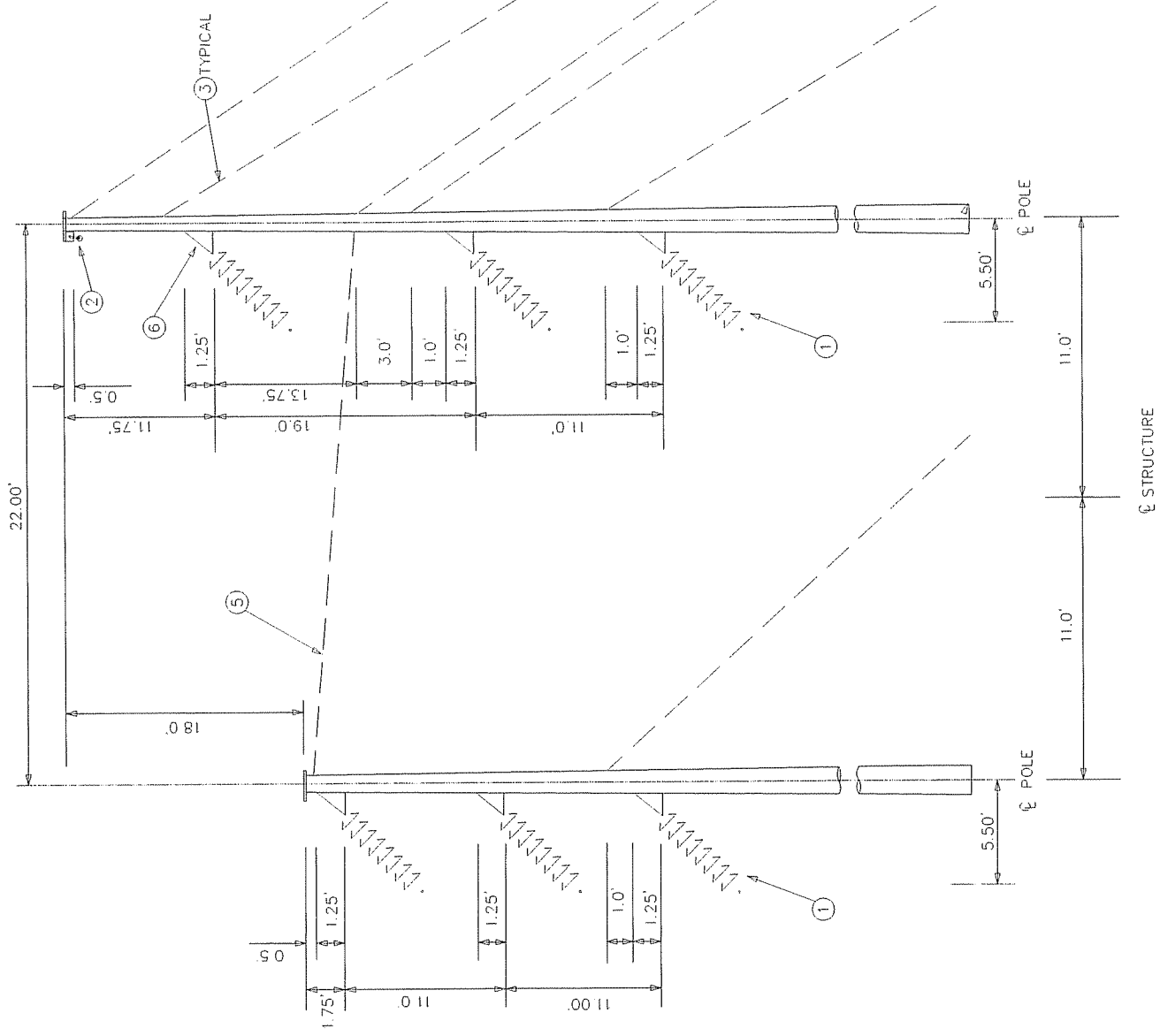


EXHIBIT 9-3

TRANSMISSION LINE STEEL STRUCTURE  
VERTICAL SMALL ANGLE



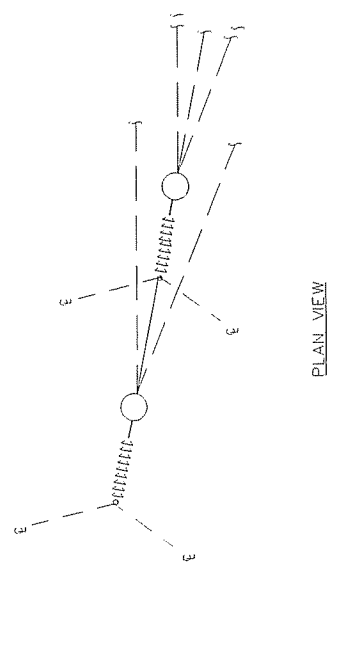
NO.	REVISION	DATE

DWG	G. HARVEY
DATE	6/27/05
CHECKED	T. MUMM

TSD-3S-161

LIST OF MATERIALS

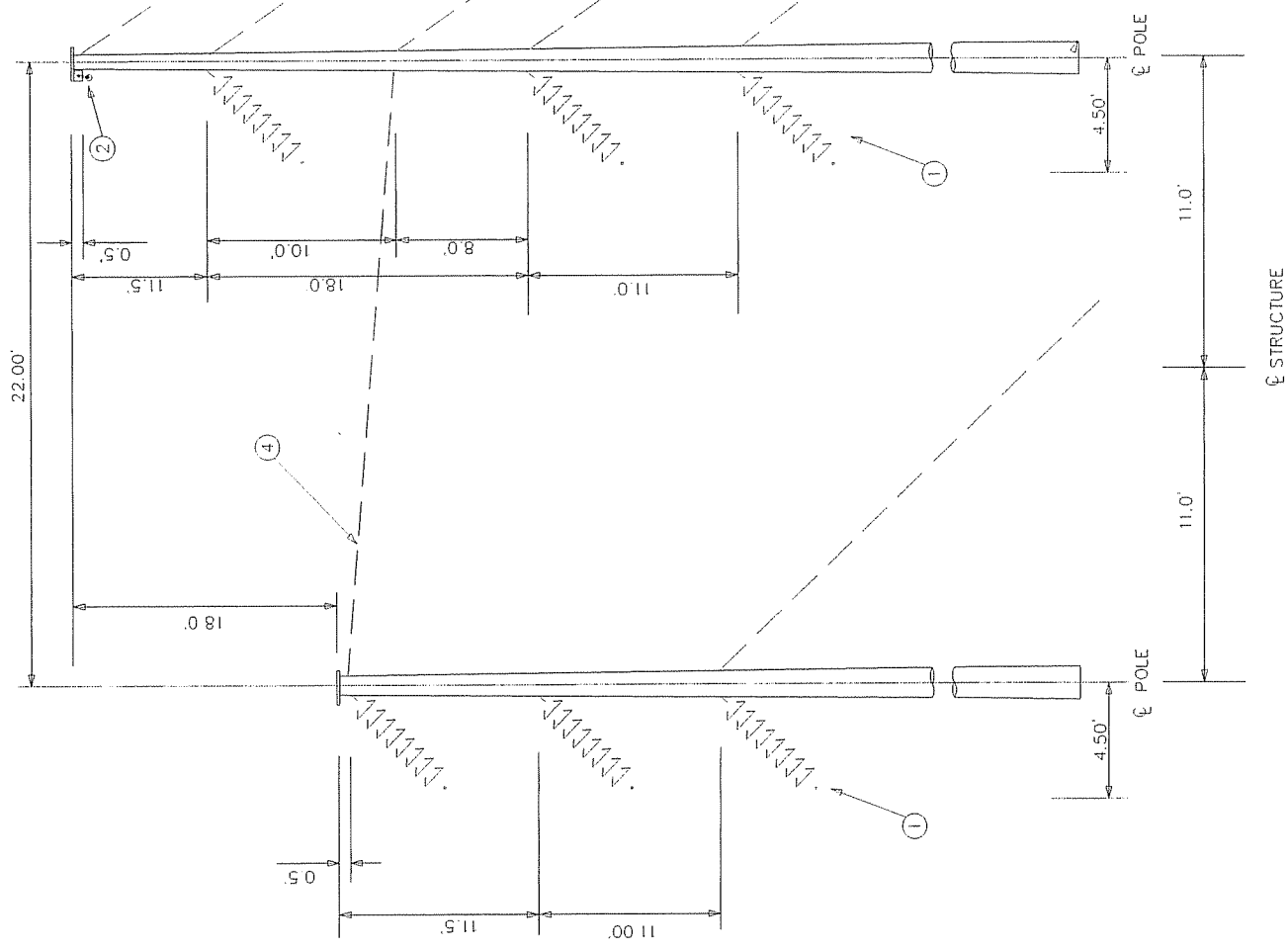
DWG. REF	QTY	DESCRIPTION	ITEM	DET.	CODE
1	6	INSULATOR ASSY TANGENT		TM-1C-161	
2	1	OPGW SUSPENSION ASSEMBLY		TM-SD	
3	7	GUY ASSEMBLY		TG-21A	
4	1	TIE GUY ASSEMBLY		TG-21D	



# EXHIBIT 9-4

TRANSMISSION LINE STEEL STRUCTURE

VERTICAL MEDIUM-LARGE ANGLE



③ TYPICAL

NO.	REVISION	DATE

DWR	G. HARVEY
DATE	6/27/05
CHECKED	T. MOHRM

TSD-4S-161

TUD-1S-161 LIST OF MATERIALS

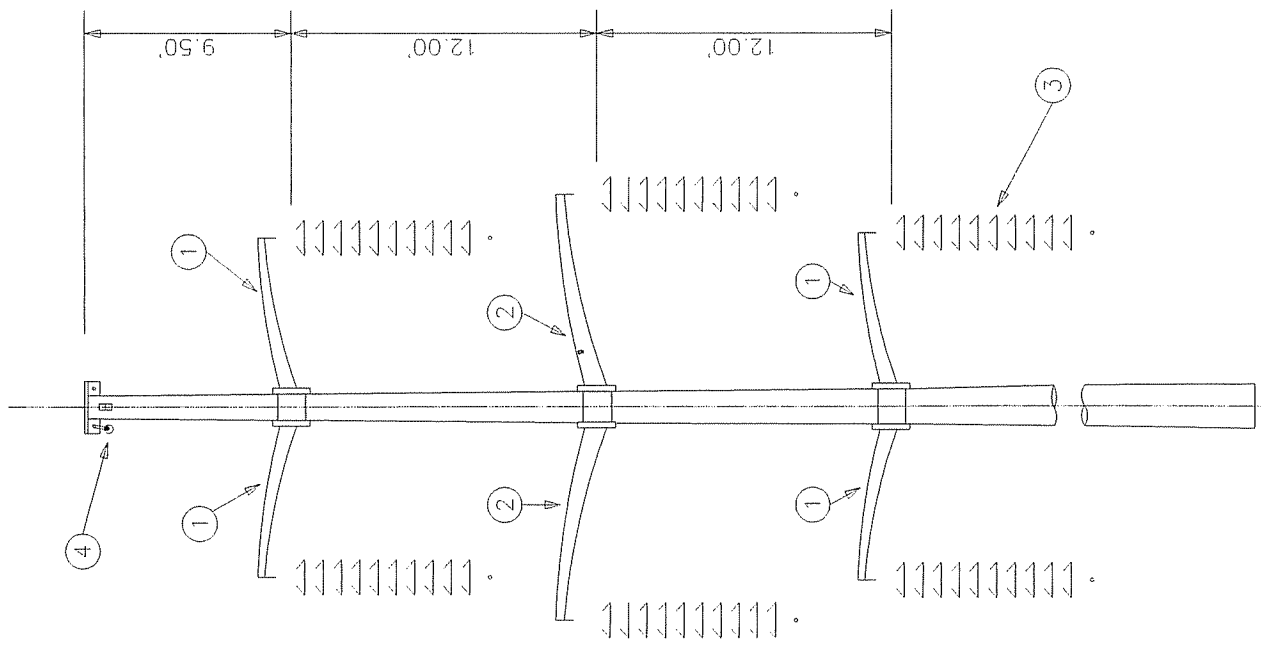
DWG. REF	QTY	DESCRIPTION	ITEM	DET.	CODE
1	4	STEEL ARM ASS'Y HVY DUTY, 8 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HVY DUTY, 9 FT.		TM-115C	
3	6	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	

NOTE:  
 IF ARMS FOR FUTURE SIDE OF DOUBLE  
 CIRCUIT ARE INITIALLY INSTALLED,  
 INSULATORS MUST ALSO BE  
 INSTALLED

# EXHIBIT 9-5

TRANSMISSION LINE STEEL STRUCTURE

DOUBLE CIRCUIT TANGENT STEEL UPSWEEP ARMS



DWG. T. NUMBER	
DATE	6/27/05
CHECKED	G. HARVEY
NO.	
REVISION	
DATE	
TUD-1S-161	