

## UPDATE TO SYSTEM IMPACT STUDY

### GENERATION INTERCONNECTION REQUESTS #30- 33

### JK SMITH COMBUSTION TURBINES #8-12 AND CFB UNIT #1 PROJECT IN CLARK COUNTY, KENTUCKY



February 13, 2007

## **Section 1: Introduction and Background**

A System Impact Study (SIS) was conducted beginning in October 2004 to analyze the impacts of requested generation additions -- Generation Interconnection Requests #30-#33 in the East Kentucky Power Cooperative (EKPC) generation queue -- at the J.K. Smith Station in Trapp, KY. The final report documenting the results of that study was completed on May 17, 2006.

The generation additions evaluated in that SIS were as follows:

<b>Requested Project</b>	<b>Commercial Operation Date</b>	<b>Summer Net Capacity (MW)</b>	<b>Winter Net Capacity (MW)</b>
JK Smith #12	March 2008	84	98
JK Smith #11	April 2008	84	98
JK Smith #10	October 2008	84	98
JK Smith #9	November 2008	84	98
JK Smith #8	December 2008	84	98
JK Smith CFB #1	March 2010	278	278

The analysis performed in the SIS identified 41 overloaded facilities in 2010 Summer and 36 overloaded facilities in 2010-11 Winter due to the addition of these proposed generators. The analysis performed recommended implementation of a construction Alternative (Alternative 1) to address the thermal overloads caused by these proposed generating unit additions at J.K. Smith. The primary project of Alternative 1 was the J.K. Smith-West Garrard 345 kV line and associated terminal facilities. This project included the following components:

- Construction of approximately 35.5 miles of 345 kV line from the existing J.K. Smith Station to a point on LGEE's existing Brown-Pineville 345 kV line in Garrard County.
- Construction of a new 345 kV switching station (to be called West Garrard) at the point of intersection in Garrard County.
- Addition of terminal facilities at LGEE's Brown North and Pineville Substations, to energize the 2<sup>nd</sup> circuit on the Brown-Pineville 345 kV line. This 2<sup>nd</sup> circuit is to be connected to the J.K. Smith-West Garrard line at the new West Garrard Substation.

Nine other upgrades of existing transmission facilities were identified as part of Alternative 1.

The need for the proposed generating units in the period specified was driven in part by the plan of Warren Rural Electric Cooperative Cooperation (WRECC) to become a

member of EKPC on April 1, 2008. Furthermore, EKPC was planning to construct nearly 100 miles of 161 kV transmission line from its Barren County Substation to the Big Rivers Electric Corporation (BREC) Wilson Substation by this date. Three interconnections in the Bowling Green area connecting to this line were also planned to provide an adequate transmission system to reliably deliver energy from EKPC generating resources to the WRECC system.

On December 7, 2006, WRECC announced its decision to remain with TVA for its power supply needs and thereby cancel its plans to become a member of EKPC. This decision has resulted in EKPC re-evaluating its generation expansion needs without WRECC as a member system. The modifications that have been identified for EKPC's generation expansion plan have driven this updated analysis of the transmission needs.

## **Section 2: Criteria, Methodology, and Assumptions**

The intent of this update to the original SIS is to use as much of the original study as possible. Engineering judgment has been used to determine which parts of the original study need to be conducted again. Much of the original study is still applicable, and has been used as the basis for the conclusions contained in this update.

### **2.1 Study Criteria**

The same study criteria were used for this updated analysis as were used in the original SIS.

### **2.2 Transmission Planning Methodology**

Only the steady-state power flow analysis was updated for this analysis. The results of the transient-stability and short-circuit analyses performed in the original study are still applicable based on the assumption that EKPC will ultimately add the generating units listed in Table 1-1 at J.K. Smith, though some of the units will be delayed.

#### **2.2.1 Power Flow Analysis**

EKPC updated the power flow analysis to reflect the following changes:

- A new generation expansion plan without EKPC serving the WRECC demand
- Continued supply of the WRECC demand by TVA generation and transmission assets
- Cancellation of the planned transmission additions by EKPC to connect its system to Warren RECC, BREC, and TVA in the Bowling Green area.
- Use of the latest available power flow models for Summer and Winter peak periods in 2007, 2010 and 2015.

EKPC's updated generation expansion plan without the requirement to serve the WRECC load is shown in Table 2-1.

<b>Requested Project</b>	<b>Commercial Operation Date</b>	<b>Summer Net Capacity (MW)</b>	<b>Winter Net Capacity (MW)</b>
JK Smith #9	January 2009	84	98
JK Smith #10	January 2009	84	98
JK Smith CFB #1	October 2010	278	278
JK Smith #8	October 2011	84	98
JK Smith #11	October 2012	84	98
JK Smith #12	October 2013	84	98

Comparing Tables 1-1 and 2-1 indicate that the total planned capacity additions at J.K. Smith are identical through 2013. The primary difference is that three of the CTs have been deferred at J.K. Smith for two to four years. The first two CTs to be installed are only delayed a few months from the previous plan. Likewise, the CFB Unit #1 is delayed by approximately seven months.

For the power flow analysis, EKPC started with its latest available 2007 Summer, 2007-08 Winter, 2010 Summer, 2010-11 Winter, 2015 Summer, and 2015-16 Winter models. These models were jointly developed by EKPC and LGEE in early 2006, and therefore include a detailed representation of the EKPC and LGEE transmission systems. The representation of EKPC's other neighboring utilities (AEP, BREC, CIN, DPL, and TVA) is the representation submitted by these utilities for the NERC MMWG 2005 Series Model Development. The remainder of the "outside world" is a reduced representation from that NERC MMWG 2005 Series.

EKPC then updated these power flow models to reflect the WRECC system being served by TVA. Therefore, TVA generation was increased to serve the WRECC load. EKPC generation was no longer modeled supplying any of the WRECC load. Also, the planned transmission system additions in the Bowling Green area needed for EKPC service to WRECC were removed from the models.

A list of thermal loading problems due to the addition of the proposed generators has been developed using the updated power flow models and the generation expansion schedule shown in Table 2-1. Any facilities that overload after the addition of the proposed generating units at J.K. Smith that are not already overloaded prior to the addition of these units has been identified.

### **2.3 Modeling & Assumptions**

The models used for the power flow analysis were from EKPC's internal model library. The models used were the following peak-load representations:

2007 Summer	2007/08 Winter
2010 Summer	2010/11 Winter
2015 Summer	2015/16 Winter

These models were jointly developed by EKPC and LGEE in the first quarter of 2006, and therefore include a detailed representation of both the EKPC and LGEE transmission systems. The representation of EKPC's other neighboring utilities (AEP, BREC, CIN, DPL, and TVA) is the representation submitted by these utilities for the NERC MMWG 2005 Series Model Development. The remainder of the "outside world" is a reduced representation from that NERC MMWG 2005 Series.

For all utilities other than EKPC and LGEE, the analysis used the loads included in the base NERC MMWG cases for the appropriate year. For EKPC and LGEE, the loads in

the models are based on forecast data available to the two companies at the time these models were developed in the first quarter of 2006.

As with the loads modeled, the analysis used the future transmission projects that each utility had included in the NERC MMWG 2005 series of cases for all utilities other than EKPC and LGEE. For EKPC and LGEE, the future transmission projects in the models are those that were included by each company during development of the joint base cases. Any projects that were expected to be attributable to the J.K. Smith generation additions were removed, since the need for these projects will be addressed as part of this update to the SIS.

As mentioned earlier, all aspects of EKPC's transmission plan to serve WRECC have been removed. Also, the models have been revised to simulate TVA generation resources serving the WRECC load in 2008 and beyond instead of EKPC generation resources. The planned generation expansion at J.K. Smith has been revised to reflect EKPC's lower load forecast without WRECC. The revised plan has been provided in Table 2-1 above.

In addition to the planned generator additions at the J.K. Smith Station, a fourth generating unit is planned for EKPC's Spurlock Station. The plans for this new unit remain unchanged, despite WRECC's decision to remain with TVA. The fourth unit is scheduled to begin commercial operations on April 1, 2009. The power flow models used for this analysis include this unit addition on this date.

For the purposes of this study, the proposed units were modeled at maximum output in the analyses. If this resulted in excess generation (beyond EKPC's load requirements), the surplus generation was exported equally to "virtual" generators that were connected to AEP's Cook 765 kV bus and to the Bowen 500 kV bus in SERC. This effectively simulates equal exports to the north and south. This is necessary to ensure adequate transmission capacity for maximum output at the J.K. Smith Plant. All other EKPC units, including the future Spurlock #4, were modeled at maximum output. The Laurel Dam Hydro units were not dispatched in the models. Table 2-1 summarizes the generation output of the existing and future EKPC units dispatched for this study.

<b>Table 2-2 EKPC Base Case Generation</b>			
<b>Unit</b>	<b>Commercial Operation Date</b>	<b>Summer Net Capacity (MW)</b>	<b>Winter Net Capacity (MW)</b>
Cooper #1	existing	116	116
Cooper #2	existing	225	225
Dale #1	existing	24	24
Dale #2	existing	24	24
Dale #3	existing	80	80
Dale #4	existing	80	80
Spurlock #1	existing	325	325
Spurlock #2	existing	535	535
Gilbert #3	existing	268	268
Spurlock #4	April 2009	278	278
JK Smith CT #1	existing	98	142
JK Smith CT #2	existing	98	142
JK Smith CT #3	existing	98	142
JK Smith CT #4	existing	75	100
JK Smith CT #5	existing	75	100
JK Smith CT #6	existing	75	100
JK Smith CT #7	existing	75	100
JK Smith CT #8	October 2011	84	98
JK Smith CT #9	January 2009	84	98
JK Smith CT #10	January 2009	84	98
JK Smith CT #11	October 2012	84	98
JK Smith CT #12	October 2013	84	98
JK Smith CFB #1	October 2010	278	278

## **Section 3: Power Flow Analysis With Proposed Generators Added and Without Transmission Upgrades**

### **3.1 Power Flow Analysis**

The power flow analysis was conducted to identify and address critical contingencies and overloads on the EKPC and neighboring systems. The initial power flow analysis identified the overloads, including the magnitudes, with the proposed generators at J.K. Smith in 2007 Summer, 2007-08 Winter, 2010 Summer, 2010-11 Winter, and 2015 Summer, and 2015-16 Winter. This initial power flow analysis did not model any new transmission in the vicinity of the J.K. Smith Station. Tables 3-1 through 3-8 show the thermal overloads (for the worst-case contingency only) identified in the power flow analysis for the various periods, with the proposed generating units added and no transmission additions. For 2010 Summer and 2010-11 Winter, the overloads are shown for two scenarios. One scenario is the addition of CTs #9 and #10 only added at J.K. Smith. The other scenario is the addition of CFB Unit #1 in addition to CTs #9 and #10. The results in all the following Tables are sorted by the severity of the overload. Appendix A contains the complete listing of overloads identified in these periods.

<b>Table 3-1</b>						
<b>2007 Summer Thermal Overloads with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Hickory Plains-PPG 69 kV Line	LGEE	Fawkes EKPC-West Berea 138 kV Line (EKPC)	Cooper #2 off, import from AEP	54	54.8	101.5%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	288.5	100.5%



<b>Table 3-2</b>						
<b>2007-08 Winter Thermal Overloads with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	305.5	106.4%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	392.3	100.8%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	None	Base	167	168.0	100.6%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	237	238.0	100.4%

<b>Table 3-3</b>						
<b>2010 Summer Thermal Overloads with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	57.6	104.7%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	292.8	102.0%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	315.6	101.5%
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	144.7	101.2%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	222.4	100.2%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	317.8	110.7%
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	315.8	104.2%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	404.8	104.1%
Union City-Lake Reba Tap 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	377.7	101.8%
West Berea Jct.-Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde-Pineville 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	101.9	100.9%

**Table 3-5  
2010 Summer Thermal Overloads with CTs 9-10 & CFB Unit #1 Installed at JK  
Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	327.6	114.1%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	62.7	114.0%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	353.8	113.8%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	300	334.2	111.4%
Rice Tap-West Irvine 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	40	44.4	111.0%
Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	317.7	110.7%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	311	338.4	108.8%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	51	55.0	107.8%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	239.2	107.7%
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	151.9	106.2%
JK Smith-Union City 138 kV Line	EKPC	None	Base	251	264.2	105.3%
Fawkes LGEE-Clark County 138 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Ghent #1 off, import from TVA	172	180.4	104.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	None	Base	241	251.3	104.3%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	231.5	104.3%
Fawkes Tap-Lake Reba Tap 138 kV Line	LGEE	JK Smith-Union City 138 kV Line (EKPC)	Cooper #2 off, import from AEP	176	183.1	104.0%

<b>Table 3-5</b>						
<b>2010 Summer Thermal Overloads with CTs 9-10 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
West Frankfort-Clay Village Tap 69 kV Line	LGEE	Bullitt County-Little Mount Jct. 161 kV Line (EKPC)	Mill Creek #4 off, import from AEP	43	44.2	102.8%
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	291.8	101.7%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	314.3	101.1%

**Table 3-6  
2010-11 Winter Thermal Overloads with CTs 9-10 & CFB Unit #1 Installed at JK  
Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	341.6	119.0%
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	356.8	117.8%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	444.3	114.2%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	413.5	111.5%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	136	147.2	108.2%
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	223.7	106.0%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Dale #3 off, import from AEP	143	151.3	105.8%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	293.5	105.6%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	223	235.4	105.6%
West Berea Jct.-Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde-Pineville 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	106.6	105.5%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	88	92.5	105.1%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	77	80.4	104.4%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	370	385.7	104.2%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	389	403.9	103.8%

<b>Table 3-6 2010-11 Winter Thermal Overloads with CTs 9-10 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Powell County 161-138 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	227.8	103.5%
Morehead-Hayward 69 kV	AEP	Rowan County-Skaggs 138 kV Line (EKPC)	Base	48	49.5	103.1%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	281.8	101.4%
Lake Reba Tap 138-161 kV Transformer	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	270	271.9	100.7%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	390.3	100.3%

**Table 3-7  
2015 Summer Thermal Overloads with CTs 8-12 and CFB Unit #1 Installed at JK  
Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	246	336.9	137.0%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	74.2	134.9%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	401.1	129.0%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	51	65.1	127.6%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	300	378.0	126.0%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	311	387.8	124.7%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	357.0	124.4%
JK Smith-Union City 138 kV Line	EKPC	None	Base	251	303.5	120.9%
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	172.1	120.3%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	None	Base	241	287.1	119.1%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	261.2	117.7%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	354.3	113.9%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	252.7	113.8%
Beattyville 161-69 kV Transformer	LGEE	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	64	71.2	111.3%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	205	227.4	110.9%

**Table 3-7  
2015 Summer Thermal Overloads with CTs 8-12 and CFB Unit #1 Installed at JK  
Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Boonesboro North-Winchester Water Works 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	158.6	110.9%
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	314.5	109.6%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	111	119.6	107.7%
Winchester South-Winchester 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	110	118.4	107.6%
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Delvinta-Green Hall Jct. 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	47	50.5	107.4%
West Irvine Tap-Delvinta 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	201	208.1	103.5%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Dale #3 off, import from AEP	129	132.7	102.9%
Clark County-Sylvania 69 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	137	139.6	101.9%
Paris 138-69 kV Transformer	LGEE	Avon-Loudon Avenue 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	173	175.9	101.7%
Farmers 138-69 kV Transformer	LGEE	Rodburn 138-69 kV Transformer (LGEE)	Base	48	48.5	101.0%
Winchester Water Works-Boone Avenue 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	150	151.3	100.9%
Fawkes LGEE-Richmond 69 kV Line	LGEE	Lake Reba 138-69 kV Transformer (LGEE)	Cooper #2 off, import from AEP	117	118.0	100.9%
Loudon Avenue 138-69 kV Transformer #628	LGEE	Loudon Avenue 138-69 kV Transformer #618 (LGEE)	Brown #3 off, import from AEP	128	128.9	100.7%
Powell County 138-161 kV Transformer	EKPC	Lake Reba Tap-West Irvine-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	193	193.8	100.4%
West Irvine-Dark Hollow 69 kV Line	LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	55.1	100.2%
Clark County 138-69 kV Transformer	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	143	143.1	100.1%



**Table 3-8  
2015-16 Winter Complete List of Identified Problems with CTs 8-12 and CFB Unit  
#1 Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	403.8	133.3%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	378.1	131.7%
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	374.9	130.6%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	500.7	128.7%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	None	Base	277	353.9	127.8%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	136	169.7	124.8%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	462.7	124.7%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	389	470.4	120.9%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Dale #3 off, import from AEP	143	169.4	118.5%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	322.5	116.0%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	370	428.6	115.8%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	442.5	113.8%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	223	253.1	113.5%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	88	99.5	113.1%

**Table 3-8  
2015-16 Winter Complete List of Identified Problems with CTs 8-12 and CFB Unit  
#1 Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	235.1	111.4%
Boonesboro North-Winchester Water Works 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	159.3	111.4%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	308.4	110.9%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	77	85.3	110.8%
Powell County 138-161 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	243.3	110.6%
JK Smith-Union City 138 kV Line	EKPC	None	Base	349	381.1	109.2%
JK Smith-Powell County 138 kV Line	EKPC	None	Base	287	308.3	107.4%
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Delvinta-Green Hall Jct. 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	62	66.6	107.4%
Lake Reba Tap 138-161 kV Transformer	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	270	289.5	107.2%
West Berea 138-69 kV Transformer	EKPC	Fawkes LGEE-Crooksville Jct. 69 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	152	162.4	106.8%
Dale-Newby #1 69 kV Line	EKPC	Dix Dam-Buena Vista 69 kV Line (LGEE)	Cooper #2 off, import from AEP	87	92.6	106.4%
Morehead-Hayward 69 kV	AEP	Rowan County-Skaggs 138 kV Line (EKPC)	Base	48	50.7	105.6%
Fawkes LGEE-Clark County 138 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Ghent #1 off, import from TVA	194	202.5	104.4%
Green Hall Jct.-Tyner 161 kV Line	EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	237	246.5	104.0%
Powell County 138-161 kV Transformer	EKPC	None	Base	178	181.2	101.8%
West Irvine 161-69 kV Transformer	LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	62	62.9	101.5%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Spurlock-Kenton 138 kV Line	EKPC-LGEE	Spurlock-Maysville Industrial Jct. 138 kV Line (EKPC)	Ghent #1 off, import from TVA	287	288.2	100.4%
Farmers 138-69 kV Transformer	LGEE	Rodburn 138-69 kV Transformer (LGEE)	Base	58	58.1	100.2%

The power flow results contained in Tables 3-1 through 3-8 indicate the following:

- o 2 transmission facilities are overloaded in 2007 Summer with CTs 9 and 10 added
- o 3 transmission facilities are overloaded in 2007-08 Winter with CTs 9 and 10 added
- o 5 transmission facilities are overloaded in 2010 Summer with CTs 9 and 10 added
- o 5 transmission facilities are overloaded in 2010-11 Winter with CTs 9 and 10 added
- o 16 transmission facilities are overloaded in 2010 Summer with CTs 9-10 and CFB #1 added
- o 19 transmission facilities are overloaded in 2010-11 Winter with CTs 9-10 and CFB #1 added
- o 29 transmission facilities are overloaded in 2015 Summer with CTs 8-12 and CFB #1 added
- o 28 transmission facilities are overloaded in 2015-16 Winter with CTs 8-12 and CFB #1 added

	<b>Total Generation Modeled at JK Smith</b>	<b>Number of Overloaded Facilities</b>	<b>Number of Critical Contingencies</b>	<b>Overload Ranges</b>
<b>2007 Summer<sup>(1)</sup></b>	762 MW	2	2	100.5%-101.5%
<b>2007-08 Winter<sup>(1)</sup></b>	1022 MW	3	5	100.4%-106.4%
<b>2010 Summer<sup>(1)</sup></b>	762 MW	5	6	100.2%-104.7%
<b>2010-11 Winter<sup>(1)</sup></b>	1022 MW	5	6	100.4%-110.7%
<b>2010 Summer<sup>(2)</sup></b>	1040 MW	16	20	100.4%-114.1%
<b>2010-11 Winter<sup>(2)</sup></b>	1300 MW	19	21	100.1%-119.0%
<b>2015 Summer<sup>(3)</sup></b>	1292 MW	29	32	100.1%-137.0%
<b>2015-16 Winter<sup>(3)</sup></b>	1578 MW	28	43	100.2%-133.3%

<sup>(1)</sup>Simulates addition of CTs 9 and 10

<sup>(2)</sup>Simulates addition of CTs 9-10 and CFB #1

<sup>(3)</sup>Simulates addition of CTs 8-12 and CFB #1

A breakdown of the ownership of these facilities is provided in Table 3-10.

<b>Table 3-10 Summary of Ownership of Overloaded Facilities</b>				
<b>Period</b>	<b>Number of AEP Facilities</b>	<b>Number of EKPC Facilities</b>	<b>Number of LGEE Facilities</b>	<b>Number of EKPC-LGEE Interconnected Facilities</b>
2007 Summer	0	0	1	1
2007-08 Winter	0	1	1	1
2010 Summer – CTs 9 and 10 added	0	2	2	1
2010-11 Winter – CTs 9 and 10 added	0	4	1	0
2010 Summer – CTs 9-10 and CFB #1 added	0	5	8	3
2010-11 Winter – CTs 9-10 and CFB #1 added	1	10	4	4
2015 Summer	0	9	17	3
2015-16 Winter	1	13	8	6

These power flow results indicate that substantial thermal overloading of the existing transmission system will be created by the addition of the proposed generators at the J.K. Smith site. Although these results do differ somewhat from those obtained in the original SIS, they are fairly consistent. Many of the same facilities were identified as overloaded in both studies, and the magnitudes are generally of similar magnitudes. Several factors other than those already described may have contributed to the differences that are observed. These factors include:

- Inclusion of the J.K. Smith-North Clark 345 kV Line Project in this updated SIS. This line was not included in the power flow analysis performed in the original SIS that identified the thermal overloads without transmission added. It was included in the power flow analysis for the various transmission Alternatives in the original SIS.
- Increases of LGEE facility ratings in the winter across its system, which have eliminated some winter problems on the LGEE transmission system
- Updated load forecasts which have resulted in some shifts in the direction of flows

However, the results still indicate that a large number of problems of potentially severe magnitude could occur in the region without any transmission system additions.

## **Section 4: Alternatives Considered**

### **4.1 Review of Alternatives Considered in Original SIS**

In the original SIS, several transmission options were considered to alleviate overloading of area transmission facilities. Upgrading existing transmission facilities was eliminated from further consideration for the following reasons:

- An excessive number of major system upgrades (significant reconductoring/rebuilding of lines, replacement or addition of high voltage transformers, etc.) would be required.
- Taking the existing facilities out of service to perform the upgrades would be an extremely difficult task, and would result in decreased system reliability and generation restrictions for much of the next several years.
- Higher transmission-system losses would be incurred if new facilities are not added.
- Upgrading existing facilities does not provide significant margin for system operations during multiple contingency conditions. If no new facilities are added, the ability to withstand more extreme contingencies is less sure.
- The scope, cost, and schedule for these upgrades is very uncertain. A detailed and lengthy analysis would be required to determine these items for all of the overloaded facilities.

All of these factors are still applicable to the system based upon the results of the updated SIS. Therefore, upgrading of existing facilities as the sole means of accommodating the J.K. Smith proposed generating units is still neither viable nor desirable.

In the original SIS, a numerous set of new outlets for the J.K. Smith Station were screened singularly and in various combinations to evaluate the performance with the proposed generators added at J.K. Smith. The screening process eliminated most of these outlet options for one of the following two reasons:

- An outlet either singularly or in combination with other outlets did not eliminate a substantial number of the thermal overloads caused by the proposed generators
- An outlet did not provide any significant additional benefits when compared to the performance of another outlet that would be shorter and/or less expensive

As shown in Figure B-1 in Appendix B, the problems identified in this updated SIS with the proposed generators and without any transmission system additions through 2015 are primarily concentrated in two areas:

1. The immediate area around the J.K. Smith, Dale, Fawkes, Lake Reba Tap, Powell County, and Clark County Substations.

2. Along the 161 kV system extending southeast from the Lake Reba Tap Substation through the Delvinta Substation.

Other isolated problems (Beattyville-Oakdale Jct., Morehead AEP-Hayward AEP 69 kV, West Berea-Three Links Jct. 69 kV) were identified outside of the two primarily impacted areas.

The screening results indicate that power flows are similar for the power flow analyses conducted with the updated models and with the models used in the original SIS. The number, severity, and location of problems are consistent between the two studies. Therefore, the same rationale for eliminating the majority of these outlet options is still applicable.

The original screening analysis determined that two of the outlet options considered have a greater impact on the transmission-system problems identified than did the remainder of the outlet options. These two outlet options are:

- ✓ The J.K. Smith-Tyner 345 kV line and the installation of a 345-161 kV transformer at Tyner
- ✓ The J.K. Smith-West Garrard 345 kV line and a new 345 kV switching station at West Garrard connecting this line with LGEE's Brown-Pineville 345 kV circuit

These two outlets substantially reduced the number and severity of overloads caused by the proposed generators. These options appeared to provide these benefits for two primary reasons:

- Each is a 345 kV outlet providing a high outlet capacity from the J.K. Smith site
- Each provides a connection to the transmission system in the southern and southeastern parts of the Kentucky transmission system. A small amount of generation exists in this area. Therefore, a large amount of the power required by customers in this area presently flows into the area on the 138 kV and 161 kV interfaces in the Richmond, KY area (through the Fawkes and Lake Reba Tap substations). Either the J.K. Smith-Tyner or J.K. Smith-West Garrard 345 kV line would provide an EHV path bypassing these heavily loaded 138 and 161 kV interfaces.

The other outlet options considered either did not provide as much benefit as either of these two options or provided similar benefits at the expense of much more construction. Again, based on the similarity between the results obtained in the original SIS and in the updated SIS, these conclusions are still valid.

The original SIS determined that the Alternative developed that included the J.K. Smith-West Garrard 345 kV line (Alternative 1) was the preferred transmission plan to address the thermal overloads caused by the generator additions. This conclusion was reached for the following reasons:

- Alternative 1 was much less expensive to implement than the other Alternatives
- Alternative 1 required a substantially smaller number of ancillary upgrade projects to implement
- Alternative 1 provided the best steady-state power flow performance
- Alternative 1 provided the best transient-stability performance
- Alternative 1 provided the best opportunities for future expansion by EKPC
- Alternative 1 appeared to provide significant advantages over the other Alternatives with regard to the physical issues associated with construction and expansion.

None of the changes that have occurred since the original SIS have changed these conclusions. Therefore, Alternative 1 is still the preferred Alternative for the reasons listed above.

## **4.2 Common Facilities Required**

As discussed in the original SIS, some common facilities are required at the J.K. Smith site to accommodate the proposed generator additions. These requirements are necessary regardless of the new outlet or outlets to be built. These system additions/modifications are necessary to accommodate the connection of the proposed generators to EKPC's transmission network. Table 4-1 lists these proposed system additions, the reason for which each is needed, and the date needed based on the latest schedule that has been provided for the generation additions.

<b>Table 4-1 Common Transmission Facilities Required to Connect the Proposed J.K. Smith Units</b>		
<b>Install Date</b>	<b>Project Description</b>	<b>Reason for Need</b>
June 2007	Install a second 345-138 kV, 450 MVA transformer at JK Smith CT Substation	Addition of CTs #9 & #10 at JK Smith; needed for desired redundancy for this critical connection between the 345 kV and 138 kV buses at J.K. Smith
June 2007	Add 345 kV Terminal Facilities at JK Smith CT Substation for CTs #9 & #10	Addition of CTs #9 & #10 at JK Smith
June 2009	Construct a second 345 kV substation at JK Smith for the CFB Unit <sup>(†)</sup>	Addition of CFB Unit #1 at JK Smith
June 2009	Add 345 kV Terminal Facilities at JK Smith CFB Substation for CFB Unit #1 <sup>(†)</sup>	Addition of CFB Unit #1 at JK Smith
June 2009	Construct two 345 kV lines (0.8 miles each) between the JK Smith CT 345 kV substation and the JK Smith CFB 345 kV substation using bundled 954 MCM ACSR conductor <sup>(†)</sup>	Addition of CFB Unit #1 at JK Smith
June 2009	Add 345 kV Terminal Facilities at JK Smith CT Substation for the two 345 kV lines to the JK Smith CFB Substation <sup>(†)</sup>	Addition of CFB Unit #1 at JK Smith
June 2009	Add 345 kV Terminal Facilities at JK Smith CFB Substation for the two 345 kV lines to the JK Smith CT Substation <sup>(†)</sup>	Addition of CFB Unit #1 at JK Smith

<b>Table 4-1 Common Transmission Facilities Required to Connect the Proposed J.K. Smith Units</b>		
<b>Install Date</b>	<b>Project Description</b>	<b>Reason for Need</b>
June 2011	Add 138 kV Terminal Facilities at JK Smith CT Substation for CT #8	Addition of CT #8 at JK Smith
June 2012	Add 345 kV Terminal Facilities at JK Smith CT Substation for CTs #11 & #12	Addition of CTs #11 & #12 at JK Smith

<sup>(f)</sup> EKPC is evaluating the possibility of deferring construction of this substation until CFB Unit #2 is added at J.K. Smith. If the substation is deferred, CFB Unit #1 will be connected directly to the J.K. Smith CT Substation.

The facilities listed in Table 4-1 include the following:

- Terminal facilities to connect J.K. Smith CT #8 to the existing 138 kV bus at J.K. Smith
- Terminal facilities to connect J.K. Smith CTs #9 through #12 to a new 345 kV switchyard to be constructed at the J.K. Smith CT Substation
- A new 345 kV switchyard near the J.K. Smith CFB Unit #1 with terminal facilities to connect J.K. Smith CFB Unit #1
- Construction of a two 345 kV lines connecting the J.K. Smith 345 kV CT Substation and the J.K. Smith 345 kV CFB Substation

EKPC is evaluating the possibility of deferring the J.K. Smith 345 kV CFB Substation until CFB Unit #2 is constructed. If this is feasible, it will provide significant savings to EKPC. Prior to making a final decision, EKPC will evaluate both the feasibility and the potential reliability/availability issues for CFB Unit #1 at J.K. Smith.

Table 4-2 provides the planning estimates for costs of the projects listed in Table 4-1. Cost information is provided for the expected costs in 2006 dollars, install year dollars, and present worth dollars.



<b>Table 4-2 Estimated Costs of Common Transmission Facilities Required to Connect the Proposed J.K. Smith Units</b>				
<b>Install Date</b>	<b>Project Description</b>	<b>Planning Estimate (2006\$)</b>	<b>Inflated Cost (Install Year \$)</b>	<b>Present Worth (2006\$)</b>
June 2007	Install a second 345-138 kV, 450 MVA transformer at JK Smith CT Substation	2,850,000	3,064,000	4,363,000
June 2007	Add 345 kV Terminal Facilities at JK Smith CT Substation for CTs #9 & #10	2,160,000	2,322,000	3,307,000
June 2009	Construct a second 345 kV substation at JK Smith for the CFB Unit #1	2,160,000	2,433,000	2,952,000
June 2009	Add 345 kV Terminal Facilities at JK Smith CFB Substation for CFB Unit #1	1,080,000	1,217,000	1,476,000
June 2009	Construct two 345 kV lines (0.8 miles each) between the JK Smith CT 345 kV substation and the JK Smith CFB 345 kV substation using bundled 954 MCM ACSR conductor	1,880,000	2,118,000	2,569,000
June 2009	Add 345 kV Terminal Facilities at JK Smith CT Substation for the two 345 kV lines to the JK Smith CFB Substation	4,310,000	4,856,000	5,891,000
June 2009	Add 345 kV Terminal Facilities at JK Smith CFB Substation for the two 345 kV lines to the JK Smith CT Substation	4,310,000	4,856,000	5,891,000
June 2011	Add 138 kV Terminal Facilities at JK Smith CT Substation for CT #8	540,000	638,000	620,000

<b>Table 4-2</b>				
<b>Estimated Costs of Common Transmission Facilities Required to Connect the Proposed J.K. Smith Units</b>				
<b>Install Date</b>	<b>Project Description</b>	<b>Planning Estimate (2006\$)</b>	<b>Inflated Cost (Install Year \$)</b>	<b>Present Worth (2006\$)</b>
June 2012	Add 345 kV Terminal Facilities at JK Smith CT Substation for CTs #9 & #10	2,160,000	2,612,000	2,337,000
<b>Total</b>		<b>\$21,450,000</b>	<b>\$24,116,000</b>	<b>\$29,406,000</b>

### 4.3 Update of J.K. Smith-West Garrard Alternative

Table 4-3 shows the updated transmission expansion plan for the preferred alternative.

Table 4-3					
Alternative 1 – Project Descriptions and Reasons for Need					
Install Date	Project Ref #	Project Description	Reason for Need	Critical Contingency	Unit Outage
June 2009	1.1	Construct 35.5 miles of 345 kV line from JK Smith to LGEE's Brown-Pineville double-circuit line at West Garrard using bundled 954 MCM ACSR conductor	Numerous Overloads (See Tables 3-1, 3-2, C-1, & C-2)	Numerous Contingencies (See Tables 3-1, 3-2, C-1, & C-2)	
June 2009	1.2	Add 345 kV Terminal Facilities at JK Smith CFB Substation for the West Garrard line. <sup>(†)</sup>	Numerous Overloads (See Tables 3-1, 3-2, C-1, & C-2)	Numerous Contingencies (See Tables 3-1, 3-2, C-1, & C-2)	
June 2009	1.3	Add terminal facilities at LGEE's Brown and Pineville Substations to energize the Brown-Pineville 345 kV circuit	Numerous Overloads (See Tables 3-1, 3-2, C-1, & C-2)	Numerous Contingencies (See Tables 3-1, 3-2, C-1, & C-2)	
June 2009	1.4	Construct a 345 kV breaker station at West Garrard with three line exits. Loop the Brown-Pineville 345 kV line through the station and terminate the new line from JK Smith	Numerous Overloads (See Tables 3-1, 3-2, C-1, & C-2)	Numerous Contingencies (See Tables 3-1, 3-2, C-1, & C-2)	
November 2009	1.5	Increase the terminal limits at LGEE's Pineville Substation associated with the low side of the Pineville 345-161 kV transformer to at least 2150A (600 MVA) winter emergency.	Overload of the 558 MVA winter emergency rating of the Pineville 345-161 kV transformer	Alcalde 345-161 kV Transformer	Cooper #2
November 2009	1.6	Increase the limits of LGEE's Alcalde-Elihu 161 kV line to at least 1105A (308 MVA) winter emergency.	Overload of the 288 MVA winter emergency rating of the Alcalde-Elihu 161 kV line	Wolf Creek TVA-Russell County Junction 161 kV Line	Cooper #2
June 2010	1.7	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North 138-69 kV transformer to at least 1320A (158 MVA) summer emergency.	Overload of the 143 MVA summer emergency rating of the Boonesboro North 138-69 kV transformer	Fawkes-Clark County 138 kV Line	Ghent #1

**Table 4-3  
Alternative 1 – Project Descriptions and Reasons for Need**

<b>Install Date</b>	<b>Project Ref #</b>	<b>Project Description</b>	<b>Reason for Need</b>	<b>Critical Contingency</b>	<b>Unit Outage</b>
November 2010	1.8	Increase the limits of the Ferguson South-Somerset (LGEE-EKPC) 69 kV line to at least 855A (102 MVA) winter emergency.	Overload of the 101 MVA winter emergency rating of the Ferguson South-Somerset 69 kV line	Cooper 161-69 kV Transformer	Mill Creek #4
November 2012	1.9	Reconductor EKPC's JK Smith-Union City 138 kV line using 954 MCM ACSS conductor.	Overload of the 389 MVA winter emergency rating of the JK Smith-Union City 138 kV line	JK Smith-Fawkes 138 kV Line	Brown #3
November 2012	1.10	Increase the terminal limits of EKPC's Powell County 138-69 kV transformer to 147 MVA winter emergency.	Overload of the 143 MVA winter emergency rating of the Powell County 138-69 kV transformer	Powell County-Beattyville-Delvinta 161 kV Line	Dale #3
June 2013	1.11	Increase the terminal limits of the Union City-Lake Reba Tap 138 kV line (EKPC-LGEE) to at least 301 MVA summer emergency.	Overload of the 300 MVA summer emergency rating of the Union City-Lake Reba Tap 138 kV line	JK Smith-Fawkes 138 kV Line	Brown #3
June 2014	1.12	Increase the limits of LGEE's Alcalde-Elihu 161 kV line to at least 950A (265 MVA) summer emergency and 1220A (340 MVA) winter emergency.	Overload of the 254 MVA summer emergency rating and the 330 MVA winter emergency rating of the Alcalde-Elihu 161 kV line	Wolf Creek TVA-Russell County Junction 161 kV Line	Cooper #2
June 2014	1.13	Increase the limits of LGEE's Artemus 161-69 kV transformer to at least 65 MVA summer emergency.	Overload of the 64 MVA summer emergency rating of the Artemus 161-69 kV transformer	Pineville-KU Park 69 kV Line	Cooper #2

**Table 4-3  
Alternative 1 – Project Descriptions and Reasons for Need**

<b>Install Date</b>	<b>Project Ref #</b>	<b>Project Description</b>	<b>Reason for Need</b>	<b>Critical Contingency</b>	<b>Unit Outage</b>
June 2014	1.14	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North 138-69 kV transformer to at least 163 MVA summer emergency.	Overload of the 158 MVA summer emergency rating of the Boonesboro North 138-69 kV transformer	Fawkes-Clark County 138 kV Line	Ghent #1
June 2014	1.15	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North-Winchester Water Works 69 kV circuit to at least 1245A (149 MVA) summer emergency.	Overload of the 143 MVA summer emergency rating of the Boonesboro North-Winchester Water Works 69 kV line	Fawkes-Clark County 138 kV Line	Ghent #1
November 2014	1.16	Replace EKPC's Powell County 138-69 kV, 100 MVA transformer with a 140 MVA transformer.	Overload of the 147 MVA winter emergency rating of the Powell County 138-69 kV transformer	Powell County-Beattyville-Delvinta 161 kV Line	Dale #3
June 2015	1.17	Increase the limits of LGEE's Pineville 161-69 kV transformer #2 to at least 139 MVA summer emergency.	Overload of the 138 MVA summer emergency rating of the Pineville 161-69 kV transformer #2	Pineville 161-69 kV Transformer #1	Cooper #2
June 2015	1.18	Reconductor EKPC's Union City-Lake Reba Tap 138 kV line using 954 MCM ACSS conductor.	Overload of the 311 MVA summer emergency rating of the Union City-Lake Reba Tap 138 kV line	JK Smith-Fawkes 138 kV Line	Brown #3
November 2015	1.19	Increase the limits of LGEE's Artemus 161-69 kV transformer and the Artemus-Barbourville City 69 kV line to at least 74 MVA winter emergency.	Overload of the 72 MVA winter emergency rating of the Artemus 161-69 kV transformer and the Artemus-Barbourville City 69 kV line	Pineville-KU Park 69 kV Line	Cooper #2

<b>Table 4-3</b>					
<b>Alternative 1 – Project Descriptions and Reasons for Need</b>					
<b>Install Date</b>	<b>Project Ref #</b>	<b>Project Description</b>	<b>Reason for Need</b>	<b>Critical Contingency</b>	<b>Unit Outage</b>
November 2015	1.20	Increase the limits of LGEE's Elihu-Ferguson South 69 kV line to at least 118 MVA winter emergency.	Overload of the 115 MVA winter emergency rating of the Elihu-Ferguson South 69 kV line	Cooper 161-69 kV Transformer	Cooper #2

<sup>(f)</sup> EKPC is evaluating the possibility of deferring construction of this substation until CFB Unit #2 is added at J.K. Smith. If the substation is deferred, the J.K. Smith-West Garrard 345 kV line will be connected to the J.K. Smith CT Substation.

Projects 1.1 through 1.4 in Table 4-3 are the projects necessary to establish a 345 kV line from J.K. Smith to West Garrard. The need for Projects 1.5, 1.6, and 1.8 is created primarily due to the establishment of the new West Garrard interconnection, which provides substantial increases in flows into the region of southern Kentucky between Pineville and Somerset. Project 1.7 is needed due to the increased contingency flows on the Boonesboro North 138-69 kV transformer, even with the new West Garrard interconnection. The remaining Projects listed in Table 4-3 are needed to address problems caused by the future additions of CTs 8, 11, and 12 at JK Smith, which are now deferred beyond 2010. Those problems will be evaluated in more detail in a subsequent SIS to analyze the requirements for these future CTs, which are no longer specifically being addressed as part of this SIS.

Therefore, the transmission requirements identified for the planned additions of CTs #9 and #10 and CFB Unit #1 at JK Smith are Projects 1.1 through 1.8. Projects 1.1 through 1.4 are major projects necessary to implement the new West Garrard interconnection with LGEE. Projects 1.5 through 1.8 are expected to be relatively minor in scope – terminal equipment replacements and/or increases of line conductor clearances on the LGEE transmission system. Therefore, the construction of the new J.K. Smith-West Garrard 345 kV line is effective in eliminating most or all of the significant problems. Some relatively minor problems remain that will need to be addressed. Some additional projects will be necessary as additional generation is added at J.K. Smith beyond 2010. Based on the power flow analysis results from this updated SIS, none of these additional problems are expected at this time to require new line or substation construction. When the SIS is performed for these additional generator additions at J.K. Smith beyond 2010, the specific determination of the projects needed to address the additional problems will be made.

The planning cost estimates for this updated Alternative are listed by project in Table 4-4. Costs are provided in 2006 dollars, install year dollars, and present worth dollars.

**Table 4-4  
Estimated Costs for Alternative 1**

<b>Install Date</b>	<b>Project Description</b>	<b>Planning Estimate (2006\$)</b>	<b>Inflated Cost (Install Year \$)</b>	<b>Present Worth (2006\$)</b>
June 2009	Construct 35.5 miles of 345 kV line from JK Smith to LGEE's Brown-Pineville double-circuit line at West Garrard using bundled 954 MCM ACSR conductor	41,750,000	47,035,000	57,062,000
June 2009	Add 345 kV Terminal Facilities at JK Smith CFB Substation for the West Garrard line. <sup>(†)</sup>	1,080,000	1,217,000	1,476,000
June 2009	Add terminal facilities at LGEE's Brown and Pineville Substations to energize the Brown-Pineville 345 kV circuit	2,160,000	2,433,000	2,952,000
June 2009	Construct a 345 kV breaker station at West Garrard with three line exits. Loop the Brown-Pineville 345 kV line through the station and terminate the new line from JK Smith	6,480,000	7,299,000	8,856,000
November 2009	Increase the terminal limits at LGEE's Pineville Substation associated with the low side of the Pineville 345-161 kV transformer to at least 2150A (600 MVA) winter emergency.	160,000	180,000	219,000
November 2009	Increase the limits of LGEE's Alcalde-Elihu 161 kV line to at least 1105A (308 MVA) winter emergency.	50,000	56,000	65,000
June 2010	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North 138-69 kV transformer to at least 1320A (158 MVA) summer emergency.	140,000	161,000	171,000
November 2010	Increase the limits of the Ferguson South-Somerset (LGEE-EKPC) 69 kV line to at least 855A (102 MVA) winter emergency.	10,000	12,000	12,000
November 2012	Reconductor EKPC's JK Smith-Union City 138 kV line using 954 MCM ACSS conductor.	2,290,000	2,769,000	2,478,000
November 2012	Increase the terminal limits of EKPC's Powell County 138-69 kV transformer to 147 MVA winter emergency.	110,000	133,000	119,000

**Table 4-4  
Estimated Costs for Alternative 1**

<b>Install Date</b>	<b>Project Description</b>	<b>Planning Estimate (2006\$)</b>	<b>Inflated Cost (Install Year \$)</b>	<b>Present Worth (2006\$)</b>
June 2013	Increase the terminal limits of the Union City-Lake Reba Tap 138 kV line (EKPC-LGEE) to at least 301 MVA summer emergency.	10,000	12,000	10,000
June 2014	Increase the limits of LGEE's Alcalde-Elihu 161 kV line to at least 950A (265 MVA) summer emergency and 1220A (340 MVA) winter emergency.	1,400,000	1,775,000	1,340,000
June 2014	Increase the limits of LGEE's Artemus 161-69 kV transformer to at least 65 MVA summer emergency.	1,100,000	1,395,000	1,053,000
June 2014	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North 138-69 kV transformer to at least 163 MVA summer emergency.	30,000	38,000	29,000
June 2014	Increase the terminal limits at LGEE's Boonesboro North associated with the Boonesboro North-Winchester Water Works 69 kV circuit to at least 1245A (149 MVA) summer emergency.	110,000	139,000	105,000
November 2014	Replace EKPC's Powell County 138-69 kV, 100 MVA transformer with a 140 MVA transformer.	1,700,000	2,155,000	1,627,000
June 2015	Increase the limits of LGEE's Pineville 161-69 kV transformer #2 to at least 139 MVA summer emergency.	2,120,000	2,752,000	1,904,000
June 2015	Reconductor EKPC's Union City-Lake Reba Tap 138 kV line using 954 MCM ACSS conductor.	290,000	376,000	260,000
November 2015	Increase the limits of LGEE's Artemus 161-69 kV transformer and the Artemus-Barbourville City 69 kV line to at least 74 MVA winter emergency.	110,000	143,000	99,000
November 2015	Increase the limits of LGEE's Elihu-Ferguson South 69 kV line to at least 118 MVA winter emergency.	10,000	13,000	9,000
<b>Total</b>		<b>\$61,110,000</b>	<b>\$70,093,000</b>	<b>\$79,846,000</b>



Both LGEE and AEP have performed some independent analysis, and have provided some of the resulting information to EKPC. The information provided indicates that some additional facility overloads have been attributed to the J.K. Smith generation and transmission additions based upon these companies' study methodologies and criteria. However, this work was performed based upon EKPC's previous plans to add five CTs and a CFB Unit at J.K. Smith by 2010. Also, the AEP analysis included EKPC's plans to provide power supply to Warren RECC. EKPC continues to work with LGEE and AEP to identify the transmission problems caused by EKPC's updated plans for J.K. Smith. This includes verification of the results provided in Tables 4-3 and 4-4 above, as well as other problems which may be identified by these companies based on updated models, study criteria, etc.

## **Section 5: Conclusions from Updated Analysis**

The analysis did not re-create the analysis performed in the original SIS. Instead, engineering judgment and selected power flow analysis have been used to verify that the results and conclusions from the original SIS are still applicable. The transmission Alternative recommended in the original SIS still provides advantages over other possible Alternatives that make it the desired Alternative for implementation. Based upon the analysis performed and engineering judgment, Alternative 1 still provides the best transient generating-unit performance at J.K. Smith during system disturbances. Furthermore, Alternative 1 provides the best opportunities for construction and future expansion. The cost of this Alternative is still lower than the other Alternatives that were considered in the original SIS. Alternative 1 requires a small number of system upgrades to accommodate the next three generating units at J.K. Smith. Therefore, more significant upgrades that may be required are deferred.

In the original SIS, several sensitivities were analyzed at the request of the ad hoc study group. These sensitivity analyses were not updated as part of this analysis. The only sensitivity that now appears to be an issue is LGEE's generation dispatch scenario at Brown. LGEE has performed its own independent analysis for its desired dispatch scenario. As stated earlier, EKPC continues to work with LGEE to address these issues.

Based on the results contained in this report, as well as the results, obtained in the original SIS, EKPC recommends proceeding with implementation of Alternative 1 to accommodate the addition of J.K. Smith CTs #9 and #10 and CFB Unit #1.

The following recommendations are made based on these conclusions:

1. The following common transmission facilities should be completed for connection of the proposed J.K. Smith units to the transmission network:
  - a) Install a second 345-138 kV, 450 MVA autotransformer at the J.K. Smith CT Substation by June 1, 2007.
  - b) Add 345 kV terminal facilities at the J.K. Smith CT Substation to connect CTs #9 and #10 by June 1, 2007.
  - c) Construct a second 345 kV Substation at J.K. Smith for the CFB Unit #1 (J.K. Smith CFB Substation) by June 1, 2009. (EKPC is evaluating the possibility of deferring construction of this substation until CFB Unit #2 is added at J.K. Smith. If the substation is deferred, CFB Unit #1 will be connected directly to the J.K. Smith CT Substation).
  - d) Add 345 kV terminal facilities at the J.K. Smith CFB Substation to connect CFB Unit #1 by June 1, 2009.
  - e) Construct two 345 kV lines between the J.K. Smith CT 345 kV Substation and the J.K. Smith CFB Substation (using bundled 954 MCM ACSR conductor) and associated terminal facilities by June 1, 2009.

2. The following transmission system additions and upgrades should be completed to provide sufficient capacity for delivery of the additional generation at J.K. Smith:
  - a) Construct a 345 kV line from J.K. Smith to LGEE's Brown-Pineville double-circuit 345 kV line (using bundled 954 MCM ACSR conductor) and associated terminal facilities at the J.K. Smith CFB Substation by June 30, 2009.
  - b) Add 345 kV terminal facilities at LGEE's Brown Substation and Pineville Substation to energize the existing Brown-Pineville 345 kV circuit by June 30, 2009.
  - c) Construct a 345 kV switching substation (West Garrard) to connect the new 345 kV line from J.K. Smith to LGEE's Brown-Pineville 345 kV circuit by June 30, 2009.
  - d) Increase the limits of LGEE's Pineville 345-161 kV transformer to at least 600 MVA winter emergency by November 30, 2009.
  - e) Increase the limits of LGEE's Alcalde-Elihu 161 kV line to at least 308 MVA winter emergency by November 30, 2009.
  - f) Increase the limits of LGEE's Boonesboro North 138-69 kV transformer to at least 158 MVA summer emergency by June 30, 2010.
  - g) Increase the limits of the LGEE-EKPC Ferguson South-Somerset 69 kV line to at least 102 MVA winter emergency by November 30, 2010.

EKPC is coordinating with LGEE to determine the scope, cost, and schedule of the required upgrades on its system.

## **Appendix A: List of Overloads Identified Via Power Flow Analysis**

Tables A-1 through A-8 contain complete lists of the thermal overloads identified in 2007 Summer, 2007-08 Winter, 2010 Summer, 2010-11 Winter, 2015 Summer, and 2015-16 Winter with the proposed generating units and with no transmission additions. An entry is included for all transmission contingencies that result in an overload, but only the worst-case generation dispatch is included.

<b>Table A-1 2007 Summer Complete List of Identified Problems with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	288.5	100.5%
Hickory Plains-PPG 69 kV Line	LGEE	Fawkes EKPC-West Berea 138 kV Line (EKPC)	Cooper #2 off, import from AEP	54	54.8	101.5%

<b>Table A-2 2007-08 Winter Complete List of Identified Problems with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	305.5	106.4%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	392.3	100.8%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	392.0	100.8%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	237	238.0	100.4%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	None	Base	167	168.0	100.6%

**Table A-3  
2010 Summer Complete List of Identified Problems with CTs 9 and 10 Installed at  
JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	144.7	101.2%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	222.4	100.2%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	292.8	102.0%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	287	291.0	101.4%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	315.6	101.5%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line	Brown #3 off, import from AEP	311	315.3	101.4%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	57.6	104.7%

<b>Table A-4</b>						
<b>2010-11 Winter Complete List of Identified Problems with CTs 9 and 10 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	315.8	104.2%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	317.8	110.7%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	404.8	104.1%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	404.5	104.0%
Union City-Lake Reba Tap 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	377.7	101.8%
Union City-Lake Reba Tap 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	377.4	101.7%
West Berea Jct.-Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde-Pineville 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	101.9	100.9%
West Berea Jct.-Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	101.4	100.4%

**Table A-5  
2010 Summer Complete List of Identified Problems with CTs 9- 10 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	151.9	106.2%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	239.2	107.7%
Dale-Three Forks Jct. 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	222	237.5	107.0%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	234.7	105.7%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC- LGEE)	Brown #3 off, import from AEP	222	233.9	105.4%
Dale-Three Forks Jct. 138 kV Line	EKPC	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	223.3	100.6%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	327.6	114.1%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	287	325.9	113.6%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	Brown #3 off, import from AEP	287	318.9	111.1%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Fawkes LGEE- Fawkes Tap-Lake Reba Tap 138 kV Line (LGEE)	Brown #3 off, import from AEP	287	308.5	107.5%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Fawkes EKPC- Fawkes Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	287	293.8	102.4%
Fawkes EKPC- Fawkes LGEE 138 kV Line	EKPC- LGEE	Dale-Boonesboro North Tap-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	289.9	101.0%
Fawkes EKPC- Fawkes Tap 138 kV Line	EKPC- LGEE	Fawkes EKPC- Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	291.8	101.7%
Fawkes LGEE- Clark County 138 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Ghent #1 off, import from TVA	172	180.4	104.9%

**Table A-5  
2010 Summer Complete List of Identified Problems with CTs 9- 10 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes LGEE-Clark County 138 kV Line	LGEE	Boonesboro North 138-69 kV Transformer (LGEE)	Ghent #1 off, import from TVA	172	176.2	102.4%
Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	317.7	110.7%
Fawkes Tap-Lake Reba Tap 138 kV Line	LGEE	JK Smith-Union City 138 kV Line (EKPC)	Cooper #2 off, import from AEP	176	183.1	104.0%
Fawkes Tap-Lake Reba Tap 138 kV Line	LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	176	179.1	101.8%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	311	338.4	108.8%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	314.3	101.1%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	311	312.3	100.4%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	353.8	113.8%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line	Brown #3 off, import from AEP	311	353.5	113.7%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	329.5	105.9%
JK Smith-Union City 138 kV Line	EKPC	None	Base	251	264.2	105.3%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	326.6	105.0%
JK Smith-Union City 138 kV Line	EKPC	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	319.8	102.8%
JK Smith-Union City 138 kV Line	EKPC	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	318.6	102.4%
JK Smith-Union City 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	311	315.9	101.6%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	62.7	114.0%



**Table A-5  
2010 Summer Complete List of Identified Problems with CTs 9- 10 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Rice Tap-West Irvine 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	40	44.4	111.0%
Three Forks Jct.- Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	231.5	104.3%
Three Forks Jct.- Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	222	229.9	103.6%
Three Forks Jct.- Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	227.2	102.3%
Three Forks Jct.- Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	222	226.3	101.9%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC- LGEE)	Brown #3 off, import from AEP	300	334.2	111.4%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	JK Smith-Fawkes EKPC 138 kV Line	Brown #3 off, import from AEP	300	333.9	111.3%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	None	Base	241	251.3	104.3%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	312.6	104.2%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	309.2	103.1%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	302.8	100.9%
Union City-Lake Reba Tap 138 kV Line	EKPC- LGEE	Three Forks Jct.- Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	301.7	100.6%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	51	55.0	107.8%
West Frankfort-Clay Village Tap 69 kV Line	LGEE	Bullitt County-Little Mount Jct. 161 kV Line (EKPC)	Mill Creek #4 off, import from AEP	43	44.2	102.8%

**Table A-5  
2010 Summer Complete List of Identified Problems with CTs 9- 10 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
West Frankfort-Clay Village Tap 69 kV Line	LGEE	Blue Lick 345-161 kV Transformer (LGEE)	Mill Creek #4 off, import from AEP	43	43.3	100.7%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	223.7	106.0%
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	216.9	102.8%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	136	147.2	108.2%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	293.5	105.6%
Dale-Three Forks Jct. 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	290.5	104.5%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	286.4	103.0%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	285.4	102.7%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	223	235.4	105.6%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	370	385.7	104.2%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	370	382.7	103.4%
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	356.8	117.8%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	389	403.9	103.8%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	390.3	100.3%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	341.6	119.0%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	335.1	116.8%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Powell County 138 kV Line	EKPC	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	333.9	116.3%
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Cooper #2 off, import from AEP	287	320.4	111.6%
JK Smith-Powell County 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	287	319.3	111.3%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	444.3	114.2%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	444.0	114.1%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	416.4	107.0%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	415.2	106.7%
JK Smith-Union City 138 kV Line	EKPC	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	401.7	103.3%
JK Smith-Union City 138 kV Line	EKPC	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	399.7	102.8%
JK Smith-Union City 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	389	389.6	100.2%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	389.6	100.2%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Brown #3 off, import from AEP	389	389.3	100.1%
Lake Reba Tap 138-161 kV Transformer	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	270	271.9	100.7%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	88	92.5	105.1%
Morehead-Hayward 69 kV	AEP	Rowan County-Skaggs 138 kV Line (EKPC)	Base	48	49.5	103.1%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Dale #3 off, import from AEP	143	151.3	105.8%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Dale #3 off, import from AEP	143	150.8	105.5%
Powell County 161-138 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	227.8	103.5%
Powell County 161-138 kV Transformer	EKPC	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	223.2	101.5%
Powell County 161-138 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	220.3	100.1%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	281.8	101.4%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	279.0	100.4%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	413.5	111.5%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	413.2	111.4%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	388.2	104.6%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	387.8	104.5%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	374.3	100.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	372.6	100.4%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	77	80.4	104.4%
West Berea Jct.-Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde-Pineville 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	106.6	105.5%

<b>Table A-6 2010-11 Winter Complete List of Identified Problems with CTs 9-10 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
West Berea Jct.- Three Links Jct. 69 kV Line	EKPC	Delvinta-Green Hall Junction 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	101	106.4	105.3%
West Berea Jct.- Three Links Jct. 69 kV Line	EKPC	Brown North-Alcalde 345 kV Line (LGEE)	Cooper #2 off, import from AEP	101	106.4	105.3%
West Berea Jct.- Three Links Jct. 69 kV Line	EKPC	Green Hall Junction- Tyner 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	101	106.0	105.0%

**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Delvinta-Green Hall Jct. 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	47	50.5	107.4%
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Green Hall Jct.-Tyner 161 kV Line (EKPC)	Cooper #2 off, import from AEP	47	50.0	106.4%
Beattyville 161-69 kV Transformer	LGEE	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	64	71.2	111.3%
Boonesboro North 138-69 kV Transformer	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	172.1	120.3%
Boonesboro North-Winchester Water Works 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	158.6	110.9%
Clark County 138-69 kV Transformer	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	143	143.1	100.1%
Clark County-Sylvania 69 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	137	139.6	101.9%
Clark County-Sylvania 69 kV Line	LGEE	Boonesboro North 138-69 kV Transformer (LGEE)	Brown #3 off, import from AEP	137	137.9	100.7%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	111	119.6	107.7%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	261.2	117.7%
Dale-Three Forks Jct. 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	222	259.2	116.8%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	255.6	115.1%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	222	254.7	114.7%
Dale-Three Forks Jct. 138 kV Line	EKPC	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	239.4	107.8%
Dale-Three Forks Jct. 138 kV Line	EKPC	Dale-Boonesboro North Tap 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	228.1	102.7%

**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Farmers 138-69 kV Transformer	LGEE	Rodburn 138-69 kV Transformer (LGEE)	Base	48	48.5	101.0%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	357.0	124.4%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	287	355.0	123.7%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	Brown #3 off, import from AEP	287	338.2	117.8%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes LGEE-Fawkes Tap-Lake Reba Tap 138 kV Line (LGEE)	Brown #3 off, import from AEP	287	329.7	114.9%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	287	316.6	110.3%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Dale-Boonesboro North Tap-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	311.5	108.5%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes-West Berea 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	304.7	106.2%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Boonesboro North 138-69 kV Transformer (LGEE)	Brown #3 off, import from AEP	287	298.8	104.1%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Dale-Boonesboro North Tap 138 kV Line (EKPC)	Brown #3 off, import from AEP	287	291.5	101.6%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-North Clark 345 kV Line (EKPC)	Brown #3 off, import from AEP	287	287.1	100.1%
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	314.5	109.6%
Fawkes LGEE-Richmond 69 kV Line	LGEE	Lake Reba 138-69 kV Transformer (LGEE)	Cooper #2 off, import from AEP	117	118.0	100.9%
Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	246	336.9	137.0%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	311	387.8	124.7%



**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Dale 138 kV Line	EKPC	JK Smith-North Clark 345 kV Line (EKPC)	Dale #4 off, import from AEP	311	375.0	120.6%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Dale #4 off, import from AEP	311	351.8	113.1%
JK Smith-Dale 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Dale #4 off, import from AEP	311	349.9	112.5%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Dale #4 off, import from AEP	311	339.3	109.1%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC)	Dale #4 off, import from AEP	311	339.0	109.0%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #4 off, import from AEP	311	320.7	103.1%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	354.3	113.9%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	311	352.0	113.2%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	313.3	100.7%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	311	401.1	129.0%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line	Brown #3 off, import from AEP	311	400.8	128.9%
JK Smith-Union City 138 kV Line	EKPC	None	Base	251	303.5	120.9%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	375.2	120.6%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	372.6	119.8%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-North Clark 345 kV Line (EKPC)	Brown #3 off, import from AEP	311	372.3	119.7%
JK Smith-Union City 138 kV Line	EKPC	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	360.6	115.9%

**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Union City 138 kV Line	EKPC	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	311	359.2	115.5%
JK Smith-Union City 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	311	357.9	115.1%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	311	349.1	112.3%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Brown #3 off, import from AEP	311	349.0	112.2%
JK Smith-Union City 138 kV Line	EKPC	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	311	335.4	107.8%
JK Smith-Union City 138 kV Line	EKPC	None	Brown #3 off, import from AEP	311	315.2	101.4%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	74.2	134.9%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	205	227.4	110.9%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	205	215.2	105.0%
Lake Reba Tap-West Irvine Tap 161 kV Line	LGEE	Powell County-Beattyville 161 kV Line (EKPC)	Cooper #2 off, import from AEP	205	215.0	104.9%
Loudon Avenue 138-69 kV Transformer #628	LGEE	Loudon Avenue 138-69 kV Transformer #618 (LGEE)	Brown #3 off, import from AEP	128	128.9	100.7%
Paris 138-69 kV Transformer	LGEE	Avon-Loudon Avenue 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	173	175.9	101.7%
Powell County 138-161 kV Transformer	EKPC	Lake Reba Tap-West Irvine-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	193	193.8	100.4%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Dale #3 off, import from AEP	129	132.7	102.9%

**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Dale #3 off, import from AEP	129	132.3	102.6%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	252.7	113.8%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	222	250.9	113.0%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	247.7	111.6%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	222	246.8	111.2%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Brown #3 off, import from AEP	222	231.0	104.1%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	300	378.0	126.0%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC 138 kV Line	Brown #3 off, import from AEP	300	377.7	125.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	None	Base	241	287.1	119.1%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	355.0	118.3%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-North Clark 345 kV Line (EKPC)	Brown #3 off, import from AEP	300	351.8	117.3%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	350.8	116.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	340.9	113.6%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	300	339.7	113.2%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	300	338.4	112.8%

**Table A-7  
2015 Summer Complete List of Identified Problems with CTs 8-12 & CFB Unit #1  
Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	300	329.3	109.8%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Powell County-Beattyville 161 kV Line (EKPC)	Brown #3 off, import from AEP	300	329.2	109.7%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	300	317.1	105.7%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	51	65.1	127.6%
West Irvine-Dark Hollow 69 kV Line	LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	55	55.1	100.2%
West Irvine Tap-Delvinta 161 kV Line	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	201	208.1	103.5%
West Irvine Tap-Delvinta 161 kV Line	LGEE	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	201	202.4	100.7%
Winchester South-Winchester 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	110	118.4	107.6%
Winchester Water Works-Boone Avenue 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	150	151.3	100.9%

<b>Table A-8</b>						
<b>2015-16 Winter Complete List of Identified Problems with CTs 8-12 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	235.1	111.4%
Beattyville-Delvinta 161 kV Line	EKPC-LGEE	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	211	227.4	107.8%
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Delvinta-Green Hall Jct. 161 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	62	66.6	107.4%
Beattyville-Oakdale Jct. 69 kV Line	EKPC	Green Hall Jct.-Tyner 161 kV Line (EKPC)	Cooper #2 off, import from AEP	62	65.7	106.0%
Boonesboro North-Winchester Water Works 69 kV Line	LGEE	Fawkes LGEE-Clark County 138 kV Line (LGEE)	Ghent #1 off, import from TVA	143	159.3	111.4%
Dale 138-69 kV Transformer	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #3 off, import from AEP	136	169.7	124.8%
Dale 138-69 kV Transformer	EKPC	Powell County 138-69 kV Transformer (EKPC)	Dale #3 off, import from AEP	136	159.3	117.1%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	322.5	116.0%
Dale-Three Forks Jct. 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	319.1	114.8%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	315.8	113.6%
Dale-Three Forks Jct. 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	314.7	113.2%
Dale-Newby #1 69 kV Line	EKPC	Dix Dam-Buena Vista 69 kV Line (LGEE)	Cooper #2 off, import from AEP	87	92.6	106.4%
Dale-Newby #1 69 kV Line	EKPC	Garrard CT-Lancaster 69 kV Line (LGEE)	Cooper #2 off, import from AEP	87	88.9	102.2%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	223	253.1	113.5%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Brown North-Alcalde-Pineville 345 kV Line (LGEE)	Cooper #2 off, import from AEP	223	238.2	106.8%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Brown North-Alcalde 345 kV Line (LGEE)	Cooper #2 off, import from AEP	223	234.9	105.3%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Cooper-Laurel Dam 161 kV Line (EKPC)	Cooper #2 off, import from AEP	223	230.1	103.2%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	Alcalde 345-161 kV Transformer (LGEE)	Cooper #2 off, import from AEP	223	228.0	102.2%
Delvinta-Green Hall Jct. 161 kV Line	LGEE-EKPC	West Berea Jct.- Three Links Jct. 69 kV Line (EKPC)	Cooper #2 off, import from AEP	223	223.7	100.3%
Farmers 138-69 kV Transformer	LGEE	Rodburn 138-69 kV Transformer (LGEE)	Base	58	58.1	100.2%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	370	428.6	115.8%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	370	425.2	114.9%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes Tap-Fawkes LGEE 138 kV Line (LGEE)	Brown #3 off, import from AEP	370	405.3	109.5%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes LGEE-Fawkes Tap-Lake Reba Tap 138 kV Line (LGEE)	Brown #3 off, import from AEP	370	394.6	106.6%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	370	377.5	102.0%
Fawkes EKPC-Fawkes LGEE 138 kV Line	EKPC-LGEE	Fawkes EKPC-West Berea 138 kV Line (EKPC)	Brown #3 off, import from AEP	370	371.0	100.3%
Fawkes EKPC-Fawkes Tap 138 kV Line	EKPC-LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	287	374.9	130.6%
Fawkes LGEE-Clark County 138 kV Line	LGEE	Dale-Boonesboro North-Avon 138 kV Line (EKPC)	Ghent #1 off, import from TVA	194	202.5	104.4%
Fawkes LGEE-Clark County 138 kV Line	LGEE	Boonesboro North 138-69 kV Transformer (LGEE)	Ghent #1 off, import from TVA	194	199.7	102.9%
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	Fawkes EKPC-Fawkes LGEE 138 kV Line	Brown #3 off, import from AEP	303	403.8	133.3%

**Table A-8  
2015-16 Winter Complete List of Identified Problems with CTs 8-12 & CFB Unit  
#1 Installed at JK Smith and with no Additional Transmission**

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Fawkes Tap-Fawkes LGEE 138 kV Line	LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	303	321.0	105.9%
Green Hall Jct.-Tyner 161 kV Line	EKPC	Delvinta-Hyden Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	237	246.5	104.0%
JK Smith-Dale 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Dale #4 off, import from AEP	389	470.4	120.9%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-North Clark 345 kV Line (EKPC)	Dale #4 off, import from AEP	389	454.6	116.9%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Dale #4 off, import from AEP	389	440.2	113.2%
JK Smith-Dale 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Dale #4 off, import from AEP	389	436.7	112.3%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Dale #4 off, import from AEP	389	424.9	109.2%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Dale #4 off, import from AEP	389	424.5	109.1%
JK Smith-Dale 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Dale #4 off, import from AEP	389	403.4	103.7%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	442.5	113.8%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	438.8	112.8%
JK Smith-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	392.3	100.8%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	378.1	131.7%
JK Smith-Powell County 138 kV Line	EKPC	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	371.4	129.4%
JK Smith-Powell County 138 kV Line	EKPC	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	287	369.6	128.8%

**Table A-8  
2015-16 Winter Complete List of Identified Problems with CTs 8-12 & CFB Unit  
#1 Installed at JK Smith and with no Additional Transmission**

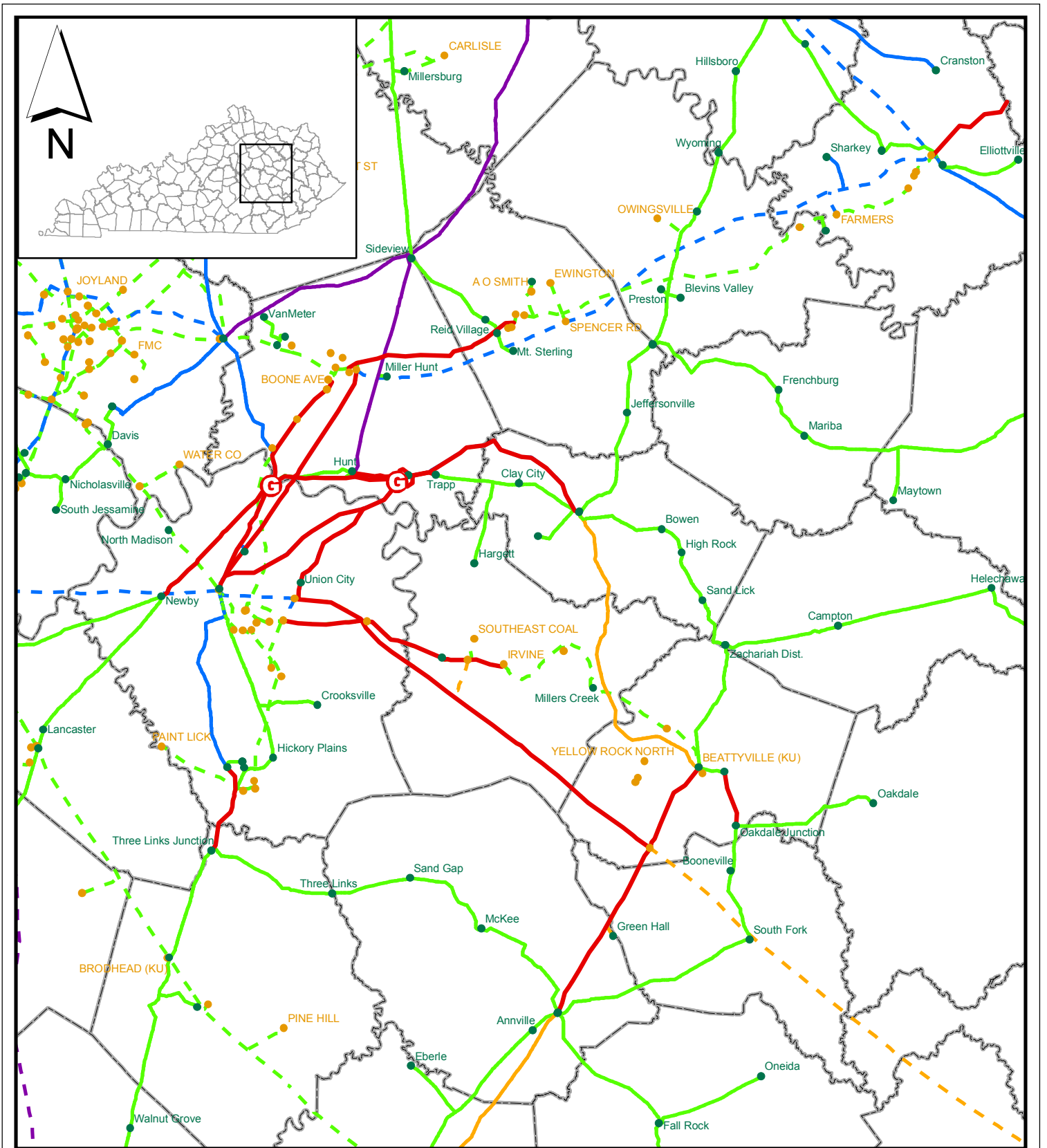
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Cooper #2 off, import from AEP	287	358.3	124.8%
JK Smith-Powell County 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	287	356.9	124.4%
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-North Clark 345 kV Line (EKPC)	Cooper #2 off, import from AEP	287	355.6	123.9%
JK Smith-Powell County 138 kV Line	EKPC	Dale 138-69 kV Transformer (EKPC)	Dale #3 off, import from AEP	287	346.7	120.8%
JK Smith-Powell County 138 kV Line	EKPC	Brown North-Alcalde-Pineville 345 kV Line (EKPC)	Cooper #2 off, import from AEP	287	345.8	120.5%
JK Smith-Powell County 138 kV Line	EKPC	Brown North-Alcalde 345 kV Line (EKPC)	Cooper #2 off, import from AEP	287	344.4	120.0%
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Cooper #2 off, import from AEP	287	341.6	119.0%
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Cooper #2 off, import from AEP	287	337.5	117.6%
JK Smith-Powell County 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	287	337.5	117.6%
JK Smith-Powell County 138 kV Line	EKPC	Goddard-Hillsboro 69 kV Line (EKPC)	Cooper #2 off, import from AEP	287	335.3	116.8%
JK Smith-Powell County 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Cooper #2 off, import from AEP	287	330.8	115.3%
JK Smith-Powell County 138 kV Line	EKPC	Broadford-Sullivan 500 kV Line (AEP-TVA)	Cooper #2 off, import from AEP	287	330.6	115.2%
JK Smith-Powell County 138 kV Line	EKPC	None	Base	287	308.3	107.4%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	500.7	128.7%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	500.4	128.6%



<b>Table A-8</b>						
<b>2015-16 Winter Complete List of Identified Problems with CTs 8-12 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	469.2	120.6%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	468.7	120.5%
JK Smith-Union City 138 kV Line	EKPC	JK Smith-North Clark 345 kV Line (EKPC)	Brown #3 off, import from AEP	389	458.1	117.8%
JK Smith-Union City 138 kV Line	EKPC	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	449.4	115.5%
JK Smith-Union City 138 kV Line	EKPC	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	389	447.1	114.9%
JK Smith-Union City 138 kV Line	EKPC	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	389	442.6	113.8%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	437.5	112.5%
JK Smith-Union City 138 kV Line	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Brown #3 off, import from AEP	389	437.2	112.4%
JK Smith-Union City 138 kV Line	EKPC	None	Base	349	381.1	109.2%
JK Smith-Union City 138 kV Line	EKPC	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	389	419.6	107.9%
Lake Reba Tap 138-161 kV Transformer	LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Cooper #2 off, import from AEP	270	289.5	107.2%
Lake Reba Tap 138-161 kV Transformer	LGEE	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Cooper #2 off, import from AEP	270	274.2	101.6%
Lake Reba Tap 138-161 kV Transformer	LGEE	Powell County-Beattyville 161 kV Line (EKPC)	Cooper #2 off, import from AEP	270	273.6	101.3%
Lake Reba-Waco 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	88	99.5	113.1%
Morehead-Hayward 69 kV	AEP	Rowan County-Skaggs 138 kV Line (EKPC)	Base	48	50.7	105.6%













<b>Table A-8 2015-16 Winter Complete List of Identified Problems with CTs 8-12 &amp; CFB Unit #1 Installed at JK Smith and with no Additional Transmission</b>						
<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville 161 kV Line (EKPC)	Dale #3 off, import from AEP	143	169.4	118.5%
Powell County 138-69 kV Transformer	EKPC	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Dale #3 off, import from AEP	143	168.4	117.8%
Powell County 138-69 kV Transformer	EKPC	Dale 138-69 kV Transformer (EKPC)	Dale #3 off, import from AEP	143	155.6	108.8%
Powell County 138-161 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	243.3	110.6%
Powell County 138-161 kV Transformer	EKPC	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	238.5	108.4%
Powell County 138-161 kV Transformer	EKPC	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	220	235.8	107.2%
Powell County 138-161 kV Transformer	EKPC	Powell County 138-69 kV Transformer (EKPC)	Cooper #2 off, import from AEP	220	227.1	103.2%
Powell County 138-161 kV Transformer	EKPC	None	Base	178	181.2	101.8%
Spurlock-Kenton 138 kV Line	EKPC-LGEE	Spurlock-Maysville Industrial Jct. 138 kV Line (EKPC)	Ghent #1 off, import from TVA	287	288.2	100.4%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Union City 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	308.4	110.9%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	Union City-Lake Reba Tap 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	305.3	109.8%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	278	302.6	108.8%
Three Forks Jct.-Fawkes EKPC 138 kV Line	EKPC	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	278	301.5	108.5%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	None	Base	277	353.9	127.8%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes EKPC-Fawkes LGEE 138 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	462.7	124.7%

<b>Limiting Facility</b>	<b>Company</b>	<b>Contingency</b>	<b>Worst-Case Dispatch</b>	<b>Rating</b>	<b>MVA Flow</b>	<b>% Overload</b>
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Fawkes 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	462.4	124.6%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Dale 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	436.0	117.5%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-Powell County 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	431.7	116.4%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	JK Smith-North Clark 345 kV Line (EKPC)	Brown #3 off, import from AEP	371	424.2	114.3%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Dale-Three Forks Jct. 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	416.9	112.4%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Three Forks Jct.-Fawkes EKPC 138 kV Line (EKPC)	Brown #3 off, import from AEP	371	415.0	111.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	North Clark-Avon 345 kV Line (EKPC)	Brown #3 off, import from AEP	371	409.9	110.5%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Powell County-Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	404.2	108.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Powell County-Beattyville 161 kV Line (EKPC)	Brown #3 off, import from AEP	371	404.1	108.9%
Union City-Lake Reba Tap 138 kV Line	EKPC-LGEE	Beattyville-Delvinta 161 kV Line (EKPC-LGEE)	Brown #3 off, import from AEP	371	389.1	104.9%
Waco-Rice Tap 69 kV Line	LGEE	Lake Reba Tap-West Irvine Tap 161 kV Line (LGEE)	Cooper #2 off, import from AEP	77	85.3	110.8%
West Berea 138-69 kV Transformer	EKPC	Fawkes LGEE-Crooksville Jct. 69 kV Line (LGEE-EKPC)	Cooper #2 off, import from AEP	152	162.4	106.8%
West Irvine 161-69 kV Transformer	LGEE	West Irvine Tap-Delvinta 161 kV Line (LGEE)	Cooper #2 off, import from AEP	62	62.9	101.5%



Revised: 2-6-07

### Legend

- |   |                  |   |                   |   |                 |
|---|------------------|---|-------------------|---|-----------------|
|   | EKPC Generation  |  | EKPC Transmission |  | KU Transmission |
|  | EKPC Substation  |  | EKPC 69 kV        |  | 69 kV           |
|  | KU Substation    |  | EKPC 138 kV       |  | 138 kV          |
|   | Overloaded Lines |  | EKPC 161 kV       |  | 161 kV          |
|   |                  |   | EKPC 345 kV       |   | 345 kV          |

**Figure B-1**  
**Updated Identification of Overloaded**  
**Facilities with J.K. Smith**  
**Proposed Generator Additions**  
**Through 2015**

