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August 15, 2012

Mr. Jeff Derouen
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
P.O. Box 615
Frankfort, Kentucky 40602-0615

Re: PSC Case No. 2012-00169
In the Matter of: East Kentucky Power Cooperative, Inc. to Transfer Functional Control of Certain Transmission Facilities to PJM Interconnection, L.L.C.

Dear Mr. Derouen:

In accordance with the Commission's Order dated August 7, 2012 in the above-referenced case, please find enclosed for filing with the Commission, an original and ten copies of the Deliverability Study and Power Flow Analysis Study.

Sincerely,

Mark David Goss by

Mark David Goss
Enclosures

CC: Parties of Record

East Kentucky Power Cooperative (EKPC) Baseline RTEP Integration Report

Issued August 13, 2012

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INTRODUCTION

The PJM Regional Transmission Expansion Planning (RTEP) Process requires the establishment of cost responsibility for facility enhancements. There are three types of facility enhancements for which cost assignment must be made:

- Attachment Facilities required solely to interconnect a new generation project,
- Network Facilities that are required to enhance the network solely or in part because of a proposed project, and
- Network Facilities required to support load growth.

In order to establish a starting point for development of Regional Transmission Expansion Plans and determine cost responsibility for expansion facilities, a 'baseline' analysis of system adequacy and security is necessary. The purpose of this analysis is threefold:

- To identify areas where the system, as planned, is not in compliance with applicable reliability standards (for purposes of this report, "applicable reliability standards" will be defined as NERC, RFC, SERC, EKPC and PJM Reliability Planning Criteria). The baseline system will be analyzed using the same criteria and analysis methods that will be used for assessing the impact of proposed new generation projects. This will ensure that the need for system enhancement of the baseline system and enhancements due to generation projects are determined in a consistent and equitable manner.
- To bring those areas into compliance, develop and recommend facility expansion plans, including cost estimates and estimated in-service dates.
- To establish what will be included as baseline costs in the allocation of the costs of expansion for those generation projects proposing to connect to the PJM system.

The system as planned is evaluated for its compliance with applicable reliability standards and PJM design standards to accommodate the forecast demand, committed resources, and commitments for firm transmission services for a specified timeframe. Areas not in compliance with the standards are identified and enhancement plans are developed to achieve compliance.

This 'baseline' analysis and the resulting expansion plans served as the base system for the generator deliverability studies that were conducted for all generation that had an executed Interconnection Agreement with EKPC as of May 3, 2012.

The focus of this first EKPC baseline analysis was on the PJM Generator Deliverability test. Generators that already had firm transmission rights on the EKPC system are assumed to be part of the base system. This assumption is based on the fact that EKPC had previously studied these generators for compliance with SERC, NERC and EKPC criteria when these generators applied for interconnection and transmission service. In addition to the PJM Generator Deliverability test, preliminary Load Deliverability analysis and baseline thermal and voltage analysis are complete for the EKPC control area on 2016 RTEP case. This report documents the results of these analyses and the deliverability results for all existing generators and all planned generators in EKPC that had executed an Interconnection Agreement with EKPC as of May 3, 2012.

Annually, PJM Planning documents the results and requirements of the overall, PJM wide RTEP in an RTEP Baseline Report. During this 2012 year planning cycle, PJM is including a review of all applicable SERC and EKPC planning criteria along with a re-evaluation of the PJM load and generator deliverability studies. The reference year for analysis will be 2017 and the EKPC results will be included within the PJM RTEP Baseline Report which will also include results for the existing PJM system.

EXECUTIVE SUMMARY

PJM has responsibility for the development of a Regional Transmission Expansion Plan (RTEP) for the PJM system that will meet the needs of the region in a reliable, economic and environmentally acceptable manner. PJM also is responsible for recommending the assignment of any transmission expansion costs to the appropriate parties. In order to carry out these responsibilities, it is necessary to establish a starting point or 'baseline' from which the need and responsibility for enhancements can be determined.

In order to establish the baseline, PJM has defined the five (5) year period from 2011 through 2016 as the initial EKPC "baseline" planning period. The existing system plus any planned modifications to the transmission system scheduled to be in service prior to the 2016 summer peak period was chosen as the base system. Generators in the EKPC Control Area were studied in three categories as explained below:

1. Generators with an EKPC Interconnection Agreement (IA) effective prior to May 3, 2012: This group of generators will maintain the deliverability (i.e., capacity) rights granted under their current IAs. To the extent any system upgrades are needed to ensure they are deliverable in PJM, such upgrades will be considered baseline upgrades in the EKPC territory, and EKPC shall have the responsibility for providing the upgrade. In addition to the deliverability study, the PJM system will also be re-evaluated for transient stability and short circuit capability. Any upgrades required to meet PJM criteria for stability or short circuit will be considered baseline upgrades in the EKPC territory and paid for by EKPC.

2. Generators with an EKPC IA effective after May 3, 2012: Any system upgrades for deliverability, including short circuit and transient study analysis, that are needed to ensure that generation is deliverable in PJM in addition to those identified through EKPC's interconnection process, will be communicated to the generator, and the costs for the upgrades shall be the responsibility of the generator.

3. Generators that are in the EKPC study process but without an IA: All Interconnection Requests pending under the EKPC Tariff at the time of integration shall be assigned the same priority date under the PJM Tariff. These projects will be assigned PJM queue identifiers so that their priority dates relative to existing PJM queued generation can be easily determined. All such generators will be integrated into the existing PJM queue effective on the integration date, and will be subject to the PJM Tariff, which would include applicable study agreements and tariffs. On the integration date, PJM will assume the technical studies that have been started by EKPC, and determine if the generating units qualify as both energy and capacity resources. After the studies are complete, the generator will be required to pay for any system upgrades that are needed for the unit to qualify as a capacity resource under the PJM Tariff.

Category 1 generators were modeled in the original basecase. This category of generation was considered to have firm delivery rights and the responsibility for any identified reliability impacts and the associated system upgrades would be assigned to EKPC. This basecase was tested for compliance with EKPC and SERC planning criteria. Any system problems were documented, upgrades were identified to mitigate all problems and the system model was

updated accordingly. This was the reference system by which the category 2 generation was studied.

KEY FINDINGS

The following areas of the system as planned through 2016 were found to be non-compliant with applicable reliability criteria without additional system upgrades. These areas are described below along with the identified reinforcements to achieve compliance.

1) In 2016, the JK Smith – Union City – Lake Reba Tap 138KV line is overloaded for the loss of either the JK Smith – Dale 138kV line or the JK Smith – Fawkes EK 138kV line fault with a stuck breaker at the JK Smith 138kV (breaker E63-91T) and for a bus fault at Fawkes EK 138kV. T he operating temperature of the existing conductor for the JK Smith – Union City – Lake Reba Tap 138kV line will be upgraded. The estimated cost is $0.28M. The projected IS date is 06/01/2016. (The PJM RTEP baseline tracking identification number is B2066).

OBJECTIVE AND SCOPE

The objectives of this study were as follows:

- To identify areas where the system as planned for the period 2012 through 2016 would not be in compliance with applicable reliability criteria.
- To develop and recommend preliminary facility expansion plans, including cost estimates and estimated in service dates, to bring those areas into compliance.
- To establish what will be included as baseline expansion costs for the allocation of the costs of expansion for future EKPC generation projects.

The scope of this study included analysis for the period 2012 through 2016 to determine compliance with the PJM Deliverability requirements.

Transmission constraints on market dispatch are economic constraints. Economic constraints are not considered violations of reliability criteria as long as the system can be adjusted to remain within reliability limits on a pre-contingency basis. Performance of the planned system under intermediate and light load conditions will be analyzed in the PJM Reliability Assessment to verify that the system as planned can indeed be operated in compliance with applicable reliability criteria. This will include a determination that the generation resources in EKPC are sufficient and are appropriately dispersed so that the generation dispatch can be adjusted to maintain the system within established thermal equipment ratings and voltage criteria limits under intermediate and light load conditions.

DELIVERABILITY ANALYSIS METHODOLOGY

Deliverability analysis was based on a representation of the 2016 forecast peak load with all firm transmission services committed for the 2016 period represented in the base case (see below).

FROM	TO	PJM 2016
PJM	NYIS	2164
PJM	FE	0
PJM	OVEC	-2467
PJM	CIN	-64
PJM	DLCO	0
PJM	NIPS	0
PJM	IPL	50
PJM	WEC	750
PJM	EKPC	0
PJM	CPLE	-17
PJM	CPLW	0
PJM	DUK	113
PJM	TVA	-94
PJM	AMIL (AMRN)	-403.4
PJM	LGEE	-159
PJM	ALTW	264
PJM	MEC	1120
PJM	ALTE	140
PJM	MECS	-196
PJM	NEPTUNE	Included in NYIS
PJM	HE	0
PJM	SIGE	0
PJM	SIPC	0
PJM	AEPW	0
PJM	MGE	0
Total		1200.6

A study of all voltage limits was completed using this base system. For analysis pertaining to thermal limits including Generator Deliverability a multitude of dispatch patterns were analyzed. A complete description of the Generator Deliverability procedures is contained in Attachment E of PJM Manual M14B.

The 2016 base case was used to analyze network transfer capability. To maintain reliability in a competitive capacity market, resources must contribute to the deliverability of electricity in the Control Area in two ways: 1) energy must be deliverable from the aggregate of resources available to the Control Area to load in portions of the Control Area experiencing a localized

capacity emergency, or deficiency, 2) capacity resources within a given electrical area must, in aggregate, be able to be exported to other areas of the Control Area within some bounds that separate the reliability requirements of the Control Area from the reasonable economic function of the market place. PJM has developed two methods for evaluating the adequacy of network transfer capability for each of these deliverability requirements. These methods are described in more detail in Attachment E of PJM Manual M14B.

The CETO/CETL method will be used to determine if the Capacity Emergency Transfer Limit (CETL) to each of the various electrical areas of PJM is sufficient to deliver each respective area's Capacity Emergency Transfer Objective (CETO).

The PJM Generation Deliverability procedure was used to determine if Network Transfer Capability was adequate to deliver all capacity resources out of defined areas to the network.

Category 1 Generator Deliverability Results

PSSE NAME	ID	Unit Commercial Name	Capacity Injection Rights (MWs)	Resource Type	Result
1CPR 1G	1	Cooper 1	116	Capacity Resource	Deliverable
1CPR 2G	1	Cooper 2	225	Capacity Resource	Deliverable
1DALE 1G	1	Dale 1	23	Capacity Resource	Deliverable
1DALE 2G	1	Dale 2	23	Capacity Resource	Deliverable
1DALE 3G	1	Dale 3	74	Capacity Resource	Deliverable
1DALE 4G	1	Dale 4	75	Capacity Resource	Deliverable
1JKCT 1G	1	Smith CT1	104	Capacity Resource	Deliverable
1JKCT 2G	1	Smith CT2	104	Capacity Resource	Deliverable
1JKCT 3G	1	Smith CT3	104	Capacity Resource	Deliverable
1JKCT 4G	1	Smith CT4	74	Capacity Resource	Deliverable
1JKCT 5G	1	Smith CT5	74	Capacity Resource	Deliverable
1JKCT 6G	1	Smith CT6	74	Capacity Resource	Deliverable
1JKCT 7G	1	Smith CT7	74	Capacity Resource	Deliverable
1JKCT 9G	1	Smith CT9	88	Capacity Resource	Deliverable
1JKCT10G	1	Smith CT10	88	Capacity Resource	Deliverable
1LAUR 1G	1	Laurel Dam Hydro	70	Capacity Resource	Deliverable
1LOVE HY	1	Love Hydro	23.3	Capacity Resource	Deliverable
1LOVE HY	2	Love Hydro	23.3	Capacity Resource	Deliverable
1LOVE HY	3	Love Hydro	23.3	Capacity Resource	Deliverable
1SPLK 1G	1	Spurlock 1	300	Capacity Resource	Deliverable
1SPLK 2G	1	Spurlock 2	510	Capacity Resource	Deliverable
1EAG 3G	1	Spurlock 3	268	Capacity Resource	Deliverable
1SPLK 4G	1	Spurlock 4	268	Capacity Resource	Deliverable

Other Deliverability Results

2016 Load deliverability test results:
The EKPC system passed this analytical test. No potential issues identified.

2017 Generator Deliverability study results:
The EKPC system passed this analytical test. No potential issues identified. All generators listed above are deliverable.

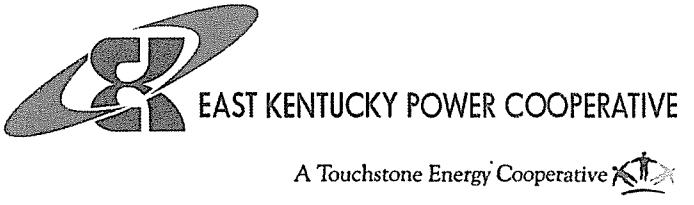
2017 Load deliverability test results:
The EKPC system passed this analytical test. No potential issues identified.

2017 Baseline Thermal Analysis and Baseline Voltage Analysis:
There is currently only one potential problem identified as part of this test methodology. PJM and EKPC are working to develop a proposed solution. The proposed solution is under development.

ANALYSIS OF TRANSMISSION SYSTEM IMPACTS OF EKPC DISPATCH SCENARIOS

AUGUST 15, 2012

PREPARED BY: EAST KENTUCKY POWER COOPERATIVE



EXECUTIVE SUMMARY

An analysis has been performed by EKPC Transmission Planning staff to identify impacts on the EKPC transmission system plus neighboring non-PJM systems (LG&E/KU and TVA) as a result of various EKPC dispatch/transfer scenarios. The scenarios evaluated are selected to bound the range of potential dispatch/transfer scenarios that are expected with EKPC as a full member of PJM. Note that these scenarios are possible even if EKPC is not a member of PJM. In fact, the scenarios considered are likely to envelop operating conditions that have occurred historically.

EKPC utilized models of 2012 Summer, 2012/13 Winter, 2016 Summer, and 2016/17 Winter for the analysis. Models were developed for load levels ranging from 50% to 100% of peak, and for each load level considered, a scenario with no EKPC incremental transfers was simulated, as well as scenarios with incremental imports and exports up to 1000 MW between EKPC and PJM. This resulted in 109 cases being developed for the analysis. The 1000 MW maximum test level for imports and exports was selected as an extreme amount in order to ensure that the analysis captured potential impacts. EKPC does not anticipate that this level of imports or exports will be experienced typically as a member of PJM.

A single-contingency analysis was conducted on each of the 109 cases, with every single contingency in LG&E/KU and EKPC simulated, plus a number of contingencies within neighboring systems. Overloaded facilities and low-voltage violations were tabulated for each of the cases. The analysis identified several overloads on the EKPC, LG&E/KU and TVA systems for the base case dispatch scenario (no transfers). Other facilities were loaded near their maximum emergency ratings with base case dispatch, and a subsequent import or export by EKPC increased loadings for these facilities marginally above the applicable emergency ratings. For most cases, the flow impacts due to EKPC imports or exports are minimal given the extreme level of imports and exports tested (no more than 10% increase). In a few incremental import cases, the flow impacts are slightly greater, mainly at certain interfaces between EKPC and AEP or LG&E/KU and AEP. The voltage impacts identified in the study are small across the board.

The nature of the interconnected transmission grid will result in variations in flows and voltages when generation is shifted between generating plants. EKPC experiences these impacts on its transmission system when it shifts generation, but it also experiences these impacts when other utilities, particularly LG&E/KU, shift generation. Similarly, LG&E/KU experiences these impacts on its transmission system when its own generation is shifted. Power flows along the path of least resistance rather than along a contract path. "Loop" power flows are created as a result of differences between the scheduled and actual flows of power across interfaces between neighboring balancing areas. "Loop" flows due to variations in load and generation are a typical occurrence on the interconnected systems, and are therefore not new phenomena created by EKPC's planned membership in PJM. These loop flows can and do occur today when generation dispatch changes as a result of economic and environmental reasons, whether it be due to internal dispatch economics of units or the ability to make economic purchases or sales. The degree to which loop flows are experienced, as well as the specific facilities impacted by loop flows, are the result of many factors, such as significant changes in fuel prices driving

revised generation dispatch merit orders or forced outages of generating units resulting in revised dispatch patterns. Therefore, the results of this analysis should not necessarily be interpreted as identifying new conditions that will be created by EKPC's membership in PJM, but rather an indication of possible loop flow impacts that could be seen when EKPC needs to import or export power.

EKPC has an existing long-term firm point-to-point transmission service reservation with a capacity of 400 MW from PJM. Additional point-to-point transmission is sometimes available from PJM into EKPC, depending on system conditions. Therefore, EKPC can routinely import 400 MW of power into its system currently, and depending on transmission availability more than 400 MW can be imported. EKPC optimizes its power supply requirements in the PJM market today as an external market participant, and will continue to do so prior to joining PJM. As a result, imports are presently occurring, and these imports sometimes approach 500 MW. Historically, EKPC has imported more than 500 MW from PJM. Similarly, EKPC can utilize transmission capacity that is available to export power into PJM when it is economical to do so. As a result, loop flows on the EKPC and LG&E/KU interconnected systems have occurred in the past, are occurring presently, and will continue to occur in the future, regardless of whether EKPC is a member of PJM. EKPC and LG&E/KU have managed these loop flows historically and will continue to do so on a real-time basis.

If loading and/or voltage issues arise that are impacted by the interconnected operations of EKPC and its neighboring utilities, it is anticipated that the companies will coordinate to mitigate the issues as is currently being done. EKPC, TVA, and LG&E/KU staff coordinate on an ongoing basis today to ensure that interconnected systems operate in a reliable, secure manner. This coordination will continue after EKPC becomes a full member of PJM. Furthermore, once EKPC becomes a PJM member, PJM will be involved in reliability coordination between EKPC and LG&E/KU, providing further mechanisms to ensure continued reliability of the interconnected systems.

Therefore, no significant impacts on the LG&E/KU or TVA systems are expected as a result of EKPC's planned membership in PJM.

SECTION 1 -- INTRODUCTION

An analysis has been performed by EKPC Transmission Planning staff to identify impacts on the EKPC transmission system plus neighboring non-PJM systems (LG&E/KU and TVA) as a result of various EKPC dispatch/transfer scenarios. The scenarios evaluated are selected to bound the range of potential dispatch/transfer scenarios that are expected with EKPC as a full member of PJM. Note that these scenarios are possible even if EKPC is not a member of PJM. In fact, the scenarios considered are likely to envelop operating conditions that have occurred historically.

SECTION 2 – METHODOLOGY

EKPC used its latest available power flow models for the analysis. EKPC selected the 2012 Summer, 2012/13 Winter, 2016 Summer, and 2016/17 Winter peak (50/50 load probability) models as the starting point for the analysis. These models were developed jointly with LG&E/KU in May of 2011, and reflect the expected loads and system topology known at the time they were developed. The analysis software used was the Siemens Power Technologies International (PTI) PSS/E power flow package (version 33.0.1).

Using the peak load models as a starting point, several cases were developed to represent various load levels and EKPC transfer scenarios. Models for load levels from 50% to 100% of peak were developed by scaling all loads down proportionally in the EKPC and LG&E/KU areas. Generation was reduced to match load using an assumed economic merit order for both EKPC and LG&E/KU. Also, for each load level a scenario with no EKPC incremental transfers was simulated, and simulations were conducted for a range of EKPC incremental transfer scenarios. The maximum incremental import and export level simulated was 1000 MW. This incremental import level was tested in all models. This maximum level was selected as an extreme case that would bound the expected typical operations for EKPC, and is not meant to reflect a level that is normally expected to experienced as a member of PJM.

The maximum incremental export level utilized in the analysis for any given load level varies, depending on the amount of excess EKPC generation available above load. For instance, for the 2012/13 and 2016/17 winter 100% peak models, EKPC has no excess generation available beyond what is necessary to serve its peak load, so no incremental exports were tested on these peak cases.

The resulting set of power flow models used for the analysis is listed in Table 1.

Table 1
List of Power Flow Models Developed for Analysis

Case #	Season	EKPC & LGE/KU Load Level Simulated	Incremental EKPC Transfer Level Simulated
1	2012 Summer	100% Peak	0 MW
2	2012 Summer	100% Peak	400 MW export
3	2012 Summer	100% Peak	500 MW import
4	2012 Summer	100% Peak	1000 MW import

Case #	Season	EKPC & LGE/KU Load Level Simulated	Incremental EKPC Transfer Level Simulated
5	2012 Summer	90% Peak	0 MW
6	2012 Summer	90% Peak	500 MW export
7	2012 Summer	90% Peak	650 MW export
8	2012 Summer	90% Peak	500 MW import
9	2012 Summer	90% Peak	1000 MW import
10	2012 Summer	80% Peak	0 MW
11	2012 Summer	80% Peak	500 MW export
12	2012 Summer	80% Peak	900 MW export
13	2012 Summer	80% Peak	500 MW import
14	2012 Summer	80% Peak	1000 MW import
15	2012 Summer	70% Peak	0 MW
16	2012 Summer	70% Peak	500 MW export
17	2012 Summer	70% Peak	1000 MW export
18	2012 Summer	70% Peak	500 MW import
19	2012 Summer	70% Peak	1000 MW import
20	2012 Summer	60% Peak	0 MW
21	2012 Summer	60% Peak	500 MW export
22	2012 Summer	60% Peak	1000 MW export
23	2012 Summer	60% Peak	500 MW import
24	2012 Summer	60% Peak	1000 MW import
25	2012 Summer	50% Peak	0 MW
26	2012 Summer	50% Peak	500 MW export
27	2012 Summer	50% Peak	1000 MW export
28	2012 Summer	50% Peak	500 MW import
29	2012 Summer	50% Peak	1000 MW import
30	2012/13 Winter	100% Peak	0 MW
31	2012/13 Winter	100% Peak	500 MW import
32	2012/13 Winter	100% Peak	1000 MW import
33	2012/13 Winter	90% Peak	0 MW
34	2012/13 Winter	90% Peak	200 MW export
35	2012/13 Winter	90% Peak	500 MW import
36	2012/13 Winter	90% Peak	1000 MW import
37	2012/13 Winter	80% Peak	0 MW
38	2012/13 Winter	80% Peak	500 MW export
39	2012/13 Winter	80% Peak	500 MW import
40	2012/13 Winter	80% Peak	1000 MW import
41	2012/13 Winter	70% Peak	0 MW
42	2012/13 Winter	70% Peak	500 MW export
43	2012/13 Winter	70% Peak	800 MW export
44	2012/13 Winter	70% Peak	500 MW import
45	2012/13 Winter	70% Peak	1000 MW import
46	2012/13 Winter	60% Peak	0 MW
47	2012/13 Winter	60% Peak	500 MW export
48	2012/13 Winter	60% Peak	1000 MW export

Case #	Season	EKPC & LGE/KU Load Level Simulated	Incremental EKPC Transfer Level Simulated
49	2012/13 Winter	60% Peak	500 MW import
50	2012/13 Winter	60% Peak	1000 MW import
51	2012/13 Winter	50% Peak	0 MW
52	2012/13 Winter	50% Peak	500 MW export
53	2012/13 Winter	50% Peak	1000 MW export
54	2012/13 Winter	50% Peak	500 MW import
55	2012/13 Winter	50% Peak	1000 MW import
56	2016 Summer	100% Peak	0 MW
57	2016 Summer	100% Peak	300 MW export
58	2016 Summer	100% Peak	500 MW import
59	2016 Summer	100% Peak	1000 MW import
60	2016 Summer	90% Peak	0 MW
61	2016 Summer	90% Peak	500 MW export
62	2016 Summer	90% Peak	600 MW export
63	2016 Summer	90% Peak	500 MW import
64	2016 Summer	90% Peak	1000 MW import
65	2016 Summer	80% Peak	0 MW
66	2016 Summer	80% Peak	500 MW export
67	2016 Summer	80% Peak	800 MW export
68	2016 Summer	80% Peak	500 MW import
69	2016 Summer	80% Peak	1000 MW import
70	2016 Summer	70% Peak	0 MW
71	2016 Summer	70% Peak	500 MW export
72	2016 Summer	70% Peak	1000 MW export
73	2016 Summer	70% Peak	500 MW import
74	2016 Summer	70% Peak	1000 MW import
75	2016 Summer	60% Peak	0 MW
76	2016 Summer	60% Peak	500 MW export
77	2016 Summer	60% Peak	1000 MW export
78	2016 Summer	60% Peak	500 MW import
79	2016 Summer	60% Peak	1000 MW import
80	2016 Summer	50% Peak	0 MW
81	2016 Summer	50% Peak	500 MW export
82	2016 Summer	50% Peak	1000 MW export
83	2016 Summer	50% Peak	500 MW import
84	2016 Summer	50% Peak	1000 MW import
85	2016/17 Winter	100% Peak	0 MW
86	2016/17 Winter	100% Peak	500 MW import
87	2016/17 Winter	100% Peak	1000 MW import
88	2016/17 Winter	90% Peak	0 MW
89	2016/17 Winter	90% Peak	500 MW import
90	2016/17 Winter	90% Peak	1000 MW import
91	2016/17 Winter	80% Peak	0 MW
92	2016/17 Winter	80% Peak	400 MW export

Case #	Season	EKPC & LGE/KU Load Level Simulated	Incremental EKPC Transfer Level Simulated
93	2016/17 Winter	80% Peak	500 MW import
94	2016/17 Winter	80% Peak	1000 MW import
95	2016/17 Winter	70% Peak	0 MW
96	2016/17 Winter	70% Peak	500 MW export
97	2016/17 Winter	70% Peak	700 MW export
98	2016/17 Winter	70% Peak	500 MW import
99	2016/17 Winter	70% Peak	1000 MW import
100	2016/17 Winter	60% Peak	0 MW
101	2016/17 Winter	60% Peak	500 MW export
102	2016/17 Winter	60% Peak	1000 MW export
103	2016/17 Winter	60% Peak	500 MW import
104	2016/17 Winter	60% Peak	1000 MW import
105	2016/17 Winter	50% Peak	0 MW
106	2016/17 Winter	50% Peak	500 MW export
107	2016/17 Winter	50% Peak	1000 MW export
108	2016/17 Winter	50% Peak	500 MW import
109	2016/17 Winter	50% Peak	1000 MW import

For each case a single-contingency analysis was performed. All single-contingencies at 69 kV and above were simulated in the EKPC and LG&E/KU areas. Also, all contingencies two buses back into neighboring systems were simulated. All overloaded facilities were identified from this contingency analysis. Additionally, all low voltage values were identified for all contingencies resulting in a decrease of at least 2.5% from pre-contingency values.

The results of the thermal and voltage analysis are presented in the following sections. All overloads are listed for comparison between the different load levels in each season. For the voltage analysis, an entry is included in the tables for a contingency resulting in a voltage violation only if the difference in the voltage between the base case (0 MW incremental transfer level) and one of the transfer cases is more than 0.5%. The bus with the lowest voltage level for each contingency is listed.

SECTION 3 – RESULTS

The results for each season are presented in the following subsections.

Section 3.1 – 2012 Summer Thermal Results

Table 2 presents a summary of the overloaded facilities identified for the 2012 Summer 100% peak load model analysis (Cases # 1 through 4).

Table 2
Overloaded Facilities Identified in 2012 Summer Models – 100% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 400 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	144.8%	143.5%	143.4%	144.2%
691 MANITOU 69.000 983 WARRIORC 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	141.1%	141.3%	140.9%	140.8%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	137.0%	136.0%	135.9%	136.5%
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	132.0%	130.8%	130.7%	131.4%
320 BEREA T 69.000 664 LK REBA 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	127.2%	126.3%	126.2%	126.8%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	119.2%	116.8%	119.2%	121.3%
320 BEREA T 69.000 767 OKONITE 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	113.5%	112.7%	112.6%	113.1%
560 GR RVR 69.000 836 RIVR Q T 69.000 1	41	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	110.0%	110.5%	109.3%	108.8%
827 RICHMD 3 69.000 831 RICHMD S 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	109.8%	109.2%	108.7%	109.1%
272 ANDALEX 69.000 871 SENTRY 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	109.8%	109.9%	109.7%	109.6%
455 DAVIS TP 69.000 903 SPEARS A 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	109.3%	108.3%	108.2%	108.8%
455 DAVIS TP 69.000 973 W HICKMN 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	109.3%	108.3%	108.2%	108.9%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 400 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
706 MIDDLT 2 69.000 707 MIDDLTWN 69.000 1	170	LGE/KU	OPEN LINE FROM BUS 191 [MIDDLT 2 138.00] TO BUS 706 [MIDDLT 2 69.000] CKT 2	108.7%	108.6%	108.9%	108.6%
825 RICH IND 69.000 830 RICHMD J 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	108.4%	107.7%	107.2%	107.8%
827 RICHMD 3 69.000 830 RICHMD J 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	108.4%	107.6%	107.2%	107.6%
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.3%	108.0%	108.5%	108.7%
677 MAD GE J 69.000 750 NEBO 69.000 1	53	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	105.9%	105.8%	105.8%	105.9%
269 ALGNQUIN 69.000 688 MAGAZINE 69.000 1	55	LGE/KU	OPEN LINE FROM BUS 399 [CLAY 69.000] TO BUS 579 [HANCOCK 69.000] CKT 1	105.6%	105.7%	105.6%	105.3%
750 NEBO 69.000 992 WEBCOAL4 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 272 [ANDALEX 69.000] TO BUS 871 [SENTRY 69.000] CKT 1	104.8%	104.7%	104.7%	104.8%
126 CANERNSW 138.00 371 CANERNSW 69.000 2	120	LGE/KU	OPEN LINE FROM BUS 126 [CANERNSW 138.00] TO BUS 371 [CANERNSW 69.000] CKT 1	104.6%	104.6%	104.5%	104.4%
568 GREENVIL 69.000 570 GRNV W T 69.000 1	28	LGE/KU	OPEN LINE FROM BUS 623 [KEN AMER 69.000] TO BUS 836 [RIVR Q T 69.000] CKT 1	104.6%	104.5%	104.4%	104.5%
983 WARRIORC 69.000 992 WEBCOAL4 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 272 [ANDALEX 69.000] TO BUS 871 [SENTRY 69.000] CKT 1	103.9%	103.9%	103.8%	103.9%
284 ASHBOTTM 69.000 629 KENWOOD 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 142 [DIXIE 138.00] TO BUS 207 [PADDYRUN 138.00] CKT 1	103.4%	103.5%	103.2%	103.1%
636 KY RIVER 69.000 903 SPEARS A 69.000 1	52	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	102.9%	102.0%	101.9%	102.5%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 400 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
323 BEVIER 69.000 617 INDIAN H 69.000 1	28	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	102.9%	103.3%	102.6%	102.1%
387 CENTR CI 69.000 737 MUHLNB P 69.000 1	45	LGE/KU	OPEN LINE FROM BUS 623 [KEN AMER 69.000] TO BUS 836 [RIVR Q T 69.000] CKT 1	102.4%	102.1%	102.2%	102.7%
623 KEN AMER 69.000 834 RIVER QU 69.000 1	39	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	102.3%	101.9%	102.2%	102.8%
691 MANITOU 69.000 871 SENTRY 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	102.0%	102.1%	101.8%	101.7%
507 ETOWN 69.000 510 ETOWN 4 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 302 [BARDSTWN 69.000] TO BUS 989 [WDLWN KU 69.000] CKT 1	101.0%	100.5%	99.7%	103.6%
126 CANERNSW 138.00 371 CANERNSW 69.000 1	127	LGE/KU	OPEN LINE FROM BUS 126 [CANERNSW 138.00] TO BUS 371 [CANERNSW 69.000] CKT 2	100.1%	100.2%	100.1%	100.0%
261 ADAMS 69.000 867 SCOTT CO 69.000 1	66	LGE/KU	OPEN LINE FROM BUS 97 [ADAMS 138.00] TO BUS 261 [ADAMS 69.000] CKT 1	98.8%	95.9%	98.4%	100.3%
367 CAMPGR J 69.000 500 EMANUE T 69.000 1	32	LGE/KU	OPEN LINE FROM BUS 669 [LONDON 69.000] TO BUS 803 [PITTSBRG 69.000] CKT 1	96.2%	88.6%	97.7%	111.7%
360445 5BRAYTOWN TN161.00 360450 5HUNTSVL TN 161.00 1	181.8	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360102 [8PHIPPS B NP500.00] CIRCUIT 1	93.9%	90.9%	96.4%	103.3%
5136 BACONCRJ 69.000 7326 LIB CH T 69.000 1	50	EKPC	OPEN LINE FROM BUS 521 [FARLEY 69.000] TO BUS 954 [US STEEL 69.000] CKT 1	92.2%	77.6%	95.7%	103.8%
720 MOREHD E 69.000 722 MOREHEAD 69.000 1	38	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	76.5%	57.5%	95.9%	105.9%

Table 3 presents a summary of the overloaded facilities identified for the 2012 Summer 90% peak load model analysis (Cases # 5 through 9).

Table 3
Overloaded Facilities Identified in 2012 Summer Models – 90% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 650 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	124.0%	122.7%	122.6%	126.4%	126.5%
691 MANITOU 69.000 983 WARRIORC 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	122.2%	122.4%	122.4%	122.0%	121.8%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	119.6%	118.7%	118.5%	121.5%	121.5%
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	112.8%	111.6%	111.5%	115.1%	115.1%
320 BEREA T 69.000 664 LK REBA 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	111.0%	110.1%	110.0%	112.8%	112.8%
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.5%	108.1%	108.0%	108.6%	108.8%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	106.1%	103.2%	102.3%	109.6%	110.5%
320 BEREA T 69.000 767 OKONITE 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	99.1%	98.3%	98.2%	100.7%	100.7%
367 CAMPGR J 69.000 500 EMANUE T 69.000 1	32	LGE/KU	OPEN LINE FROM BUS 669 [LONDON 69.000] TO BUS 803 [PITTSBRG 69.000] CKT 1	84.3%	80.3%	75.9%	94.8%	100.4%

Table 4 presents a summary of the overloaded facilities identified for the 2012 Summer 80% peak load model analysis (Cases # 10 through 14).

Table 4
Overloaded Facilities Identified in 2012 Summer Models – 80% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 900 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.3%	108.0%	107.7%	108.7%	108.8%
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	105.9%	104.7%	104.6%	106.4%	106.3%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	103.7%	102.7%	102.6%	104.1%	104.0%
691 MANITOU 69.000 983 WARRIORC 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	103.4%	103.7%	103.8%	103.3%	103.2%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	99.2%	96.3%	94.0%	101.3%	101.8%

Table 5 presents a summary of the overloaded facilities identified for the 2012 Summer 70% peak load model analysis (Cases # 15 through 19).

Table 5
Overloaded Facilities Identified in 2012 Summer Models – 70% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.3%	107.9%	107.6%	108.5%	108.5%

Table 6 presents a summary of the overloaded facilities identified for the 2012 Summer 60% peak load model analysis (Cases # 20 through 24).

Table 6
Overloaded Facilities Identified in 2012 Summer Models – 60% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.2%	107.9%	107.6%	108.3%	108.5%

Table 7 presents a summary of the overloaded facilities identified for the 2012 Summer 50% peak load model analysis (Cases # 25 through 29).

Table 7
Overloaded Facilities Identified in 2012 Summer Models – 50% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	108.0%	108.0%	107.6%	108.2%	108.4%

Section 3.1.1 – Discussion of 2012 Summer Thermal Results

The results in Tables 2 through 7 indicate that several overloaded facilities were identified in 2012 summer, particularly for peak load conditions. Many of these facilities are owned by LG&E/KU. Most of these facilities are overloaded under EKPC's base case dispatch. Furthermore, for the majority of the facilities, EKPC import/export scenarios have minimal impacts on the level of loading. Five facilities experienced an increase of more than 5% in loading for at least one import/export scenario versus base case conditions. These facilities are:

- LG&E/KU's Campground Jct.-Emanual Tap 69 kV line section
- TVA's Braytown-Huntsville 161 kV line
- EKPC's Bacon Creek Jct.-Liberty Church Jct. 69 kV line section
- LG&E/KU's Morehead East-Morehead 69 kV line section
- LG&E/KU's West Frankfort 138/69 kV transformer

EKPC incremental exports decrease post-contingency loadings on these facilities. EKPC incremental imports increase post-contingency loadings on these facilities. The loading issues primarily occur at a peak load level, and in all cases other than the West Frankfort transformer overload, overloads of these facilities were identified only at the 1000 MW import level.

Section 3.2 – 2012 Summer Voltage Results

Table 8 presents a summary of the voltage violations (voltages less than 90%) identified for the 2012 Summer 100% peak load model analysis (Cases # 1 through 4).

Table 8
Voltage Violations Identified in 2012 Summer Models – 100% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 400 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	80.9%	81.5%	80.2%	81.8%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	81.8%	82.5%	82.6%	82.1%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	82.0%	82.7%	82.8%	82.3%
341770 HORSCVKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5207 [BARRENCO 69.000] TO BUS 6891 [HORSCV T 69.000] CKT 1	86.4%	86.3%	87.4%	86.8%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	87.0%	87.7%	87.8%	87.4%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	87.0%	87.7%	87.8%	87.4%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	87.9%	88.5%	88.7%	88.3%
989 WDLWN KU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 302 [BARDSTWN 69.000] TO BUS 989 [WDLWN KU 69.000] CKT 1	88.7%	89.0%	90.6%	90.2%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	89.3%	89.9%	90.3%	89.9%
8261 PLEASGRV 69.000	90%	EKPC	OPEN LINE FROM BUS 5596 [BULLITCO 161.00] TO BUS 5597 [BULLITCO 69.000] CKT 1	89.4%	89.7%	90.8%	90.5%
8816 SKAGGS 138.00	90%	EKPC	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	90.8%	90.9%	89.1%	90.3%

Table 9 presents a summary of the voltage violations (voltages less than 90% or higher than 105%) identified for the 2012 Summer 90% peak load model analysis (Cases # 5 through 9).

Table 9
Voltage Violations Identified in 2012 Summer Models – 90% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 650 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	87.6%	88.0%	88.1%	86.2%	85.9%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.3%	87.2%	87.3%	84.6%	84.5%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.5%	87.4%	87.5%	84.7%	84.7%
341770 HORSCVKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5207 [BARRENCO 69.000] TO BUS 6891 [HORSCV T 69.000] CKT 1	89.8%	90.2%	90.3%	88.9%	88.7%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.5%	91.3%	91.4%	88.9%	88.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.5%	91.3%	91.4%	88.9%	88.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	91.2%	92.0%	92.1%	89.6%	89.6%

Table 10 presents a summary of the voltage violations (voltages less than 90% or higher than 105%) identified for the 2012 Summer 80% peak load model analysis (Cases # 10 through 14).

Table 10
Voltage Violations Identified in 2012 Summer Models – 80% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 900 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.1%	91.2%	91.2%	89.7%	89.8%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.3%	91.3%	91.4%	89.8%	89.9%

No voltage violations were identified for the 2012 summer 70%, 60%, or 50% peak cases (Cases #15 through #29).

Section 3.2.1 – Discussion of 2012 Summer Voltage Results

Tables 8 through 10 identify several potential voltage violations that are possible in 2012 Summer at peak and shoulder-peak load conditions. The large majority of these issues exist under EKPC base dispatch conditions with no incremental transfers. In a few cases, voltages that are only marginally above minimum required voltage levels in the base case drop below the minimum threshold for EKPC import scenarios. The impacts are relatively small, so EKPC's import/export levels are not expected to significantly impact voltages.

Section 3.3 – 2012/13 Winter Thermal Results

Table 11 presents a summary of the overloaded facilities identified for the 2012/13 Winter 100% peak load model analysis (Cases # 30 through 32).

Table 11
Overloaded Facilities Identified in 2012/13 Winter Models – 100% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
320 BEREA T 69.000 664 LK REBA 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	129.9%	129.8%	132.0%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	124.8%	126.2%	129.0%
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	114.4%	112.7%	110.5%
6037 DALE 69.000 7916 NEWBY2 69.000 1	78	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	113.7%	93.3%	111.6%
333 BOND 69.000 937 TOMS C T 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 473 [DORCHEST 69.000] TO BUS 504 [ESSERVIL 69.000] CKT 1	112.1%	112.1%	115.7%
7131 JK SMITH 138.00 9240 UNION CJ 138.00 1	297	EKPC	OPEN LINE FROM BUS 6326 [FAWKESEK 138.00] TO BUS 7131 [JK SMITH 138.00] CKT 1	111.0%	100.2%	81.2%
827 RICHMD 3 69.000 831 RICHMD S 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	110.4%	110.4%	112.1%
9240 UNION CJ 138.00 180 LK REB T 138.00 1	297	EKPC-LGE/KU	OPEN LINE FROM BUS 6326 [FAWKESEK 138.00] TO BUS 7131 [JK SMITH 138.00] CKT 1	107.2%	96.3%	77.2%
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	94	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	107.1%	107.0%	104.2%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
6036 DALE 138.00 9136 THREEFKJ 138.00 1	212	EKPC	OPEN LINE FROM BUS 7131 [JK SMITH 138.00] TO BUS 9240 [UNION CJ 138.00] CKT 1	105.5%	100.9%	92.3%
338 BOONSB N 69.000 341196 BOONSB N 138.00 1	143	LGE/KU	OPEN LINE FROM BUS 134 [CLARK CO 138.00] TO BUS 149 [FAWKS KU 138.00] CKT 1	103.7%	98.9%	89.9%
261 ADAMS 69.000 867 SCOTT CO 69.000 1	88	LGE/KU	OPEN LINE FROM BUS 97 [ADAMS 138.00] TO BUS 261 [ADAMS 69.000] CKT 1	103.4%	104.9%	107.4%
157 GR RVR 138.00 560 GR RVR 69.000 1	131	LGE/KU	OPEN LINE FROM BUS 157 [GR RVR 138.00] TO BUS 560 [GR RVR 69.000] CKT 2	102.8%	102.6%	102.3%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	102.8%	106.7%	113.9%
6326 FAWKESEK 138.00 9136 THREEFKJ 138.00 1	212	EKPC	OPEN LINE FROM BUS 7131 [JK SMITH 138.00] TO BUS 9240 [UNION CJ 138.00] CKT 1	102.7%	98.1%	89.5%
320 BEREA T 69.000 767 OKONITE 69.000 1	83	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	101.5%	101.4%	103.0%
5491 BOURNE 69.000 9160 TODDVILJ 69.000 1	88	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	101.0%	82.8%	99.1%
5491 BOURNE 69.000 7916 NEWBY2 69.000 1	88	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	100.9%	82.8%	99.1%
915 ST PAUL 69.000 957 VA CITY 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 860 [SANDY RI 69.000] TO BUS 957 [VA CITY 69.000] CKT 1	99.2%	107.1%	117.3%
276 AOSMTH T 69.000 907 SPENC RD 69.000 1	59	LGE/KU	OPEN LINE FROM BUS 5477 [BOONSB T 138.00] TO BUS 341196 [BOONSB N 138.00] CKT 1	99.1%	100.9%	105.2%
9126 THELMA 69.000 247101 05THELM2 69.000 1	90	EKPC-AEP	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	90.8%	94.5%	101.1%
231 VA CITY 138.00 242605 05CLNCHR 138.00 1	162	LGE/KU-AEP	OPEN LINE FROM BUS 2 [POCKET N 500.00] TO BUS 74 [POCKET N 161.00] CKT 1	88.2%	93.9%	100.7%

Table 12 presents a summary of the overloaded facilities identified for the 2012/13 Winter 90% peak load model analysis (Cases # 33 through 36).

Table 12
Overloaded Facilities Identified in 2012/13 Winter Models – 90% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 200 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	113.1%	112.2%	116.0%	119.7%
320 BEREA T 69.000 664 LK REBA 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	112.7%	112.8%	113.4%	115.9%
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	105.1%	105.6%	102.7%	99.8%
7131 JK SMITH 138.00 9240 UNION CJ 138.00 1	297	EKPC	OPEN LINE FROM BUS 6326 [FAWKESEK 138.00] TO BUS 7131 [JK SMITH 138.00] CKT 1	98.1%	102.5%	78.9%	68.2%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	97.9%	98.4%	105.2%	111.9%
915 ST PAUL 69.000 957 VA CITY 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 860 [SANDY RI 69.000] TO BUS 957 [VA CITY 69.000] CKT 1	87.1%	74.4%	96.9%	107.1%
333 BOND 69.000 937 TOMS C T 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 473 [DORCHEST 69.000] TO BUS 504 [ESSERVIL 69.000] CKT 1	99.3%	99.3%	99.4%	106.1%

Table 13 presents a summary of the overloaded facilities identified for the 2012/13 Winter 80% peak load model analysis (Cases # 37 through 40).

Table 13
Overloaded Facilities Identified in 2012/13 Winter Models – 80% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	103.9%	101.9%	106.6%	109.9%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	96.3%	99.0%	102.8%	108.2%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	96.1%	100.6%	93.3%	93.6%
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	94.2%	104.0%	87.8%	83.2%

Table 14 presents a summary of the overloaded facilities identified for the 2012/13 Winter 70% peak load model analysis (Cases # 41 through 45).

Table 14
Overloaded Facilities Identified in 2012/13 Winter Models – 70% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 800 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	95.6%	96.3%	95.7%	101.8%	95.4%
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	92.3%	102.3%	104.1%	86.9%	78.6%

Table 15 presents a summary of the overloaded facilities identified for the 2012/13 Winter 60% peak load model analysis (Cases # 46 through 50).

Table 15
Overloaded Facilities Identified in 2012/13 Winter Models – 60% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	90.5%	100.5%	103.3%	84.0%	76.0%

Table 16 presents a summary of the overloaded facilities identified for the 2012/13 Winter 50% peak load model analysis (Cases # 51 through 55).

Table 16
Overloaded Facilities Identified in 2012/13 Winter Models – 50% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	90.5%	98.8%	101.6%	81.2%	73.6%

Section 3.3.1 – Discussion of 2012/13 Winter Thermal Results

The results in Tables 11 through 16 indicate that several overloaded facilities were identified in 2012/13 winter, particularly for peak and shoulder-peakload conditions. Both EKPC and LG&E/KU have a number of facilities listed. Most of these facilities are either above the winter emergency rating or very near being above that rating under EKPC's base case dispatch. The primary areas where EKPC imports increase loading are at the interfaces between EKPC and AEP (at Thelma) and between LG&E/KU and AEP (in the Morehead area and in the southwestern Virginia area). In most of these cases, the impacted facilities are already overloaded or very nearly overloaded without EKPC incremental imports. Also, there are several cases where an EKPC import/export scenario results in loadings that are only slightly above emergency ratings.

Section 3.4 – 2012/13 Winter Voltage Results

Table 17 presents a summary of the voltage violations (voltages less than 90%) identified for the 2012/13 Winter 100% peak load model analysis (Cases # 30 through 32).

Table 17
Voltage Violations Identified in 2012/13 Winter Models – 100% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	Divergent	15.6%	Divergent
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	34.3%	59.9%	34.4%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	77.6%	77.6%	79.9%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.8%	86.8%	85.2%

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 5491 [BOURNE 69.000] TO BUS 7916 [NEWBY2 69.000] CKT 1	83.7%	83.6%	82.9%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 6037 [DALE 69.000] TO BUS 7916 [NEWBY2 69.000] CKT 1	83.9%	83.8%	83.1%
342013 MACKVLKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	Divergent	84.4%	Divergent
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 5161 [BALLARD 69.000] TO BUS 6931 [HUNTFRMJ 69.000] CKT 1	86.4%	86.3%	87.1%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.8%	86.8%	85.2%
8816 SKAGGS 138.00	90%	EKPC	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	87.2%	87.3%	87.9%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 5161 [BALLARD 69.000] TO BUS 9160 [TODDVILJ 69.000] CKT 1	87.2%	87.1%	88.0%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	87.5%	87.5%	85.9%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 6931 [HUNTFRMJ 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	88.4%	88.5%	86.5%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	88.6%	88.7%	87.2%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	90.6%	90.7%	89.1%
341770 HORSCVKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5207 [BARRENCO 69.000] TO BUS 6891 [HORSCV T 69.000] CKT 1	89.2%	90.9%	90.7%
7986 OAKDALE 69.000	90%	EKPC	OPEN LINE FROM BUS 5250 [BEATTYD1 69.000] TO BUS 5262 [BEATTYVL 69.000] CKT 1	89.3%	89.6%	88.3%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 180 [LK REB T 138.00] TO BUS 239 [BGAD TAP 138.00] CKT 1	89.5%	89.6%	90.8%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 181 [LK REBA 138.00] TO BUS 239 [BGAD TAP 138.00] CKT 1	89.5%	89.6%	90.8%
324 BIG STON 69.000	90%	LGE/KU	OPEN LINE FROM BUS 557 [GORGE 69.000] TO BUS 616 [IMBODEN 69.000] CKT 1	90.4%	90.3%	89.7%
1015 WISE 69.000	90%	LGE/KU	OPEN LINE FROM BUS 504 [ESSERVIL 69.000] TO BUS 1016 [WISE TAP 69.000] CKT 1	89.9%	89.8%	91.3%

Table 18 presents a summary of the voltage violations (voltages less than 90%) identified for the 2012/13 Winter 90% peak load model analysis (Cases # 33 through 36).

Table 18
Voltage Violations Identified in 2012/13 Winter Models – 90% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 200 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	84.0%	84.0%	83.2%	80.4%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	84.3%	84.2%	83.5%	80.7%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 7861 [N.SPRFLD 69.000] CKT 1	84.5%	84.5%	83.5%	78.4%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 8186 [PERRYVIL 69.000] CKT 1	85.7%	85.7%	84.9%	79.2%
342013 MACKVLKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 7442 [MACKVL J 69.000] TO BUS 7861 [N.SPRFLD 69.000] CKT 1	85.7%	85.7%	84.8%	79.8%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.8%	90.7%	90.2%	87.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	91.3%	91.3%	90.7%	88.5%
8816 SKAGGS 138.00	90%	EKPC	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	88.2%	88.0%	88.2%	88.8%
786 PAINT LK 69.000	90%	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	92.3%	92.2%	91.7%	89.7%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 5491 [BOURNE 69.000] TO BUS 7916 [NEWBY2 69.000] CKT 1	92.0%	92.2%	91.4%	89.8%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	90.7%	90.7%	90.1%	87.9%

Table 19 presents a summary of the voltage violations (voltages less than 90%) identified for the 2012/13 Winter 80% peak load model analysis (Cases #37 through 40).

Table 19
Voltage Violations Identified in 2012/13 Winter Models – 80% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	82.6%	82.4%	81.9%	79.0%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	89.2%	88.9%	88.7%	86.9%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	89.4%	89.1%	88.9%	87.1%
8816 SKAGGS 138.00	90%	EKPC	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	90.0%	89.2%	90.0%	89.6%

No voltage violations were identified for the 2012/13 Winter 70%, 60%, or 50% peak cases (Cases #41 through #55).

Section 3.4.1 – Discussion of 2012/13 Winter Voltage Results

Tables 17 through 19 identify several potential voltage violations that are possible in 2012/13 Winter at peak and shoulder-peak load conditions. The large majority of these issues exist under EKPC base dispatch conditions with no incremental transfers. In a few cases, voltages that are only marginally above minimum required voltage levels in the base case drop below the minimum threshold for EKPC import scenarios. The impacts are relatively small, so EKPC's import/export levels are not expected to significantly impact voltages.

Section 3.5 – 2016 Summer Thermal Results

Table 20 presents a summary of the overloaded facilities identified for the 2016 Summer 100% peak load model analysis (Cases # 56 through 59).

Table 20
Overloaded Facilities Identified in 2016 Summer Models – 100% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 300 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	161.9%	161.1%	158.0%	164.3%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 300 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	146.7%	145.9%	143.1%	148.9%
691 MANITOU 69.000 983 WARRIORC 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	135.5%	135.7%	135.4%	135.2%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	143.0%	142.5%	144.9%	144.5%
320 BEREA T 69.000 664 LK REBA 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	128.9%	128.4%	130.6%	130.2%
455 DAVIS TP 69.000 903 SPEARS A 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	121.7%	121.0%	118.6%	123.6%
455 DAVIS TP 69.000 973 W HICKMN 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	121.7%	121.1%	118.7%	123.6%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	118.7%	117.2%	121.3%	124.0%
320 BEREA T 69.000 767 OKONITE 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	116.9%	116.4%	118.4%	118.1%
636 KY RIVER 69.000 903 SPEARS A 69.000 1	52	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	114.6%	114.0%	111.7%	116.4%
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69 000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.1%	111.8%	112.3%	112.7%
261 ADAMS 69.000 867 SCOTT CO 69.000 1	66	LGE/KU	OPEN LINE FROM BUS 97 [ADAMS 138.00] TO BUS 261 [ADAMS 69.000] CKT 1	111.5%	109.3%	114.8%	117.5%
827 RICHMD 3 69.000 831 RICHMD S 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	110.5%	110.1%	111.7%	111.3%
560 GR RVR 69.000 836 RIVR Q T 69.000 1	41	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	108.6%	109.0%	108.0%	107.4%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 300 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
269 ALGNQUIN 69.000 688 MAGAZINE 69.000 1	55	LGE/KU	OPEN LINE FROM BUS 399 [CLAY 69.000] TO BUS 579 [HANCOCK 69.000] CKT 1	108.5%	108.6%	108.5%	108.1%
677 MAD GE J 69.000 750 NEBO 69.000 1	53	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	107.4%	107.3%	107.4%	107.4%
636 KY RIVER 69.000 904 SPEARS B 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	107.3%	106.7%	104.7%	108.9%
568 GREENVIL 69.000 570 GRNV W T 69.000 1	28	LGE/KU	OPEN LINE FROM BUS 623 [KEN AMER 69.000] TO BUS 836 [RIVR Q T 69.000] CKT 1	107.1%	107.1%	107.2%	107.2%
825 RICH IND 69.000 830 RICHMD J 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	106.9%	106.6%	108.2%	107.8%
827 RICHMD 3 69.000 830 RICHMD J 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	106.9%	106.5%	108.2%	107.8%
272 ANDALEX 69.000 871 SENTRY 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	106.6%	106.6%	106.5%	106.3%
126 CANERNSW 138.00 371 CANERNSW 69.000 2	120	LGE/KU	OPEN LINE FROM BUS 126 [CANERNSW 138.00] TO BUS 371 [CANERNSW 69.000] CKT 1	106.1%	106.2%	106.1%	105.9%
623 KEN AMER 69.000 834 RIVER QU 69.000 1	39	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	105.4%	105.1%	105.8%	106.2%
387 CENTR CI 69.000 737 MUHLNB P 69.000 1	45	LGE/KU	OPEN LINE FROM BUS 623 [KEN AMER 69.000] TO BUS 836 [RIVR Q T 69.000] CKT 1	104.8%	104.6%	105.1%	105.4%
323 BEVIER 69.000 617 INDIAN H 69.000 1	28	LGE/KU	OPEN LINE FROM BUS 560 [GR RVR 69.000] TO BUS 737 [MUHLNB P 69.000] CKT 1	104.6%	104.9%	104.1%	103.7%
391 CHAD TAP 69.000 939 TOTZ 69.000 1	23	LGE/KU	OPEN LINE FROM BUS 514 [EVARTS 69.000] TO BUS 515 [EVARTS T 69.000] CKT 1	104.3%	104.1%	104.6%	104.5%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 300 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
750 NEBO 69.000 992 WEBCOAL4 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 272 [ANDALEX 69.000] TO BUS 871 [SENTRY 69.000] CKT 1	103.9%	103.9%	103.9%	103.9%
284 ASHBOTTM 69.000 629 KENWOOD 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 142 [DIXIE 138.00] TO BUS 207 [PADDYRUN 138.00] CKT 1	103.8%	103.9%	103.7%	103.5%
288 ASHL PIP 69.000 855 S.POINTJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 747 [N.MADSNJ 69.000] CKT 1	103.0%	102.9%	103.4%	103.1%
983 WARRIORC 69.000 992 WEBCOAL4 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 272 [ANDALEX 69.000] TO BUS 871 [SENTRY 69.000] CKT 1	103.0%	103.0%	103.1%	103.1%
391 CHAD TAP 69.000 408 CLOVRLCK 69.000 1	28	LGE/KU	OPEN LINE FROM BUS 514 [EVARTS 69.000] TO BUS 515 [EVARTS T 69.000] CKT 1	102.7%	102.5%	102.9%	102.9%
232 VILEY RD 138.00 235 W LEXNGT 138.00 1	265	LGE/KU	OPEN LINE FROM BUS 159 [HAEFLING 138.00] TO BUS 235 [W LEXNGT 138.00] CKT 1	102.6%	101.0%	105.0%	106.2%
126 CANERNSW 138.00 371 CANERNSW 69.000 1	127	LGE/KU	OPEN LINE FROM BUS 126 [CANERNSW 138.00] TO BUS 371 [CANERNSW 69.000] CKT 2	101.6%	101.7%	101.5%	101.4%
6096 DAVIS 69.000 7946 NICHLSVL 69.000 1	66	EKPC	OPEN LINE FROM BUS 5151 [BAKER LN 138.00] TO BUS 104 [BAKR L T 138.00] CKT 1	101.6%	101.2%	103.0%	103.4%
159 HAEFLING 138.00 235 W LEXNGT 138.00 1	265	LGE/KU	OPEN LINE FROM BUS 232 [VILEY RD 138.00] TO BUS 235 [W LEXNGT 138.00] CKT 1	100.9%	99.4%	103.4%	104.6%
99 ALGNQUIN 138.00 269 ALGNQUIN 69.000 1	153	LGE/KU	OPEN LINE FROM BUS 207 [PADDYRUN 138.00] TO BUS 785 [PADDYSRN 69.000] TO BUS 1213 [PADDYR2B 14.000] CKT 3	100.3%	100.3%	100.3%	100.2%
560 GR RVR 69.000 737 MUHLNB P 69.000 1	53	LGE/KU	OPEN LINE FROM BUS 623 [KEN AMER 69.000] TO BUS 836 [RIVR Q T 69.000] CKT 1	100.3%	100.1%	100.6%	100.8%
48 EARLNG N 161.00 79 WALKER 161.00 1	114	LGE/KU	OPEN LINE FROM BUS 48 [EARLNG N 161.00] TO BUS 485 [EARLNG N 69.000] CKT 1	100.0%	99.9%	100.3%	100.4%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 300 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
724 MORGNF 4 69.000 997 WHEATC T 69.000 1	18	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	99.9%	99.8%	100.1%	100.2%
619 JACKS CR 69.000 939 TOTZ 69.000 1	23	LGE/KU	OPEN LINE FROM BUS 514 [EVARTS 69.000] TO BUS 515 [EVARTS T 69.000] CKT 1	99.8%	99.7%	100.1%	100.0%
159 HAEFLING 138.00 232 VILEY RD 138.00 1	237	LGE/KU	OPEN LINE FROM BUS 159 [HAEFLING 138.00] TO BUS 235 [W LEXNGT 138.00] CKT 1	99.3%	97.6%	102.1%	103.4%
367 CAMPGR J 69.000 500 EMANUE T 69.000 1	32	LGE/KU	OPEN LINE FROM BUS 669 [LONDON 69.000] TO BUS 803 [PITTSBRG 69.000] CKT 1	94.9%	89.3%	98.6%	111.2%
5136 BACONCRJ 69.000 7326 LIB CH T 69.000 1	50	EKPC	OPEN LINE FROM BUS 521 [FARLEY 69.000] TO BUS 954 [US STEEL 69.000] CKT 1	91.3%	79.8%	96.8%	107.0%
720 MOREHD E 69.000 722 MOREHEAD 69.000 1	38	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	69.2%	56.2%	94.5%	108.8%
804 POCKET 69.000 913 ST CHARL 69.000 1	35	LGE/KU	OPEN LINE FROM BUS 56 [HARLAN Y 161.00] TO BUS 586 [HARLAN Y 69.000] CKT 1	95.7%	93.7%	98.6%	102.0%
809 POWEL MT 69.000 913 ST CHARL 69.000 1	35	LGE/KU	OPEN LINE FROM BUS 56 [HARLAN Y 161.00] TO BUS 586 [HARLAN Y 69.000] CKT 1	95.5%	93.6%	98.4%	101.8%
9126 THELMA 69.000 247101 05THELM2 69.000 1	66	EKPC-AEP	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	88.6%	84.1%	95.0%	100.4%
333 BOND 69.000 937 TOMS C T 69.000 1	57	LGE/KU	OPEN LINE FROM BUS 915 [ST PAUL 69.000] TO BUS 957 [VA CITY 69.000] CKT 1	88.3%	84.4%	94.0%	100.8%

Table 21 presents a summary of the overloaded facilities identified for the 2016 Summer 90% peak load model analysis (Cases # 60 through 64).

Table 21
Overloaded Facilities Identified in 2016 Summer Models – 90% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 600 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	140.0%	138.1%	138.1%	143.9%	144.1%
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	126.6%	124.9%	124.8%	130.1%	130.3%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	126.5%	125.2%	125.2%	129.1%	129.2%
691 MANITOU 69.000 983 WARRIORC 69.000 1	40	LGE/KU	OPEN LINE FROM BUS 485 [EARLNG N 69.000] TO BUS 677 [MAD GE J 69.000] CKT 1	116.9%	117.1%	117.1%	116.7%	116.6%
320 BEREA T 69.000 664 LK REBA 69.000 1	85	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	113.7%	112.5%	112.4%	116.1%	116.2%
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.2%	111.9%	111.8%	112.5%	112.7%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	111.8%	108.9%	108.4%	115.5%	116.7%
455 DAVIS TP 69.000 903 SPEARS A 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	104.8%	103.3%	103.3%	107.8%	108.0%
455 DAVIS TP 69.000 973 W HICKMN 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	104.8%	103.3%	103.3%	107.8%	108.0%
320 BEREA T 69.000 767 OKONITE 69.000 1	67	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	103.4%	102.4%	102.3%	105.5%	105.6%
261 ADAMS 69.000 867 SCOTT CO 69.000 1	66	LGE/KU	OPEN LINE FROM BUS 97 [ADAMS 138.00] TO BUS 261 [ADAMS 69.000] CKT 1	103.2%	98.9%	98.3%	108.1%	109.4%
636 KY RIVER 69.000 903 SPEARS A 69.000 1	52	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	98.7%	97.3%	97.3%	101.5%	101.7%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 600 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
367 CAMPGR J 69.000 500 EMANUE T 69.000 1	32	LGE/KU	OPEN LINE FROM BUS 5951 [COOPER-2 161.00] TO BUS 7276 [LAURELDM 161.00] CKT 1	85.4%	80.6%	74.7%	95.6%	101.9%

Table 22 presents a summary of the overloaded facilities identified for the 2016 Summer 80% peak load model analysis (Cases # 65 through 69).

Table 22
Overloaded Facilities Identified in 2016 Summer Models – 80% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 800 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	119.0%	117.3%	117.0%	119.7%	119.6%
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.0%	111.7%	111.5%	112.4%	112.4%
767 OKONITE 69.000 825 RICH IND 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	109.6%	108.4%	108.2%	110.2%	110.1%
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	49	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	107.3%	105.8%	105.6%	108.0%	107.9%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	101.7%	98.9%	97.2%	104.1%	104.5%

Table 23 presents a summary of the overloaded facilities identified for the 2016 Summer 70% peak load model analysis (Cases # 70 through 74).

Table 23
Overloaded Facilities Identified in 2016 Summer Models – 70% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.0%	111.7%	111.4%	112.1%	112.3%

Table 24 presents a summary of the overloaded facilities identified for the 2016 Summer 60% peak load model analysis (Cases # 75 through 79).

Table 24
Overloaded Facilities Identified in 2016 Summer Models – 60% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.0%	111.8%	111.7%	112.0%	112.2%

Table 25 presents a summary of the overloaded facilities identified for the 2016 Summer 50% peak load model analysis (Cases # 80 through 84).

Table 25
Overloaded Facilities Identified in 2016 Summer Models – 50% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
362124 2LOVELLTN 69.000 362496 2WATTROAD TN69.000 1	58.4	TVA	OPEN LINE FROM BUS 360097 [8VOLUNTEER 500.00] TO BUS 360093 [8BULL RUN FP500.00] CIRCUIT 1	112.0%	112.0%	111.7%	112.1%	112.2%

Section 3.5.1 – Discussion of 2016 Summer Thermal Results

The results in Tables 20 through 25 indicate that several overloaded facilities were identified in 2016 summer, particularly for peak and shoulder-peak load conditions. Many of these facilities are owned by

LG&E/KU. Most of these facilities are overloaded under EKPC's base case dispatch. Furthermore, for the majority of the facilities, EKPC import/export scenarios have minimal impacts on the level of loading. Eight facilities experienced an increase of more than 5% in loading for at least one import/export scenario versus base case conditions. These facilities are:

- LG&E/KU's Adams-Scott County 69 kV line section
- LG&E/KU's Campground Jct.-Emanual Tap 69 kV line section
- EKPC's Bacon Creek Jct.-Liberty Church Jct. 69 kV line section
- LG&E/KU's Morehead East-Morehead 69 kV line section
- LG&E/KU's Pocket-St. Charles 69 kV line section
- LG&E/KU's Powell Mountain-St. Charles 69 kV line section
- Thelma AEP-Thelma EKPC 69 kV line section
- LG&E/KU's Bond-Toms Creek Tap 69 kV line section

EKPC incremental exports decrease post-contingency loadings on these facilities. EKPC incremental imports increase post-contingency loadings on these facilities. The loading issues primarily occur at a peak load level, and in all cases other than the Adams-Scott County line section overload, overloads of these facilities were identified only at the 1000 MW import level.

Section 3.6 – 2016 Summer Voltage Results

Table 26 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016 Summer 100% peak load model analysis (Cases # 56 through 59).

Table 26
Voltage Violations Identified in 2016 Summer Models – 100% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 300 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	79.7%	80.1%	81.7%	78.4%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	79.9%	80.3%	82.0%	78.7%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	85.8%	86.2%	84.5%	84.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	85.9%	86.2%	84.6%	84.9%
341770 HORSCVKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5207 [BARRENCO 69.000] TO BUS 6891 [HORSCV T 69.000] CKT 1	86.7%	86.1%	86.4%	85.9%

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 300 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	86.9%	87.3%	85.6%	86.0%
989 WDLWN KU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 302 [BARDSTWN 69.000] TO BUS 989 [WDLWN KU 69.000] CKT 1	88.3%	88.4%	88.0%	89.0%
9446 W.NICHVL 69.000	90%	EKPC	OPEN LINE FROM BUS 5152 [BAKER LN 69.000] TO BUS 6876 [HOLLOWYJ 69.000] CKT 1	90.6%	90.8%	89.6%	89.3%
5151 BAKER LN 138.00	90%	EKPC	OPEN LINE FROM BUS 5151 [BAKER LN 138.00] TO BUS 104 [BAKR L T 138.00] CKT 1	89.7%	90.0%	88.5%	88.3%
973 W HICKMN 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 973 [W HICKMN 69.000] CKT 1	90.9%	91.2%	89.8%	90.1%

Table 27 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016 Summer 90% peak load model analysis (Cases # 60 through 64).

Table 27
Voltage Violations Identified in 2016 Summer Models – 90% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 600 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	80.5%	81.0%	81.1%	81.3%	80.9%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	83.3%	84.5%	84.5%	81.0%	80.8%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	83.5%	84.7%	84.7%	81.2%	81.0%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	88.2%	89.3%	89.3%	86.2%	86.1%
341770 HORSCVKU 69.000	90%	LGE/KU	OPEN LINE FROM BUS 5207 [BARRENCO 69.000] TO BUS 6891 [HORSCV T 69.000] CKT 1	88.2%	88.4%	88.5%	88.3%	89.7%

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 600 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	88.3%	89.3%	89.3%	86.2%	86.1%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	89.1%	90.1%	90.2%	87.1%	87.0%

Table 28 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016 Summer 80% peak load model analysis (Cases # 65 through 69).

Table 28
Voltage Violations Identified in 2016 Summer Models – 80% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Export Case	% Voltage – 800 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	90.1%	90.7%	90.8%	89.6%	89.6%
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	87.5%	88.8%	89.0%	87.0%	87.0%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	87.7%	89.0%	89.2%	87.1%	87.2%

No voltage violations were identified for the 2016 Summer 70%, 60%, or 50% peak cases (Cases #70 through #84).

Section 3.6.1 – Discussion of 2016 Summer Voltage Results

Tables 26 through 28 identify several voltage violations that are possible in 2016 Summer at peak and shoulder-peak load conditions. The large majority of these issues exist under EKPC base dispatch conditions with no incremental transfers. In a few cases, voltages that are only marginally above minimum required voltage levels in the base case drop below the minimum threshold for EKPC import scenarios. The impacts are relatively small, so EKPC's import/export levels are not expected to significantly impact voltages.

Section 3.7 - 2016/17 Winter Thermal Results

Table 29 presents a summary of the overloaded facilities identified for the 2016/17 Winter 100% peak load model analysis (Cases # 85 through 87).

Table 29
Overloaded Facilities Identified in 2016/17 Winter Models – 100% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
320 BEREA T 69.000 664 LK REBA 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	131.7%	131.5%	132.9%
9126 THELMA 69.000 247101 05THELM2 69.000 1	90	EKPC-AEP	OPEN LINE FROM BUS 8481 [ROWAN CO 138.00] TO BUS 8816 [SKAGGS 138.00] CKT 1	94.4%	96.5%	102.7%
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	127.9%	128.2%	131.2%
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	94	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	119.6%	119.3%	120.2%
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	117.5%	115.4%	113.8%
333 BOND 69.000 937 TOMS C T 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 473 [DORCHEST 69.000] TO BUS 504 [ESSERVIL 69.000] CKT 1	112.6%	112.6%	116.0%
827 RICHMD 3 69.000 831 RICHMD S 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	111.8%	111.6%	112.7%
747 N.MADSNJ 69.000 904 SPEARS B 69.000 1	94	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	105.8%	105.5%	106.3%
320 BEREA T 69.000 767 OKONITE 69.000 1	83	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	103.8%	103.6%	104.7%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	103.8%	105.1%	112.3%
276 AOSMTH T 69.000 907 SPENC RD 69.000 1	59	LGE/KU	OPEN LINE FROM BUS 5477 [BOONSB T 138.00] TO BUS 341196 [BOONSB N 138.00] CKT 1	102.6%	103.4%	107.1%
915 ST PAUL 69.000 957 VA CITY 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 860 [SANDY RI 69.000] TO BUS 957 [VA CITY 69.000] CKT 1	101.1%	107.8%	117.8%

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
157 GR RVR 138.00 560 GR RVR 69.000 1	131	LGE/KU	OPEN LINE FROM BUS 157 [GR RVR 138.00] TO BUS 560 [GR RVR 69.000] CKT 2	100.0%	99.9%	99.6%
231 VA CITY 138.00 242605 05CLNCHR 138.00 1	162	LGE/KU -AEP	OPEN LINE FROM BUS 2 [POCKET N 500.00] TO BUS 74 [POCKET N 161.00] CKT 1	89.3%	93.7%	100.3%

Table 30 presents a summary of the overloaded facilities identified for the 2016/17 Winter 90% peak load model analysis (Cases # 88 through 90).

Table 30
Overloaded Facilities Identified in 2016/17 Winter Models – 90% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	118.6%	121.5%	124.7%
320 BEREA T 69.000 664 LK REBA 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	115.0%	115.4%	117.7%
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	106.7%	104.3%	101.4%
524 FAWKES 69.000 747 N.MADSNJ 69.000 1	94	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	103.9%	104.6%	103.3%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	98.4%	104.9%	111.8%
915 ST PAUL 69.000 957 VA CITY 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 860 [SANDY RI 69.000] TO BUS 957 [VA CITY 69.000] CKT 1	88.8%	98.3%	108.5%
333 BOND 69.000 937 TOMS C T 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 473 [DORCHEST 69.000] TO BUS 504 [ESSERVIL 69.000] CKT 1	99.9%	99.9%	107.8%

Table 31 presents a summary of the overloaded facilities identified for the 2016/17 Winter 80% peak load model analysis (Cases # 91 through 94).

Table 31
Overloaded Facilities Identified in 2016/17 Winter Models – 80% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 400 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	106.9%	105.3%	109.7%	112.8%
320 BEREA T 69.000 664 LK REBA 69.000 1	97	LGE/KU	OPEN LINE FROM BUS 524 [FAWKES 69.000] TO BUS 831 [RICHMD S 69.000] CKT 1	98.3%	98.5%	98.8%	100.4%
72 PINEVIL2 161.00 801 PINEVIL 69.000 2	194	LGE/KU	OPEN LINE FROM BUS 71 [PINEVIL1 161.00] TO BUS 72 [PINEVIL2 161.00] CKT 1	98.0%	100.9%	95.5%	94.3%
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	95.7%	103.2%	89.2%	84.0%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	95.5%	98.8%	102.5%	108.7%

Table 32 presents a summary of the overloaded facilities identified for the 2016/17 Winter 70% peak load model analysis (Cases # 95 through 99).

Table 32
Overloaded Facilities Identified in 2016/17 Winter Models – 70% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 700 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
234 W FRNKFT 138.00 970 W FRNKFT 69.000 1	120	LGE/KU	OPEN LINE FROM BUS 153 [FRANKF E 138.00] TO BUS 234 [W FRNKFT 138.00] CKT 1	97.1%	95.0%	93.9%	100.0%	101.3%
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	94.6%	104.6%	105.8%	88.1%	81.1%
216 RODBURN 138.00 843 RODBURN 69.000 1	72	LGE/KU	OPEN LINE FROM BUS 216 [RODBURN 138.00] TO BUS 221 [SHARKEYT 138.00] CKT 1	93.9%	97.4%	97.1%	100.9%	96.8%

Table 33 presents a summary of the overloaded facilities identified for the 2016/17 Winter 60% peak load model analysis (Cases # 100 through 104).

Table 33
Overloaded Facilities Identified in 2016/17 Winter Models – 60% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	92.5%	102.4%	105.3%	86.7%	78.0%

Table 34 presents a summary of the overloaded facilities identified for the 2016/17 Winter 50% peak load model analysis (Cases # 105 through 109).

Table 34
Overloaded Facilities Identified in 2016/17 Winter Models – 50% Peak Case

Facility	MVA Rating	Owner	Contingency	% Loading – 0 MW Transfer Case	% Loading – 500 MW Export Case	% Loading – 1000 MW Export Case	% Loading – 500 MW Import Case	% Loading – 1000 MW Import Case
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	LGE/KU -AEP	OPEN LINE FROM BUS 8816 [SKAGGS 138.00] TO BUS 8817 [SKAGGS 69.000] CKT 1	92.0%	100.1%	102.9%	82.5%	74.8%

Section 3.7.1 – Discussion of 2016/17 Winter Thermal Results

The results in Tables 29 through 34 indicate that several overloaded facilities were identified in 2016/17 winter at various load levels. Many of these facilities are owned by LG&E/KU. Most of these facilities are overloaded under EKPC's base case dispatch. Several of the facilities are either above the winter emergency rating or very near being above that rating under EKPC's base case dispatch. Also, there are several cases where an EKPC import/export scenario results in loadings that are only slightly above emergency ratings.

The primary areas where EKPC imports increase loading are at the interfaces between EKPC and AEP (at Thelma) and between LG&E/KU and AEP (in the Morehead area and in the southwestern Virginia area).

Eight facilities experienced an increase of more than 5% in loading for at least one import/export scenario versus base case conditions. These facilities are:

- Thelma AEP-Thelma EKPC 69 kV line section
- LG&E/KU's Rodburn 138/69 kV transformer
- LG&E/KU's Virginia City-St. Paul 69 kV line section
- Clinch River AEP-Virginia City LG&E/KU 138 kV line
- LG&E/KU's West Frankfort 138/69 kV transformer

- LG&E/KU's Pineville 161/69 kV transformer #2
- LG&E/KU's Bond-Toms Creek Tap 69 kV line section
- Morehead AEP-Rodburn LG&E/KU 69 kV line

EKPC incremental exports decrease post-contingency loadings on most of these facilities. Likewise, EKPC incremental imports increase post-contingency loadings on most of these facilities. The exceptions are the Pineville transformer and the Morehead AEP-Rodburn KU line, for which EKPC imports decrease loading and EKPC exports increase loading.

Section 3.8 - 2016/17 Winter Voltage Results

Table 35 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016/17 Winter 100% peak load model analysis (Cases #85 through 87).

Table 35
Voltage Violations Identified in 2016/17 Winter Models – 100% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	84.6%	84.8%	83.7%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	84.6%	84.8%	83.7%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	85.5%	85.6%	84.6%
5151 BAKER LN 138.00	90%	EKPC	OPEN LINE FROM BUS 5151 [BAKER LN 138.00] TO BUS 104 [BAKR L T 138.00] CKT 1	88.1%	88.2%	87.0%
6331 FAYETTE 138.00	90%	EKPC	OPEN LINE FROM BUS 5122 [AVON 138.00] TO BUS 6331 [FAYETTE 138.00] CKT 1	89.4%	89.4%	88.8%
9446 W.NICHVL 69.000	90%	EKPC	OPEN LINE FROM BUS 5152 [BAKER LN 69.000] TO BUS 6876 [HOLLOWYJ 69.000] CKT 1	89.5%	89.5%	88.5%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 7639 [MERCR CO 138.00] TO BUS 7640 [MERCR CO 69.000] CKT 1	89.7%	89.8%	90.3%
7641 MERCR CI 69.000	90%	EKPC	OPEN LINE FROM BUS 7640 [MERCR CO 69.000] TO BUS 7641 [MERCR CI 69.000] CKT 1	89.7%	89.8%	90.3%
9446 W.NICHVL 69.000	90%	EKPC	OPEN LINE FROM BUS 5151 [BAKER LN 138.00] TO BUS 5152 [BAKER LN 69.000] CKT 1	89.9%	90.0%	88.8%
318 BEREA 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 320 [BEREA T 69.000] TO BUS 664 [LK REBA 69.000] CKT 1	89.9%	90.0%	89.1%
181 LK REBA 138.00	90%	LGE/KU	OPEN LINE FROM BUS 180 [LK REB T 138.00] TO BUS 239 [BGAD TAP 138.00] CKT 1	91.8%	89.9%	91.8%

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
181 LK REBA 138.00	90%	LGE/KU	OPEN LINE FROM BUS 181 [LK REBA 138.00] TO BUS 239 [BGAD TAP 138.00] CKT 1	91.8%	89.9%	91.8%

Table 36 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016/17 Winter 90% peak load model analysis (Cases #88 through 90).

Table 36
Voltage Violations Identified in 2016/17 Winter Models – 90% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	79.6%	79.1%	80.2%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	88.2%	87.8%	85.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 855 [S.POINTJ 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	88.2%	87.8%	85.9%
288 ASHL PIP 69.000	90%	LGE/KU	OPEN LINE FROM BUS 288 [ASHL PIP 69.000] TO BUS 855 [S.POINTJ 69.000] CKT 1	88.9%	88.5%	86.6%

Table 37 presents a summary of the voltage violations (voltages less than 90%) identified for the 2016/17 Winter 80% peak load model analysis (Cases #91 through 94).

Table 37
Voltage Violations Identified in 2016/17 Winter Models – 80% Peak Case

Bus (Largest Violation)	Voltage Limit	Owner	Contingency	% Voltage – 0 MW Transfer Case	% Voltage – 400 MW Export Case	% Voltage – 500 MW Import Case	% Voltage – 1000 MW Import Case
9291 VANARSDL 69.000	90%	EKPC	OPEN LINE FROM BUS 5416 [BONDS MJ 69.000] TO BUS 334 [BONDS ML 69.000] CKT 1	Divergent	Divergent	27.0%	Divergent
1010 WILS D 2 69.000	90%	LGE/KU	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.3%	86.2%	85.6%	83.7%
8616 S.POINT 69.000	90%	EKPC	OPEN LINE FROM BUS 596 [HIGBY618 69.000] TO BUS 1003 [WIL D2 T 69.000] CKT 1	86.6%	86.4%	85.8%	83.9%

No voltage violations were identified for the 2016/17 Winter 70%, 60%, or 50% peak cases (Cases #95 through #109).

Section 3.8.1 – Discussion of 2016/17 Winter Voltage Results

Tables 35 through 37 identify several potential voltage violations that are possible in 2016/17 Winter at peak and shoulder-peak load conditions. The large majority of these issues exist under EKPC base dispatch conditions with no incremental transfers. In a couple of cases, voltages that are only marginally above minimum required voltage levels in the base case drop below the minimum threshold for EKPC import scenarios. The impacts are relatively small, so EKPC's import/export levels are not expected to significantly impact voltages.

Section 4 – Conclusions

The purpose of this analysis is to provide an indication of the types and magnitudes of impacts that might be seen by EKPC, LG&E/KU, and TVA due to EKPC variations of its dispatch patterns, related primarily to importing or exporting power by EKPC. The nature of the interconnected transmission grid will result in variations in flows and voltages when generation is shifted between generating plants. EKPC experiences these impacts on its transmission system when it shifts generation, but it also experiences these impacts when other utilities, particularly LG&E/KU, shift generation. Similarly, LG&E/KU experiences these impacts on its transmission system when its own generation is shifted. Power flows along the path of least resistance rather than along a contract path. "Loop" power flows are created as a result of differences between the scheduled and actual flows of power across interfaces between neighboring balancing areas. "Loop" flows due to variations in load and generation are a typical occurrence on the interconnected systems, and are therefore not new phenomena created by EKPC's planned membership in PJM. These loop flows can and do occur today when generation dispatch changes as a result of economic and environmental reasons, whether it be due to internal dispatch economics of units or the ability to make economic purchases or sales. The degree to which loop flows are experienced, as well as the specific facilities impacted by loop flows, are the result of many factors, such as significant changes in fuel prices driving revised generation dispatch merit orders or forced outages of generating units resulting in revised dispatch patterns. Therefore, the results of this analysis should not necessarily be interpreted as identifying new conditions that will be created by EKPC's membership in PJM, but rather an indication of possible loop flow impacts that could be seen when EKPC needs to import or export power.

EKPC has an existing long-term firm point-to-point transmission service reservation with a capacity of 400 MW from PJM. Additional point-to-point transmission is sometimes available from PJM into EKPC, depending on system conditions. Therefore, EKPC can routinely import 400 MW of power into its system currently, and depending on transmission availability more than 400 MW can be imported. EKPC optimizes its power supply requirements in the PJM market today as an external market participant, and will continue to do so prior to joining PJM. As a result, imports are presently occurring, and these imports sometimes approach 500 MW. Historically, EKPC has imported more than 500 MW from PJM.

Similarly, EKPC can utilize transmission capacity that is available to export power into PJM when it is economical to do so. As a result, loop flows on the EKPC and LG&E/KU interconnected systems have occurred in the past, are occurring presently, and will continue to occur in the future, regardless of whether EKPC is a member of PJM. EKPC and LG&E/KU have managed these loop flows historically and will continue to do so on a real-time basis.

If loading and/or voltage issues arise that are impacted by the interconnected operations of EKPC and its neighboring utilities, it is anticipated that the companies will coordinate to mitigate the issues as is currently being done. EKPC, TVA, and LG&E/KU staff coordinate on an ongoing basis today to ensure that interconnected systems operate in a reliable, secure manner. This coordination will continue after EKPC becomes a full member of PJM. Furthermore, once EKPC becomes a PJM member, PJM will be involved in reliability coordination between EKPC and LG&E/KU, providing further mechanisms to ensure continued reliability of the interconnected systems.

Therefore, no significant impacts on the LG&E/KU or TVA systems are expected as a result of EKPC's planned membership in PJM.