This study was performed by EKPC prior to integration with PJM.

A Feasibility Study on the Flemingsburg 250-MW Wind and Solar Power Plant

Transmission Planning Department

East Kentucky Power Cooperative

Winchester, Kentucky

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Executive Summary

A 250-MW wind and solar power plant has been proposed for interconnection to the East Kentucky Power Cooperative (EKPC) transmission system by [redacted]. The plant will have two components: a 150-MW wind farm, and a 100-MW solar power plant. The proposed point of interconnection (POI) for the 250-MW plant is a 138-kV POI on the existing Spurlock – Flemingsburg 138-kV line located approximately four (4) miles north of the Flemingsburg substation. An alternate point of interconnection (POI) for the 250-MW plant, which was considered in this feasibility study, is a 345-kV POI on the existing Spurlock – North Clark 345-kV line located approximately 13 miles south of the Spurlock substation.

Thermal analyses were performed under both pre-project and post-project conditions. Electric power flows on existing facilities were noted under both system normal and contingency conditions. Effects of the project on relevant power transfer capabilities were also studied. Lastly, effects of the project on existing circuit breaker duties were analyzed.

Power flow contingency analysis indicated thermally limiting conditions resulting from the Flemingsburg Wind and Solar Power 250-MW project. Total cost estimate information, derived from results of detailed engineering power flow analysis and individual component cost estimate information, were presented in the report. These order-of-magnitude estimates are not definitive and would need to be refined in the System Impact Study and Facilities Study processes.

1.0 Introduction

A 250-MW wind and solar power plant has been proposed for interconnection to the East Kentucky Power Cooperative (EKPC) transmission system by [redacted]. The plant will have two components: a 150-MW wind farm, and a 100-MW solar power plant. The proposed point of interconnection (POI) for the 250-MW plant is a 138-kV POI on the existing Spurlock – Flemingsburg 138-kV line located approximately four (4) miles north of the Flemingsburg substation. An alternate point of interconnection (POI) for the 250-MW plant, which was considered in this feasibility study, is a 345-kV POI on the existing Spurlock – North Clark 345-kV line located approximately 13 miles south of the Spurlock substation.

In this feasibility study report, the term "project" is used to designate the Flemingsburg wind and solar power plant and the set of activities designed to bring it into full operation. The term "pre-project" is used to designate electric system conditions in which the Flemingsburg plant is not interconnected to the EKPC system. The term "post-project" is used to designate electric system conditions in which the Flemingsburg plant, delivering real and reactive power, is actually interconnected to the EKPC system.

The comparison of pre-project and post-project conditions, ceteris paribus, is the essence of this feasibility study. Thermal and voltage analyses were performed on the effects of the proposed 250-MW plant to the EKPC transmission system and its facilities.

The conversion of the JK Smith plant generating units #6 and #7 into combined cycle operation, which will increase the plant output at JK Smith by 170 MW, is a possibility which had to be considered in this study, because this is a project with a higher queue position in the EKPC Generator Interconnection queue. The effects of the Flemingsburg project on the EKPC system needed to be analyzed, both with and without the JK Smith plant conversion.

Thermal and voltage analyses were performed under both pre-project and post-project conditions. Electric power flows and bus voltage magnitudes on existing facilities were noted under both system normal and contingency conditions. Effects of the project on relevant power transfer capabilities were also studied. Lastly, effects of the project on existing circuit breaker duties were analyzed.

2.0 Methodology

Pre-project versus post-project sensitivity analysis was performed for each of the sixteen (16) combinations and permutations of point of interconnection (POI), JK Smith plant generation dispatch, and year-season, as shown on the following table:

POI	JK Smith Plant Generation Dispatch	Time Season
138-kV	With Units #6 and #7 Conversion	Summer 2017
138-kV	With Units #6 and #7 Conversion	Winter 2017-2018
138-kV	With Units #6 and #7 Conversion	Summer 2022
138-kV	With Units #6 and #7 Conversion	Winter 2022-2023
138-kV	Without Units #6 and #7 Conversion	Summer 2017
138-kV	Without Units #6 and #7 Conversion	Winter 2017-2018
138-kV	Without Units #6 and #7 Conversion	Summer 2022
138-kV	Without Units #6 and #7 Conversion	Winter 2022-2023
345-kV	With Units #6 and #7 Conversion	Summer 2017
345-kV	With Units #6 and #7 Conversion	Winter 2017-2018
345-kV	With Units #6 and #7 Conversion	Summer 2022
345-kV	With Units #6 and #7 Conversion	Winter 2022-2023
345-kV	Without Units #6 and #7 Conversion	Summer 2017
345-kV	Without Units #6 and #7 Conversion	Winter 2017-2018
345-kV	Without Units #6 and #7 Conversion	Summer 2022
345-kV	Without Units #6 and #7 Conversion	Winter 2022-2023

The PTI PSS/E software (Version 33.2.0) was used to perform power flow and contingency analysis. The models utilized were from EKPC's internal library of power-flow cases derived from the NERC MMWG 2011 series of base cases. These models include detailed representations of the EKPC and LG&E/KU systems, with the representations originally provided for the NERC MMWG series for the remainder of the outside world.

The Bulk Electric System (BES) is defined as the set of facilities in the electric power system operated at a voltage of 100 kV or higher. The following table shows the service areas for which sets of contingencies were simulated, and results of power flow analysis monitored, in the study:

Service Area	Simulated 69-kV Contingencies?	Simulated BES Contingencies?	Monitored 69-kV Facilities?	Monitored BES Facilities?
EKPC[1]	Yes	Yes	Yes	Yes
LG&E/KU[2]	Yes	Yes	Yes	Yes
AEP[3]	No	Yes	No	Yes
DAY[4]	No	Yes	No	Yes
DEOK[5]	No	Yes	No	Yes
TVA[6]	No	Yes	No	Yes

[1] East Kentucky Power Cooperative

[2] Louisville Gas and Electric/ Kentucky Utilities

[3] American Electric Power

[4] Dayton Power and Light

[5] Duke Energy Ohio and Kentucky

[6] Tennessee Valley Authority

The PTI MUST software (Version 11.0) was used for the transfer capability analysis. Flow limits, together with the associated limiting facilities and contingencies, were identified for both pre-project and post-project conditions.

The ASPEN OneLiner program (Version 11) and ASPEN Breaker Rating Comparison program (Version 11) were used for the fault duty analysis, and for the pre-project versus post-project sensitivity analysis on breaker ratings, respectively.

3.0 Results

3.1 Voltage and Thermal Analysis

No voltage problems were identified as being caused by the project.

Details of thermal analysis results and comparisons of pre-project and post-project conditions, for the sixteen (16) combinations/permutations of post-project cases (with the corresponding pre-project cases) are shown in Appendix I. Each table in Appendix I corresponds to one of these combinations/permutations. For each table in Appendix I, a record indicates a limiting condition (as a pair of limiting facility and critical contingency) which would cause a thermal problem at a given MW output of the Flemingsburg plant. The Flemingsburg plant MW output level (anywhere from 0 MW to 250 MW) at which a thermal problem will first appear for the limiting condition is also shown in the Appendix.

Summaries of the thermal analyses are presented in this subsection, along with high-level cost-estimate information, in the following four (4) tables. In each table, the last three (3) columns provide cost estimates for three MW output levels, namely, 100 MW, 150 MW, and 250 MW, respectively. Note that the corrective actions identified are based on engineering judgment and expertise, but could be replaced with other projects after further engineering analysis. These actions have not been modeled to verify that they will address the limits identified, or that additional thermal limitations will not be created by implementing these solutions. Also note that the cost estimates provided are based on generic cost numbers. No detailed engineering analysis was performed at this stage of the study process to provide a high-level of accuracy in the costs. It is anticipated that the cost estimates provided at this stage have an accuracy of +/- 50%.

For this feasibility study, EKPC did not coordinate with neighboring utilities. EKPC has used its engineering judgment to identify potential solutions and costs for the issues identified on neighboring systems. If the project proceeds to the System Impact Study phase of the process, coordination would occur with these neighboring utilities.

The new 138-kV switching station (“Flemingsburg Junction”), listed in Tables 3.1.1 and 3.1.2, will interconnect the Flemingsburg 250-MW wind and solar power plant to the EKPC transmission system on the existing Spurlock – Flemingsburg Tap 138-kV line, approximately four (4) miles north of the Flemingsburg substation.

The new 345-kV switching station (“South Mason”), listed in Tables 3.1.3 and 3.1.4, will interconnect the Flemingsburg 250-MW wind and solar power plant to the EKPC transmission system on the existing Spurlock – North Clark 345-kV line, approximately thirteen (13) miles south of the Spurlock substation.

Appendix IV shows a map showing the locations of the main and alternate points of interconnection relative to the Spurlock substation.

3.1.1 Cost Estimates for 138-kV Point of Interconnection (with No Generation Conversion at JK Smith Plant)

		Component Cost for MW Output Level		
Thermally Limiting Facility	**Corrective Action**	**P<=100MW**	**P<=150MW**	**P<=250MW**
Goddard 138/69kV Transformer (EKPC)	Replace 138/69kV transformer with a 150 MVA unit.	$1,500,000	$1,500,000	$1,500,000
Goddard - Plummers Landing Tap 69kV Line (EKPC)	Reconductor 4.24 miles with 556.5 ACSR phase conductor.	$0	$901,000	$901,000
Murphysville - Plumville 69kV Line (EKPC)	Upgrade relay to at least 81 MVA.	$0	$6,250	$6,250
Rodburn 138/69kV Transformer (LG&E/KU)	Replace 138/69kV transformer with a 100 MVA unit.	$1,225,000	$1,225,000	$1,225,000
Morehead - Morehead West 69kV Line (LG&E/KU)	Reconductor 1.14 miles with 556.5 ACSR phase conductor	$0	$0	$242,250
Farmers 138/69kV Transformer (LG&E/KU)	Replace 138/69kV transformer with a 100 MVA unit.	$0	$1,225,000	$1,225,000
Morehead East - Morehead 69kV Line (LG&E/KU)	Reconductor 0.30 mile with 556.5 ACSR phase conductor	$0	$0	$63,750
LG&E/KU Rodburn - AEP Morehead 69kV Line	Reconductor 1.81 miles with 266.8 ACSR	$0	$384,625	$384,625
Silvergrove 345/138kV Transformer (DEO&K)	Upgrade terminal equipment to 3000 Amperes.	$1,050,000	$1,050,000	$1,050,000
		$3,775,000	**$6,291,875**	**$6,597,875**
	Direct Connect Facility			
	New Flemingsburg Junction 138-kV Switching Station	**$3,750,000**	**$3,750,000**	**$3,750,000**
		$7,525,000	**$10,041,875**	**$10,347,875**

3.1.2 Cost Estimates for 138-kV Point of Interconnection (with Generation Conversion at JK Smith Plant)

		Component Cost for MW Output Level		
Thermally Limiting Facility	**Corrective Action**	**P<=100MW**	**P<=150MW**	**P<=250MW**
North Springfield - South Springfield Tap 69kV Line (EKPC)	Upgrade conductor maximum operating temperature (9.97 mi.)	$0	$0	$249,250
Goddard 138/69kV Transformer (EKPC)	Replace 138/69kV transformer with a 150 MVA unit.	$1,500,000	$1,500,000	$1,500,000
Goddard - Plummers Landing Tap 69kV Line (EKPC)	Reconductor 4.24 miles with 556.5 ACSR phase conductor.	$0	$901,000	$901,000
Murphysville - Plumville 69kV Line (EKPC)	Upgrade relay to at least 81 MVA.	$0	$6,250	$6,250
Plumville - Rectorville Tap 69kV Line (EKPC)	Upgrade conductor maximum operating temperature (2.81 mi.)	$70,250	$70,250	$70,250
Morehead - Morehead West 69kV Line (LG&E/KU)	Reconductor 1.14 miles with 556.5 ACSR phase conductor	$0	$0	$242,250
Rodburn 138/69kV Transformer (LG&E/KU)	Replace 138/69kV transformer with a 100 MVA unit.	$0	$1,225,000	$1,225,000
Farmers 138/69kV Transformer (LG&E/KU)	Replace 138/69kV transformer with a 100 MVA unit.	$0	$1,225,000	$1,225,000
LG&E/KU Rodburn - AEP Morehead 69kV Line	Reconductor 1.81 mile with 266.8 ACSR.	$0	$384,625	$384,625
		$2,795,250	**$5,312,125**	**$5,803,625**
	Direct Connect Facility			
	New Flemingsburg Junction 138-kV Switching Station	**$3,750,000**	**$3,750,000**	**$3,750,000**
		$6,545,250	**$9,062,125**	**$9,553,625**

3.1.3 Cost Estimates for 345-kV Point of Interconnection (with No Generation Conversion at JK Smith Plant)

		Component Cost for MW Output Level		
Thermally Limiting Facility	**Corrective Action**	**P<=100MW**	**P<=150MW**	**P<=250MW**
Silvergrove 345/138kV Transformer (DEO&K)	Upgrade terminal equipment to 3000 Amperes.	$1,050,000	$1,050,000	$1,050,000
LG&E/KURodburn - AEP Morehead 69kV Line	Reconductor 1.81 miles with 266.8 ACSR	$0	$0	$384,625
		$1,050,000	**$1,050,000**	**$1,434,625**
	Direct Connect Facility			
	New South Mason 345-kV Switching Station	**$11,250,000**	**$11,250,000**	**$11,250,000**
		$12,300,000	**$12,300,000**	**$12,684,625**

3.1.4 Cost Estimates for 345-kV Point of Interconnection (with Generation Conversion at JK Smith Plant)

		Component Cost for MW Output Level		
Thermally Limiting Facility	**Corrective Action**	**P<=100MW**	**P<=150MW**	**P<=250MW**
North Springfield - South Springfield Tap 69kV Line (EKPC)	Upgrade conductor maximum operating temperature (9.97 mi.)	$0	$0	$249,250
JK Smith - Union City Tap 138kV Line (EKPC)	Reconductor 10.26 miles with bundled 556.5 ACSR	$8,464,500	$8,464,500	$8,464,500
Elizabeth-town 4 - Hodgenville 69kV Line (LG&E/KU)	Reconductor 8.51 miles with 556.5 ACSR	$0	$0	$1,808,375
LG&E/KU Rodburn - AEP Morehead 69kV Line	Reconductor 1.81 mile with 266.8 ACSR	$0	$0	$384,625
		$8,464,500	**$8,464,500**	**$10,906,750**
	Direct Connect Facility			
	New South Mason 345kV Switching Station	**$11,250,000**	**$11,250,000**	**$11,250,000**
		$19,714,500	**$19,714,500**	**$22,156,750**

3.2 Transfer Capability Analysis

Details of transfer capability analysis results and comparisons of pre-project and post-project conditions, for the sixteen (16) combinations/permutations of post-project cases (with the corresponding pre-project cases) are shown in Appendix II. Each table in Appendix II corresponds to one of these combinations/permutations.

Results of the transfer capability analysis indicate that the project causes either an increase or a negligible reduction in the power transfer limits into or out of the EKPC service area.

3.3 Fault Duty Analysis and Breaker Rating Comparisons

Details of fault duty analysis, breaker rating comparisons, and sensitivity analysis from pre-project to post-project conditions are shown in Appendix III.

Results of the analysis indicate that the fault duty on the Inland Container 1&2 138-kV transformer circuit interrupter will increase by approximately 2.9% (from 93.7% of the rating to 96.6% of the rating) for the cases where the Flemingsburg plant point of interconnection is at 138-kV.

Results of the analysis also indicate that the fault duty on the Inland Container 1&2 138-kV transformer circuit interrupter will increase by approximately 1.0% (from 93.7% of the rating to 94.7% of the rating) for the cases where the Flemingsburg plant point of interconnection is at 345-kV.

EKPC has a project in its work plan to install a second circuit interrupter at Inland Container in 2015 to provide a dedicated circuit interrupter for each transformer. This will reduce the fault duty on the existing Inland Container interrupter, which will mitigate this issue.

4.0 Conclusions

Power flow contingency analysis indicated thermally limiting conditions resulting from the Flemingsburg Wind and Solar Power 250-MW project. Total cost estimate information, derived from results of detailed engineering power flow analysis and individual component cost estimate information, were presented in the report. These order-of-magnitude estimates are not definitive and would need to be refined at later stages of the generator interconnection study process. Coordination with neighboring utilities will also be required in the next stages of the study process.

Without any upgrades on existing EKPC facilities, generation limits due to thermal constraints under contingency conditions can range anywhere from 5 to 250 MW, as indicated in Appendix I.

Appendix I

Power Flow Analysis Results

POI at 138-kV, No JK Smith Plant Generation Conversion, Summer 2017

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	117	64.11	99.09	84.69%	77.93	122.35	104.57%	19.88%	193
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	47	68.5	97.86%	53.88	80.94	115.63%	17.77%	30
BROWN UNIT 3:RODBURN - SHARKEY TAP 138KV LINE (LG&E/KU)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	66	32.65	56.94	86.27%	37.12	68.24	103.39%	17.12%	200
BROWN UNIT 3:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	47	67	95.71%	53.88	78.29	111.84%	16.13%	66
BROWN UNIT 3:SHARKEY-FARMERS-SPENCER ROAD 138 (LG&E/KU)									
721 MOREHD W 69.000 722 MOREHEAD 69.000 1	35	8.44	31.24	89.26%	9.04	35.06	100.17%	10.91%	246
TRIMBLE COUNTY UNIT 2:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									
147 FARMERS 138.00 522 FARMERS 69.000 1	48	25.5	44.38	92.46%	28.04	49.52	103.17%	10.71%	176
MILL CREEK UNIT 4:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									
249573 08SGROVE 345.00 250097 08SGROVE 138.00 1	478	280.6	477.75	99.95%	287.32	490.7	102.66%	2.71%	5
REDBK - SGROVE 345KV LINE (DEOK)									

POI at 138-kV, No JK Smith Plant Generation Conversion, Winter 2017-2018

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	56.53	62.96	87.44%	64.05	79.64	110.61%	23.17%	136
TRIMBLE COUNTY UNIT 2:BEN2EQ - PRINCS 999KV LINE (AEP)									
216 RODBURN 138.00 843 RODBURN 69.000 1	72	59.82	63.43	88.10%	66.73	75.89	105.40%	17.30%	172
TRIMBLE COUNTY UNIT 2:BEN2EQ - PRINCS 999KV LINE (AEP)									
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	139	84.34	128.66	92.56%	98.74	152.36	109.61%	17.05%	109
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
341923 2MURPHYSVIL 69.000 342091 2PLUMVILLE 69.000 1	70	41.15	66.05	94.36%	50.26	75.29	107.56%	13.20%	107
COOPER UNITS 1&2:SPURLOCK (EKPC) - KENTON (LG&E/KU) 138KV LINE									
147 FARMERS 138.00 522 FARMERS 69.000 1	58	31.29	55.15	95.09%	33.84	60.27	103.91%	8.82%	139
MILL CREEK UNIT 4:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									

POI at 138-kV, No JK Smith Plant Generation Conversion, Summer 2022

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	117	69.61	105.16	89.88%	84.21	129.22	110.44%	20.56%	123
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	44.56	67.33	96.19%	51.3	79.58	113.69%	17.50%	54
BROWN UNIT 3:RODBURN - SHARKEY TAP 138KV LINE (LG&E/KU)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	66	35.68	59.97	90.86%	39.99	70.98	107.55%	16.69%	137
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	44.56	64.67	92.39%	51.3	75.85	108.36%	15.97%	119
BROWN UNIT 3:SHARKEY-FARMERS-SPENCER ROAD 138 (LG&E/KU)									
720 MOREHD E 69.000 722 MOREHEAD 69.000 1	38	8.57	33.77	88.87%	8.37	39.59	104.18%	15.31%	182
BROWN UNIT 3:RODBURN - SHARKEY TAP 138KV LINE (LG&E/KU)									

POI at 138-kV, No JK Smith Plant Generation Conversion, Winter 2022-2023

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	54.67	60.96	84.67%	62.22	78.51	109.04%	24.37%	157
MILL CREEK UNIT 4:BEN2EQ - PRINCS 999KV LINE (AEP)									
216 RODBURN 138.00 843 RODBURN 69.000 1	72	58.78	62.37	86.63%	65.81	75.99	105.54%	18.91%	177
BROWN UNIT 3:BEN2EQ - PRINCS 999KV LINE (AEP)									
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	139	92.79	138.18	99.41%	107.93	162.75	117.09%	17.68%	8
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	88	48.11	79.66	90.52%	52.63	90.44	102.77%	12.25%	193
BROWN UNIT 3:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									

POI at 138-kV, With JK Smith Plant Generation Conversion, Summer 2017

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
341935 2N SPRINGFLD69.000 342208 2S SPRINGF T69.000 1	16	3.26	13.58	84.88%	3.12	16.96	106.00%	21.12%	179
BROWN UNIT 3:HODGENVILLE - SULPHUR CRK 69KV LINE (EKPC)									
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	117	62.98	97.41	83.26%	76.81	120.74	103.20%	19.94%	210
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	46.97	66.67	95.24%	53.86	79.2	113.14%	17.90%	66
BROWN UNIT 3:RODBURN - SHARKEY TAP 138KV LINE (LG&E/KU)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	66	32.53	56.46	85.55%	37.01	67.82	102.76%	17.21%	210
BROWN UNIT 3:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	46.97	65.81	94.01%	53.86	77.17	110.24%	16.23%	92
BROWN UNIT 3:SHARKEY-FARMERS-SPENCER ROAD 138 (LG&E/KU)									
721 MOREHD W 69.000 722 MOREHEAD 69.000 1	35	9.47	32.15	91.86%	10.05	35.98	102.80%	10.94%	186
TRIMBLE COUNTY UNIT 2:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									
147 FARMERS 138.00 522 FARMERS 69.000 1	48	25.59	44.46	92.63%	28.13	49.6	103.33%	10.70%	172
MILL CREEK UNIT 4:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									
510 ETOWN 4 69.000 604 HODGN KU 69.000 1	64	42.55	60.04	93.81%	42.49	65.6	102.50%	8.69%	178
BROWN UNIT 3:BARDSTWN - WDLWN KU 69KV LINE (LG&E/KU)									

POI at 138-kV, With JK Smith Plant Generation Conversion, Winter 2017-2018

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	57.48	63.89	88.74%	65	80.36	111.61%	22.87%	123
TRIMBLE COUNTY UNIT 2:BEN2EQ - PRINCS 999KV LINE (AEP)									
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	139	83.27	127.18	91.50%	97.6	150.84	108.52%	17.02%	125
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	72	59.83	63.53	88.24%	66.73	75.75	105.21%	16.97%	173
TRIMBLE COUNTY UNIT 2:BEN2EQ - PRINCS 999KV LINE (AEP)									
341923 2MURPHYSVIL 69.000 342091 2PLUMVILLE 69.000 1	70	40.8	65.34	93.34%	49.89	74.94	107.06%	13.72%	121
COOPER UNITS 1&2:SPURLOCK (EKPC) - KENTON (LG&E/KU) 138KV LINE									
147 FARMERS 138.00 522 FARMERS 69.000 1	58	31.39	55.26	95.28%	33.94	60.37	104.09%	8.81%	134
MILL CREEK UNIT 4:RODBURN 138/69KV TRANSFORMER (LG&E/KU)									

POI at 138-kV, With JK Smith Plant Generation Conversion, Summer 2022

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	117	68.57	103.66	88.60%	83.13	127.65	109.10%	20.50%	139
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	44.56	65.67	93.81%	51.28	77.9	111.29%	17.48%	89
BROWN UNIT 3:RODBURN - SHARKEY TAP 138KV LINE (LG&E/KU)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	66	35.57	59.58	90.27%	39.88	70.56	106.91%	16.64%	146
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	70	44.56	63.6	90.86%	51.28	74.73	106.76%	15.90%	144
BROWN UNIT 3:SHARKEY-FARMERS-SPENCER ROAD 138 (LG&E/KU)									

POI at 138-kV, With JK Smith Plant Generation Conversion, Winter 2022-2023

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
342589 4GODDARD 138.00 341536 2GODDARD 69.000 1	139	91.79	136.66	98.32%	106.88	161.15	115.94%	17.62%	24
COOPER UNITS 1&2:GODDARD - CRANSTON TAP 138KV LINE (EKPC)									
341536 2GODDARD 69.000 342088 2PLUMMR L T 69.000 1	88	48.02	79.58	90.43%	52.54	90.06	102.34%	11.91%	201
BROWN UNIT 3:GODDARD - CRANSTON TAP 138KV LINE(EKPC)									
216 RODBURN 138.00 843 RODBURN 69.000 1	72	58.78	68.61	95.29%	65.8	75.99	105.54%	10.25%	115
COOPER UNITS 1&2:BEN2EQ - PRINCS 999KV LINE (AEP)									
342091 2PLUMVILLE 69.000 342124 2RECTORVILLE69.000 1	78	42.21	77.5	99.36%	38.27	79.09	101.40%	2.04%	78
COOPER UNITS 1&2:GODDARD 138/69KV TRANSFORMER(EKPC)									

POI at 345-kV, No JK Smith Plant Generation Conversion, Summer 2017

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
249573 08SGROVE 345.00 250097 08SGROVE 138.00 1	478	280.57	477.75	99.95%	288.78	492.94	103.12%	3.17%	4
REDBK - SGROVE 345KV LINE (DEOK)									

POI at 345-kV, No JK Smith Plant Generation Conversion, Winter 2017-2018

The table is empty. No thermal violations are attributable to the Flemingsburg plant.

POI at 345-kV, No JK Smith Plant Generation Conversion, Summer 2022

The table is empty. No thermal violations are attributable to the Flemingsburg plant.

POI at 345-kV, No JK Smith Plant Generation Conversion, Winter 2022-2023

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	54.67	60.96	84.67%	56.33	73.08	101.50%	16.83%	228
MILL CREEK UNIT 4:BEN2EQ - PRINCS 999KV LINE (AEP)									

POI at 345-kV, With JK Smith Plant Generation Conversion, Summer 2017

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
341935 2N SPRINGFLD69.000 342208 2S SPRINGF T69.000 1	16	3.26	13.58	84.88%	3.12	16.92	105.75%	20.87%	181
BROWN UNIT 3:HODGENVILLE - SULPHUR CRK 69KV LINE (EKPC)									
510 ETOWN 4 69.000 604 HODGN KU 69.000 1	64	42.55	60.04	93.81%	42.49	65.61	102.52%	8.71%	178
BROWN UNIT 3:BARDSTWN - WDLWN KU 69KV LINE (LG&E/KU)									

POI at 345-kV, With JK Smith Plant Generation Conversion, Winter 2017-2018

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
843 RODBURN 69.000 243740 05MOREHE 69.000 1	72	57.48	63.89	88.74%	59.18	75.01	104.18%	15.44%	182
TRIMBLE COUNTY UNIT 2:BEN2EQ - PRINCS 999KV LINE (AEP)									

POI at 345-kV, With JK Smith Plant Generation Conversion, Summer 2022

Monitored Element	LTE	Pre-Project Flows			Post-Project Flows			Delta	Generation Limit
Contingency		Base	Emergency	% of LTE	Base	Emergency	% of LTE		(MW)
	(MVA)	(MVA)	(MVA)		(MVA)	(MVA)			
342607 4JK SMITH 138.00 342688 4UNION CTY T138.00 1	355	233.3	354.36	99.82%	237.38	361.71	101.89%	2.07%	22
COOPER UNITS 1&2:FAWKES-JK SMITH & FAWKES-THREE FORKS JCT 138 KV (EKPC)									

POI at 345-kV, With JK Smith Plant Generation Conversion, Winter 2022-2023

The table is empty. No thermal violations are attributable to the Flemingsburg plant.

Appendix II

Transfer Capability Analysis

POI at 138-kV, No JK Smith Plant Generation Conversion, Summer 2017

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2057	2144	87
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	581	721	140
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 76	1301	1311	10
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 76	1838	1848	10
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, No JK Smith Plant Generation Conversion, Winter 2017-2018

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2310	2312	2
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1852	1911	59
LG&E/KU	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2990 (DC)	2992 (DC)	2
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, No JK Smith Plant Generation Conversion, Summer 2022

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	1902	1973	71
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	844	982	138
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1577	1586	9
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2201	2208	7
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, No JK Smith Plant Generation Conversion, Winter 2022-2023

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2120	2124	4
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1256	1357	101
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2542	2549	7
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, With JK Smith Plant Generation Conversion, Summer 2017

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2114	2270	156
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	601	746	145
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1243	1239	-4
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1706	1721	15
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, With JK Smith Plant Generation Conversion, Winter 2017-2018

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2319	2324	5
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1889	1953	64
LG&E/KU	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	>3000	2993 (DC)	<-7
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, With JK Smith Plant Generation Conversion, Summer 2022

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	1868 (DC)	1989 (DC)	121
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	866	1017	151
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1532	1526	-6
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2072	2082	10
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 138-kV, With JK Smith Plant Generation Conversion, Winter 2022-2023

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2102 (DC)	2098 (DC)	-4
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1317	1416	99
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2505	2510	5
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, No JK Smith Plant Generation Conversion, Summer 2017

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2057	2139	82
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	581	719	138
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1301	1308	7
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1838	1839	1
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, No JK Smith Plant Generation Conversion, Winter 2017-2018

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2310	2305	-5
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1852	1910	58
LG&E/KU	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2990 (DC)	2990 (DC)	0
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, No JK Smith Plant Generation Conversion, Summer 2022

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	1902	1967	65
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	844	980	136
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1577	1583	6
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2201	2201	0
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, No JK Smith Plant Generation Conversion, Winter 2022-2023

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2120	2113	-7
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1256	1288	32
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2542	2545	3
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, With JK Smith Plant Generation Conversion, Summer 2017

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2114	2267	153
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	601	744	143
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1243	1234	-9
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1706	1710	4
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, With JK Smith Plant Generation Conversion, Winter 2017-2018

From Area	To Area	Limiting Element / Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2319	2284	-35
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1889	1952	63
LG&E/KU	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	>3000	2989 (DC)	<-11
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, With JK Smith Plant Generation Conversion, Summer 2022

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	1868 (DC)	1985 (DC)	117
TVA	EKPC	360103 5PHIPPS B NP 161 360705 5JSEV C34 TP 161 3 Open 360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	866	1019	153
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	1532	1522	-10
EKPC	PJM	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2072	2072	0
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

POI at 345-kV, With JK Smith Plant Generation Conversion, Winter 2022-2023

From Area	To Area	Limiting Element Contingency	Pre-Project FCITC (MW)	Post-Project FCITC (MW)	Delta (MW)
PJM	EKPC	37 ALCALDE 161 49 ELIHU 161 1 Open 342826 5WOLF CRK J 161 360448 5WOLF CRK HP 161 1	2102 (DC)	2093 (DC)	-9
TVA	EKPC	342811 5SUMM SHAD T 161 360334 5SUMMER SHAD 161 1 Open 342814 5SUMM SHADE 161 360334 5SUMMER SHAD 161 1	1317	1417	100
LG&E/KU	EKPC	23 TRIMBLCO 345 248000 06CLIFTY 345 1 Open 243208 05JEFRSO 765 243209 05ROCKPT 765 1	2505	2528 (DC)	23
EKPC	PJM		>3000	>3000	N.C.
EKPC	TVA		>3000	>3000	N.C.
EKPC	LG&E/KU		>3000	>3000	N.C.

Appendix III

Circuit Breaker Fault Duty Analysis

Breaker Rating Comparison

Sensitivity Analysis

POI at 138-kV, No JK Smith Plant Generation Conversion

_Bus Name_____	Device Name_____	Pre-Project Duty %_____	Post-Project Duty %____	Delta %
FLEMINGSBG 138.kV	908 DIST	20.5	23.7	3.2
INLAND 1&2 138.kV	828 XFMR	93.6	96.5	2.9
GODDARD 138.kV	808 XFMR	21.7	24.2	2.5
GODDARD 138.kV	814 SPURLOCK	22.9	25.4	2.5
GODDARD 138.kV	824 PLUMVILL	22.9	25.4	2.5
GODDARD 138.kV	834 ROWAN CO	22.9	25.4	2.5
GODDARD 138.kV	849 TRANSFER	22.9	25.4	2.5
SPURLOCK 138.kV	878 T9	80.4	82.9	2.5
SPURLOCK 138.kV	898 T12	80.4	82.9	2.5
SPURLOCK 138.kV	93T TIE BKR	80.4	82.9	2.5
SPURLOCK 138.kV	94T TIE BKR	80.4	82.9	2.5
SPURLOCK 138.kV	91T TIE BKR	80.3	82.7	2.4
SPURLOCK 138.kV	18G UNIT 1	81.9	84.3	2.4
SPURLOCK 138.kV	802 GENERAL	81.9	84.3	2.4
SPURLOCK 138.kV	814 STANLEY	81.9	84.3	2.4
SPURLOCK 138.kV	824 RENAKER	81.9	84.3	2.4
SPURLOCK 138.kV	834 PLUMMVIL	81.9	84.3	2.4
SPURLOCK 138.kV	844 GODDARD	81.9	84.3	2.4
SPURLOCK 138.kV	854 KENTON	81.9	84.3	2.4
SPURLOCK 138.kV	864 INLAND C	81.9	84.3	2.4
SPURLOCK 138.kV	888 T10	81.9	84.3	2.4
SPURLOCK 138.kV	90T TIE BKR	81.9	84.3	2.4
SPURLOCK 138.kV	92T TIE BKR	81.4	83.4	2

POI at 138-kV, With JK Smith Plant Generation Conversion

_Bus Name_____	Device Name_____	Pre-Project Duty %_____	Post-Project Duty %____	Delta %
FLEMINGSBG 138.kV	908 DIST	20.5	23.8	3.3
INLAND 1&2 138.kV	828 XFMR	93.7	96.6	2.9
GODDARD 138.kV	808 XFMR	21.7	24.2	2.5
GODDARD 138.kV	814 SPURLOCK	22.9	25.4	2.5
GODDARD 138.kV	824 PLUMVILL	22.9	25.4	2.5
GODDARD 138.kV	834 ROWAN CO	22.9	25.4	2.5
GODDARD 138.kV	849 TRANSFER	22.9	25.4	2.5
SPURLOCK 138.kV	18G UNIT 1	81.9	84.4	2.5
SPURLOCK 138.kV	802 GENERAL	81.9	84.4	2.5
SPURLOCK 138.kV	814 STANLEY	81.9	84.4	2.5
SPURLOCK 138.kV	824 RENAKER	81.9	84.4	2.5
SPURLOCK 138.kV	834 PLUMMVIL	81.9	84.4	2.5
SPURLOCK 138.kV	844 GODDARD	81.9	84.4	2.5
SPURLOCK 138.kV	854 KENTON	81.9	84.4	2.5
SPURLOCK 138.kV	864 INLAND C	81.9	84.4	2.5
SPURLOCK 138.kV	878 T9	80.5	83	2.5
SPURLOCK 138.kV	888 T10	81.9	84.4	2.5
SPURLOCK 138.kV	898 T12	80.5	83	2.5
SPURLOCK 138.kV	90T TIE BKR	81.9	84.4	2.5
SPURLOCK 138.kV	91T TIE BKR	80.3	82.8	2.5
SPURLOCK 138.kV	93T TIE BKR	80.5	83	2.5
SPURLOCK 138.kV	94T TIE BKR	80.5	83	2.5
SPURLOCK 138.kV	92T TIE BKR	81.5	83.5	2

POI at 345-kV, No JK Smith Plant Generation Conversion

The table is empty. No circuit breaker over-duties are attributable to the Flemingsburg plant.

POI at 345-kV, With JK Smith Plant Generation Conversion

The table is empty. No circuit breaker over-duties are attributable to the Flemingsburg plant.

Appendix IV

Vicinity Map of Spurlock Substation

Relative Locations of the 345-kV and 138-kV Points of Interconnection