



Generation Interconnection
Queue Project AE1-106
Lake Lynn - Hazelton 138 kV
Feasibility Study Report
Capacity : 59 MW / Energy : 99.6 MW

February, 2019

General

Interconnection Customer has proposed a new solar generating facility located in Preston County, West Virginia. The installed facilities will have a total capability of 99.6 MW with 59 MW of this output being recognized by PJM as Capacity Interconnection Rights. The proposed in-service date for this project is June 1, 2022. **This study does not imply a Monongahela Power Company (Transmission Owner or Mon Power) commitment to this in-service date.**

Point of Interconnection

The AE1-106 solar facility will interconnect with the Mon Power transmission system by tapping the Lake Lynn – Hazelton 138 kV Line at a point located approximately 11.3 miles from Lake Lynn sub and 6.6 miles from Hazelton substation. A three-breaker ring bus station is required to tap the line, which will be located one to two spans adjacent to transmission line.

There is no secondary Point of Interconnection requested for this project.

Network Impacts

The Queue Project AE1-106 was evaluated as a 99.6 MW (Capacity 59 MW) injection tapping the Lake Lynn to 106 Junction 138 kV line in the APS zone (Mon Power, FirstEnergy). Project AE1-106 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-106 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Primary POI: Summer Peak Analysis – 2022

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/DC	MW IMPACT
638914	235207	01LARDIN	AP	235820	01CLARKSVLLE	AP	1	AP-P2-	breaker	151.0	94.53	101.96	DC	11.21

								3-WP-138-206						
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Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPAC T
63871 1	23512 2	01LKLYNN	AP	23520 7	01LARDIN	AP	1	AP-P2-3-WP-500-438B	breaker	303.0	125.15	130.97	DC	17.6
63871 2	23512 2	01LKLYNN	AP	23520 7	01LARDIN	AP	1	AP-P2-3-WP-500-438A	breaker	303.0	125.15	130.97	DC	17.6
63871 3	23512 2	01LKLYNN	AP	23520 7	01LARDIN	AP	1	AP-P2-3-WP-138-183T	breaker	303.0	113.61	119.31	DC	17.26
64023 0	23512 2	01LKLYNN	AP	23520 7	01LARDIN	AP	1	AP-P7-1-WPP-138-11	tower	303.0	108.47	115.46	DC	21.18
63878 8	23512 4	01MITCHL	AP	25401 1	15ELRAMA	DLCO	1	AP-P2-3-WP-138-183T	breaker	590.0	122.63	123.24	DC	8.74
64007 9	23512 4	01MITCHL	AP	25401 1	15ELRAMA	DLCO	1	DLC_P71_ELRAMA-ROUTE51_ELRAMA-WYCOFFTAP	tower	590.0	147.44	148.01	DC	7.52
64008 0	23512 4	01MITCHL	AP	25401 1	15ELRAMA	DLCO	1	APS-P7-WP-138-9904	tower	590.0	147.39	147.96	DC	7.52
63893 8	23518 4	01GATESH	AP	23582 1	01BROWNSVLL E	AP	1	AP-P2-3-WP-138-YUKON_2_	breaker	151.0	103.37	111.18	DC	11.79
64027 1	23518 4	01GATESH	AP	23582 1	01BROWNSVLL E	AP	1	AP-P7-1-WPP-138-68	tower	151.0	104.02	111.95	DC	11.96
63891 2	23520 7	01LARDIN	AP	23582 0	01CLARKSVLLE	AP	1	AP-P2-3-WP-138-230	breaker	151.0	105.52	113.44	DC	11.96
63891 3	23520 7	01LARDIN	AP	23582 0	01CLARKSVLLE	AP	1	AP-P2-3-WP-138-209	breaker	151.0	104.38	112.21	DC	11.81
63818 6	25401 8	15WILSON	DLCO	25402 8	15DRAVO	DLCO	1	DLC_P22_DRAV_1_13 8	bus	510.0	127.37	127.83	DC	5.21
63872 9	25401 8	15WILSON	DLCO	25402 8	15DRAVO	DLCO	1	DLC_P23_DRAV_Z-15	breaker	510.0	127.37	127.83	DC	5.21
64012 8	25401 8	15WILSON	DLCO	25402 8	15DRAVO	DLCO	1	DLC_P71_Z-13_DRAV-ELRAMA	tower	510.0	137.46	137.95	DC	5.5
64012 9	25401 8	15WILSON	DLCO	25402 8	15DRAVO	DLCO	1	DLC_P71_Z-73_DRAV-ELRAMA	tower	510.0	134.03	134.51	DC	5.5

Short Circuit

None. (No overdutied circuit breakers identified)

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
639737	235122	01LKLYNN	AP	235207	01LARDIN	AP	1	AP-P2-2-WP-138-042	operation	303.0	104.94	111.94	DC	21.18
639740	235122	01LKLYNN	AP	235207	01LARDIN	AP	1	Base Case	operation	261.0	103.72	110.55	DC	17.81
639774	235184	01GATESH	AP	235821	01BROWNSVLE	AP	1	AP-P2-2-WP-138-019	operation	151.0	102.68	110.5	DC	11.8
639936	235207	01LARDIN	AP	235820	01CLARKSVLE	AP	1	AP-P2-2-WP-138-077	operation	151.0	94.31	101.74	DC	11.22
639719	235305	01 106 J	AP	235120	01ALBRIG	AP	1	AP-P2-2-WP-138-043-A	operation	186.0	74.06	114.87	DC	75.9
639677	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-2-MP-138-001	operation	306.0	98.65	117.46	DC	57.53

System Reinforcements:

Short Circuit

None.

Stability and Reactive Power Requirement

Will be determined at a later study stages.

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

ID	Index	Facility	Upgrade Description	Cost
638938,640271	4	01GATESH 138.0 kV - 01BROWNSVLE 138.0 kV Ckt 1	<u>AP</u> Description : Reconductor Line with 556 ACSR Conductor Time Estimate : 16.0 Months Cost : \$12,672,600	\$12,672,600

ID	Index	Facility	Upgrade Description	Cost
640128,638729,638186,640129	5	15WILSON 138.0 kV - 15DRAVO 138.0 kV Ckt 1	<u>DLCO</u> Description : a) PJM baseline upgrade b3061: Reconductor the West Mifflin - Dravosburg (Z-73) and Dravosburg - Elrama (Z-75) 138 kV lines. b) PJM baseline upgrade b3062: Install 138 kV tie breaker at West Mifflin. c) PJM baseline upgrade b3063: Reconductor the Wilson - Dravosburg (Z-72) 138 kV line (~5 miles) d) PJM baseline upgrade b3064: Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line e) Install 138 kV tie breaker at Wilson. These baseline projects have an projected in-service date of 06/01/2021.	\$0
640080,638788,640079	3	01MITCHL 138.0 kV - 15ELRAMA 138.0 kV Ckt 1	<u>AP</u> Description : a) PJM baseline upgrade b2612.1: Relocate All Dam 6 138 kV line and the 138 kV line to AE units 1&2. b) PJM baseline upgrade b2612.2: Install 138 kV 3000A bus tie breaker, foundation, control cable and associated facilities at Springdale substation. c) PJM baseline upgrade b2612.3: Install a 6-pole manual switch, foundation, control cable, and all associated facilities. The baseline projects have an projected in-service date of 12/31/2019. <u>DLCO</u> Description : a) PJM baseline upgrade b3061: Reconductor the West Mifflin - Dravosburg (Z-73) and Dravosburg - Elrama (Z-75) 138 kV lines. b) PJM baseline upgrade b3062: Install 138 kV tie breaker at West Mifflin. c) PJM baseline upgrade b3063: Reconductor the Wilson - Dravosburg (Z-72) 138 kV line (~5 miles) d) PJM baseline upgrade b3064: Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line e) Install 138 kV tie breaker at Wilson. These baseline projects have an projected in-service date of 06/01/2021. Time Estimate : Months Cost : \$0	\$0
638912,638913,638914	1	01LARDIN 138.0 kV - 01CLARKSVLLE 138.0 kV Ckt 1	<u>AP</u> Description : Reconductor the Clarksville Jct line from structure 142 to Lardin substation with 954 kcmil ACSR. Time Estimate : 20.0 Months Cost : \$20,320,900	\$20,320,900
638712,638713,640230,638711	2	01LKLYNN 138.0 kV - 01LARDIN 138.0 kV Ckt 1	<u>AP</u> Description : a) Reconductor the Lake Lynn-Lardin No 2 line with 556.5 kcmil ACSS. b) Reconfigure the Lake Lynn 138 kV line terminal at Lardin Substation. c) Reconductor the 138 kV Lardin line terminal at Lake Lynn Substation Time Estimate : 20.0 Months Cost : \$26,267,900	\$26,267,900
			TOTAL COST	\$59,261,400

Flow Gate Detail, ID #638912

PJM Queue Position: AE1-106

This appendix contains additional information about the flowgate presented in the body of the report. A description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
638912	235207	01LARDIN	AP	235820	01CLARKSVLLE	AP	1	AP-P2-3-WP-138-230	breaker	151.0	105.52	113.44	DC	11.96

Bus #	Bus	MW Impact
235091	U2-061_E	2.5
235098	U2-073A E	7.7
235099	U2-073B E	3.37
235570	01LAKEL1	0.65
235571	01LAKEL2	0.65
235615	01GANS 8	1.02
235616	01GANS 9	1.02
235625	01BACKB	2.38
237312	01DANS_S-014	0.76
290229	S-014 E	3.02
292401	K-028 E	4.96
885642	T-016 E	1.48
918341	AA1-047 C	0.86
918342	AA1-047 E	5.74
918471	AA1-062 C	0.98
918472	AA1-062 E	4.57
918812	AA1-100 E	0.59
920072	AA2-103 E	1.11
924002	AB2-041 E	1.0
929522	U2-030 E	3.65
930261	AB1-065 C	0.33
930262	AB1-065 E	0.54
933951	AD1-018 C	0.4
933952	AD1-018 E	0.65
934441	AD1-068 C	0.74
934442	AD1-068 E	4.32
936861	AD2-109	1.82
937361	AD2-180 C O1	0.87
937362	AD2-180 E O1	5.45
938022	AE1-003 E	3.65

Bus #	Bus	MW Impact
938341	AE1-052	0.29
938801	AE1-106 C	7.09
938802	AE1-106 E	4.88
BLUEG	BLUEG	0.06
CARR	CARR	0.1
CBM-S1	CBM-S1	0.21
CBM-S2	CBM-S2	0.35
CBM-W2	CBM-W2	0.71
COFFEEN	COFFEEN	0.01
CPL	CPL	0.17
DEARBORN	DEARBORN	0.25
DUCKCREEK	DUCKCREEK	0.04
EDWARDS	EDWARDS	0.02
FARMERCITY	FARMERCITY	0.0
G-007	G-007	0.12
GIBSON	GIBSON	0.0
NEWTON	NEWTON	0.02
O-066	O-066	0.43
RENSSELAER	RENSSELAER	0.08
TATANKA	TATANKA	0.01
TILTON	TILTON	0.02
TRIMBLE	TRIMBLE	0.01

Flow Gate Detail, ID #638712

PJM Queue Position: AE1-106

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638712	235122	01LKLYNN	AP	235207	01LARDIN	AP	1	AP-P2-3-WP-500-438A	breaker	303.0	125.15	130.97	DC	17.6

Bus #	Bus	MW Impact
235091	U2-061_E	3.74
235098	U2-073A E	11.67
235099	U2-073B E	5.11
235520	01WVACO_S38	4.0
235570	01LAKEL1	0.95
235571	01LAKEL2	0.95
235615	01GANS 8	1.49
235616	01GANS 9	1.49
235625	01BACKB	3.57
236000	01WVU	0.78
237312	01DANS_S-014	1.15
237319	01FMR_U2-030	0.13
290229	S-014 E	4.61
292401	K-028 E	7.44
885642	T-016 E	2.23
918341	AA1-047 C	1.28
918342	AA1-047 E	8.5
918471	AA1-062 C	1.47
918472	AA1-062 E	6.88
918812	AA1-100 E	0.91
920072	AA2-103 E	1.67
924002	AB2-041 E	1.51
929522	U2-030 E	5.49
930261	AB1-065 C	0.5
930262	AB1-065 E	0.81
931152	AB1-166 E	1.36
932141	AC2-021	1.06
933951	AD1-018 C	0.61

Bus #	Bus	MW Impact
933952	AD1-018 E	1.0
934441	AD1-068 C	1.1
934442	AD1-068 E	6.39
934931	AD1-125 C	0.89
934932	AD1-125 E	5.14
936861	AD2-109	2.65
937361	AD2-180 C O1	1.31
937362	AD2-180 E O1	8.25
938022	AE1-003 E	5.49
938341	AE1-052	0.44
938801	AE1-106 C	10.43
938802	AE1-106 E	7.18
938831	AE1-109 C	0.65
938832	AE1-109 E	0.85
CARR	CARR	0.28
CBM-S1	CBM-S1	0.78
CBM-S2	CBM-S2	0.87
CBM-W2	CBM-W2	4.2
CIN	CIN	0.18
CPL	CPL	0.41
DEARBORN	DEARBORN	0.39
G-007	G-007	0.47
IPL	IPL	0.11
LGEE	LGEE	0.08
MEC	MEC	0.4
O-066	O-066	1.66
RENSSELAER	RENSSELAER	0.22
WEC	WEC	0.02

Flow Gate Detail, ID #640079

PJM Queue Position: AE1-106

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
640079	235124	01MITCHL	AP	254011	15ELRAMA	DLCO	1	DLC_P71_ELRAMA- ROUTE51_ELRAMA- WYCOFFTAP	tower	590.0	147.44	148.01	DC	7.52

Bus #	Bus	MW Impact
235098	U2-073A E	6.21
235099	U2-073B E	2.72
236523	01WDPWR_K20	0.04
236665	K20 E	1.54
292401	K-028 E	4.09
885642	T-016 E	1.22
917651	Z2-106	2.28
918341	AA1-047 C	0.59
918342	AA1-047 E	3.92
920571	AA2-161 C	74.75
920572	AA2-161 E	4.08
924002	AB2-041 E	0.81
929522	U2-030 E	2.82
930261	AB1-065 C	0.24
930262	AB1-065 E	0.4
931152	AB1-166 E	7.6
934441	AD1-068 C	0.62
934442	AD1-068 E	3.57
934451	AD1-069 C	1.55
934452	AD1-069 E	8.99
936011	AD2-002	2.76
936851	AD2-108	0.86
936861	AD2-109	1.14
936881	AD2-112 C	3.62
936882	AD2-112 E	1.44
938202	AE1-029 E	0.26
938361	AE1-054	0.85
938583	AE1-079 CBAT	0.05
938584	AE1-079 EBAT	0.11
938801	AE1-106 C	4.45

Bus #	Bus	MW Impact
938802	AE1-106 E	3.06
939973	AE1-237 C2	0.05
939974	AE1-237 EBAT	0.07
BAYOU	BAYOU	1.39
BIG_CAJUN1	BIG_CAJUN1	2.09
BIG_CAJUN2	BIG_CAJUN2	4.21
BLUEG	BLUEG	8.7
CALDERWOOD	CALDERWOOD	0.6
CANNELTON	CANNELTON	0.51
CATAWBA	CATAWBA	0.22
CBM-N	CBM-N	1.21
CHEOAH	CHEOAH	0.54
CHILHOWEE	CHILHOWEE	0.2
CHOCTAW	CHOCTAW	1.36
COFFEEN	COFFEEN	0.92
COTTONWOOD	COTTONWOOD	5.56
DEARBORN	DEARBORN	2.46
DUCKCREEK	DUCKCREEK	2.1
EDWARDS	EDWARDS	0.97
ELMERSMITH	ELMERSMITH	0.87
FARMERCITY	FARMERCITY	0.59
G-007A	G-007A	4.5
GIBSON	GIBSON	0.36
HAMLET	HAMLET	0.48
NEWTON	NEWTON	2.39
NYISO	NYISO	5.24
O-066A	O-066A	2.11
PRAIRIE	PRAIRIE	4.23
SANTEETLA	SANTEETLA	0.16
SMITHLAND	SMITHLAND	0.31
TATANKA	TATANKA	1.1
TILTON	TILTON	1.15
TRIMBLE	TRIMBLE	0.97
TVA	TVA	2.23
UNIONPOWER	UNIONPOWER	0.95
VFT	VFT	12.13

Flow Gate Detail, ID #640271

PJM Queue Position: AE1-106

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640271	235184	01GATESH	AP	235821	01BROWNSVLE	AP	1	AP-P7-1-WPP-138-68	tower	151.0	104.02	111.95	DC	11.96

Bus #	Bus	MW Impact
235091	U2-061_E	2.5
235098	U2-073A E	7.71
235099	U2-073B E	3.38
235570	01LAKEL1	0.65
235571	01LAKEL2	0.65
235615	01GANS 8	1.03
235616	01GANS 9	1.03
235625	01BACKB	2.38
237312	01DANS_S-014	0.76
290229	S-014 E	3.03
292401	K-028 E	4.97
885642	T-016 E	1.49
918341	AA1-047 C	0.86
918342	AA1-047 E	5.74
918471	AA1-062 C	0.98
918472	AA1-062 E	4.58
918812	AA1-100 E	0.59
920072	AA2-103 E	1.11
924002	AB2-041 E	1.0
929522	U2-030 E	3.65
930261	AB1-065 C	0.33
930262	AB1-065 E	0.54
933951	AD1-018 C	0.4
933952	AD1-018 E	0.65
934441	AD1-068 C	0.75
934442	AD1-068 E	4.33
936861	AD2-109	1.82
937361	AD2-180 C O1	0.87

Bus #	Bus	MW Impact
937362	AD2-180 E O1	5.46
938022	AE1-003 E	3.65
938341	AE1-052	0.29
938801	AE1-106 C	7.09
938802	AE1-106 E	4.88
BLUEG	BLUEG	0.09
CANNELTON	CANNELTON	0.0
CARR	CARR	0.09
CBM-S1	CBM-S1	0.19
CBM-S2	CBM-S2	0.35
CBM-W2	CBM-W2	0.59
COFFEEN	COFFEEN	0.01
CPL	CPL	0.17
DEARBORN	DEARBORN	0.26
DUCKCREEK	DUCKCREEK	0.05
EDWARDS	EDWARDS	0.03
FARMERCITY	FARMERCITY	0.0
G-007	G-007	0.11
GIBSON	GIBSON	0.01
NEWTON	NEWTON	0.03
O-066	O-066	0.42
PRAIRIE	PRAIRIE	0.0
RENSSELAER	RENSSELAER	0.07
TATANKA	TATANKA	0.02
TILTON	TILTON	0.03
TRIMBLE	TRIMBLE	0.01

Flow Gate Detail, ID #640128

PJM Queue Position: AE1-106

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640128	254018	15WILSON	DLCO	254028	15DRAVO	DLCO	1	DLC_P71_Z-13_DRAV-ELRAMA	tower	510.0	137.46	137.95	DC	5.5

Bus #	Bus	MW Impact
236523	01WDPWR_K20	0.03
236665	K20 E	1.3
917651	Z2-106	1.79
920571	AA2-161 C	76.24
920572	AA2-161 E	4.16
931152	AB1-166 E	6.42
934451	AD1-069 C	1.29
934452	AD1-069 E	7.51
936011	AD2-002	1.89
936851	AD2-108	0.9
936861	AD2-109	0.83
936881	AD2-112 C	3.76
936882	AD2-112 E	1.49
938202	AE1-029 E	0.24
938361	AE1-054	0.71
938801	AE1-106 C	3.26
938802	AE1-106 E	2.24
BAYOU	BAYOU	1.28
BIG_CAJUN1	BIG_CAJUN1	1.93
BIG_CAJUN2	BIG_CAJUN2	3.88
BLUEG	BLUEG	7.95
CALDERWOOD	CALDERWOOD	0.55
CANNELTON	CANNELTON	0.47
CATAWBA	CATAWBA	0.21
CBM-N	CBM-N	1.15
CHEOAH	CHEOAH	0.5
CHILHOWEE	CHILHOWEE	0.18
CHOCTAW	CHOCTAW	1.25
COFFEEN	COFFEEN	0.84
COTTONWOOD	COTTONWOOD	5.12

Bus #	Bus	MW Impact
DEARBORN	DEARBORN	2.23
DUCKCREEK	DUCKCREEK	1.92
EDWARDS	EDWARDS	0.89
ELMERSMITH	ELMERSMITH	0.79
FARMERCITY	FARMERCITY	0.54
G-007A	G-007A	4.19
GIBSON	GIBSON	0.33
HAMLET	HAMLET	0.47
NEWTON	NEWTON	2.19
NYISO	NYISO	4.96
O-066A	O-066A	1.96
PRAIRIE	PRAIRIE	3.87
SANTEETLA	SANTEETLA	0.15
SMITHLAND	SMITHLAND	0.29
TATANKA	TATANKA	1.01
TILTON	TILTON	1.05
TRIMBLE	TRIMBLE	0.89
TVA	TVA	2.06
UNIONPOWER	UNIONPOWER	0.88
VFT	VFT	11.28

Contingencies List

PJM Queue Position: AE1-106

Contingency Name	Contingency Definition
Base Case	
DLC_P71_Z-13_DRAV-ELRAMA	CONTINGENCY 'DLC_P71_Z-13_DRAV-ELRAMA' OPEN BRANCH FROM BUS 254023 TO BUS 254018 CKT 1 OPEN BRANCH FROM BUS 254028 TO BUS 254011 CKT 1 END
AP-P2-2-WP-138-077	CONTINGENCY 'AP-P2-2-WP-138-077' /* CHARLEROI #3 138KV BUS DISCONNECT BRANCH FROM BUS 235161 TO BUS 235821 CKT 1 /* 01CHARLR 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235261 CKT 1 /* 01CHARLR 138 01VANCEV 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235124 CKT 1 /* 01CHARLR 138 01MITCHL 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235283 CKT 1 /* 01CHARLR 138 01YUKON 138 END
AP-P7-1-WPP-138-68	CONTINGENCY 'AP-P7-1-WPP-138-68' /* 50 DISCONNECT BRANCH FROM BUS 235155 TO BUS 235161 CKT 1 /* 01CALIFN 138 01CHARLR 138 DISCONNECT BRANCH FROM BUS 235155 TO BUS 235815 CKT 1 /* 01CALIFN 138 01MALDEN 138 DISCONNECT BRANCH FROM BUS 235214 TO BUS 235815 CKT 1 /* 01LUZERN 138 01MALDEN 138 DISCONNECT BRANCH FROM BUS 235815 TO BUS 236563 CKT 1 /* 01MALDEN 138 01MALDEN 25 DISCONNECT BRANCH FROM BUS 235214 TO BUS 235820 CKT 1 /* 01LUZERN 138 01CLARKSVLE138 DISCONNECT BRANCH FROM BUS 235207 TO BUS 235820 CKT 1 /* 01LARDIN 138 01CLARKSVLE138 END
DLC_P71_Z-73_DRAV-ELRAMA	CONTINGENCY 'DLC_P71_Z-73_DRAV-ELRAMA' OPEN BRANCH FROM BUS 254028 TO BUS 254023 CKT 1 OPEN BRANCH FROM BUS 254028 TO BUS 254011 CKT 1 END
AP-P2-2-WP-138-019	CONTINGENCY 'AP-P2-2-WP-138-019' /* CHARLEROI #1 138KV BUS DISCONNECT BRANCH FROM BUS 235161 TO BUS 235260 CKT 1 /* 01CHARLR 138 01UNIONJ 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235155 CKT 1 /* 01CHARLR 138 01CALIFN 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235135 CKT 1 /* 01CHARLR 138 01ALLENP 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235283 CKT 1 /* 01CHARLR 138 01WESTRV 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235872 CKT 2 /* 01CHARLR 138 01CHAR 25 END

Contingency Name	Contingency Definition
AP-P2-3-WP-138-209	CONTINGENCY 'AP-P2-3-WP-138-209' /* 219 (GATES_HI BRK AT CHARLEROI) DISCONNECT BRANCH FROM BUS 235161 TO BUS 235261 CKT 1 /* 01CHARLR 138 01VANCEV 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235283 CKT 1 /* 01CHARLR 138 01YUKON 138 DISCONNECT BRANCH FROM BUS 235124 TO BUS 235161 CKT 1 /* 01MITCHL 138 01CHARLR 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235821 CKT 1 /* 01CHARLR 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235176 TO BUS 235821 CKT 1 /* 01EMERLD 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235821 CKT 1 /* 01GATESH 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235176 TO BUS 236376 CKT 1 /* 01EMERLD 138 01EMERALD 25 DISCONNECT BRANCH FROM BUS 235176 TO BUS 236376 CKT 2 /* 01EMERLD 138 01EMERALD 25 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235207 CKT 1 /* 01GATESH 138 01LARDIN 138 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235899 CKT 1 /* 01GATESH 138 01GATES HL 25 END
AP-P2-3-WP-138-206	CONTINGENCY 'AP-P2-3-WP-138-206' /* 216 (CHARLERO BRK AT WASHINGTON) DISCONNECT BRANCH FROM BUS 235161 TO BUS 235821 CKT 1 /* 01CHARLR 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235283 CKT 1 /* 01CHARLR 138 01ROUTE51 138 DISCONNECT BRANCH FROM BUS 235124 TO BUS 235161 CKT 1 /* 01MITCHL 138 01CHARLR 138 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235261 CKT 1 /* 01CHARLR 138 01VANCEV 138 DISCONNECT BRANCH FROM BUS 235261 TO BUS 235268 CKT 1 /* 01VANCEV 138 01WASH 138 DISCONNECT BRANCH FROM BUS 235261 TO BUS 236071 CKT 2 /* 01VANCEV 138 01VANCEVL 25 END
AP-P2-2-MP-138-001	CONTINGENCY 'AP-P2-2-MP-138-001' /* ALBRIGHT-138-NORTH DISCONNECT BRANCH FROM BUS 235120 TO BUS 235356 CKT 1 /* 01ALBRIG 138 01KINGWD 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235398 CKT 1 /* 01ALBRIG 138 01RUTHBL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235304 CKT 1 /* 01ALBRIG 138 01BRANDN 138 END
AP-P2-3-WP-138-230	CONTINGENCY 'AP-P2-3-WP-138-230' /* 240 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235207 CKT 1 /* 01GATESH 138 01LARDIN 138 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235821 CKT 1 /* 01GATESH 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235184 TO BUS 235899 CKT 1 /* 01GATESH 138 01GATES HL 25 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235821 CKT 1 /* 01CHARLR 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235176 TO BUS 235821 CKT 1 /* 01EMERLD 138 01BROWNSVLE138 DISCONNECT BRANCH FROM BUS 235176 TO BUS 236376 CKT 1 /* 01EMERLD 138 01EMERALD 25 DISCONNECT BRANCH FROM BUS 235176 TO BUS 236376 CKT 2 /* 01EMERLD 138 01EMERALD 25 END
APS-P7-WP-138-9904	CONTINGENCY 'APS-P7-WP-138-9904' /* ROUTE 51 - ELRAMA #1 & #2 138 KV LINES OPEN BUS 235870 /* 01WYCOFF TAP 138.00 OPEN BUS 235275 /* 01WYCOFF 138.00 OPEN BRANCH FROM BUS 235283 TO BUS 254011 CKT 2 /* 01ROUTE51 138.00 15ELRAMA 138.00 END

Contingency Name	Contingency Definition
AP-P2-2-WP-138-043-A	CONTINGENCY 'AP-P2-2-WP-138-043-A' /* LAKE LYNN #1 138KV BUS DISCONNECT BRANCH FROM BUS 235122 TO BUS 938800 CKT 1 /* 01LKLYNN 138 AE1-106 TAP 138 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235207 CKT 1 /* 01LKLYNN 138 01LARDIN 138 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235156 CKT 1 /* 01LKLYNN 138 01GANS 138 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235571 CKT 1 /* 01LKLYNN 138 01LAKEL2 11 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235570 CKT 1 /* 01LKLYNN 138 01LAKEL1 11 DISCONNECT BUS 235571 /* 01LAKEL2 11 DISCONNECT BUS 235570 /* 01LAKEL1 11 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235901 CKT 71 /* 01LKLYNN 138 01LAKE LYN 25 DISCONNECT BRANCH FROM BUS 235122 TO BUS 235424 CKT 1 /* 01LKLYNN 138 01W RUN 138 END
AP-P7-1-WPP-138-11	CONTINGENCY 'AP-P7-1-WPP-138-11' /* 10 DISCONNECT BRANCH FROM BUS 235143 TO BUS 235594 CKT 1 /* 01BETHLB 138 01NU TP1 138 DISCONNECT BRANCH FROM BUS 235284 TO BUS 235594 CKT 1 /* 01TEX E5 138 01NU TP1 138 DISCONNECT BRANCH FROM BUS 235594 TO BUS 235595 CKT 1 /* 01NU TP1 138 01NU 61 138 DISCONNECT BRANCH FROM BUS 235143 TO BUS 235255 CKT 1 /* 01BETHLB 138 01NU TP2 138 DISCONNECT BRANCH FROM BUS 235228 TO BUS 235255 CKT 1 /* 01NU 62 138 01NU TP2 138 DISCONNECT BRANCH FROM BUS 235254 TO BUS 235255 CKT 1 /* 01SUNION 138 01NU TP2 138 DISCONNECT BRANCH FROM BUS 235223 TO BUS 235284 CKT 1 /* 01NECEST 138 01TEX E5 138 END
DLC_P23_DRAV_Z-15	CONTINGENCY 'DLC_P23_DRAV_Z-15' OPEN BRANCH FROM BUS 254028 TO BUS 254026 CKT 1 /*DRAVOS-USSILL (Z-79)*/ OPEN BRANCH FROM BUS 254028 TO BUS 253988 CKT 1 /*DRAVOS-CARSON (Z-71)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254023 CKT 1 /*DRAVOS-WMIFFN (Z-73)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254033 CKT 1 /*DRAVOS-WILMRD (Z-77)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254024 CKT 1 /*DRAVOS-USS CLAIRTON (Z-15)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254011 CKT 1 /*DRAVOS-ELRAMA END
DLC_P22_DRAV_1_138	CONTINGENCY 'DLC_P22_DRAV_1_138' OPEN BRANCH FROM BUS 254028 TO BUS 254026 CKT 1 /*DRAVOS-USSILL (Z-79)*/ OPEN BRANCH FROM BUS 254028 TO BUS 253988 CKT 1 /*DRAVOS-CARSON (Z-71)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254023 CKT 1 /*DRAVOS-WMIFFN (Z-73)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254033 CKT 1 /*DRAVOS-WILMRD (Z-77)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254024 CKT 1 /*DRAVOS-USS CLAIRTON (Z-15)*/ OPEN BRANCH FROM BUS 254028 TO BUS 254011 CKT 1 /*DRAVOS-ELRAMA END
AP-P2-3-WP-138-183T	CONTINGENCY 'AP-P2-3-WP-138-183T' /* SPRINGDALE-WYCOFF STK BKR AT SPRINGDALE OPEN BRANCH FROM BUS 235256 TO BUS 235181 CKT 1 OPEN BRANCH FROM BUS 235256 TO BUS 235222 CKT 1 OPEN BRANCH FROM BUS 235256 TO BUS 235195 CKT 1 OPEN BRANCH FROM BUS 235256 TO BUS 235190 CKT 1 OPEN BRANCH FROM BUS 235256 TO BUS 254064 CKT 1 OPEN BUS 235283 OPEN BUS 235275 OPEN BUS 235613 OPEN BUS 235614 END

Contingency Name	Contingency Definition
DLC_P71_ELRAMA-ROUTE51_ELRAMA-WYCOFFTAP	CONTINGENCY 'DLC_P71_ELRAMA-ROUTE51_ELRAMA-WYCOFFTAP' OPEN BUS 235870 /* WYCOFF TAP */ OPEN BRANCH FROM BUS 254011 TO BUS 235283 CKT 2 END
AP-P2-3-WP-500-438A	CONTINGENCY 'AP-P2-3-WP-500-438A' /* 449 DISCONNECT BRANCH FROM BUS 235116 TO BUS 235277 CKT 3 /* 01YUKON 500 01YUKON 138 DISCONNECT BRANCH FROM BUS 235116 TO BUS 235277 CKT 2 /* 01YUKON 500 01YUKON 138 DISCONNECT BRANCH FROM BUS 235116 TO BUS 292625 CKT 1 /* 01YUKON 500 T174_TAP 500 END
AP-P2-3-WP-138-YUKON_2_	CONTINGENCY 'AP-P2-3-WP-138-YUKON_2_' /* CHARLEROI YUKON_2_ STUCK BRK DISCONNECT BRANCH FROM BUS 235161 TO BUS 235283 CKT 2 /* 01CHARLR 138 01ROUTE51 138 #2 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235155 CKT 1 /* 01CHARLR 138 01CALIFN 138 #1 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235260 CKT 1 /* 01CHARLR 138 01UNIONJ 138 #1 DISCONNECT BRANCH FROM BUS 235161 TO BUS 235135 CKT 1 /* 01CHARLR 138 01ALLENP 138 #1 END
AP-P2-3-WP-500-438B	CONTINGENCY 'AP-P2-3-WP-500-438B' /* 450 DISCONNECT BRANCH FROM BUS 235116 TO BUS 235277 CKT 1 /* 01YUKON 500 01YUKON 138 DISCONNECT BRANCH FROM BUS 235116 TO BUS 235277 CKT 3 /* 01YUKON 500 01YUKON 138 DISCONNECT BRANCH FROM BUS 235116 TO BUS 292625 CKT 1 /* 01YUKON 500 T174_TAP 500 END
AP-P2-2-WP-138-042	CONTINGENCY 'AP-P2-2-WP-138-042' /* BETHELBORO #2 138KV BUS DISCONNECT BRANCH FROM BUS 235143 TO BUS 235277 CKT 1 /* 01BETHLB 138 01YUKON 138 DISCONNECT BRANCH FROM BUS 235143 TO BUS 235255 CKT 1 /* 01BETHLB 138 01NU TP2 138 DISCONNECT BRANCH FROM BUS 235143 TO BUS 235594 CKT 1 /* 01BETHLB 138 01NU TP1 138 DISCONNECT BRANCH FROM BUS 235143 TO BUS 235919 CKT 2 /* 01BETHLB 138 01BETHELBO 25 REMOVE LOAD 1 FROM BUS 235143 /* 01BETHLB 138 END