Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-332

ELECTRIC JCT-NELSON

20 MW Capacity / 50 MW Energy

January, 2020

1 General

The Interconnection Customer (IC) has proposed a storage generating facility located in Lee County, Illinois. The installed facilities will have a capability of 50 MW with 20 of new request MW of this output being recognized by PJM as capacity. Note that this project is an increase to the Interconnection Customer's prior queue project and will share the same property and connection point. The conduct of light load analysis as required under the PJM planning process is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of the light load analysis which shall be performed following execution of the System Impact Study agreement.

Queue Number	AF1-332
Project Name	ELECTRIC JCT-NELSON
State	Illinois
County	Lee
Transmission Owner	ComEd
MFO	225
MWE	50
MWC	20
Fuel	Storage
Basecase Study Year	2023

1.1 Point of Interconnection

Queue Position AF1-332, a 50 MW storage facility proposes to interconnect with the ComEd transmission system at a new interconnection substation on the Nelson- Electric Junction 345kV line 15502.

1.2 Cost Summary

AF1-332 will be responsible for the following costs associated with the physical interconnection of the project:

Description	Total Cost
Attachment Facilities	$200,000
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$0
Total Costs	**$200,000**

In addition, the AF1-332 project may be responsible for a contribution to the following costs associated with network upgrades:

Description	Total Cost
System Upgrades	**$25,400,000**

Cost allocations for these upgrades will be provided in the System Impact Study Report.

2 Transmission Owner Scope of Work

Attachment Facilities

To accommodate interconnection of AF1-332; the relaying, SCADA, Communication and metering will be reviewed and upgraded if needed.

Direct Connection Network Upgrades

None

Non-Direct Connection Network Upgrades

None

3 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
The relaying, SCADA, Communication and metering will be reviewed and upgraded if needed.	$200,000
Total Attachment Facility Costs	**$200,000**

4 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
None	$0
Total Direct Connection Facility Costs	$0

5 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
None	$0
Total Non-Direct Connection Facility Costs	$0

6 Schedule

ComEd would take approximately 18-months to review and possibly upgrade the relaying, SCADA, Communication and metering after the ISA / ICSA are signed.

7 Transmission Owner Analysis

See Section 3.

8 Interconnection Customer Requirements

ComEd interconnection requirements can be found at https://www.pjm.com/planning/design-engineering/to-tech-standards/private-comed.aspx

To the extent that these Applicable Technical Requirements and Standards may conflict with the terms and conditions of the Tariff, the Tariff shall control.

ComEd distribution line drops to move customer cranes and heavy equipment is not part of PJM process. The customer should directly contact ComEd New Business Group to arrange for line drops, if needed.

9 Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10 Network Impacts

The Queue Project AF1-332 was evaluated as a 50.1 MW (Capacity 20.0 MW) injection tapping the Electric Junction to Nelson 345 kV line in the ComEd area. Project AF1-332 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-332 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

11 Generation Deliverability

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

None

12 Multiple Facility Contingency

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

None

13 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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
44540605	270828	NELSON ; B	345.0	CE	943410	AF1-012 TAP	345.0	CE	1	COMED_P4_155-45-BT6-7__	breaker	1656.0	130.34	131.85	DC	28.32
44540606	270828	NELSON ; B	345.0	CE	943410	AF1-012 TAP	345.0	CE	1	COMED_P4_937-45-BT1-2__	breaker	1656.0	122.85	123.49	DC	28.53
44540607	270828	NELSON ; B	345.0	CE	943410	AF1-012 TAP	345.0	CE	1	COMED_P4_937-45-BT1-4__	breaker	1656.0	122.49	123.13	DC	28.52
44540554	943410	AF1-012 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P4_155-45-BT6-7__	breaker	1656.0	135.54	135.89	DC	21.68

14 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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4454126 7	27082 8	NELSO N ; B	345. 0	CE	94341 0	AF1- 012 TAP	345. 0	CE	1	COMED_P1 -2_345- L15501_B- R-B	operatio n	1656. 0	122.46	123.1	DC	28.52
4454127 0	27082 8	NELSO N ; B	345. 0	CE	94341 0	AF1- 012 TAP	345. 0	CE	1	Base Case	operatio n	1334. 0	106.03	108.45	DC	32.74
4454139 0	27476 8	LEE CO EC;BP	345. 0	CE	27067 8	BYRO N ; B	345. 0	CE	1	COMED_P1 -2_345- L15502_B- R-B	operatio n	1726. 0	105.26	105.77	DC	19.44
4454117 8	94341 0	AF1- 012 TAP	345. 0	CE	27073 0	ELECT JCT; B	345. 0	CE	1	COMED_P1 -2_345- L15501_B- R-A	operatio n	1656. 0	132.27	132.62	DC	21.48
4454118 0	94341 0	AF1- 012 TAP	345. 0	CE	27073 0	ELECT JCT; B	345. 0	CE	1	Base Case	operatio n	1334. 0	120.38	121.62	DC	17.26

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
44540605,44540607, 44540606	1	**NELSON ; B 345.0 kV - AF1-012 TAP 345.0 kV Ckt 1**	**CE_NUN_15502 : ComEd 345kV L15502 SSTE rating is 1837 MVA. The upgrade will be to re-conductor a portion of the line, 1-345kV circuit breaker and associated switches and upgrade of station conductor. A preliminary estimate for the upgrade is $25.4M with an estimated construction timeline od 30 months. Upon completion of the upgrade the ratings will be 2293/2293/2293/2436 MVA (SN/SLTE/SSTE/SLD).** **Project Type : FAC** **Cost : $25,400,000** **Time Estimate : 30.0 Months**	$0
44540554	2	**AF1-012 TAP 345.0 kV - ELECT JCT; B 345.0 kV Ckt 1**	**CE_NUN_15502 (56) : ComEd 345kV L15502 SSTE rating is 1837 MVA. The upgrade will be to re-conductor a portion of the line, 1-345kV circuit breaker and associated switches and upgrade of station conductor. A preliminary estimate for the upgrade is $25.4M with an estimated construction timeline od 30 months. Upon completion of the upgrade the ratings will be 2293/2293/2293/2436 MVA (SN/SLTE/SSTE/SLD).** **Project Type : FAC** **Cost : $25,400,000** **Time Estimate : 30.0 Months**	$25,400,000
			TOTAL COST	**$25,400,000**

16 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, 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.

16.1 Index 1

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
44540605	270828	NELSON ; B	CE	943410	AF1-012 TAP	CE	1	COMED_P4_155-45-BT6-7__	breaker	1656.0	130.34	131.85	DC	28.32

Bus #	Bus	MW Impact
274662	QUAD CITI;1U	31.9770
274663	QUAD CITI;2U	32.0391
274699	CORDOVA ;1C	5.6233
274700	CORDOVA ;2C	5.6233
274701	CORDOVA ;1S	6.3262
274715	NELSON EC;1C	8.1817
274716	NELSON EC;1S	5.9698
274717	NELSON EC;2C	8.2449
274718	NELSON EC;2S	6.0233
276156	O-029 C	0.3733
276157	O-029 C	0.4036
276158	O-029 C	0.7365
276160	W4-084	0.7032
290051	GSG-6; E	5.4296
293513	O-009 C1	0.6894
293514	O-009 C2	0.3498
293515	O-009 C3	0.3868
293516	O-009 E1	19.7667
293517	O-009 E2	10.0400
293518	O-009 E3	11.0567
293715	O-029 E	21.1328
293716	O-029 E	11.5868
293717	O-029 E	10.6495
293771	O-035 E	4.8825
294401	BSHIL;1U E	7.9846
294410	BSHIL;2U E	7.9846
294763	P-046 E	4.7546
919221	AA1-146	7.6324
919581	AA2-030	54.6800
919621	AA2-039 C	1.9462
919622	AA2-039 E	13.0248
925161	**AB2-173 (Withdrawn : 12/24/2019)**	**9.7518**
925581	AC1-033 C	1.3078
925582	AC1-033 E	8.7553
927201	AC1-214 C O1	1.5670
927202	AC1-214 E O1	4.9815
933341	AC2-147 C	1.1234
933342	AC2-147 E	1.8329

Bus #	Bus	MW Impact
934051	AD1-031 C O1	2.6560
934052	AD1-031 E O1	4.3335
934431	AD1-067 C	0.0682
934432	AD1-067 E	0.2867
934651	AD1-096 C	0.5446
934652	AD1-096 E	0.8885
934701	AD1-098 C O1	3.9894
934702	AD1-098 E O1	2.9126
937001	AD2-134 C	1.4194
937002	AD2-134 E	5.8635
937311	AD2-172 C	1.2481
937312	AD2-172 E	1.7235
937531	AD2-214 C	10.2934
937532	AD2-214 E	6.8623
938861	AE1-114 C O1	3.9792
938862	AE1-114 E O1	13.5762
939051	AE1-134 1	4.2490
939061	AE1-134 2	4.2490
940501	AE2-035 C	0.6615
940502	AE2-035 E	0.9135
943381	AF1-009 C	0.1829
943382	AF1-009 E	0.7316
943401	AF1-011 C	3.1695
943402	AF1-011 E	3.3431
943422	AF1-013 E	0.9145
943921	AF1-060	0.3780
946321	AF1-296 C O1	3.9971
946322	AF1-296 E O1	18.7135
946501	AF1-314 C	1.5120
946502	AF1-314 E	7.0778
946533	AF1-317 BAT	28.3210
946683	AF1-332 BAT	28.3210
950181	J407 C	3.0508
950182	J407 E	12.2032
950401	J041 C	1.6578
950402	J041 E	6.6312
950471	J438 C	3.3963
950472	J438 E	13.5852
950501	J449 C	3.2760
950502	J449 E	13.1041
950522	J455 E	21.7410
951031	J344 C	3.0687
951032	J344 E	9.2061
951221	J475 C	3.7524
951222	J475 E	15.0096
951301	J495 C	3.5170
951302	J495 E	10.5510
951351	J500 C	6.8720
951352	J500 E	27.4880
951381	J504	5.8275
951421	J514	3.4842
951441	J523 C	2.2302

Bus #	Bus	MW Impact
951442	J523 E	1.4868
951451	J524 C	4.5390
951452	J524 E	3.0260
951501	J529 C	3.4800
951502	J529 E	13.9200
951511	J530 C	5.5475
951512	J530 E	22.1900
951541	J534 C	3.5910
951542	J534 E	14.3640
951551	J535 C	3.0509
951552	J535 E	12.2035
951821	J541 C	4.4741
951822	J541 E	24.2059
951841	J555 C	2.0488
951842	J555 E	11.0846
952021	J614 C	0.7584
952022	J614 E	4.1032
952191	J583 C	2.1695
952192	J583 E	11.7375
952211	J590 C	1.0175
952212	J590 E	5.5048
952231	J598 C	3.3556
952232	J598 E	18.1544
953011	J885 C	0.7615
953012	J885 E	4.1198
953082	J836 E	14.4840
953231	J447 C	1.9691
953232	J447 E	10.6534
953821	J840 C	1.6286
953822	J840 E	8.8114
954091	J873 C	3.3262
954092	J873 E	17.9958
954131	J877	18.1175
954301	J898 C	1.1371
954302	J898 E	6.1519
954521	J927 C	1.1312
954522	J927 E	6.1198
954702	J844 E	14.1752
954792	J952 E	6.8467
954861	J959 C	2.3117
954862	J959 E	12.5068
954901	J963	1.4155
954931	J967 C	1.8327
954932	J967 E	9.9153
955051	J981 C	3.8950
955052	J981 E	21.0730
955061	J982 C	3.2573
955062	J982 E	17.6227
955201	J998	3.7420
955211	J999	12.3500
955221	J1000	4.0215
955291	J1008	3.5385

Bus #	Bus	MW Impact
955661	J1050 C	2.7936
955662	J1050 E	15.1141
955871	J1072	11.7480
955971	J1084	31.8375
956231	J1110	7.3440
956381	J1128	11.1540
956411	J1131	17.0440
956431	J1135	4.0970
956761	J1174	23.2770
956771	J1175 C	3.6312
956772	J1175 E	19.6458
956781	J1176 C	1.8399
956782	J1176 E	9.9544
956791	J1177 C	3.3556
956792	J1177 E	18.1544
956831	J1181 C	3.0270
956832	J1181 E	16.3770
990901	L-005 E	10.7600
LGEE	LGEE	0.1010
CPLE	CPLE	0.3308
CBM-W2	CBM-W2	22.4979
NY	NY	0.1134
CBM-W1	CBM-W1	47.0376
TVA	TVA	2.6880
O-066	O-066	1.2230
CBM-S2	CBM-S2	4.0865
CBM-S1	CBM-S1	13.5979
G-007	G-007	0.1872
MADISON	MADISON	14.4507
MEC	MEC	18.4133

16.2 Index 2

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
44540554	943410	AF1-012 TAP	CE	270730	ELECT JCT; B	CE	1	COMED_P4_155-45-BT6-7__	breaker	1656.0	135.54	135.89	DC	21.68

Bus #	Bus	MW Impact
274715	NELSON EC;1C	8.1817
274716	NELSON EC;1S	5.9698
274717	NELSON EC;2C	8.2449
274718	NELSON EC;2S	6.0233
276160	W4-084	0.7032
290051	GSG-6; E	5.4296
293516	O-009 E1	16.8017
293517	O-009 E2	8.5340

Bus #	Bus	MW Impact
293518	O-009 E3	9.3982
293715	O-029 E	17.9629
293716	O-029 E	9.8488
293717	O-029 E	9.0521
293771	O-035 E	4.8825
294401	BSHIL;1U E	7.9846
294410	BSHIL;2U E	7.9846
294763	P-046 E	4.7546
919221	AA1-146	7.6324
919581	AA2-030	54.6800
919621	AA2-039 C	1.9462
919622	AA2-039 E	13.0248
925161	**AB2-173 (Withdrawn : 12/24/2019)**	**9.7518**
925581	AC1-033 C	1.3078
925582	AC1-033 E	8.7553
927201	AC1-214 C O1	1.5670
927202	AC1-214 E O1	4.9815
933341	AC2-147 C	1.1234
933342	AC2-147 E	1.8329
934051	AD1-031 C O1	2.6560
934052	AD1-031 E O1	4.3335
934431	AD1-067 C	0.0682
934432	AD1-067 E	0.2867
934651	AD1-096 C	0.5446
934652	AD1-096 E	0.8885
934701	AD1-098 C O1	3.9894
934702	AD1-098 E O1	2.9126
937001	AD2-134 C	1.4194
937002	AD2-134 E	5.8635
937311	AD2-172 C	1.2481
937312	AD2-172 E	1.7235
937531	AD2-214 C	10.2934
937532	AD2-214 E	6.8623
938861	AE1-114 C O1	3.9792
938862	AE1-114 E O1	13.5762
939051	AE1-134 1	4.2490
939061	AE1-134 2	4.2490
940501	AE2-035 C	0.6615
940502	AE2-035 E	0.9135
943381	AF1-009 C	0.1829
943382	AF1-009 E	0.7316
943401	AF1-011 C	3.1695
943402	AF1-011 E	3.3431
943411	AF1-012 C	45.5259
943412	AF1-012 E	30.3506
943422	AF1-013 E	0.9145
943921	AF1-060	0.3780
946321	AF1-296 C O1	3.9971
946322	AF1-296 E O1	18.7135
946501	AF1-314 C	1.5120
946502	AF1-314 E	7.0778
946531	AF1-317 C O1	8.6716

Bus #	Bus	MW Impact
946532	AF1-317 E O1	13.0074
946541	AF1-318 C O1	1.6264
946542	AF1-318 E O1	7.6155
946681	AF1-332 C	8.6716
946682	AF1-332 E	13.0074
950181	J407 C	3.0508
950182	J407 E	12.2032
950401	J041 C	1.6578
950402	J041 E	6.6312
950471	J438 C	3.3963
950472	J438 E	13.5852
950501	J449 C	3.2760
950502	J449 E	13.1041
950522	J455 E	21.7410
951031	J344 C	3.0687
951032	J344 E	9.2061
951221	J475 C	3.7524
951222	J475 E	15.0096
951301	J495 C	3.5170
951302	J495 E	10.5510
951351	J500 C	6.8720
951352	J500 E	27.4880
951381	J504	5.8275
951402	J506 E	13.1320
951421	J514	3.4842
951441	J523 C	2.2302
951442	J523 E	1.4868
951451	J524 C	4.5390
951452	J524 E	3.0260
951491	J528 C	2.6808
951492	J528 E	10.7232
951501	J529 C	3.4800
951502	J529 E	13.9200
951511	J530 C	5.5475
951512	J530 E	22.1900
951541	J534 C	3.5910
951542	J534 E	14.3640
951551	J535 C	3.0509
951552	J535 E	12.2035
951821	J541 C	4.4741
951822	J541 E	24.2059
951841	J555 C	2.0488
951842	J555 E	11.0846
952021	J614 C	0.7584
952022	J614 E	4.1032
952191	J583 C	2.1695
952192	J583 E	11.7375
952211	J590 C	1.0175
952212	J590 E	5.5048
952231	J598 C	3.3556
952232	J598 E	18.1544
952781	J748 C	2.0873

Bus #	Bus	MW Impact
952782	J748 E	11.2927
953001	J785 C	1.1096
953002	J785 E	6.0031
953011	J885 C	0.7615
953012	J885 E	4.1198
953082	J836 E	14.4840
953091	J916	0.1325
953231	J447 C	1.9691
953232	J447 E	10.6534
953571	J720 C	2.0873
953572	J720 E	11.2927
953821	J840 C	1.6286
953822	J840 E	8.8114
954091	J873 C	3.3262
954092	J873 E	17.9958
954131	J877	18.1175
954301	J898 C	1.1371
954302	J898 E	6.1519
954521	J927 C	1.1312
954522	J927 E	6.1198
954702	J844 E	14.1752
954792	J952 E	6.8467
954861	J959 C	2.3117
954862	J959 E	12.5068
954901	J963	1.4155
954931	J967 C	1.8327
954932	J967 E	9.9153
955011	J977 C	3.1389
955012	J977 E	16.9821
955051	J981 C	3.8950
955052	J981 E	21.0730
955061	J982 C	3.2573
955062	J982 E	17.6227
955201	J998	3.7420
955211	J999	12.3500
955221	J1000	4.0215
955291	J1008	3.5385
955571	J1041	1.3154
955661	J1050 C	2.7936
955662	J1050 E	15.1141
955731	J1057	8.2213
955871	J1072	11.7480
955971	J1084	31.8375
955991	J1086	7.8780
956111	J1098	2.6568
956231	J1110	7.3440
956271	J1114 C	2.0486
956272	J1114 E	11.0834
956381	J1128	11.1540
956411	J1131	17.0440
956421	J1132	3.3785
956431	J1135	4.0970

Bus #	Bus	MW Impact
956761	J1174	23.2770
956771	J1175 C	3.6312
956772	J1175 E	19.6458
956781	J1176 C	1.8399
956782	J1176 E	9.9544
956791	J1177 C	3.3556
956792	J1177 E	18.1544
956831	J1181 C	3.0270
956832	J1181 E	16.3770
990901	L-005 E	10.7600
LGEE	LGEE	0.1010
CPLE	CPLE	0.3308
CBM-W2	CBM-W2	22.4979
NY	NY	0.1134
CBM-W1	CBM-W1	47.0376
TVA	TVA	2.6880
O-066	O-066	1.2230
CBM-S2	CBM-S2	4.0865
CBM-S1	CBM-S1	13.5979
G-007	G-007	0.1872
MADISON	MADISON	14.4507
MEC	MEC	18.4133

Affected Systems

17 Affected Systems

17.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

17.2 MISO

MISO Impacts to be determined during later study phases (as applicable).

17.3 TVA

TVA Impacts to be determined during later study phases (as applicable).

17.4 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

17.5 NYISO

NYISO Impacts to be determined during later study phases (as applicable).

Contingency Name	Contingency Definition
COMED_P1-2_345-L15502_B-R-B	CONTINGENCY 'COMED_P1-2_345-L15502_B-R-B' TRIP BRANCH FROM BUS 943410 TO BUS 270730 CKT 1 / AF1-012 TAP 345 ELEC JUNC; B 345 END
COMED_P4_155-45-BT6-7__	CONTINGENCY 'COMED_P4_155-45-BT6-7__' TRIP BRANCH FROM BUS 275204 TO BUS 270828 CKT 1 / NELSO;4M 138 NELSO; B 345 TRIP BRANCH FROM BUS 275204 TO BUS 272094 CKT 1 / NELSO;4M 138 NELSO; B 138 TRIP BRANCH FROM BUS 275204 TO BUS 275304 CKT 1 / NELSO;4M 138 NELSO;4C 34.5 TRIP BRANCH FROM BUS 270828 TO BUS 946160 CKT 1 / NELSO; B 345 AF1-281 TAP 345 END
COMED_P4_937-45-BT1-2__	CONTINGENCY 'COMED_P4_937-45-BT1-2__' TRIP BRANCH FROM BUS 946160 TO BUS 274768 CKT 1 / AF1-281 TAP 345 LEECO;BP 345 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 END
COMED_P1-2_345-L15501_B-R-A	CONTINGENCY 'COMED_P1-2_345-L15501_B-R-A' TRIP BRANCH FROM BUS 270828 TO BUS 946160 CKT 1 / NELSO; B 345 AF1-281 TAP 345 END
COMED_P4_937-45-BT1-4__	CONTINGENCY 'COMED_P4_937-45-BT1-4__' TRIP BRANCH FROM BUS 946160 TO BUS 274768 CKT 1 / AF1-281 TAP 345 LEECO;BP 345 TRIP BRANCH FROM BUS 271421 TO BUS 274450 CKT 1 / EASYR; B 138 EASYR;1 34.5 TRIP BRANCH FROM BUS 271421 TO BUS 274451 CKT 1 / EASYR; B 138 EASYR;2 34.5 TRIP BRANCH FROM BUS 272528 TO BUS 271421 CKT 1 / S DIX; B 138 EASYR; B 138 TRIP BRANCH FROM BUS 274420 TO BUS 274857 CKT 1 / EASYR;1H 34.5 EASYR;U1 0.69 TRIP BRANCH FROM BUS 274421 TO BUS 274858 CKT 1 / EASYR;2H 34.5 EASYR;U2 0.69 TRIP BRANCH FROM BUS 274450 TO BUS 274420 CKT 1 / EASYR;1 34.5 EASYR;1H 34.5 TRIP BRANCH FROM BUS 274451 TO BUS 274421 CKT 1 / EASYR;2 34.5 EASYR;2H 34.5 TRIP BRANCH FROM BUS 274768 TO BUS 272528 CKT 1 / LEECO;BP 345 S DIX; B 138 REMOVE UNIT W1 FROM BUS 274857 / EASYR;U1 0.69 REMOVE UNIT W2 FROM BUS 274858 / EASYR;U2 0.69 END
COMED_P1-2_345-L15501_B-R-B	CONTINGENCY 'COMED_P1-2_345-L15501_B-R-B' TRIP BRANCH FROM BUS 946160 TO BUS 274768 CKT 1 / AF1-281 TAP 345 LEECO;BP 345 END
Base Case	

Short Circuit

18 Short Circuit

The following Breakers are overdutied:

None