PJM April 2016 Queue Generation Affected System Impact Study

December 21, 2016

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1. EXECUTIVE SUMMARY

This report documents the Affected System Impacts of 19 projects in the PJM generator interconnection queue on the Midcontinent Independent System Operator ("MISO") transmission system. The projects are listed in **Error! Reference source not found.**.

Table 1-1 List of PJM Group Generation Interconnection Projects

Queue Number	Point of Interconnection(POI)	Size (MW)	Fuel Type	State	TO
AB1-058	Gavin Unit #1 765kV	11	coal	OH	AEP
AA1-123	Highland-Sammis 345kV	1152	natural gas	OH	ATSI
AA2-030	Nelson	190	natural gas	IL	ComEd
AA2-035	Collins	1019.3	natural gas	IL	ComEd
AA2-116	Cook-East Elkhart 345kV	994	natural gas	MI	AEP
AB1-015	Evergreen 138kV	16.5	natural gas	OH	APS
AB1-017	Highland-Sammis 34kV & Highland-Mansfield 34kV	140	natural gas	OH	ATSI
AB1-080	Dumont-Olive 345kV	40	natural gas	IN	AEP
AB1-105	Highland-Hanna 345kV	940	natural gas	OH	ATSI
AB1-178	Pidgeon 69kV	19.9	natural gas	OH	ATSI
AB1-014	Hillcrest 138kV	125	solar	OH	DEOK
AB1-032	Lee Station Southwest 12kV	3.3	solar	OH	AEP
AB1-174	Thornville12kV	10	solar	OH	AEP
Z2-113	Watervliet 12.47kV	4.6	solar	MI	AEP
Z2-114	Olive 12.47kV	5	solar	IN	AEP
Z2-116	Twin Branch 12.47kV	2.6	solar	IN	AEP
AB1-167	South Cumberland 69kV	50	storage	OH	AEP
AA2-039	Kewanee 138kV	150	wind	IL	ComEd
AA2-075	Southwest Lima 345kV	250	wind	OH	AEP

Steady State AC analysis was performed to identify any reliability criteria violations caused by study generators. The study did not identify any constraints in both the summer shoulder and

summer peak scenarios in out-year (2021). The study projects have full injection capability conditional to the transmission and generation assumptions in this study.

Table 1-2 List of Remote PJM Projects

QueueNumber	Point of Interconnection(POI)	Size (MW)	FuelType	State	TO
AA1-085	Moshannon-Milesburg 230kV	82	wind	PA	APS
AA1-103	Harwood-Siegfried 230kV	208.5	wind	PA	PPL
AA1-106	Grover II 34.5kV	19.9	natural gas	PA	PENELEC
AA1-108	Churchtown 230kV	158	natural gas	NJ	AEC
AA1-111	Moshannon-East Towanda 230kV	463	natural gas	PA	PENELEC
AA1-114	Harwood-East Hazelton #2 69kV	60	wind	PA	PPL
AA1-133	Hickory-Shawboro 230kV	80	solar	NC	Dominion
AA1-134	Sunbury-WinFall 230kV	80	solar	NC	Dominion
AA1-135	Earleys-Everetts 230kV	80	solar	NC	Dominion
AA1-138	Earleys-Suffolk 230kV	80	solar	NC	Dominion
AA1-140	Worcester 25kV	20	solar	MD	DPL
AA1-141	Kenney 25kV	15	solar	MD	DPL
AA2-008	Saegers 230 kV	57	natural gas	PA	PPL
AA2-017	East Palmerton-Acahela 69kV	98	wind	PA	PPL
AA2-048	Allenwood-Larrabee 34kV	7	storage	NJ	JCPL
AA2-057	Hornertown-Whitakers 115kV	66	solar	NC	Dominion
AA2-060	Branchville-Sussex #1 34kV	6	storage	NJ	JCPL
AA2-061	Branchville-Sussex #2 34.5kV	8	storage	NJ	JCPL
AA2-079	Possum Point 230kV	28	natural gas	VA	Dominion
AA2-082	Alpha 34.5kV	20	storage	NJ	JCPL
AA2-084	Lappans Road 12.5kV	4	solar	MD	APS
AA2-085	General Office 12.5kV	10	solar	MD	APS
AB1-026	Westmoreland 34.5kV	20	solar	VA	Dominion
AB1-027	Old Church 34.5kV	20	solar	VA	Dominion
AB1-030	Huron 69kV	7.5	natural gas	NJ	AEC
AB1-033	North Wales 34.5kV	6.1	diesel	PA	PECO
AB1-034	Maintou 34.5kV	0.6	natural gas	NJ	JCPL
AB1-055	Balls Gap 34.5kV	2	storage	WV	AEP
AB1-056	Indian River 230kV I	247.8	offshore wind	MD	DPL
AB1-057	Indian River 230kV II	251.8	offshore wind	DE	DPL
AB1-064	Monessen 25kV	4	methane	PA	APS

QueueNumber	Point of Interconnection(POI)	Size (MW)	FuelType	State	TO
AB1-072	Hancock-Marlowe 34.5kV	2.5	solar	MD	APS
AB1-075	Riverside 115kV	20	storage	MD	BGE
AB1-077	Suffolk-WinFall 230kV	150	wind	NC	Dominion
AB1-078	Wilson 34.5kV	2	storage	PA	APS
AB1-082	Potter 46kV	19.9	natural gas	PA	APS
AB1-084	Greenfield-Elk Mountain 69kV	19.9	natural gas	PA	PPL
AB1-096	Carroll-Mt. Airy 34.5kV	9.9	solar	MD	APS
AB1-098	Walkersville 12kV	8	solar	MD	APS
AB1-106	Yukon-Hatfield 500kV	10	natural gas	PA	APS
AB1-109	Mountaineer	36	coal	WV	AEP
AB1-112	Hatfield 500kV	20	natural gas	PA	APS
AB1-119	Tansboro Road 12kV	0.735	natural gas	NJ	AEC
AB1-125	Carroll-Monocacy 34.5kV	15	solar	MD	APS
AB1-126	McConnellsburg-Mercersburg 34.5kV	20	solar	PA	APS
AB1-127	St. Thomas-Guilford 34.5kV	20	solar	PA	APS
AB1-128	St. Thomas-Mercersburg 34.5kV	20	solar	PA	APS
AB1-129	Mercersburg-Milnor 34.5kV	15	solar	PA	APS
AB1-135	Providence Forge 34.5kV	20	solar	VA	Dominion
AB1-141	Church-Price 69kV I	19.8	solar	MD	DPL
AB1-142	Church-Price 69kV II	19.8	solar	MD	DPL
AB1-149	Baker 138kV	121.6	wind	WV	APS
AB1-150	Grassy Falls 138kV	50.6	wind	WV	APS
AB1-166	Wilson 23kV	20	storage	PA	DL
AB1-169A	Cardiff-New Freedom 230kV	575	natural gas	NJ	AEC
AB1-173	Brink-Trego 115kV	19.8	solar	VA	Dominion
AB1-173A	Brink-Trego 115kV	19.8	solar	VA	Dominion
AB1-176	Price 25kV II	9	solar	MD	DPL
AB1-180	Pine View 12kV	3.2	methane	WV	AEP
AB1-183	Kennedyville-Massey 69kV	0	solar	MD	DPL
AB1-001	Moss Mill 12kV	5	solar	NJ	AEC
AB1-053	Hornertown 34.5kV	10	solar	NC	Dominion
AB1-054	Boykins 115kV	60	solar	VA	Dominion
AB1-065	Jennings-Hoyes 34.5kV	13	solar	MD	APS
AB1-068	Eldred-Frackville 230kV	20	natural gas	PA	PPL
AB1-069	Wylie Ridge 500kV	1025	natural gas	PA	APS
AB1-073	Eddystone 138kV	20	storage	PA	PECO
AB1-074	Richmond 230kV	20	storage	PA	PECO
AB1-076	Fourmile Ridge 138kV	20	storage	MD	APS

QueueNumber	Point of Interconnection(POI)	Size (MW)	FuelType	State	TO
AB1-081	Anaconda-Heartsease 115kV	80	solar	NC	Dominion
AB1-092	Moshannon-East Towanda 230kV	41	natural gas	PA	PENELEC
AB1-114	Masury-Maysvile 69kV	12.5	storage	PA	ATSI
AB1-123	Showalter 34.5kV	18.4	solar	MD	APS
AB1-124	Monocacy-Carroll 34.5kV	20	solar	MD	APS
AB1-137	Frankford 25kV	20	solar	DE	DPL
AB1-138	Navy 34.5kV	9.6	solar	NJ	JCPL
AB1-140	George Washington 138kV I	10	natural gas	WV	AEP
AB1-143	George Washington 138kV II	10	natural gas	WV	AEP
AB1-145	Winslow 12kV	3	solar	NJ	AEC
AB1-152	Culpeper 34.5kV	15	solar	VA	Dominion
AB1-154	Gilbert 230kV	1092.2	natural gas	NJ	JCPL
AB1-157	George Washington 138kV III	10	natural gas	WV	AEP
AB1-160	Gold-Sabinsville 115kV	20	wind	PA	PENELEC
AB1-162	Price 25kV	16.7	solar	MD	DPL
AB1-163	Glidden-Van Hiseville 34.5 kV	5	solar	NJ	JCPL
AB1-164	Whiteley 25kV	20	storage	PA	APS
AB1-165	Tabernacle 12kV	5.5	solar	NJ	AEC
AB1-168	Berlin 12kV	4.5	solar	NJ	AEC
AB1-179	Sabinsville-Wellsboro 34kV	19.9	natural gas	PA	PENELEC
AB1-181	Cunningham 500kV	37.3	natural gas	VA	Dominion
AB1-182	Bear Creek	20	storage	PA	PPL

2. STUDY METHODOLOGY & ASSUMPTIONS

2.1. STUDY CRITERIA

All interconnection requirements are based on the applicable MISO Interconnection Planning Criteria and in accordance with the NERC Reliability Standards. Steady state violations of applicable planning criteria were attributed to the PJM group generation requests by the usage of MISO injection criteria, and applicable local planning criteria, especially, Northern Indiana Power Service Co. (NIPSCO) generation interconnection criteria. NIPSCO's Generation Interconnection criteria can be found under section 4.5 of the planning methodology document available at:
https://www.misoenergy.org/Library/Repository/Study/TO%20Planning%20Criteria/NIPSCO%20TO%20Planning%20Criteria.pdf

2.1.1. MISO Criteria

A branch is considered as a thermal injection constraint if the branch is loaded above its applicable normal or emergency rating for the post-change case, and any of the following conditions are met:

1) The generator (NR/ER) has a larger than 20% DF on the overloaded facility under post contingent condition or 5% DF under system intact condition, or
2) The megawatt impact due to the generator is greater than or equal to 20% of the applicable rating (normal or emergency) of the overloaded facility, or
3) The Cumulative MW Impact from study generators is greater than or equal to 20% of the applicable (normal or Emergency) facility rating, where study generators whose Individual MW Impact is greater than 5% of the facility rating will be responsible to mitigate the Cumulative MW Impact Constraint, or
4) The overloaded facility or the overload-causing contingency is at generator's outlet.

A bus is considered a voltage constraint if both of the following conditions are met. All voltage constraints must be resolved before a project can receive interconnection service

1) The bus voltage is outside of applicable normal or emergency limits for the post-change case, and
2) The change in bus voltage is greater than 0.01 per unit.

All generation projects in the study group must mitigate thermal injection constraints in order to obtain unconditional Interconnection Service.

2.1.2. TOs' LOCAL PLANNING CRITERIA

A constraint is identified as an injection constraint if it violates applicable Transmission Owner FERC filed Local Planning Criteria.

2.2. CONTINGENCY CRITERIA

A comprehensive list of contingencies was considered for steady-state analysis:

- NERC Category P0 with system intact (no contingencies)
- NERC category P1, P2, P4, P5, P7 contingencies
    - AMMO (area 356), AMIL (area 357), WEC (area 295), MIUP (area 296), ALTE (area 694), WPS (area 696), MGE (area 697), UPPC (area 698), HE (area 207), DEI (area 208), SIGE (area 210), IPL (area 216), NIPS (area 217), BREC (area 314), CWLD (area 333), CWLP (area 360), SIPC (area 361), METC (area 218), ITCT (area 219).
- NERC Category P3
    - Selected NERC Category P3 events provided by ad-hoc study group in the study region of areas.
- For all the contingencies and post-disturbance analyses, cases were solved with transformer tap adjustment enabled, area interchange adjustment disabled, phase shifter adjustment enabled and switched shunt adjustment enabled.

2.3. MONITORED ELEMENTS

Table 2-1 listed the area monitored in this study.

Table 2-1 Monitored Area

Area #	Voltage	Area ID	Area Name
356	100kV and above	AMMO	Ameren Missouri
357	100kV and above	AMIL	Ameren Illinois
295	69kV and above	WEC	Wisconsin Electric Power Company (ATC)
296	69kV and above	MIUP	Michigan Upper Peninsula (ATC)
694	69kV and above	ALTE	Alliant Energy East (ATC)
696	69kV and above	WPS	Wisconsin Public Service Corporation (ATC)
697	69kV and above	MGE	Madison Gas and Electric Company (ATC)
698	69kV and above	UPPC	Upper Peninsula Power Company (ATC)
207	69kV and above	HE	Hoosier Energy
208	69kV and above	DEI	Duke Energy Indiana
210	69kV and above	SIGE	Southern Indiana Gas & Electric Company
216	69kV and above	IPL	Indianapolis Power & Light Company
217	69kV and above	NIPS	Northern Indiana Public Service Company
314	69kV and above	BREC	Big Rivers Electric Corporation
333	69kV and above	CWLD	Columbia, MO Water and Light
360	69kV and above	CWLP	City Water Light & Power(Springfield)
361	69kV and above	SIPC	Southern Illinois Power Co.
218	69kV and above	METC	Michigan Electric Transmission Co., LLC
219	69kV and above	ITCT	International Transmission Company
600	69kV and above	XEL	Xcel Energy North
608	69kV and above	MP	Minnesota Power & Light
613	69kV and above	SMMPA	Southern Minnesota Municipal Power Association
615	69kV and above	GRE	Great River Energy
620	69kV and above	OTP	Otter Tail Power Company
627	69kV and above	ALTW	Alliant Energy West
633	69kV and above	MPW	Muscatine Power & Water
635	69kV and above	MEC	MidAmerican Energy
661	69kV and above	MDU	Montana-Dakota Utilities Co.
680	69kV and above	DPC	Dairyland Power Cooperative

2.4. MODEL DEVELOPMENT

The following MTEP base case load profiles were used for the study:

- 2021 Summer Shoulder
- 2021 Summer Peak

The study cases were built by adding and dispatching the appropriate queue projects to the base cases. The detail of each PJM interconnection request is listed in **Error! Reference source not ound.**. The study projects were dispatched per MISO criteria to the entire PJM footprint, where generators were scaled in proportion to the available reserve.

2.5. STUDY ASSUMPTIONS

This affected system impact study was conducted with all the participating generators operating together as a group. Analysis was not performed on individual generating units or subsets of the generating units unless specifically noted otherwise. Higher queued PJM projects were modeled as outlined in Appendix A of the report. The results obtained in this analysis may change if any of the data or assumptions made during the development of the study models is revised.

3. STEADY STATE ANALYSIS

3.1. OUT YEAR (2021) SUMMER SHOULDER ANALYSIS

No criteria violations identified.

3.2. OUT YEAR (2021) SUMMER PEAK ANALYSIS

No criteria violations identified.

4. CONCLUSION

The Affected system study did not identify any Steady State - Thermal or Voltage violations with the interconnection of the 19 PJM projects on the monitored MISO transmission system. Both Out-year Summer Shoulder (2021) and Out-year Summer Peak (2021) analysis were performed as part of the study. These study projects have full injection capability conditional to the transmission and generation assumptions in this study.

5. APPENDIX A PJM HIGHER QUEUED PROJECTS

Table 5-1 PJM Higher Queued Projects

Queue Number	PJM Cycle	POI	Size(MW)	Fuel Type	State
T94	PJM2013APRIL	Cook – Palesades 345kV	1035	CC	MI
T99	PJM2013APRIL	Caledonia Wind 100 MW	100	wind	IL
T131	PJM2013APRIL	Lincoln – Sterling 138kV	150	wind	OH
T142	PJM2013APRIL	Southwest Lima – Marysville 345kV	300	wind	OH
T148	PJM2013APRIL	Caledonia Wind II 100 MW	100	wind	IL
U2-072	PJM2013APRIL	East Lima – Marysville 345kV	300	wind	OH
U3-021	PJM2013APRIL	Silver Lake – Cherry Valley 345kV	100	CT	IL
U4-027	PJM2013APRIL	Normandy-Kewanee 138kV	100	CT	IL
V1-011	PJM2013APRIL	Haviland 138kV	100	wind	OH
V1-012	PJM2013APRIL	Haviland 138kV	150	wind	OH
V2-006	PJM2013APRIL	East Leipsic 138kV	150	wind	OH
V3-007	PJM2013APRIL	Desoto-Tanners Creek #1 345kV	200	wind	IN
V3-008	PJM2013APRIL	Desoto-Tanners Creek #1 345kV	200	wind	IN
V3-009	PJM2013APRIL	Desoto-Tanners Creek #1 345kV	200	wind	IN
V4-010	PJM2013APRIL	Tiffin Center 138kV	200	wind	OH
W1-072A_AT5	PJM2013APRIL	Lemoyne 345kV	640	CC	OH
W3-088	PJM2013APRIL	South West Lima 345kV	200	wind	OH
W3-128	PJM2013APRIL	Sporn – Waterford 345kV	652	CC	OH
X1-027A_AT12	PJM2013APRIL	Davis Besse – Beaver 345kV	500	wind	OH
Y1-006	PJM2013APRIL	Jubal Early – Austinville 138kV	72	wind	VA
Y1-069	PJM2013APRIL	Bay Shore – Fostoria Central 345kV	799	CC	OH
V1-024	PJM2013OCT	LaSalle 1	1188	nuclear	LaSalle, IL
V1-025	PJM2013OCT	LaSalle 2	1191	nuclear	LaSalle, IL
V4-046	PJM2013OCT	Byron 1	1249	nuclear	Ogle, IL
V4-047	PJM2013OCT	Byron 2	1223	nuclear	Ogle, IL
V4-048	PJM2013OCT	Braidwood 1	1247	nuclear	Will, IL
V4-049	PJM2013OCT	Braidwood 2	1219	nuclear	Will, IL
W2-048	PJM2013OCT	Pontiac MidPoint – Lanesville 345kV	62.5	wind	Logan, IL
W3-046	PJM2013OCT	Powerton 345kV – Katydid 345kV	207.5	wind	Mason, IL
W4-005	PJM2013OCT	Pontiac Midpoint – Latham 345kV	351	wind	Macon

Queue Number	PJM Cycle	POI	Size(MW)	Fuel Type	State
X1-096	PJM2013OCT	Loretto-Kings Creek 138kV	150	wind	Somerset
X2-022	PJM2013OCT	Pontiac Midpoint-Lanesville II	189	wind	Logan
X2-031	PJM2013OCT	Krayn 115kV	50	wind	Cambria
X2-052	PJM2013OCT	Dumont-Olive 345kV	675	CC	Adams
X3-051	PJM2013OCT	Flatlick 765kV	1460	CC	Unknown
X4-025	PJM2013OCT	Millbrook Park 138kV	80	coal	Greenup
Y1-065	PJM2013OCT	Rock Spring 500kV	834.1	CC	Cecil
X1-087	PJM2014MAY	Stillman Valley	15.3	methane	IL
X3-023	PJM2014MAY	S. Greenwich-Willard 69kV	60	wind	OH
Y2-050	PJM2014MAY	Tidd-Canton Central	742	CC	OH
Y3-088	PJM2014MAY	Kendall I	1158.8	CC	IL
Y3-089	PJM2014MAY	Kendall II	1178.8	CC	IL
Y3-090	PJM2014MAY	Kendall III	1198.8	CC	IL
Y3-091	PJM2014MAY	Kendall IV	1218.8	CC	IL
Y3-103	PJM2014MAY	Valley-Raccoon 138kV	205	CT	PA
V4-033	PJM2014NOV	AEP	299.2	wind	Randolph, IN
W4-004	PJM2014NOV	AEP	90	wind	Henry, IN
W4-008	PJM2014NOV	AEP	180	wind	Henry, IN
X2-006	PJM2014NOV	AEP	585	CC	Lawrence, KY
Y3-038	PJM2014NOV	AEP	1356	coal	Spencer, IN
Z1-035	PJM2014NOV	ATSI	18	wind	Unknown, OH
Z1-051	PJM2014NOV	AEP	1192	nuclear	Berrien, MI
Z1-079	PJM2014NOV	DEOK	513	CC	Butler, OH
Z1-127	PJM2014NOV	ComEd	320	CT	Will, IL
X1-020	PJM2015APRIL	Dumont-Greentown 765kV	1500	wind	IN
Y2-103	PJM2015APRIL	Zion Energy Center	945	CC	IL
Y3-013	PJM2015APRIL	Zion Energy Center	945	CC	IL
Z2-081	PJM2015APRIL	Streator 34.5kV	13.3	methane	IL
Z2-087	PJM2015APRIL	Pontiac MidPoint-Brokaw 345kV	200	wind	IL
AA1-018	PJM2015APRIL	Powerton-Goodings Grove	150	wind	IL
AA1-040	PJM2015APRIL	Morris	140	CC	IL
AA1-078	PJM2015APRIL	University Park North	560	CC	IL
AA1-116	PJM2015APRIL	Kensington/Kankakee	20	storage	IL
AA1-117	PJM2015APRIL	Kensington/Kankakee	20	storage	IL
AA1-129	PJM2015APRIL	Northbrook-Skokie	27	CT	IL
AA1-146	PJM2015APRIL	Nelson	190	CT	IL

Queue Number	PJM Cycle	POI	Size(MW)	Fuel Type	State
AA2-100	PJM2015OCT	Brown 34.5kV	6.4	methane	OH
AA2-106	PJM2015OCT	Bluff Point 69kV	20	storage	IN
AA2-137	PJM2015OCT	Hanging Rock 765kV - Power Block 1	1340	natural gas	OH
AA2-138	PJM2015OCT	Hanging Rock 765kV - Power Block 2	1235	natural gas	OH

6. APPENDIX B STUDY SCENARIOS AND STUDY CONTINGENCIES

Table 6-1 Study Scenarios and Study Contingencies

STUDY SCENARIO	CONTINGENCY FILE	TYPE	NUMBER OF CONTINGENCY
2021SH	2021_AMRN-P1-1 2020.con	P1	49
2021SH	2021_AMRN-P1-2 2020.con	P1	499
2021SH	2021_AMRN-P1-3 2020.con	P1	78
2021SH	2021_AMRN-P1-4 2020.con	P1	21
2021SH	2021_AMRN-P2-1 2020.con	P2	288
2021SH	2021_AMRN-P2-2 2020.con	P2	204
2021SH	2021_AMRN-P2-3 2020.con	P2	333
2021SH	2021_AMRN-P2-4 2020.con	P2	139
2021SH	2021_AMRN-P7-1 2020.con	P7	89
2021SH	2021_CWLD_P1.con	P1	22
2021SH	2021_CWLP_MTEP15_CatP1.con	P1	59
2021SH	2021_CWLP_MTEP15_CatP2.con	P2	83
2021SH	2021_CWLP_MTEP15_CatP7.con	P7	1
2021SH	2021_DEI 2020SUM-SH P1 ALL MTEP.con	P1	316
2021SH	2021_DEI 2020SUM-SH P2 ALL MTEP.con	P2	668
2021SH	2021_DEI 2020SUM-SH P4 ALL MTEP.con	P4	386
2021SH	2021_DEI 2020SUM-SH P5 ALL MTEP.con	P5	307
2021SH	2021_DEI 2020SUM-SH P7 ALL MTEP.con	P7	70
2021SH	2021_HE_2014_CatP1.con	P1	48
2021SH	2021_HE_2014_CatP2-P7.con	P2-P7	28
2021SH	2021_IPL_P1_MTEP15_Pass3_Targeted_Approval.con	P1	139
2021SH	2021_IPL_P2_MTEP15_Pass3_Targeted_Approval.con	P2	368
2021SH	2021_IPL_P4_MTEP15_Pass3_Targeted_Approval.con	P4	272
2021SH	2021_IPL_P5_MTEP15_Pass3_Targeted_Approval.con	P5	62

Study Scenario	Contingency File	Type	Number of Contingency
2021SH	2021_IPL_P7_MTEP15_Pass3_Targeted_Approval.con	P7	21
2021SH	2021_MTEP15_BREC_P1_Contingencies_List.con	P1	80
2021SH	2021_MTEP15_BREC_P2_Contingencies_List.con	P2	37
2021SH	2021_MTEP15_BREC_P4_P7_Contingencies_List.con	P4-P7	4
2021SH	2021_P1_Explicit_SIPC_MISO.con	P1	20
2021SH	2021_P2_Explicit_CWLD.con	P2	11
2021SH	2021_P2_Explicit_SIPC.con	P4	9
2021SH	2021_P4_Explicit_CWLD.con	P4	16
2021SH	2021_P4_Explicit_SIPC.con	P4	10
2021SH	2021_P7_Explicit_CWLD.con	P7	14
2021SH	2021_Vectren_SIGE_MISO_MTEP15_CatP1_Cont_All_Other_Models.con	P1	70
2021SH	2021_Vectren_SIGE_MISO_MTEP15_CatP2_All_Other_Models.con	P2	101
2021SH	2021_Vectren_SIGE_MISO_MTEP15_CatP7_All_Other_Models.con	P7	7
2021SH	2021_METC_ITC_BUS-BKR_P2.con	P2	2209
2021SH	2021_METC_ITC_DCT_P7.con	P7	403
2021SH	2021_METC_ITC_FAILED_PROTECTION_P5.con	P5	76
2021SH	2021_METC_ITC_GEN_P1.con	P1	224
2021SH	2021_METC_ITC_LINE_P1.con	P1	669
2021SH	2021_METC_ITC_SHUNT_P1.con	P1	61
2021SH	2021_METC_ITC_STUCK-BKR_P4.con	P4	1513
2021SH	2021_METC_ITC_XFMR_P1.con	P1	88
2021SH	2021_NIPS_CATP1_2020.con	P1	259
2021SH	2021_NIPS_P2_2020_2025all_ProposedTargetA.con	P2	336
2021SH	2021_NIPS_P5.con	P5	28
2021SH	2021_NIPS_P7_2020.con	P7	117
2021SH	NIPS P7 Reynolds_Second_Loop-In.con	P7	2
2021SH	NIPS_P2_Reynolds_ Second_Loop-In.con	P2	3
2021SH	ComEd_RTEP_Cat_P1.con	P1	467
2021SH	ComEd_RTEP_Cat_P2-P7.con	P2-P7	1163
2021SH	2020SUM_P1-1_ATC_2020SUM_Proposed_20150224.con	P1	101
2021SH	2020SUM_P1-2_ATC_2020SUM_Proposed_20150224.con	P1	490
2021SH	2020SUM_P1-3_ATC_2020SUM_Proposed_20150224.con	P1	65
2021SH	2020SUM_P1-4_ATC_2020SUM_Proposed_20150224.con	P1	71
2021SH	2020SUM_P2-1_ATC_2020SUM_Proposed_20150224.con	P2	195
2021SH	2020SUM_P2-2_ATC_2020SUM_Proposed_20150224.con	P2	455
2021SH	2020SUM_P2-3_ATC_2020SUM_Proposed_20150224.con	P2	925

Study Scenario	Contingency File	Type	Number of Contingency
2021SH	2020SUM_P2-4_ATC_2020SUM_Proposed_20150224.con	P2	153
2021SH	2020SUM_P5-5_ATC_2020SUM_Proposed_20150224.con	P5	137
2021SH	2020SUM_P7-1_ATC_2020SUM_Proposed_20150224.con	P7	155
2021SH	PJM_April-2016-AFS_Central.con	P1	3695
2021SH	PJM_April-2016-AFS_AMRN.con	P1	1245
2021SH	PJM_April-2016-AFS_ATC.con	P1	1983
2021SH	PJM_April-2016-AFS_MI.con	P1	2283
2021SP	2021_AMRN-P1-1 2020.con	P1	49
2021SP	2021_AMRN-P1-2 2020.con	P1	499
2021SP	2021_AMRN-P1-3 2020.con	P1	78
2021SP	2021_AMRN-P1-4 2020.con	P1	21
2021SP	2021_AMRN-P2-1 2020.con	P2	288
2021SP	2021_AMRN-P2-2 2020.con	P2	204
2021SP	2021_AMRN-P2-3 2020.con	P2	333
2021SP	2021_AMRN-P2-4 2020.con	P2	139
2021SP	2021_AMRN-P7-1 2020.con	P7	89
2021SP	2021_CWLD_P1.con	P1	22
2021SP	2021_CWLP_MTEP15_CatP1.con	P1	59
2021SP	2021_CWLP_MTEP15_CatP2.con	P2	83
2021SP	2021_CWLP_MTEP15_CatP7.con	P7	1
2021SP	2021_DEI 2020SUM-SH P1 ALL MTEP.con	P1	316
2021SP	2021_DEI 2020SUM-SH P2 ALL MTEP.con	P2	668
2021SP	2021_DEI 2020SUM-SH P4 ALL MTEP.con	P4	386
2021SP	2021_DEI 2020SUM-SH P5 ALL MTEP.con	P5	307
2021SP	2021_DEI 2020SUM-SH P7 ALL MTEP.con	P7	70
2021SP	2021_HE_2014_CatP1.con	P1	48
2021SP	2021_HE_2014_CatP2-P7.con	P2-P7	28
2021SP	2021_IPL_P1_MTEP15_Pass3_Targeted_Approval.con	P1	139
2021SP	2021_IPL_P2_MTEP15_Pass3_Targeted_Approval.con	P2	368
2021SP	2021_IPL_P4_MTEP15_Pass3_Targeted_Approval.con	P4	272
2021SP	2021_IPL_P5_MTEP15_Pass3_Targeted_Approval.con	P5	62
2021SP	2021_IPL_P7_MTEP15_Pass3_Targeted_Approval.con	P7	21
2021SP	2021_MTEP15_BREC_P1_Contingencies_List.con	P1	80
2021SP	2021_MTEP15_BREC_P2_Contingencies_List.con	P2	37
2021SP	2021_MTEP15_BREC_P4_P7_Contingencies_List.con	P4-P7	4
2021SP	2021_P1_Explicit_SIPC_MISO.con	P1	20

Study Scenario	Contingency File	Type	Number of Contingency
2021SP	2021_P2_Explicit_CWLD.con	P2	11
2021SP	2021_P2_Explicit_SIPC.con	P4	9
2021SP	2021_P4_Explicit_CWLD.con	P4	16
2021SP	2021_P4_Explicit_SIPC.con	P4	10
2021SP	2021_P7_Explicit_CWLD.con	P7	14
2021SP	2021_Vectren_SIGE_MISO_MTEP15_CatP1_Cont_All_Other_Models.con	P1	70
2021SP	2021_Vectren_SIGE_MISO_MTEP15_CatP2_All_Other_Models.con	P2	101
2021SP	2021_Vectren_SIGE_MISO_MTEP15_CatP7_All_Other_Models.con	P7	7
2021SP	2021_METC_ITC_BUS-BKR_P2.con	P2	2209
2021SP	2021_METC_ITC_DCT_P7.con	P7	403
2021SP	2021_METC_ITC_FAILED_PROTECTION_P5.con	P5	76
2021SP	2021_METC_ITC_GEN_P1.con	P1	224
2021SP	2021_METC_ITC_LINE_P1.con	P1	669
2021SP	2021_METC_ITC_SHUNT_P1.con	P1	61
2021SP	2021_METC_ITC_STUCK-BKR_P4.con	P4	1513
2021SP	2021_METC_ITC_XFMR_P1.con	P1	88
2021SP	2021_NIPS_CATP1_2020.con	P1	259
2021SP	2021_NIPS_P2_2020_2025all_ProposedTargetA.con	P2	336
2021SP	2021_NIPS_P5.con	P5	28
2021SP	2021_NIPS_P7_2020.con	P7	117
2021SP	NIPS P7 Reynolds_Second_Loop-In.con	P7	2
2021SP	NIPS_P2_Reynolds_ Second_Loop-In.con	P2	3
2021SP	ComEd_RTEP_Cat_P1.con	P1	467
2021SP	ComEd_RTEP_Cat_P2-P7.con	P2-P7	1163
2021SP	2020SUM_P1-1_ATC_2020SUM_Proposed_20150224.con	P1	101
2021SP	2020SUM_P1-2_ATC_2020SUM_Proposed_20150224.con	P1	490
2021SP	2020SUM_P1-3_ATC_2020SUM_Proposed_20150224.con	P1	65
2021SP	2020SUM_P1-4_ATC_2020SUM_Proposed_20150224.con	P1	71
2021SP	2020SUM_P2-1_ATC_2020SUM_Proposed_20150224.con	P2	195
2021SP	2020SUM_P2-2_ATC_2020SUM_Proposed_20150224.con	P2	455
2021SP	2020SUM_P2-3_ATC_2020SUM_Proposed_20150224.con	P2	925
2021SP	2020SUM_P2-4_ATC_2020SUM_Proposed_20150224.con	P2	153
2021SP	2020SUM_P5-5_ATC_2020SUM_Proposed_20150224.con	P5	137
2021SP	2020SUM_P7-1_ATC_2020SUM_Proposed_20150224.con	P7	155
2021SP	PJM_April-2016-AFS_Central.con	P1	3695
2021SP	PJM_April-2016-AFS_AMRN.con	P1	1245

Study Scenario	Contingency File	Type	Number of Contingency
2021SP	PJM_April-2016-AFS_ATC.con	P1	1983
2021SP	PJM_April-2016-AFS_MI.con	P1	2283