



# **AFFECTED SYSTEM LIMITED OPERATION IMPACT STUDY REPORT**

**ASGI-2016-J442**

Published December 2019

By SPP Generator Interconnection Dept.

## REVISION HISTORY

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DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
12/13/2019	SPP	Report issued.

## SUMMARY

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Affected System Interconnection Customer “J442” has requested an Affected System Limited Operation System Impact Study (AS-LOIS) consistent with Southwest Power Pool Open Access Transmission Tariff (OATT) for 200 MW of wind generation to interconnect with 200 MW of Energy Resource interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS) to the Midcontinent Independent System Operator (MISO) transmission system footprint. The generator will interconnect into the transmission system Otter Tail Power Company in Deuel County, South Dakota.

For this LOIS, Power System Solutions (PSS) conducted a powerflow analysis. The LOIS assumes that only the higher-queued projects listed within the PSS reports of this study will be in-service. If additional generation projects with queue priority equal-to or higher-than the study project, request to go into commercial operation, this LOIS may need to be restudied to ensure that interconnection service remains available for this customer’s request. The study report follows this executive summary.

Power-flow analysis from the AS-LOIS determined that J442 may have full interconnection capacity at **200 MW ERIS** and **200 MW NRIS**.

It should be noted that although this LOIS analyzed many of the most probable contingencies, it is not an all-inclusive list that can account for every operational situation. Additionally, the generator may not be able to inject any power onto the Transmission System due to constraints that fall below the threshold of mitigation for a Generator Interconnection request. Because of this, it is likely that the Customers may be required to reduce their generation output to **0 MW** under certain system conditions to allow system operators to maintain the reliability of the transmission network.

Transient stability analysis was not performed for this LOIS study.

Nothing in this study should be construed as a guarantee of delivery or transmission service. If the customer wishes to sell power from the facility, the Customer must request a separate request for transmission service on Southwest Power Pool’s OASIS in accordance with SPP OATT Attachment Z1.

## A: CONSULTANT'S POWERFLOW STUDY REPORT

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See next page for the Consultant's Study report.

12/13/2019

# Affected System Limited Operation Impact Study for MISO Generator Interconnection J442

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## REVISION HISTORY

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Date	Author	Comments
12/11/2019	Power System Solutions	Affected System Limited Operation Impact Study (LOIS) for MISO Generator Interconnection Request J442 Report Revision 0 Issued

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# EXECUTIVE SUMMARY

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Affected System Interconnection Customer has requested an Affected System Limited Operation System Impact Study (AS-LOIS) to be consistent with Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for 200 MW of wind generation, known as J442, to be interconnected with 200 MW of Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Resource (NRIS) to the Midcontinent Independent System Operator (MISO) transmission system footprint.

Affected System Interconnection Customer has requested this Affected System Limited Operation Interconnection Study (AS-LOIS) to determine the impacts of interconnecting J442 to the transmission system under the following assumptions:

- Include all higher queued SPP assigned upgrades except for Gentleman – Thedford – Holt 345kV (“R-Plan”) Project
- All higher queued MISO assigned upgrades
- Include GEN-2015-023 at 195 MW of limited injection

This AS-LOIS was performed to ensure that J442 was not limited prior to the completion of previously identified contingent facilities.

Power-flow analysis from this Affected System LOIS has determined that the J442 request can interconnect 200 MW of ERIS and NRIS prior to the completion of the required Network Upgrades, listed within Table 3.

Transient stability and short circuit analysis were not performed for this AS-LOIS study.

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this AS-LOIS at the expense of the Customer.



## PURPOSE

The purpose of this study is to evaluate the impacts of interconnecting J442 request with a total of 200 MW interconnecting at the Big Stone 230 kV Point of Interconnection. The Affected System Interconnection Customer has requested this amount to be studied with 200 MW of Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS) to commence on or around December 16, 2019. Additionally, the Affected System Interconnection Customer has requested this Affected System LOIS analysis be conducted under the following assumptions:

- Include all higher queued SPP assigned upgrades except for Gentleman – Thedford – Holt 345kV (“R-Plan”) Project
- All higher queued MISO assigned upgrades
- Include GEN-2015-023 at 195 MW of limited injection

Table 1 is the list of SPP generation requests that are included in this AS-LOIS study.

Table 2: MISO Generation Requests Included within AS-LOIS

*Table 1: SPP Generation Requests Included within AS-LOIS*

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
PQ	GEN-2001-014	94.5	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-026	74.25	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-033	180.29	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-036	80	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-037	102	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-039A	105	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2001-039M	99	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-004	153	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-005	120	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-008	240	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-009	80	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-022	239.2	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2002-025A	150	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-004	100	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-005	100	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-006A	201	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-019	249.3	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-020	159	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-021N	75	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2003-022	120	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2004-014	100	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
PQ	GEN-2004-020	27	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2004-023	20.6	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2004-023N	75	Coal	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2005-003	30.6	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2005-008	120	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2005-012	248.4	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2005-013	199.8	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-002	100.8	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-018	162	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-020N	42	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-020S	19.8	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-021	94	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-024S	18.9	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-026	502	Gas	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-035	132	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-038N005	80	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-038N019	80	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-043	99	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-044	370	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2006-046	130	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2007-011N08	81	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	GEN-2008-1190	60	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
PQ	Llano Estacado (White Deer)	80	Wind	02 HITCHLND	
PQ	Gray County Wind (Montezuma)	110	Wind	03 SPRVLE	
PQ	SPS Distributed (Dumas 19th St)	20	Wind	02 HITCHLND	
PQ	SPS Distributed (Etter)	20	Wind	02 HITCHLND	
PQ	SPS Distributed (Sherman)	20	Wind	02 HITCHLND	
PQ	SPS Distributed (Moore E)	17.5	Wind	02 HITCHLND	
PQ	NPPD Distributed (Broken Bow)	7.3	Heat	09 NEB	
PQ	NPPD Distributed (Burwell)	3	Heat	09 NEB	
PQ	NPPD Distributed (Ord)	10.8	Heat	09 NEB	
PQ	NPPD Distributed (Stuart)	1.8	Heat	09 NEB	
PQ	NPPD Distributed (Columbus Hydro)	45	Hydro	09 NEB	
PQ	WAPA SEAMS (Gavins Pt Hydro)	102	Hydro	09 NEB	
PQ	WAPA SEAMS (Ft Randle Hydro)	352	Hydro	09 NEB	

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
PQ	WAPA SEAMS (Spirit Mound Heat)	120	Heat	09 NEB	
PQ	SPS Distributed (Hopi)	10	Solar	06 NM & W-TX	
PQ	SPS Distributed (Monument)	10	Solar	06 NM & W-TX	
PQ	SPS Distributed (Lea Road)	10	Solar	06 NM & W-TX	
PQ	SPS Distributed (Jal)	10	Solar	06 NM & W-TX	
PQ	SPS Distributed (Ocotillo)	10	Solar	06 NM & W-TX	
PQ	NPPD Distributed (Burt County Wind)	12	Wind	09 NEB	
PQ	NPPD Distributed (Buffalo County Solar)	10	Solar	09 NEB	
PQ	SPS Distributed (Carson)	10	Wind	02 HITCHLND	COMMERCIAL OPERATION
PQ	Sunray	34.5	Wind	06 NM & W-TX	COMMERCIAL OPERATION
ICS1	GEN-2007-021	200	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-025	299.2	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-043	200	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-044	300	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-046	200	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-050	151.8	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-052	150	Gas	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2007-062	425	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2008-003	101.2	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2008-013	299.04	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
ICS1	GEN-2008-018	250	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2006-037N1	74.8	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2006-044N	40.5	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2007-040	131.1	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-023	150	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-051	161	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-079	98.9	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-086N02	201	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-092	200.5	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-124	200.1	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2008-129	80	CT	13 NE-KS & NW-MO	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-09-1	GEN-2009-025	59.8	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	ASGI-2010-010	42.15	Gas	06 NM & W-TX	COMMERCIAL OPERATION
DIS-10-1	GEN-2008-022	299.65	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2008-037	100.8	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2008-044	197.8	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2008-047	263.13	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
DIS-10-1	GEN-2008-098	99.5	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2008-123N	89.7	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2009-008	198.9	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2009-020	48.3	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2009-040	73.8	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2010-003	99.5	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2010-005	299.2	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-10-1	GEN-2010-006	205	Gas	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2010-009	165.6	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2010-011	29.7	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-1	GEN-2010-014	358.8	Wind	02 HITCHLND	IA FULLY EXECUTED/ON SCHEDULE
DIS-10-2	ASGI-2010-020	30	Wind	06 NM & W-TX	COMMERCIAL OPERATION
DIS-10-2	ASGI-2010-021	15	Wind	06 NM & W-TX	COMMERCIAL OPERATION
DIS-10-2	ASGI-2011-001	27.3	Wind	06 NM & W-TX	COMMERCIAL OPERATION
DIS-10-2	GEN-2010-001	300	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-2	GEN-2010-036	5.9	Hydro	13 NE-KS & NW-MO	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-2	GEN-2010-040	300	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-10-2	GEN-2010-051	200	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	ASGI-2011-002	20	Wind	02 HITCHLND	COMMERCIAL OPERATION
DIS-11-1	ASGI-2011-003	10	Wind	06 NM & W-TX	COMMERCIAL OPERATION
DIS-11-1	GEN-2010-055	4.5	Gas	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2010-057	201	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-008	600	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-010	100.8	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-011	50	Coal	13 NE-KS & NW-MO	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-014	198	Wind	02 HITCHLND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-018	73.6	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-022	299	Wind	02 HITCHLND	IA FULLY EXECUTED/ON SCHEDULE
DIS-11-1	GEN-2011-025	80	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-1	GEN-2011-027	120	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2-PQ	NPPD Distributed (North Platte - Lexington)	54	Hydro	09 NEB	
DIS-11-2	ASGI-2011-004	19.8	Wind	06 NM & W-TX	COMMERCIAL OPERATION
DIS-11-2	GEN-2011-037	7	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-040	110	Wind	14 S-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-045	205	NG CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-046	27	Diesel CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-048	175	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-049	250.7	Wind	07 SW-OK	IA FULLY EXECUTED/ON SCHEDULE

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
DIS-11-2	GEN-2011-050	109.8	Wind	14 S-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-054	300	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-056	3.6	Hydro	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-056A	3.6	Hydro	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-056B	4.5	Hydro	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-11-2	GEN-2011-057	150	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-1	GEN-2012-001	61.2	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-1	GEN-2012-004	41.4	Wind	14 S-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-1	GEN-2012-007	120	Gas	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	ASGI-2012-002	18.15	Wind	06 NM & W-TX	
DIS-12-2	GEN-2012-020	477.1	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-021	4.8	Gas	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-024	180	Wind	03 SPRVLE	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-028	74.8	Wind	07 SW-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-032	300	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-033	98.82	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-034	7	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-035	7	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-036	7	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-037	203	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-12-2	GEN-2012-041	121.5	CT	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-1	ASGI-2013-001	11.5	Wind	02 HITCHLND	
DIS-13-1	ASGI-2013-002	18.4	Wind	06 NM & W-TX	
DIS-13-1	ASGI-2013-003	18.4	Wind	06 NM & W-TX	
DIS-13-1	GEN-2013-007	100	Wind	14 S-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-1	GEN-2013-008	1.2	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-1	GEN-2013-011	30	Coal	12 W-ARK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-1	GEN-2013-012	147	Gas	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-1	GEN-2013-016	203	CT	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-2	ASGI-2013-004	36.6	Gas	04 NW-KS	
DIS-13-2	ASGI-2013-005	1.65	Wind	06 NM & W-TX	
DIS-13-2	GEN-2013-022	25	Solar	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-2	GEN-2013-028	495	Gas	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-2	GEN-2013-029	299	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-2	GEN-2013-030	300	Wind	02 HITCHLND	IA FULLY EXECUTED/ON SCHEDULE
DIS-13-2	GEN-2013-032	202.5	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-13-2	GEN-2013-033	27	Gas	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-1	GEN-2014-001	200.6	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-14-1	GEN-2014-002	10.53	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-1	GEN-2014-004	3.96	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
DIS-14-1	GEN-2014-005	5.67	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-1	GEN-2014-013	73.5	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	ASGI-2014-014	54.3	Thermal	08 N-OK & S-KS	
DIS-14-2	GEN-2013-027	148.35	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-020	100	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-021	300	Wind	13 NE-KS & NW-MO	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-025	2.41	Wind	04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-028	35	CC	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-031	35.8	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-032	10.22	Wind	09 NEB	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-033	70	Solar	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-034	70	Solar	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-035	30	Solar	06 NM & W-TX	IA FULLY EXECUTED/ON SCHEDULE
DIS-14-2	GEN-2014-039	73.39	Wind	09 NEB	IA FULLY EXECUTED/ON SCHEDULE
DIS-14-2	GEN-2014-040	320	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-056	250	Wind	01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-057	250	Wind	14 S-OK	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-14-2	GEN-2014-064	248.4	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1-PQ	GEN-2007-017IS	200	Wind	09 NEB	ON SCHEDULE
DIS-15-1-PQ	GEN-2007-018IS	200	Wind	09 NEB	ON SCHEDULE
DIS-15-1	ASGI-2015-001	6.13	Thermal	03 SPRVLE	
DIS-15-1	ASGI-2015-002	2	Wind	06 NM & W-TX	
DIS-15-1	ASGI-2015-004	18.79	Thermal	08 N-OK & S-KS	
DIS-15-1	GEN-2015-001	200	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-004	52.9	Wind	07 SW-OK	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-1	GEN-2015-005	200.11	Wind	13 NE-KS & NW-MO	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-007	160	Wind	09 NEB	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-1	GEN-2015-013	119.95	Solar	07 SW-OK	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-1	GEN-2015-014	150	Wind	06 NM & W-TX	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-015	154.56	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-016	200	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-021	20	Solar	03 SPRVLE	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-1	GEN-2015-023	195	Wind	09 NEB	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-1	GEN-2015-024	220	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-025	220	Wind	08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-1	GEN-2015-029	161	Wind	01 WDWRD	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2002-008IS	40.5		18 E-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2002-009IS	40.5		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION



Study	Gen Number	Capacity	Fuel Source	Group	STATUS
DIS-15-2-PQ	GEN-2005-003IS	100		18 E-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2005-008IS	49.5		16 W-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2006-002IS	51		17 W-SC-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2006-006IS	18.7		18 E-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2006-015IS	49.5		16 W-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2007-013IS	50		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2007-014IS	100		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2007-015IS	100		16 W-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2007-020IS	16		18 E-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2008-008IS	5		18 E-ND	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2009-001IS	200		15 E-SD	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2009-018IS	99.5		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2009-020AIS	79.5		17 W-SC-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2009-026IS	106.5		16 W-ND	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2010-001IS	99		15 E-SD	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2010-003IS	34		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2012-012IS	75		16 W-ND	ON SUSPENSION
DIS-15-2-PQ	GEN-2013-009IS	19.5		15 E-SD	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2-PQ	GEN-2014-001IS	103.7	Wind	15 E-SD	IA PENDING
DIS-15-2-PQ	GEN-2014-006IS	113.28		16 W-ND	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2014-010IS	150		16 W-ND	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	GEN-2014-014IS	149.73		16 W-ND	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2-PQ	MPC00100	99	Wind	18 E-ND	IN SERVICE
DIS-15-2-PQ	MPC00200	60	Wind	18 E-ND	IN SERVICE
DIS-15-2-PQ	MPC00300	40.5	Wind	18 E-ND	IN SERVICE
DIS-15-2-PQ	MPC00500	378.9	Wind	18 E-ND	IN SERVICE
DIS-15-2-PQ	MPC01200	49.5	Wind	18 E-ND	IN SERVICE
DIS-15-2-PQ	MPC01300	493	Wind	16 W-ND	IN SERVICE
DIS-15-2-PQ	MPC02100	99.25	Wind	16 W-ND	IN SERVICE
DIS-15-2	ASGI-2015-006	9	Solar	14 S-OK	
DIS-15-2	GEN-2015-020	100		06 NM & W-TX	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-034	200		08 N-OK & S-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-045	20		14 S-OK	IA FULLY EXECUTED/ ON SCHEDULE
DIS-15-2	GEN-2015-046	300		16 W ND	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-047	297.8		08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2	GEN-2015-048	200		01 WDWRD	IA FULLY EXECUTED/IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-052	300		08 N-OK & S-KS	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-055	40		07 SW-OK	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-057	100		01 WDWRD	IA FULLY EXECUTED/COMMERCIAL OPERATION

Study	Gen Number	Capacity	Fuel Source	Group	STATUS
DIS-15-2	GEN-2015-062	4.5		08 N-OK & S-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-063	300		08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2	GEN-2015-064	197.8		04 NW-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-065	202.4		04 NW-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2	GEN-2015-066	248.4		08 N-OK & S-KS	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-069	300		08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2	GEN-2015-071	200		07 SW-OK	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-073	200.1		08 N-OK & S-KS	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-076	158.4		09 - Nebraska	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-088	300		09 - Nebraska	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-090	220		08 N-OK & S-KS	IA FULLY EXECUTED/COMMERCIAL OPERATION
DIS-15-2	GEN-2015-092	250		14 S-OK	IA FULLY EXECUTED/ON SCHEDULE
DIS-15-2	GEN-2015-093	250		01 WDWRD	IA FULLY EXECUTED/ON SUSPENSION
DIS-15-2	GEN-2015-096	150		16 W ND	IA FULLY EXECUTED/COMMERCIAL OPERATION

Table 2: MISO Generation Requests Included within AS-LOIS

Study	MISO Project	Capacity	Fuel Source	Area
PQ	G132	180	Wind	SD-G15
PQ	G255	100	Wind	SD-G15
PQ	G263	105	Wind	SD-G15
PQ	G287	200	Wind	SD-G15
PQ	G349	200	Wind	SD-G15
PQ	G362	200	Wind	SD-G15
PQ	G370	205	Gas	SD-G15
PQ	G380	150	Wind	ND-G16
PQ	G386	100	Wind	SD-G15
PQ	G389	200	Gas	SD-G15
PQ	G514	150	Wind	SD-G15
PQ	G540	80	Wind	IA-G09
PQ	G548	80	Wind	IA-G09
PQ	G551	99	Wind	IA-G09
PQ	G573	80	Wind	IA-G09
PQ	G574	80	Wind	IA-G09
PQ	G575	40	Wind	IA-G09
PQ	G586	30	Wind	SD-G15
PQ	G595	150	Wind	IA-G09
PQ	G602	32	Wind	SD-G15
PQ	G604	44	Wind	SD-G15
PQ	G612	150	Wind	IA-G09
PQ	G619	50	Wind	ND-G16
PQ	G621	20	Wind	SD-G15
PQ	G685	20	Wind	SD-G15
DPP-2008-NOV	G735	200	Wind	IA-G09
DPP-2008-NOV	G741	8	Waste Heat	SD-G15
DPP-2012-AUG	G752	150	Wind	ND-G16
DPP-2009-MAR	G788	49	Wind	ND-G16
DPP-2010-APR	G798	150	Wind	IA-G09



Study	MISO Project	Capacity	Fuel Source	Area
DPP-2010-AUG	G826	200	Wind	SD-G15
DPP-2012-AUG	G858	38	Wind	SD-G15
DPP-2012-AUG	G870	201	Wind	SD-G15
DPP-2013-FEB	G929	60	Nuclear	SD-G15
DPP-2012-AUG	G930	60	Coal	SD-G15
PQ	G947	99	Wind	IA-G09
DPP-2009-MAR	G971	20	Wind	SD-G15
DPP-2009-MAR	H007	41	Wind	IA-G09
DPP-2013-AUG	H008	36	Wind	IA-G09
DPP-2009-MAR	H009	150	Wind	IA-G09
DPP-2012-AUG	H021	138.6	Wind	IA-G09
DPP-2012-AUG	H071	40	Wind	SD-G15
DPP-2012-AUG	H078	121	Wind	IA-G09
DPP-2013-FEB	H092	60	Coal	ND-G16
DPP-2008-NOV	H081	201	Wind	SD-G15
DPP-2008-NOV	H096	50	Wind	IA-G09
DPP-2012-AUG	J020	20	Diesel	SD-G15
DPP-2009-JUL	J091	66	Wind	IA-G09
DPP-2012-AUG	J110	7.5	Biomass	ND-G16
DPP-2012-AUG	J112	4.95	Wind	SD-G15
DPP-2012-AUG	J171	12	Biomass	SD-G15
DPP-2012-AUG	J183	200	Wind	SD-G15
DPP-2012-AUG	J191	101.2	Wind	IA-G09
DPP-2012-AUG	J200	75	Gas	ND-G16
DPP-2012-AUG	J233	635	CC	IA-G09
DPP-2012-AUG	J249	180	Wind	ND-G16
DPP-2012-AUG	J262	100	Wind	ND-G16
DPP-2013-FEB	J263	100	Wind	ND-G16
DPP-2013-FEB	J274	100	Wind	IA-G09
DPP-2013-FEB	J278	200	Wind	SD-G15
DPP-2013-AUG	J279	(Uprate) 30	Coal	IA-G09
DPP-2013-AUG	J290	150	Wind	ND-G16
DPP-2013-AUG	R15	80	Wind	IA-G09
DPP-2013-AUG	R23	100	Wind	IA-G09
PQ	R26	146	Wind	IA-G09
PQ	R34	250	Wind	IA-G09
PQ	R38	200	Wind	IA-G09
PQ	R39	500	Wind	IA-G09
PQ	R41	100	Wind	IA-G09
PQ	R42	250	Wind	IA-G09
PQ	R49	12	Wind	IA-G09
DPP-2012-AUG	R65	92	Wind	IA-G09
DPP-2012-AUG	J285	250	Wind	IA-G09
DPP-2012-AUG	J289	20	Wind	IA-G09
DPP-2014-AUG	J316	150	Wind	ND-G16
DPP-2014-AUG	J320	55	Gas	SD-G15
DPP-2014-AUG	J329	55	Hydro	IA-G09
DPP-2014-AUG	J343	150	Wind	IA-G09
DPP-2014-AUG	J344	169	Wind	IA-G09
DPP-2014-AUG	G736	200	Wind	SD-G15
DPP-2014-AUG	J299	183.48	Gas	SD-G15
DPP-2015-FEB	J385	100	Solar	SD-G15
DPP-2015-FEB	J391	50	Gas	SD-G15
DPP-2015-FEB	J400	62	Solar	SD-G15
DPP-2015-FEB	J405	9.6	Gas	ND-G16

Study	MISO Project	Capacity	Fuel Source	Area
DPP-2015-FEB	J407	200	Wind	SD-G15
DPP-2015-FEB	J411	150	Wind	IA-G09
DPP-2015-FEB	J416	87.5	Wind	IA-G09
DPP-2015-FEB	J426	100	Wind	IA-G09
DPP-2015-AUG	J041	90	Wind	IA-G09
DPP-2015-AUG	J412	200	Wind	IA-G09
DPP-2015-AUG	J436	150	Wind	SD-G15
DPP-2015-AUG	J437	150	Wind	SD-G15
DPP-2015-AUG	J438	170.2	Wind	IA-G09
DPP-2015-AUG	J443	41	Wind	IA-G09
DPP-2015-AUG	J449	202	Wind	IA-G09
DPP-2015-AUG	J455	300	Wind	IA-G09
<b>DPP-2015-AUG</b>	<b>J442</b>	<b>200</b>	<b>Wind</b>	<b>SD-G15</b>

Additional MISO Generators that were included in the dispatch:

Study	Bus Number	Bus Name	Capacity	Area
MISO-PQ	630385	SLAKES 8 69.000	40.00	IA-G09
MISO-PQ	630385	SLAKES 8 69.000	39.00	IA-G09
MISO-PQ	633408	MPW GEN8 69.000	22.00	IA-G09
MISO-PQ	633408	MPW GEN8 69.000	18.80	IA-G09
MISO-PQ	635044	WALNUT0 0.5750	75.00	IA-G09
MISO-PQ	635045	WALNUT1 0.5750	76.50	IA-G09
MISO-PQ	635312	VICTRYG1 0.5750	99.00	IA-G09
MISO-PQ	635316	CARROLG2 0.5750	75.00	IA-G09
MISO-PQ	635317	CARROLG1 0.5750	75.00	IA-G09
MISO-PQ	635352	CLIPR G1 0.5700	70.50	IA-G09
MISO-PQ	635352	CLIPR G1 0.5700	15.00	IA-G09
MISO-PQ	635354	CLIPR G2 0.5700	90.00	IA-G09
MISO-PQ	635637	ADAIWVG1 0.6900	87.50	IA-G09
MISO-PQ	635638	ADAIWVG2 0.6900	87.50	IA-G09
MISO-PQ	636027	POCHNTG1 0.5750	96.00	IA-G09
MISO-PQ	636033	POCHNTG2 0.5750	106.00	IA-G09
MISO-PQ	636035	POCHNTG3 0.5750	52.50	IA-G09
MISO-PQ	636035	POCHNTG3 0.5750	29.90	IA-G09
MISO-PQ	636238	ENXCO G1 0.5700	70.50	IA-G09
MISO-PQ	636238	ENXCO G1 0.5700	35.00	IA-G09
MISO-PQ	636239	ENXCO G2 0.5700	94.50	IA-G09
MISO-PQ	636309	CCITYSG1 0.5750	75.00	IA-G09

This AS-LOIS was required because the Affected System Interconnection Customer is requesting interconnection prior to the completion of all higher queued assigned required upgrades listed within the latest iteration of SPP Affected System Impact Study for MISO DPP-AUG-2015 West. Table 3 below lists an upgrade project that was not included in this AS-LOIS. This upgrade is required for full interconnection service but is not required for the 200 MW of ERIS or NRIS Limited Operation identified in this report. J442 was included within SPP Affected System Impact Study for MISO DPP-AUG-2015 West that was studied in August 2015.

*Table 3: Upgrade Projects not included but Required for Full Interconnection Service*

Upgrade Project	Type	Description	Status	Study
Gentleman – Thedford – Holt County 345kV (“R-Plan”) Project	New line, transformer, and substation	Build approximately two hundred twenty-seven (227) miles of new 345kV from Gentleman – Holt County. Install Thedford 345/115/13kV transformer, and built Holt County Substation	New ISD scheduled for 2021	2012 SPP Integrated Transmission Plan – 10 Year Assessment (ITP10)

# FACILITIES

## Generating Facility

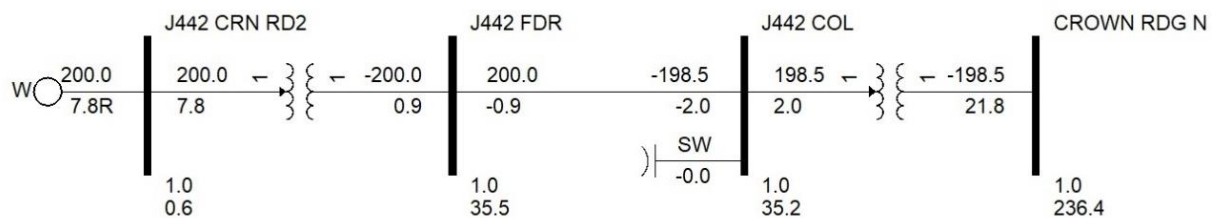
Interconnection Customer shall install a wind Generating Facility in Codington, Deuel, and Grant Counties in South Dakota and is interconnecting into the Transmission Owner's Big Stone South substation in Grant County, SD. The J442 Generating Facility is composed of eighty-seven (87) GE 2.3 MW wind turbines.

The J442 switchyard shall contain a 34.5/230 kV generator step up transformer, rated at 135/180/225 MVA, and a high side breaker.

## Interconnection Facilities

The POI for J442 is Big Stone substation via a radial 230 kV line. The POI is depicted in the power flow model below.

Figure 1: Proposed POI Configuration and Request Power Flow Model



# POWER FLOW ANALYSIS

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The Power flow analysis is used to determine if the transmission system can accommodate the injection from the request without violating thermal or voltage transmission planning criteria.

## Model Preparation

Power flow analysis was performed using modified versions of the 2016 series of transmission service request study models including the 2017 Winter Peak (17WP), 2018 Spring (18G), and 2018 Summer Peak (18SP), 2021 Light (21L), and 2021 Summer (21SP) and Winter (21WP) peak and 2026 Summer (26SP) seasonal models. To incorporate the Interconnection Customers' request, a re-dispatch of existing generation within SPP and MISO was performed with respect to the amount of the Customers' injection.

To incorporate the Interconnection Customers' request, a re-dispatch of existing generation within SPP and MISO was performed with respect to the amount of the Customers' injection.

Per SPP's dispatch methodology, Variable Energy Resources (VER) (solar/wind) in each power flow case are for evaluated Energy Resource Interconnection Service (ERIS). The VER's within a geographical area of the interconnection request(s) are dispatched at 100% nameplate of maximum generation. The VERs in the remote areas are dispatched at 20% nameplate of maximum generation. These projects are dispatched across the SPP footprint using load factor ratios.

Peaking units are not dispatched in the 2018 spring and 2021 light, or in the "High VER" summer and winter peaks. To study peaking units' impacts, the 2017 winter peak, 2018 summer peak, and 2021 summer and winter peaks and 2026 summer peak, models are developed with peaking units dispatched at 100% of the nameplate rating and VERs dispatched at 20% of the nameplate rating. Each interconnection request is also modeled separately at 100% nameplate for certain analyses.

All SPP generators (VER and peaking) that requested Network Resource Interconnection Service (NRIS) are dispatched in an additional analysis into the interconnecting Transmission Owner's (T.O.) area at 100% nameplate with Energy Resource Interconnection Service (ERIS) only requests at 80% nameplate. All MISO generators (VER and peaking) that requested Network Resource Interconnection Service (NRIS) are dispatched based on their respective NRIS amounts in an additional analysis into the MISO transmission system. This method allows for identification of network constraints that are common between regional groupings to have affecting requests share the mitigating upgrade costs throughout the cluster.

For this AS-LOIS, only the previous queued requests listed in Table 1 were assumed to be in-service at 100% dispatch.

## Study Methodology and Criteria

### THERMAL OVERLOADS

Network constraints are found by using PSS/E AC Contingency Calculation (ACCC) analysis with PSS/E MUST First Contingency Incremental Transfer Capability (FCITC) analysis on the entire cluster grouping dispatched at the various levels previously mentioned.

For Energy Resource Interconnection Service (ERIS), thermal overloads are determined for system intact (n-0) (greater than 100% of Rate A - normal) and for contingency (n-1) (greater than 100% of Rate B – emergency) conditions.

The overloads are then screened to determine which generator interconnection requests have at least:

- 3% Distribution Factor (DF) for system intact conditions (n-0)
- 20% DF upon outage-based conditions (n-1)
- 3% DF on contingent elements that resulted in a non-converged solution

Interconnection Requests that requested Network Resource Interconnection Service (NRIS) are also studied in a separate NRIS analysis to determine if any constraint measured greater than or equal to a 3% DF. If so, these constraints are also considered for transmission reinforcement under NRIS.

The contingency set includes all SPP control area branches and ties 69kV and above, first tier Non- SPP control area branches and ties 115 kV and above, any defined contingencies for these control areas, and generation unit outages for the SPP control areas with SPP reserve share program redispatch.

The monitored elements include all SPP control area branches, ties, and buses 69 kV and above, and all first tier Non-SPP control area branches and ties 69 kV and above. NERC Power Transfer Distribution Flowgates for SPP and first tier Non-SPP control area are monitored. Additional NERC Flowgates are monitored in second tier or greater Non-SPP control areas. Voltage monitoring was performed for SPP control area buses 69 kV and above.

## VOLTAGE

For non-converged power flow solutions that are determined to be caused by lack of voltage support, appropriate transmission support will be determined to mitigate the constraint.

After all thermal overload and voltage support mitigations are determined; a full ACCC analysis is then performed to determine voltage constraints. The following voltage performance guidelines are used in accordance with the Transmission Owner local planning criteria.

### SPP Areas (69kV+):

Transmission Owner	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
AEPW	0.95 – 1.05 pu	0.92 – 1.05 pu
GRDA	0.95 – 1.05 pu	0.90 – 1.05 pu
SWPA	0.95 – 1.05 pu	0.90 – 1.05 pu
OKGE	0.95 – 1.05 pu	0.90 – 1.05 pu
OMPA	0.95 – 1.05 pu	0.90 – 1.05 pu
WFEC	0.95 – 1.05 pu	0.90 – 1.05 pu
SWPS	0.95 – 1.05 pu	0.90 – 1.05 pu
MIDW	0.95 – 1.05 pu	0.90 – 1.05 pu
SUNC	0.95 – 1.05 pu	0.90 – 1.05 pu
KCPL	0.95 – 1.05 pu	0.90 – 1.05 pu
INDN	0.95 – 1.05 pu	0.90 – 1.05 pu
SPRM	0.95 – 1.05 pu	0.90 – 1.05 pu

NPPD	0.95 – 1.05 pu	0.90 – 1.05 pu
WAPA	0.95 – 1.05 pu	0.90 – 1.05 pu
WERE L-V	0.95 – 1.05 pu	0.93 – 1.05 pu
WERE H-V	0.95 – 1.05 pu	0.95 – 1.05 pu
EMDE L-V	0.95 – 1.05 pu	0.90 – 1.05 pu
EMDE H-V	0.95 – 1.05 pu	0.92 – 1.05 pu
LES	0.95 – 1.05 pu	0.90 – 1.05 pu
OPPD	0.95 – 1.05 pu	0.90 – 1.05 pu

**SPP Buses with more stringent voltage criteria:**

Bus Name/Number	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
TUCO 230kV 525830	0.925 – 1.05 pu	0.925 – 1.05 pu
Wolf Creek 345kV 532797	0.985 – 1.03 pu	0.985 – 1.03 pu
FCS 646251	1.001 – 1.047 pu	1.001 – 1.047 pu

**Affected System Areas (115kV+):**

Transmission Owner	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
EES-EAI	0.95 – 1.05 pu	0.90 – 1.05 pu
LAGN	0.95 – 1.05 pu	0.90 – 1.05 pu
EES	0.95 – 1.05 pu	0.90 – 1.05 pu
AMMO	0.95 – 1.05 pu	0.90 – 1.05 pu
CLEC	0.95 – 1.05 pu	0.90 – 1.05 pu
LAFA	0.95 – 1.05 pu	0.90 – 1.05 pu
LEPA	0.95 – 1.05 pu	0.90 – 1.05 pu
XEL	0.95 – 1.05 pu	0.90 – 1.05 pu
MP	0.95 – 1.05 pu	0.90 – 1.05 pu
SMMPA	0.95 – 1.05 pu	0.90 – 1.05 pu
GRE	0.95 – 1.05 pu	0.90 – 1.10 pu
OTP	0.95 – 1.05 pu	0.90 – 1.05 pu
OTP-H (115kV+)	0.97 – 1.05 pu	0.92 – 1.10 pu
ALTW	0.95 – 1.05 pu	0.90 – 1.05 pu
MEC	0.95 – 1.05 pu	0.90 – 1.05 pu
MDU	0.95 – 1.05 pu	0.90 – 1.05 pu
SPC	0.95 – 1.05 pu	0.95 – 1.05 pu
DPC	0.95 – 1.05 pu	0.90 – 1.05 pu
ALTE	0.95 – 1.05 pu	0.90 – 1.05 pu

The constraints identified through the voltage scan are then screened for the following for each interconnection request. 1) 3% DF on the contingent element and 2) 2% change in pu voltage. In certain conditions, engineering judgement was used to determine whether a generator had impacts to voltage constraints.

## Results

Based on our analysis, the ERIS and NRIS results show there were no thermal, voltage, or non-converged constraints that meet the SPP criteria for mitigation for J442. Therefore, J442 can interconnect at full ERIS and NRIS output of 200 MW before completion of the Gentleman – Thedford – Holt County 345 kV (R-Plan) transmission line project.

## Curtailement and System Reliability

In no way does this study guarantee operation for all periods of time. It should be noted that although this study analyzed many of the most probable contingencies, it is not an all-inclusive list and cannot account for every operational situation. Because of this, the Customer may be required by the Transmission Provider to reduce generation output to 0 MW under certain operational system conditions to allow system operators to maintain the reliability of the transmission network.



## STABILITY ANALYSIS

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Transient stability analysis was not performed for this AS-LOIS study. The results from DPP-2015-AUG-West transient stability analysis remain valid.

## CONCLUSION

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Affected System Interconnection Customer has requested an Affected System Limited Operation System Impact Study (AS-LOIS) to be consistent with Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for 200 MW of wind generation, known as J442, to be interconnected with Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS) to the Midcontinent Independent System Operator (MISO) transmission system footprint. J442 is planned to interconnect into the Transmission Owner's Big Stone South substation in Grant County, SD. Affected System Interconnection Customer has requested this Affected System Limited Operation Interconnection Study (AS-LOIS) to determine the impacts of interconnecting J442 to the transmission system under the following assumptions:

- Include all higher queued SPP assigned upgrades except for Gentleman – Thedford – Holt 345kV ("R-Plan") Project
- All higher queued MISO assigned upgrades
- Include GEN-2015-023 at 195 MW of limited injection

Transient stability and short circuit analysis were not performed for this AS-LOIS study. The transient stability and short circuit analysis results from DPP-2015-AUG-West remain valid.

Power-flow analysis from this Affected System LOIS has determined that the J442 request can interconnect 200 MW of ERIS and NRIS prior to the completion of the required Network Upgrades, listed within Table 3.

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this AS-LOIS at the expense of the Customer.