

Rugby Area Wind Farm Impacts

Effective: 12/01/2016	End/Review: 12/01/2017	APP ID: N/A
Monitored Elements:	Dorsey – Riel – Roseau 500kV (M602F) Peace Garden – Glenboro 230kV Glenboro – Cornwallis 230kV Richer-Roseau 230kV (R50M) Rugby230 – Rugby WAPA 115kV	
Written By:	Miles Larson (MISO), Kris Ruud (MISO), Lin Bo (MISO)	
Reviewed By:	Jake Heck / Gabe Kainz (OTP), Wenjie Zhang / Allan Silk (MHEB), Pam Sordet (XEL), Patrick DeLassus (SPP), Ben Hammer (WAPA)	
Issued By:	Miles Larson (MISO)	

1.0 Purpose/Background

This Guide addresses congestion management of both MHEB and MISO/SPP systems during the operation of the Herd Lake (Rugby) and Border (Peace Garden) wind farms:

Herd Lake (Rugby) Wind Farm has the total capacity of 150MW.

Border (Peace Garden) Wind Farm has the total capacity of 150MW.

This Op Guide will address congestion mitigation plans during the operation of these wind farms and also cover prior outage limitations as well as the transmission rights associated with the wind farms.

Entities involved:

MISO-North: Reliability Coordinator, Balancing Authority

Iberdrola Renewable: Generation Operator

Otter Tail Power Company (OTP): Transmission Operator, Local Balancing Authority

Manitoba Hydro (MHEB): Transmission Operator

Xcel Energy (XEL): Transmission Operator

Southwest Power Pool (SPP): WAPA/BEPC/CBPC Reliability Coordinator, Balancing Authority

Border Wind (XEL): Generation Operator

2.0 Pre-Positioning Considerations

2.1 Prior Outage Limitations / Considerations

Herd Lake (Rugby) Wind Farm has firm transmission rights **only into the MISO network**. The wind farm does not have rights into the WAPA/SPP Rugby 115kV path or the 230kV Peace Garden → Glenboro MHEB path.

The Border (Peace Garden) Wind Farm has firm transmission rights **only into the MISO network**. The wind farm does not have rights into the Rugby230-RugbyWAPA 115kV path or the 230kV Peace Garden → Glenboro MHEB path.

*Only if proper Transmission Service Requests (TSR's) are granted by WAPA/SPP or MHEB (Prior to any planned outages that remove the MISO path) will the wind farm be allowed to output.

Prior Outage	Herd Lake (Rugby) Wind Impact	Border (Peace Garden) Wind Impact
Rugby 230/115kV TR1 or TR2	No limitations (Rugby230-Balta 230kV path can handle max wind output).	No limitations (Rugby230-Balta 230kV path can handle max wind output).
Rugby230-Balta 230kV ¹	Curtailed/Limited to 0MW Unless a proper TSR was approved by MHEB or WAPA/SPP to allow the transmission access.	Curtailed/Limited to 0MW Unless a proper TSR was approved by MHEB or WAPA/SPP to allow the transmission access.
Rugby230-Peace Garden 230kV	No limitations (Rugby230-Balta 230kV path still available).	Curtailed/Limited to 0MW Unless a proper TSR was approved by MHEB to allow the transmission access.
Peace Garden-Glenboro 230kV (G82P)	No limitations (Rugby230-Balta 230kV path can handle max wind output).	No limitations (Rugby230-Balta 230kV path can handle max wind output).
Rugby230-RugbyWAPA 115kV	No limitations (Rugby230-Balta 230kV path can handle max wind output).	No limitations (Rugby230-Balta 230kV path can handle max wind output).

¹For this prior outage, additional switching is needed to protect potential out of step conditions on the 115kV system.

- **If it's a PLANNED outage**, MISO North RC will coordinate with the area TO's (XEL/OTP/MHEB/WAPA/SPP) to determine the best switching option to implement prior to taking the outage. Depending on system conditions at the time of the outage, the following options will be discussed:
 - 1) Open G82P (Glenboro-Peace Garden 230kV)
 - 2) Open Rugby230-Peace Garden 230kV
 - 3) Open Rugby230 (OTP) – Rugby (WAPA) 115kV tie-line
- **If it's a FORCED outage**, MISO North RC will instruct OTP to open up CB's 2355 and 2365 at RUGBY230 (Effectively open-ending the RUGBY230-PEACGRDN 230kV line). If the RUGBY230 (OTP) – RUGBY (WAPA) 115kV tie line is OPEN at the time of this forced outage, then no actions are required.

3.0 Pre-Contingent

3.1 Congestion Mitigation

MISO North RC will monitor and control the identified flowgates, as listed in section 3.1.1 below, by using either market to market action or other standard congestion management procedures.

In a situation where market to market action or TLR3 procedures do not provide sufficient relief, MISO North RC will curtail Border and Herd Lake wind farms to 0MW prior to the initiation of TLR 5.

3.1.1 NERC Flowgates

OTDF Flowgates (Table 1)

FG Number	Flowgate Type	Owner	Monitored Element	Contingent Element	Rating Set	Emergency Rating
FG21150	RCF/M2M	SPP	Rugby230- RugbyWAPA 115kV	Rugby230-Balta 230kV	Summer/Winter	219/219 MVA
FG6213	RCF/M2M	MISO	Glenboro-Peace Garden 230kV (G82P N/S)	Dorsey-Riel-Roseau 500kV (M602F)	Summer/Winter	420 / 495 MVA
FG6212	RCF	MHEB	Glenboro-Cornwallis 230kV (G37C N)	Dorsey-Riel-Roseau 500kV (M602F)	Summer/Winter	402/ 496 MVA

PTDF Flowgates (Table 2)

Flowgate Number	Flowgate Type	Owner	Monitored Element	Rating Set	Normal Rating
FG6061	RCF	MISO	Richer-Roseau 230kV (R50M)	Summer/Winter	230 / 230 MVA
FG6120	RCF	MHEB	Glenboro-Peace Garden 230kV (G82P South Flow)	Summer/Winter	390.4 / 495 MVA
FG6060	RCF/M2M	MISO	Dorsey-Riel-Roseau 500kV (M602F)	Summer/Winter	1732 / 1732MVA
FG6138	RCF/M2M	MISO	Glenboro-Peace Garden 230kV (G82P North Flow)	Summer/Winter	390.4 / 495 MVA

3.1.1.1 Dorsey – Roseau -- Forbes 500kV line (M602F)

During the prior outage of any 230kV and above lines in the area, Dorsey - Roseau - Forbes 500kV line may overload.

For FG6060 (See table 2 above), please refer to the “M602F Constraint” Standing Op Guide for additional mitigation considerations.

3.1.1.2 Richer–Roseau 230kV (R50M)

During the prior outage of M602F, Richer – Roseau 230kV line may overload.

For FG6061 (See table 2 above), please refer to the “R50M Constraint” Standing Op Guide for additional mitigation considerations.

3.1.1.3 Glenboro-Peace Garden 230kV line

During the prior outage of any 230kV and above lines in the area, Glenboro-Peace Garden 230kV line may overload. Flowgates **6138** and **6120** (See table 2 above), as well as **6213** (See table 1 above), have been created as RCF flowgates and MISO RC will commence Congestion Management Procedures of Table 1 in RTO-RA-OP-001.

3.1.1.4 Glenboro-Cornwallis 230kV

During the prior outage of M602F with MHEX north flow, Glenboro-Cornwallis 230kV line may overload. Flowgate **6212** (See table 1 above) has been created as a RCF flowgate and MISO RC will commence Congestion Management Procedures of Table 1 in RTO-RA-OP-001.

4.0 Post-Contingent / During the Outage

In the event that Border (Peace Garden) or Herd Lake (Rugby) Wind farms are isolated to MHEB/WAPA networks (MISO Path(s) are opened), the wind farms will be curtailed to 0MW until TSR’s are granted or the MISO path(s) become available again.

Refer to **Section 2.1** above for further details on N-1 considerations.

5.0 References

MHEX Winter Operating standing Guide
M602F Constraint Standing Op Guide
R50M Constraint Standing Op Guide
RTO-RA-OP-001

Revision History

Revision Level	Description	Revised by:	Issued Date
2016-R00	Complete Guide Revision	Miles Larson	04/28/2016
2016-R01	Rugby 115kV Tie-Line Rating Increase	Miles Larson	5/23/2016
New 2016-R00	Updated Active Flowgates	Miles Larson	11/11/2016
New 2016-R01	Updated language for Rugby-Balta 230kV Prior Outage.	Miles Larson	12/01/2016