



**Presque Isle  
Special Protection System  
“Remedial Action Tripping Scheme” (RATS)**

**Update**

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American Transmission Company, LLC**

*Prepared By:*  
David Cullum, P.E.  
Team Leader – G-T & Special Studies

*Reviewed By:*  
Dale Burmester, P.E.  
Manager, Economic Planning

## **Introduction**

On December 17, 2007, ATC posted the third and final version of the Presque Isle Special Protection System, also known as the Remedial Action Tripping Scheme (RATS), report documenting the then-existing RATS implementation along with study results for future system conditions and the recommended RATS changes once certain transmission projects affecting the study area were completed. This update communicates the status of the Presque Isle RATS as of summer 2008.

## **Update**

During May 2008, ATC completed system upgrades to the 138-kV line between the Forsyth and Empire substations such that the summer emergency rating of the transmission line increased from 202 MVA to 300 MVA. During June 2008, ATC completed the Presque Isle RATS setting changes as documented in Tables 1 and 2 of this report. Tables 1 and 2 contain a correction to the information previously communicated in Tables 2.6.1.1 and 4.0.1 of the final report. Specifically, the RATS relaying for line 457 is located at the Presque Isle substation instead of the Empire substation.

In addition, the prior transmission element outage restrictions on the Presque Isle power plant output as communicated in Table 4.2.1 of the final report is reproduced here as Table 3.

The remaining major changes to the transmission system are not projected to be completed until 2009 and 2010. These changes include the completion of the 345-kV lines known as the Gardner Park-Central Wisconsin and Morgan-Werner West projects and the 138-kV conversion project between Conover and Plains substations. Once these changes are complete, further changes to the RATS settings are expected, as communicated in the final report in Tables 6.2.2 and 6.2.1.1.

Table 1: Current Presque Isle RATS Relay Trip Level Settings

Relay Name	Relay at	Relay sees	Fault type <sup>1</sup>	Fault Location		Trip Signal <sup>3</sup>
SEL-311C <sup>2</sup>	DRV 345	Line 85601	3PG/2PG/2PP 1PG	Anywhere	Anywhere	2 3
SEL-311C <sup>2</sup>	PRI 138	Line 481 and both DRV 345/138	3PG/2PG/2PP 1PG	Anywhere	Anywhere	1 2
SEL-321	PRI 138	Line 468	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 30% 30 to 100% Anywhere	line 468 line 468	3 No trip No trip
SEL-321	PRI 138	Line 457	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 25% 25 to 100% Anywhere	line 457 line 457	3 No trip No trip
SEL-321	PRI 138	Goose Lake Line	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 25% 25 to 100% Anywhere	Goose Lake line Goose Lake line	3 No trip No trip
SEL-321	PRI 138	Line 446	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 25% 25 to 100% Anywhere	line 446 line 446	3 No trip No trip
SEL-321	PRI 138	Lines PI605	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 35% 35 to 100% Anywhere	line PI605 line PI605	3 No trip No trip
SEL-321	PRI 138	Line PI336	3PG/2PG/2PP 3PG/2PG/2PP 1PG	0 to 35% 35 to 100% Anywhere	line PI336 line PI336	3 No trip No trip

1. Breaker open conditions are described in Table 2.
2. The SEL-321 relay provides a redundant trip signal.
3. The existing SPS has a voltage relay on the 138 kV Bus Section #5 at the Presque Isle Substation which supervises the SPS trips for faults on the lines that emanate from the PIPP and for faults on the Forsyth line. For these faults, the voltage would also have to drop below a threshold value before generation is tripped at the PIPP. The threshold value for the existing SPS is being checked as of the date of this report. The recommended voltage threshold is 0.90 p.u. for the Permanent Solution.

Table 2: Current Presque Isle SPS Breaker Open Trip Level Settings

Substation	Breaker(s) opened <sup>1</sup>	Trip signal <sup>2</sup>
PRI 138	BS18 and BS78	3
PLA 345	BS12 and BS23	3
DRV 138	481	3
DRV 345	BS12	3

1. All faults which cause these circuit breakers to open also result in the respective trip signals listed in Table 1. Therefore both trip signals from Tables 1 and 2 are sent.
2. There is no voltage supervision for the breaker open signals.

Table 3: Current Prior Transmission Element Outage Restrictions

Prior Outage	Stability			Thermal <sup>4</sup>		
	Worst Next Contingency <sup>3</sup>	Limiting Element	Maximum allowed MW injection at the Presque Isle 138 kV bus <sup>2</sup>	Worst Next Contingency <sup>3</sup>	Limiting Element	Maximum allowed MW injection at the Presque Isle 138 kV bus
EMP 138 – FRY 138	3PG fault @ DRV 138 – PRI 138	Angular stability	280 Year Round	3PG fault @ DRV 345 – PLA 345	PLK 138 – NRD 138	290 Year Round
PRI 138 – DRV 138 DRV 345 – PLA 345	3PG fault @ EMP 138 – FRY 138	Angular stability	280 Year Round	3PG fault @ EMP 138 – FRY 138	PLK 138 – NRD 138	290 Year Round
FRY 138 – ARN 138	3PG fault @ DRV 345 – PLA 345	Angular stability	430 Year Round	3PG fault @ DRV 345 – PLA 345	FRY 138/69	310 Year Round
PLK 138 – NRD 138	3PG fault at PRI 138 – DRV 138	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	ARN 138 – FRY 138	405 Year Round
NRD 138 – PLA 138	3PG fault @ DRV 345 – PLA 345	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	NRD 138/69	315 Year Round
PRI 138 – PLK 138	3PG fault at PRI 138 – DRV 138	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	CDR 138 – M38 138	320 Year Round
CDR 138 – M38 138	3PG fault at PRI 138 – DRV 138	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	PRI 138 – PLK 138	475 Year Round
ARN 138 – PLA 138	3PG fault @ DRV 345 – PLA 345	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	PLK 138 – NRD 138	420 Year Round
EMP 138 – NAT 138	3PG fault at PRI 138 – DRV 138	Angular stability	No limit (SPS resolves stability)	3PG fault @ DRV 345 – PLA 345	PRI 138 – EMP 138	515 Summer Only

1. The highlighted cell is the most restrictive condition for each prior outage.
2. Maximum injection at the Presque Isle 138-kV bus in this table is the sum of a 30 MW injection from the City of Marquette with the remaining amount of generation supplied by the Presque Isle power plant units. The stability limits in the table are plant specific meaning the total acceptable Presque Isle power plant output cannot exceed the noted limit minus 30 MW unless a study of the specific system conditions determines otherwise.
3. Applying 3 phase to ground fault at the selected locations results in all but 20 MW of mine load to trip off line.
4. The thermal limits communicated in this table are for information only. The actual limit will be communicated in real-time and may be higher or lower.