

August 14 Blackout Significant Restoration Milestones

Introduction

- This information provides a brief summary of system operations on the IMO-controlled grid surrounding the system blackout and subsequent system restoration for the days of August 14 and 15, 2003.
- This summary does not cover those operations and events that occurred outside of Ontario.
- Times may be revised as disturbance analysis continues. All time are in EDT.

1. Pre Event System Conditions – August 14, 2003, 4:06 p.m.

Temperature: 31degrees Celsius
Ontario Demand: 24,050 MW
Imports: 2,300 MW (New York, Michigan, Quebec, Manitoba, Minnesota)

- All flows on the transmission system were within limits prior to the event.
- Demand was within expectations at the time of the event, with all reserve criteria being met. All power system conditions were normal.
- Sufficient resources were scheduled to meet the demand and reserve obligations for the expected evening peak of 24,400 MW.

2. The Event

- Large power swings occurred at the Michigan and New York interfaces between 4:09 p.m. and 4:12 p.m.
- The records show that at approximately 4:09 p.m. the first power swing occurred. This swing resulted in a changed flow of 700 MW from New York through Ontario toward Michigan.
- The first swing was unusual but not abnormal. All other conditions were normal at the time of the first power swing.

- Approximately 90 seconds later there were several power swings ranging between 2,000 MW and 4,000 MW over a 12 second period between New York, Ontario and Michigan.
- During this time, at approximately 4:11 p.m. the power system begins to shut down.
- The power system of the Northeastern United States and portions of Canada were affected. Approximately 61,800 MW of customer load was interrupted affecting approximately 50 million people. The cause of the event is under review.

3. Impact on Ontario

- Nearly all of the load in Ontario east of Wawa was interrupted. The area west of Wawa was not affected and remained connected to the Manitoba and Minnesota systems.
- Two notable islands of load and generation were formed in the Niagara area and the Cornwall area.
- Two smaller islands of local load and generation were formed, one north of the Timmins area and another along the Ottawa River near Deep River stretching along the bottom of Algonquin Park

4. System Restoration - Event Milestone

- The following is a chronology of events and focuses on the early stages of restoration.

4.1. Restoration from the Niagara Area

- The first circuits were energized out of the Niagara island at 4:42 p.m with a goal of bringing power to the Bruce Nuclear generating units. The three Bruce "B" generating units that were available returned to service between 7:13 p.m. and 9:13 p.m..
- Energizing the circuits towards the Bruce Nuclear complex also allowed the IMO to return potential to Nanticoke generating station.
- Restoration came next toward the GTA, Pickering Nuclear Stations, Lambton Generating Station and TransAlta - Sarnia.
- The transmission system in the area bounded by London in the west and Toronto in the east had to be reinforced quickly to support the reloading of the Bruce generation. To perform this, customers' power was restored in a controlled manner at many locations throughout the transmission corridor.

4.2. Restoration from the Cornwall Area

- The period from 4:11 p.m. to 5:15 p.m. was used to assess the conditions in the area, stabilize available generation, and secure transmission that was operating near its limits.
- At 5:15 p.m. the first circuit was energized out from the Cornwall area westward towards Pickering, Darlington and Lennox Generating stations. The Darlington generating unit that was available returned to service at 9:18 p.m.
- Generating units from Quebec were synchronized to the system at 8:17 p.m. to add additional stability to the area.
- With the transmission system that was restored across the GTA from Niagara supplying power to Pickering, a link between the Cornwall area and the GTA was completed at 10:37 p.m. forming a complete loop around Lake Ontario.
- While the transmission system was being restored toward Darlington, another restoration effort from Cornwall towards Ottawa began at 6:40 p.m. in order to restore critical telecommunications facilities.

4.3. Restoration from the Chats Falls Area

- Chats Falls generating station units (Northwest of Ottawa) were successfully started from power supplied by Quebec at 5:15 p.m. Restoration from this area was directed to Pickering in an effort to return power to Pickering in an expedient manner.
- After considerable switching efforts and with the aid of additional units from Quebec, circuits were energized from Chats falls towards Pickering at 8:21 p.m.
- Power arrived for Pickering from Niagara and Chats Falls at nearly the same time. Pickering was energized from the Niagara sources at 9:15 p.m.
- Chats Falls generation was eventually connected to the remainder of the system early Friday.

4.4. Northeastern Area

- Several Hydroelectric generators remained spinning but not connected to the island north of Timmins. A number of the generators at various facilities were synchronized together and by 7:41 p.m. the transmission system was energized south to Timmins.
- When sufficient Timmins area load was restored, the transmission system was energized south to the Sudbury area.

- From Sudbury the transmission system was energized in both an eastward direction towards the pocket of load along the Ottawa River that survived the initial event and westward towards Wawa.
- The connection between the northeastern area with southern Ontario, was completed at 3:43 a.m. Friday morning.
- The connection of northwestern Ontario to the rest of the Province was completed at Wawa at 5:20 a.m. Friday morning.