

**ERCOT Operations Report on the**

**EEA Level 1 Event of March 23, 2011**

Executive Summary

On March 23, 2011 the Station A 345 KV bus tripped at 14:46:55 simultaneously causing loss of the Station A to B 345 KV line, from Station A to C 345 KV line, from Station A to D 345 KV line, from Station A 345/138 KV Autotransformer and the Station A to E 345 KV line causing the loss of two units (units F and G) at Station F (approximately 1,014 MW generation).

ERCOT ISO implemented Level 1 of its Energy Emergency Alert (EEA) at 14:50 as Physical Responsive Capability (PRC) dropped below 2,300 MW. ERCOT requested 1,873 MW of Non-Spinning Reserve Services (NSRS) at 14:58. By 15:14 PRC was above 3,000 MW and EEA Level 1 was cancelled at 15:23. This event caused a frequency deviation of 0.3 Hz (59.700 Hz) at 14:46:50 per ERCOT ISO High-Speed Frequency Recorder Data. Frequency recovered within 5 minutes and 40 seconds to 60 Hz at 14:52:30.

At 14:47:30 Station H unit H was generating 383 MW when started ramping back and tripped at 14:48:55.

The following Operation Report discusses factors leading up to the event, system performance during the event, and actions taken by ERCOT in response to the event.

Time Line and Description of Significant Events

***March 23, 2011***

* 14:46:48 ERCOT system frequency prior to disturbance was 59.973 Hz.
* 14:46:50 Station A 345 KV bus tripped, causing the Station F to come off line with approximately 1,014 MW.
* 14:46:50 ERCOT system frequency dropped to approximately 59.700 Hz (High-Speed Frequency Recorder Data) immediately after the trip.
* 14:47:30 Station H unit H was generating 383 MW when started ramping back and tripped at 14:48:55.
* 14:50 ERCOT declared EEA Level 1. Physical Responsive Capability (PRC) dropped below 2,300 MW.
* 14:52:30 ERCOT system frequency recovered to 60 Hz.
* 14:58 1,873 MW Non-Spinning Reserve Services (NSRS) was requested.
* 15:23 EEA Level 1 was cancelled.

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*Figure 1 Event Timeline on March 23, 2011*

**Observations/Data Review**

03/23/11 12:00 – 20:00 Physical Responsive Capability (PRC), Non-Spinning Reserve Services (NSRS) and ERCOT Frequency.



*Figure 2PRC, NSRS performance and Frequency on March 23, 2011.*

### 03/23/11 12:00 – 20:00 Non-Spinning Reserves Services (NSRS)

### Below is a graph of ERCOT NSRS performance and Frequency during the event.



*Figure 3 NSRS performance and Frequency on March 23, 2011.*

### 03/23/11 12:00 – 20:00 Physical Responsive Capability (PRC)

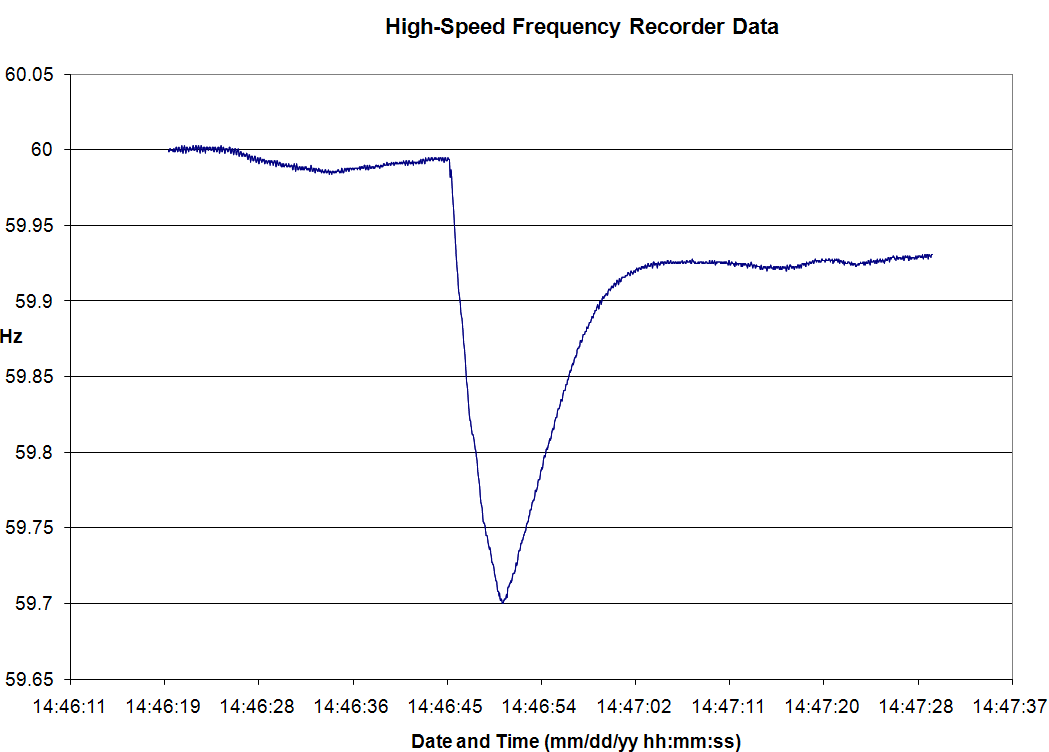
### Below is a graph of ERCOT PRC and Frequency during the event. At 14:50 ERCOT declared EEA Level 1. PRC dropped below 2,300 MW.

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*Figure 4 PRC and ERCOT Taylor Frequency on March 23, 2011.*

03/23/11 14:46 – 14:47 ERCOT ISO High-Speed Frequency Recorder Data

As can be seen in the Figure 5, per ERCOT ISO High-Speed Frequency Recorder Data the frequency dropped to 59.700003 Hz at approximately 14:46:50.

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*Figure 5 ERCOT High-Speed Frequency Recorder Data on March 23, 2011.*

03/23/11 12:00 – 20:00 Area Control Error (ACE) and ERCOT Taylor Frequency

Below shows the system frequency vs. ACE. At the lowest point ACE dropped to about -1,091 MW.



*Figure 6 ACE and ERCOT Frequency on March 23, 2011.*

03/23/11 14:30 – 15:30 Load Resource s (LR)

The following graph provided by ERCOT ISO Market Operations Support, present the data depicting the Load Resources (LR) deployment and ERCOT Frequency:

*Figure 7 ERCOT Load Resources RRS deployment 03/24/2011*

03/23/11 12:00 – 20:00 System Demand

Figure 8 shows actual load and generation used to meet load. The flow on the five DC Ties is included to show the difference between the actual generation and load.



*Figure 8 Actual Load and generation on March 23, 2011*

03/23/11 01:00 – 24:00 The role of wind plants

Figure 9 shows the hourly averages of actual wind and the wind Hour-ahead COPs data.



*Figure 9 Actual Aggregated Wind on March 23, 2011.*

**Action Items and Lessons Learned**

Event Analysis is ongoing.

Performed By: Operations Support Engineering

Department: System Operations Support