NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

# Conference Call Agenda

## Disturbance Monitoring Standard Drafting Team

February 15, 2008 | 1–4 p.m. EST
Dial in Number: 1-732-694-2061 | Conference Code: 1208021508
WebEx Site: https://nerc.webex.com/
WebEx Meeting Number: 714 458 154 | Password: standards

### 1. Administrative

#### 1.1. Roll Call

David Taylor welcomed the members and guests of the standard drafting team (SDT) for Project 2007-11 Disturbance Monitoring. The members of the drafting team in attendance were:

- Navin B. Bhatt — American Electric Power (Chair)
- Felix Amarh — Georgia Transmission Corporation
- Alan D. Baker — Florida Power & Light Company
- Larry Brusseau — Midwest Reliability Organization
- James R. Detweiler — FirstEnergy Corp.
- Barry G. Goodpaster — Exelon Business Services Company
- Daniel J. Hansen — Reliant Energy, Inc.
- Susan L. McGill — PJM Interconnection, L.L.C.
- Robert (Bob) Millard — ReliabilityFirst Corporation
- Steven Myers — Electric Reliability Council of Texas, Inc.
- Jeffrey M. Pond — National Grid
- Jack Soehren — ITC Holdings
- David Taylor — North American Electric Reliability Corporation

The members of the drafting team not in attendance were:

- Bharat Bhargava — Southern California Edison Co.
- Charlie Childs — Ametek Power Instruments
- Richard Dernbach — Los Angeles Department of Water & Power
- Willy Haffecke — Springfield Missouri City Utilities
- Tracy M. Lynd — Consumers Energy Co.
- Larry E. Smith — Alabama Power Company

Those in attendance not on the drafting team were:

- Stephanie Monzon — North American Electric Reliability Corporation

- Richard Ferner — WAPA
- Terry Conrad — Concurrent Technologies
- Chuck Jensen — JEA

David Taylor noted Stephanie Monzon will be transitioning to be the NERC Standards Coordinator over the next couple of months.

Each team member was asked to verify the information on the DM SDT roster and notify David Taylor via e-mail of any corrections that should be made.

### 1.2. NERC Antitrust Compliance Guidelines

David Taylor reviewed the NERC Antitrust Compliance Guidelines with the group.

## 2. Action Items

David Taylor reviewed the actions generated during the last meeting of the standard drafting team for Project 2007-11 Disturbance Monitoring:

| Action Items | Status: | Assigned To: |
|---|---|---|
| Everyone on the team was assigned to e-mail the entire SDT with the thresholds/levels used by their company for fault recorder data triggering (see R5 of the attached for additional information). This information should be e-mailed to the DMSDT@NERC.com distribution list by COB on Thursday, December 13. Barry Goodpaster graciously volunteered to summarize the information received. | **New — Completed** | All |
| Larry Smith and Chuck Jensen have volunteered to participate on a call with the SDT for Project 2007-17 to discuss responsibility of maintenance and testing requirements for disturbance monitoring equipment. David Taylor will lead that coordination effort. | **New — Completed**<br><br>Chuck Jensen and Larry Smith met with the SDT for Project 2007-17 Protection System Maintenance and Testing. The SDT for Project 2007-17 did not accept our proposal for transferring the testing and maintenance requirements. | Larry Smith, Chuck Jensen, and David Taylor |

David Taylor noted that even though the SDT fro Project 2007-17 declined this drafting team suggestion for moving the development of maintenance and testing requirements for disturbance monitoring equipment, the issue of how to organization requirements within standards is an ongoing project within NERC. In the mean time, the SDT for disturbance monitoring will continue to consider how to properly address the issues associated with maintenance and testing of disturbance monitoring equipment.

## 3. Project Schedule and SDT Objectives

David Taylor reviewed the schedule for Project 2007-01 Disturbance Monitoring with the group. He pointed out that even though we have not made a tremendous amount of progress the last few months, we are still on schedule; however, we must get to the point that we post the standard by the end of March or early April to stay on schedule.

The team discussed next steps in order to get to the point where the standard could be posted for comment. Alan Baker was very adamant that the standard should not be posted without an implementation plan.

**Action Item:** Jim Detweiler agreed to supply the RFC implementation as the basis to develop an implementation for this project. Jim will work with Jeff Pond and Alan Baker to draft an implementation plan prior to the next meeting of the group.

## 4. Standards Revisions

Navin Bhatt led the group in discussing the draft standards. The first item discussed was Barry Goodpaster's summary of the various fault recorder triggers used by those that replied to the action item form last meeting. **Attachment 1** is a summary of the information provided to Barry.

The original purpose of collecting the fault recorder triggers were to determine a set of practices exist that could be readily incorporated into a standard. After some debate the group agreed that it would be very difficult, if not impossible, to define a set of FR triggers. Steve Myers suggested that the SDT is not to specify how things are done; only what the desired outcome is to be. He further suggested that if a requirement or set of requirements exist for an entity to collect fault data, it is up to the entity to best determine their FR triggers to capture the data necessary to comply with the requirement. The group agreed to review the FR triggers information during the review of the draft standard.

The group then began to review the draft standard but got stuck on Requirement 2. See **Attachment 2** for the changes proposed to Requirement 2.

Susan McGill offered to clean up the draft standard and send it around for comment prior to the next meeting. Navin encouraged everyone to be prepared to discuss the entire standard at the next meeting which the group agreed would be face-to-face.

**Action Item:** Susan McGill to clean up the draft standard and send it around for comment prior to the next meeting.

**Action Item:** Everyone is to develop comments on draft standard prior to next meeting.

## 5. Compliance Elements of the Standard

The group did not have time to discuss the guidelines for developing compliance elements for the standard. This item will be discussed at the next meeting.

## 6. Action Items

Navin Bhatt will review the action items generated during the meeting and confirm assignments.

| Action Items | Status: | Assigned To: |
|---|---|---|
| Jim Detweiler agreed to supply the RFC implementation as the basis to develop an implementation for this project. Jim will work Jeff Pond and Alan Baker to draft an implementation plan prior to the next meeting of the group. | New | Jim Detweiler, Jeff Pond, and Alan Baker |
| Revise draft standard and distribute it to SDT prior to next meeting. | New | Susan McGill |
| Prepare comments on draft standard prior to next meeting. | New | All |

## 7. Next Steps

David Taylor will coordinate with Stephanie Monzon and Navin Bhatt for the dates and times of the next SDT meeting. David will issue an e-mail requesting everyone's availability for the next meeting.

## 8. Adjourn

**Attachment 1**

# Fault Recorder Triggers

- For transmission substations fault recording shall be initiated by the following triggers as a minimum:
    - Neutral, or residual overcurrent, set at a maximum of 0.2 pu of the rated current transformer secondary current
    - Phase undervoltage set at a minimum of 0.8 pu
    - Protective relay operation or circuit breaker opening, but not needed it the phase undervoltage is set at 0.9 pu or higher
- In addition, for generator locations, fault recording shall also be initiated by the following triggers:
    - GSU neutral current set at a maximum of 0.2 pu of the rated current transformer secondary
    - Operation of generator and GSU lockout (86) devices

Where local conditions or historical experience require deviations from the above they shall be documented. Triggers in addition to the above are acceptable.

**Attachment 2**

## A. Introduction

**1. Title:** Disturbance Monitoring and Reporting Requirements

**2. Number:** PRC-002-1

**3. Purpose:** To establish requirements for recording and reporting sequence of events (SOE) data, fault recording (FR) data, and dynamic disturbance recording (DDR) data to facilitate analysis of Disturbances.

**4. Applicability:**

**4.1.** Transmission Owners

**4.2.** Generator Owners

**5. (Proposed) Effective Date:** TBD

## B. Requirements

**R1.** Transmission Owners and Generator Owners shall record or have a process in place to derive SOE data for the change in circuit breaker position (open/close) for:

- Circuit breakers 200 kV and above at substations containing any combination of three or more elements consisting of transmission lines ~~(~~operated at 200 kV or above~~)~~ and transformers (having primary and secondary voltage ratings of 200 kV or above),
- All generator output circuit breakers at substations connected at 200 kV or above through generating unit step up transformer(s) to either a generating plant having a single generating unit of 500 MVA or higher nameplate rating or an aggregate plant total nameplate capacity of 1500 MVA or higher, and
- Circuit breakers on tie lines 200 kV and above at substations between Balancing Authorities Area.

**R2.** Transmission Owners and Generator Owners shall record the time stamp, or shall have a process in place to determine the time stamp, for the change in circuit breaker position (open/close) such that the time stamp is recorded to within 4 milliseconds from the time an input for a change in circuit breaker position is received to the time the actual time stamp is recorded~~data or have a process in place to derive the time stamp to within 4 millisecondsone quarter of a cycle from the time an of input is received by the recording device for~~

~~the change in circuit breaker position (open/close)~~ for the circuit breakers identified in R1.

**R3.** Transmission Owners shall record or have a process in place to derive the following FR data:

- The three phase to neutral voltages on each monitored line or bus as follows:
  - On ring busses, the voltages of bus sections connected to transmission lines
  - On breaker-and-a-half arrangements, the outer bus voltages, or the individual line voltages
  - On straight busses, common bus voltages or the individual line voltages
- The three phase currents and the residual or neutral currents of each monitored line and transformer.
- Polarizing currents, if used

For the following:

| Location | Monitored Equipment |
|---|---|
| Any combination of three or more elements consisting of transmission lines (operated[A3] at 200 kV or above) and transformers (having low-side operating voltage of 200 kV or above) | • Transmission lines operated at 200 kV or above, but if fault recording equipment is installed at the remote terminal of the transmission line this may be considered optional<br>• Transmission buses operated at 200 kV or above<br>• Transformers having low-side operating voltage of 200 kV or above<br>• Tie lines between Balancing Authority Areas 200 kV and above |
| Transmission substation connected at 200 kV or above through generating unit step up | • Transmission lines operated at 200 kV or above, but if fault recording |

| | |
|---|---|
| transformer(s) to either a generating plant having a single generating unit of 500 MVA or higher nameplate rating or an aggregate plant total nameplate capacity of 1500 MVA or higher | equipment is installed at the remote terminal of the transmission line this may be considered optional<br>• Transmission buses operated at 200 kV or above<br>• Transformers having low-side operating voltage of 200 kV or above<br>• Tie lines between Balancing Authority Areas 200 kV and above |

**R4.** Generator Owners shall record or have a process in place to derive the following FR data:

| Location | Monitored Equipment |
|---|---|
| Transmission substations connected at 200 kV or above through generating unit step up transformer(s) to either a generating plant having a single generating unit of 500 MVA or higher nameplate rating or an aggregate plant total nameplate capacity of 1500 MVA or higher | • The three phase to neutral voltages on each Generator Step-up Transformer (GSU). The voltages can be monitored at either the high voltage side or low voltage side of the GSU. Generator bus voltages may be used.<br>• The three phase currents of each GSU at the same voltage used above.<br>• The neutral current of wye connected GSU high voltage windings.<br>• Polarizing currents, if used |

**R5.** The Transmission Owners and Generator Owners shall ensure that the FR data obtained conform to the following:

- The FR data shall include any one of the following:
  - A post trigger record length of at least 50 cycles, or

- A duration to include the first three cycles of an event and the final cycle of an event, using either a single continuous record or multiple triggered records

- The FR data shall be recorded with a minimum recording rate of 16 samples per cycle.

- The FR data recording triggering parameters shall include one or more of following:

  - negative sequence voltage
  - negative sequence current
  - zero sequence current (tertiary or residual)
  - under voltage
  - over voltage
  - over current
  - zero sequence voltage

  and one or more of the following:

  - activation of DC trip busses
  - circuit breaker contact opening
  - protective relay operation

**R6.** Transmission Owners and Generator Owners shall record DDR data to be able to derive the following:[A9]

- Positive sequence bus voltage
- Frequency
- Positive sequence line current
- Three phase active power and reactive power (MW and MVAR) line flows

For the following locations either directly or derivable from DDR data available one or two transmission substations or switching stations away at a common voltage level[A10]:

- Transmission substations or switching stations connected at 200 kV or above to a single generating unit of 850 MVA or higher nameplate rating or multiple generating units having a total nameplate capacity of 1500 MVA or higher.
- Transmission substations or switching stations having a total of 7 or more transmission lines connected at 200 kV or above.
- Transmission substations or switching stations connecting to another Balancing Authority or Reliability Coordinator at 345 kV or above.
- All elements at 345 kV or above associated with IROLs.
- At least one location within an area that has an Under-Voltage Load Shedding program installed to which NERC PRC-021 applies.

For at least one phase of the following system elements in the above:

- All transmission lines connected at 200 kV or above
- Connections to all GSU transformers connected at 200 kV or above
- All other transformers with both primary and secondary windings connected at 200 kV or above

**R7.** The Transmission Owners and Generator Owners shall obtain DDR data that conform to the following technical specifications:

- DDR Data from any new location shall be continuously recorded.
- DDR Data from existing locations which do not have continuous recording capability shall be triggered and recorded according to the following:
    - for rate-of-change of frequency.
    - data available for oscillation triggers shall be set to trigger for low frequency oscillations in 0.1 to 4 Hz range.
    - data record lengths shall be not less than three minutes.
    - data sampling rate shall be at least 960 samples per second

- data shall record the RMS value of electrical quantities at a rate of at least 6 times per second.

**R8.** Transmission Owners and Generator Owners shall synchronize all SOE, FR, and DDR data to within 2 milliseconds of Universal Coordinated Time scale (UTC) with hour offset as necessary.

**R9.** Transmission Owners and Generator Owners shall ensure all recorded SOE, FR, and DDR data is retrievable for 10 calendar days after a Disturbance.

**R10.** Transmission Owners and Generator Owners shall meet all of the following criteria when reporting SOE, FR, and DDR data to the Regional Entity (RE) or the Reliability Coordinator (RC):

- All SOE, FR, and DDR data shall be provided to the RE or RC within 30 calendar days of a request,
- All FR and DDR data shall be in a format such that any software system capable of viewing and analyzing COMTRADE (IEEE Std. C37.111-1997 or successor) files may be used to process and evaluate the data,
- All known delays in interposing relays shall be reported along with the SOE data,
- All data files shall be named in conformance with IEEE C37.232, Recommended Practice for Naming Time Sequence Data Files, and
- All applicable hour offsets shall be reported with the time synchronized data files.

**R11.** Transmission Owners and Generator Owners shall retain all data retrieved and provided to the RE or RC until the end of the third calendar year following the event.

**R12.** The Transmission Owner and Generator Owner shall each maintain, and report to its RE within 30 calendar days of a request, the following information for SOE, FR, and DDR data:

- Location
- Make and model of equipment
- Type of data source (SOE, FR, or DDR).

- Monitored elements, such as transmission circuit, bus section, circuit breakers, etc.

**C. Measures**

**M1.** .

**D. Compliance**

**1.** Violation Severity Levels

**E. Definitions**

The following are definitions of terms used in this Standard

The following definitions have been extracted from IEEE standards.

Substation — As defined by the IEEE C2-2002, (National Electric Safety Code) "An enclosed assemblage of equipment, e.g. switches, circuit breakers, buses and transformers, under control of qualified persons, through which electric energy is passed for the purpose of switching or modifying its characteristics."

**F. IntraRegional Differences**

None

**G. Notes**

**Version History**

| Version | Date | Action | Change Tracking |
|---|---|---|---|
| 1st Draft | 8/09/07 | Initial draft from first meeting | |
| 2nd Draft | 8/27/07 | E-Mailed changes | |
| Draft 2.03 | 9/26/07 | Additional e-mailed changes | |
| Draft 2.04 | 9/27/07 | Changes made during the 9/27/07 conference call | |
| Draft 2.05 | 10/02/07 | Document formatting cleaned up | |
| Draft 2.06 | 10/15/07 | Changes made during the 10/11-12/2007 meeting. | |

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|---|---|---|---|
| Draft 2.07 | 11/02/07 | Changes made during the 11/02/07 meeting | |