LAKE ERIE EMERGENCY RE-DISPATCH
OPERATIONS MANUAL

August 2002
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Lake Erie Emergency Re-dispatch (LEER) Operations Manual

Introduction

The LEER Operations Manual provides the necessary steps and operations level descriptions required for LEER participant System Operators to implement the process described in the LEER Agreement. Nothing in this Operations Manual is intended to contradict what is stipulated to in the Agreement and where a conflict results, the language of the Agreement prevails. This Operations Manual may be revised from time to time as need and condition warrants.
SECTION A: GENERATION SHIFT FACTORS

Generation Shift Factors are defined from a generator source bus to a specific predefined generator sink bus in order to assist RCs/CAs in quickly identifying effective re-dispatch options. Identification of generation shift factor effect of controlling actions should be determined via the company’s EMS system, if the capability exists. If the controlling action is on an external system, the distribution factor effect of the controlling action should be discussed between the controlling and constrained systems. PTDF and OTDF factors are defined for Control Area to Control Area re-dispatches and should be used in place of GSFs if a Control Area is non specific about its source or sink.

GSF/PTDF/OTDF can be determined using the appropriate viewer at the appropriate NERC websites or via loadflows.

The PTDF/OTDF viewer is at http://205.247.120.10:1114/Tdf/TdfViewer.html. The GSF Viewer can be accessed by RC’s through the RCIS. Others may access is through the NERC CRC web site (https://www.nerc.net/crc/). To select factors for generation pairs to evaluate effectiveness for a LEER, the user will take the following steps:

1. Select “Current Day” from the Matrix Pull Down.
2. Click ‘OK’ in processing window after processing is complete
3. Select “All Transactions” in the Report Pull down menu
4. Select the Constraining flowgate
   a. Select the **Constrained CA**
   b. Select appropriate Direction
   c. Select Flowgate from FG pull down menu
5. Click on ‘1st Set’ for 1st Generator Set.
6. Select appropriate CA’s (generally AEP, FE, IMO, MECS, NYIS, PJM) and click ‘ok.’
7. Click on ‘2nd Set’ for 2nd Generator Set.
8. Select appropriate CA’s (generally AEP, FE, IMO, MECS, NYIS, PJM) and click ‘ok.’
9. Select ‘Factor’ from Sort By: pull down menu
10. Enter an appropriate cut-off factor (generally > 15%)
11. Click on ‘Calculate’
12. Select cut-off in Select Results Group
SECTION B: Communications Protocols

Reliability Authority Information System (RAIS) is used to communicate NERC Transmission Loading Relief (TLR) Levels and actions to all RAs. The Dependent RAs/CAs are responsible for notifying other Lake Erie RAs/CAs of the magnitude of expected dependency prior to the morning conference call via the RAIS. The RAIS is also used to indicate the time of any planned conference calls. The constrained RAs/CAs are responsible for notifying other Lake Erie RAs/CAs when the LEER procedures have been implemented on the behalf of the RAs/CAs protecting firm load. The message must include the controlling action, MW amount of flowgate reduction, protected transaction’s NERC tags, and total MW transaction(s) protected. Protected transactions only apply to those protected by the controlling action on the constrained flowgate. Periodic updates shall be supplied as the level of dependency changes and system conditions permit. The constrained RAs/CAs are responsible for notifying all other RAs/CAs once the LEER procedures are no longer necessary.

LERR Hotline Use –

A conference call is initiated by the RA/CA that anticipates a capacity deficient situation. Every LEER Hotline call will begin with a roll call. During the conference call, the constrained RAs/CAs will discuss re-dispatch options and determine the potential location of replacement energy.

A LEER participant may initiate a LEER Hotline call if there are conditions that may have wide-area effects on the operating areas around Lake Erie. A call of this nature should be initiated to provide supplementary information to notifications already made to the RAIS or if there are extenuating circumstances that would assist in maintaining regional security if communicated. For example, a constraining RA/CA may have a high level of confidence that curtailments will be made following the issuance of a TLR Level 1. This early warning gives the other participants an opportunity to check for dependency and either prepare for a LEER or take other actions.

Alternative LEER Conference Procedure(s)

In the event of a failure of the prescribed LEER Hotline call procedure (defined as an inability to connect with any LESP member affected by the anticipated emergency redispatch action), the initiating RA shall:

1. request that any member(s) successfully participating in the call, but not directly affected by the LEER, attempt to contact the affected member(s) using a separate line, and then establish an internal link to the LEER Hotline call; or

2. request that a different member re-initiate the LEER Hotline call; or

3. cancel the call and notify all members via RAIS to call the Allegheny Power conferencing scheme.

Changing LEER Hotline Phone Numbers

Changes to the pre-selected LEER Hotline phone numbers should be submitted to the Chairman of the Lake Erie Security Process Working Group:
E-mail submissions are preferred. The number should be sent to the Chairman only. After the appropriate change is made, the chairman will distribute the revised phone numbers to the LEER participants control room representatives. Allow one week for changes to be completed.

**LEER Hotline Test**

The LEER Hotline will be tested once a month, on the first Monday. The LEER Hotline test will be initiated by each of the LEER participants according to the following schedule:

<table>
<thead>
<tr>
<th>January</th>
<th>AEP</th>
<th>July</th>
<th>AEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>MISO</td>
<td>August</td>
<td>MISO</td>
</tr>
<tr>
<td>March</td>
<td>IMO</td>
<td>September</td>
<td>IMO</td>
</tr>
<tr>
<td>April</td>
<td>MECS</td>
<td>October</td>
<td>MECS</td>
</tr>
<tr>
<td>May</td>
<td>NYISO</td>
<td>November</td>
<td>NYISO</td>
</tr>
<tr>
<td>June</td>
<td>PJM</td>
<td>December</td>
<td>PJM</td>
</tr>
</tbody>
</table>

Following the June and December tests, PJM will test the back-up conference bridge through AP.
SECTION C: Lake Erie Emergency Re-dispatch Procedure Template

1. The **Dependent RC** determines the dependency situation as follows:

<table>
<thead>
<tr>
<th>Dependent Control Area:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CA Peak Load Forecast</strong></td>
<td>MW</td>
</tr>
<tr>
<td><strong>Less Committed Resources</strong></td>
<td>MW</td>
</tr>
<tr>
<td><strong>Less Voltage Reduction “Control Action” relief</strong></td>
<td>MW</td>
</tr>
<tr>
<td><strong>Less Interruptible/Curtailable “Control Action” relief</strong></td>
<td>MW</td>
</tr>
<tr>
<td><strong>Control Area Total Dependency</strong></td>
<td>MW</td>
</tr>
</tbody>
</table>

2. The **Dependent RC** to Provide “Dependency” Data via **RCIS**’s “**System Emergency**” messaging page:

3. The **Dependent RC** establishes a conference call with the **Constrained RC** and other (impacted) LEER participants using **LEER Hotline**

**Conference Call Agenda**

a. Roll Call
b. Discussion of Dependency situation:

**Dependent Transaction(s) to be Protected:**

<table>
<thead>
<tr>
<th>Transaction Identification (Tag ID)</th>
<th>Transfer Distribution Factor (TDF) on Constrained Flowgate</th>
<th>Anticipated Time of Dependency Hour-ending (EDT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="#">Ex. NYIS-MIJM01-001A000-MECS</a></td>
<td>15% PTDF (P) or OTDF (O)</td>
<td>1900</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rows may be added as needed.

c. Discussion of possible controlling actions available to relieve the constraint and what units/replacement energy are available for re-dispatch. The **Dependent RC** should obtain a list of available **Source (INC) / Sink (DEC)** generator pairs, sorted in descending **Generator Shift Factor (GSF)** order, from the **IDC GSF Viewer**.

Next Steps may be taken off line for further analysis

d. Assessment of optimal controlling actions available to relieve the constraint (by the **Dependent** and **Constrained RCs** & other RCs that may be **Controlling**).
f. Determination of generation shift effect of (re-dispatch) controlling action by Dependent RC. The Dependent RC should arrange for more than one controlling action (Source/Sink pair) if possible, to allow for unexpected changes in unit availability.

<table>
<thead>
<tr>
<th>Sink (DEC) Unit</th>
<th>Source (INC) Unit</th>
<th>Generation Shift Factor (GSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex.</td>
<td>AP FM1 500</td>
<td>AEP CONE 345</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rows may be added as needed.

4. The Dependent RC/CA re-convenes conference call with affected Security Coordinators to review re-dispatch options analysis completed “off line” and obtain concurrence from the Constrained RC/CA of projected effectiveness of schedule/re-dispatch changes.

a) Protected Transaction ID: __________________________

b) Generation re-dispatch (INC & DEC unit pairs) available:

<table>
<thead>
<tr>
<th>Sink (DEC) Unit</th>
<th>Source (INC) Unit</th>
<th>Generation Shift Factor (GSF)</th>
<th>MW Relief at Flowgate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex.</td>
<td>AP FM1 500</td>
<td>AEP CONE 345</td>
<td>39.1%</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<td>4</td>
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<td></td>
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<tr>
<td>5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rows may be added as needed.

If multiple Protected Transactions were involved, Steps 4 a) and b) would be repeated for each.

5. The Dependent RC/CA confirms arrangements for re-dispatch with Controlling CA(s) providing updates of any dependency changes via the RCIS identifying:

<table>
<thead>
<tr>
<th>Sink (DEC) Unit</th>
<th>Source (INC) Unit</th>
<th>Generation Shift Factor</th>
<th>MW Relief at Flowgate</th>
<th>Transaction Identification (Tag ID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex.</td>
<td>AP FM1 500</td>
<td>AEP CONE 345</td>
<td>39.1%</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>5</td>
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</tr>
<tr>
<td>6*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rows may be added as needed.
6. **Constrained RC** issues a TLR 3a or higher on constrained flowgate excludes the **Protected Transactions** from the **ADJUST_LIST**.

7. Each Participating control area obtains from the **IDC** viewer an appropriate TLR **ADJUST_LIST** that excludes the **Protected Transactions** from the list.

8. The **Constrained RC/CA** initiates conference call on **LEER hotline** so that:
   - The **Constrained RC** can confirm **Dependent Transactions** from TLR **ADJUST_LIST** that are NOT to be cut
   - **Controlling RC** to confirm generators and MWs to be shifted
   - **Dependent RC** to confirm that Load Management and Voltage Reduction have been implemented as applicable.
   - **Constrained RC/CA** re-issues the cut list to confirm the transactions that are to be protected and those that are to be cut.

9. The **Constrained RC/CA** declares via the **RCIS**: “**TLR**” messaging page the following:

   The following transaction is to be protected through re-dispatch with **Source/Sink RCs**.:
   ________________________________________________

   *If multiple **Protected Transaction**s were involved, they would be listed here.*

10. Each **Controlling RC** enters appropriate MW shifts into their respective schedules to begin at the agreed upon time.

11. Start of **LEER** re-dispatch by **Controlling CAs**.

12. The **Constrained RC** declares LEER has been implemented on the **RCIS** “**System Emergency**” messaging page.

13. **Dependent** and **Constrained RC** update status of dependencies and constraint respectively via **RCIS**
   - Changes to the dependency information as indicated in the initial **RCIS** “**System Emergency**” messaging page.
   - Changes in the **Dependent Transactions**.
   - Changes to the agreed upon controlling actions and **Generation Shift Factor**.
   - Changes to constrained **Flowgate** flows and forecast

14. **Unwind LEER**
   a) The **Constrained RC** declares:
      - **Source** Unit ID # ___________________________
      - **Sink** Unit ID # ___________________________
      are no longer required to support
      - **Dependent Transaction** ID# ___________________________
      as a result of reduction in the constrained flowgate flow.
   b) The **Dependent RC** can then cancel the Emergency transaction.
   c) The **Sink** and **Source** Control Areas can then remove this transaction from their schedule and return generation dispatch to appropriate economic loading.
15. (Repeated for multiple transactions, if re-dispatches are released separately.)
   a) The Constrained RC declares:
      Source Unit ID # _____ and
      Sink Unit ID #_
      are no longer required to support
      Dependent Transaction ID# ___________________________
      as a result of reduction in the constrained flowgate flow.
   b) The Dependent RC can then cancel the Emergency transaction.
   c) The Sink and Source Control Areas can then remove this transaction from their schedule and
      return generation dispatch to appropriate economic loading.

16. The Dependent RC/CA and the Constrained RC/CA update status of dependencies and constraint
    respectively via RCIS:
    • Changes to the dependency information as indicated in the initial RCIS “System Emergency”
      messaging page.
    • Changes in the dependent transactions.
    • Changes to the agreed upon controlling actions and Generation Shift Factor.
    • Changes to constrained Flowgate flows and forecast

17. The Constrained RC/CA declares the end of the LEER via the RCIS.

END
SECTION D: HELPFUL EQUATIONS / CALCULATIONS

1. Dependency Calculation

Dependency = Forecasted/Actual Load – Committed/Available Resources – MW Voltage Reduction – MW Interruptible/Curtailable Load

2. Dependent Transaction Flowgate Effect

Dependent Transaction Flowgate Effect = (Transaction MW Amount) * PTDF

(PTDF to be replaced by OTDF where appropriate)

3. Re-dispatch Requirement 1 (DEC generation)

Re-dispatch requirement = ______ Dependent Transaction Flowgate Effect ______.
                      Controlling Action GSF ± Replacement Energy GSF

4. Re-dispatch Requirement 2 (INC generation)

Re-dispatch requirement = \frac{Dependent Transaction Flowgate Effect}{Controlling Action GSF}
SECTION E: LEER Unit Response Guidelines

The following section provides general guidelines for units involved in a LEER transaction. These guidelines are intended to be consistent with NERC Market Re-dispatch unit response practices.

1. The generation providers of the ‘INC’ and ‘DEC’ units must maintain the capability to provide the contracted MW during the specified period of the Emergency Re-dispatch.

2. Once allocated for an Emergency Re-dispatch, the DEC unit must respect a new unit low limit equivalent to the normal low limit plus the DEC amount. After implementing the re-dispatch, the DEC unit must respect a new unit high limit, based on the normal dependable capability of the unit minus the DEC amount.

3. Once it is allocated for an Emergency Re-dispatch, the INC unit must respect a new unit high limit, and once re-dispatched, it must respect a new low limit based on the normal minimum stable, operating limit of the unit plus the INC amount.

4. The DEC unit’s capability above the reduced high limit may not be counted in an Area's operating reserves.

5. The ‘INC’ and ‘DEC’ units will change their output by the amount of their Emergency Re-dispatch.
   - To ramp in the Emergency Re-dispatch Transaction, the INC and DEC units’ output must move according to their scheduled loading changes as indicated by the re-dispatch schedule.
   - Both units must actually alter their output at the time of implementation.

The generation owners should respond such that the required generator movement is completed within 30 minutes of the request to implement.

6. It is permissible to have the ‘INC’ and ‘DEC’ unit(s) in the same Control Area.

7. Several units may be designated as ‘INC’ Re-dispatch in an Emergency Re-dispatch transaction.

8. Several units may be designated as ‘DEC’ units in an Emergency Re-dispatch transaction.

9. A group of units in the ‘DEC’ or ‘INC’ side of the transaction may be set up so that when the re-dispatch schedule is executed, the generation owner would have the choice as to which unit(s) the generation owner moved.

10. A Control Area schedule change may be used instead of specific generating units for the INC and/or DEC of the Lake Erie Emergency Re-dispatch. When a Control Area to Control Area schedule change is used for an Emergency Re-dispatch the PTDF (or OTDF if appropriate) from the PTDF viewer will be used to determine the countervailing flow relief.
SECTION F: New Constraints and Dependencies After Resuming Normal Dispatch

The LEER Transaction will be terminated when either the Dependent System no longer has a dependency or the Constrained System ‘s constraint is mitigated (i.e. TLR canceled). The Lake Erie participants have agreed that once a LEER Transaction is terminated, then the participants would return the dispatch to the normal, or pre-LEER state.

At the time the LEER Transaction is terminated, and normal dispatch is resumed, any new constraints and/or dependencies that may arise will be handled as a new event. If a new flowgate becomes constraining following the resumption of normal operation with the termination of a LEER, the Dependent System may or may not still have load at risk of curtailment. If the Dependent System no longer has a Dependency, that Area would not request or continue redispatch assistance. If the Dependent System still has a Dependency, then the Dependent System may choose to continue the LEER assistance. However, the amount of the redispatch may be adjusted to a different MW level or to different Controlling Systems, as may be appropriate to relieve the new constraint.
SECTION G: Energy Logging for Settlements

The Dependent System’s CA are required to compensate the Controlling Systems’, for all charges and costs incurred in acquiring the LEER Transaction. In order for the service providing entities to be appropriately compensated a transaction is to be billed as it’s scheduled, from source to sink. The Sink Controlling System will recover all costs from the Dependent System. The Sink Controlling System will initially pay all energy and transmission service charges as if it were the purchaser of the redispatch service. The Sink Controlling System will then send a bill for all the payments it made to the Dependent System for full recovery.

Controlling Systems should log the following information to support the settlement:

- time the LEER Transaction started to flow,
- the amount of energy transacted (MW),
- associated resources used (i.e., generators, transmission service, ancillary services)
- time the LEER Transaction was terminated.
- Source and sink Controlling Systems