Lake Erie Emergency Redispatch (LEER) Procedure

Lake Erie Security Process Training

May 2001
Prepared By Lake Erie Security Process Working Group
Agenda

- LEER Procedure Review
- Background and History
- Examples
- Drill Procedure
Goals

- Procedure to protect Firm Load served by Non-Firm Transmission Service within Lake Erie Region via Redispatch option in lieu of TLR curtailments.

- Increase system reliability
**Vision**

- Incorporation of collaborative actions by both the market and system segments
Basic Principles

- No Firm load should be shed when generation is still available
- Procedure must not conflict with FERC filed tariffs or NERC policies (Policy 9 in particular)
- Prior agreement to decisive action is essential
- Act now, dispute later
- Information confidentiality must be observed
- Keep it simple
Lake Erie Circulation (LEC)

- Growing since early 1990s from about 500 MW
- Recently recorded levels exceeding 1,600 MW.
- Heavy counterclockwise LEC using up transmission capacity of QFW and MECS-IMO Interface. (entering Ontario in the Niagara area and exiting via Michigan)
- Impedes
  - Commerce from from the North East into Ontario
  - Michigan’s ability to purchase from Ontario & New York
  - Transactions from North East (NY & PJM) to the Midwest.
- Numerous transaction curtailments since 1995 due to limitations in the Niagara area (QFW) or Michigan-Ontario Interconnections
- Spring and Summer of 1988, 1999 escalated to almost daily problems
- In 1998 declared:
  - 33 TLRs on QFW (7 in 1999)
  - 21 TLRs on the Michigan-Ontario Interconnections (15 in 1999).
500 MW flow on QFW means a total east to west transaction of 4200 MW.

Factors based on PTDF Viewer Data file 1999/02/18
Power Transfer from Maritime area to Chicago area
Basic Elements of Agreement

- An emergency procedure intended to avoid firm load cuts
- Intended primarily for non-firm transmission service
- A first of its kind involving multiple Control Areas crossing Regional boundaries
- Implemented after voltage reduction and interruptible load cuts - (caveat)
- Emergency energy purchases to be made under the provision of Interconnection Agreements or Market Rules.
Some LEER Definitions

- **Dependency (MW):**
  - Forecast/Actual Load - Resource - MW Voltage Red. - MW interruptible

- **Dependent SCs/CAs:** the sink SCs/CAs of a dependent transaction

- **Constrained SCs/CAs:** where a potential or actual FG overload is identified (these SCs direct redispatch)

- **Controlling SCs/CAs:** where generation shift (INC or DEC) is available and identified
Overview of LEER Procedure

- **Dependent SC: Initiate LEER**
  
  posts dependency on SCIS, updated throughout the day, & initiate LEER Hot Line conf. call

- **Participating SCs identify potential, impactive constraints as soon as possible (TLR 1)**

- **Impacted SCs/CAs assess effects of redispatch using GSFs (MECS Web), and identify a/v generation**
  

- **E-Tag created by PSE or LCA (DEC unit)**

- **Implement LEER at NERC TLR Levels 3a and higher**

- **Energy settled at prevailing emergency price or local tariff**

- **Reduced generation receives energy credit according to local tariff rules**

- **Owner of protected transaction bears all costs**
LEER Cancellation

- Dependent SC to cancel LEER when dependency no longer exists.
- Constrained SC to cancel LEER if system constraint sans Control Action no longer exists.
- Controlling SC to cancel LEER if controlling units no longer available.
- SC providing emergency energy may cancel LEER if emergency replacement energy becomes u/a.
- LEER transaction curtailed by TLR because it contributes to constraint on another flowgate.
Interface with NERC Policy

- **Not to conflict with** NERC Operating Policy 9
- Dependent transactions - protected from curtailment through re-dispatch
- Transmission service (non-firm hourly transmission service Level 2) required **but** after the fact
- Use of “MRD”- tag to enter into and be evaluated by IDC note it as a “LEER” transaction in comments field?
- Re-dispatch arranged by “Dependent” CA (Sink) with INC/DEC generator PSE’s
- Once re-dispatch begins to flow to protect dependent transactions categorized as protected transactions.
Interface with NERC Policy (Cont’d)

- Additional loading on flowgate **not** to be associated with protected transactions so as long re-dispatch in place.

- Re-dispatch can be applied to a part or all of a transaction, as required by the magnitude of the dependency.

- Portions of transactions for which re-dispatch is implemented are protected from further non-firm curtailment on constrained flowgate.

- Unprotect portion on constrained flowgate may be curtailed.

- Constraint on another flowgate can cause protecting transaction to be curtailed, exposing formerly protected transaction to curtailment.
Interface with NERC Policy (Cont’d)

- LEER does NOT transform non-firm transactions into firm transaction
- LEER does not encourage use of non-firm transmission to supply firm load
LEER Development

- LESPWG developed final LEER draft in Sept., 1998
- Areas participated: – PJM, NYISO(PP), IMO(OH), MECS, FE, DQE, AP(APS), AEP
- Operation reps + affiliated marketers + individual marketing reps
- Six participants signed agreement 12/98; committed to continue refining LEER in 1999
- LEER filed with FERC 2/26/1999
LEER Development

- Two interventions filed in March 1999
- LEER added to NYISO Tariff - April 1999
- FERC conditionally accepts LEER - May 12 1999
- LEER Compliance filing - June 1 1999
- LEER first Dry Run June 2 1999
- FERC accepts LEER compliance filing Aug 2 1999
- LEER Agreement Document restructured - Fall 1999
**LEER Development**

- Materially the same as the original procedure
- Reorganize document to include:
  - principles and elements of agreement in main body
  - procedural elements in appendices
- Added and strengthened language
  - referring to NERC Policy compliance
  - answering FERC’s questions
LEER Development

- Participants re-sign in June 2000 (FE joins)
- File update with FERC in July 2000
- FERC accepts revised LEER - September 2000
FERC Comments on LEER

- "We [FERC] find the LEER proposal is an additional measure that goes beyond the requirements of our December 16 Order. The LEER participants have designed an emergency assistance scheme that obligates members to assist each other not only by selling emergency power (the traditional focus of emergency assistance agreements), but also by cooperating in regional redispatch arrangements."

- FERC goes on to state that they "do not share the intervenors' concerns that the LEER proposal is unclear" and that they "disagree" that it is discriminatory since it only applies to LEER participants recognizing that participation is open to those who wish to join in the agreement and "are willing to accept the obligation to provide emergency assistance".
Example 1

Limiting facility - Actual overload on South Ripley to Erie 230 kV tie line
facility is overloaded by 14.2 MW

Starting conditions:
FE purchasing 500 MW from IMO non-firm
FE has no internal generation available

PJM dfax relative to Kammer swing:
S. Ripley Gen .652
Dunkirk Gen .344
IMO system .100
NYISO system .08
FE system -.04
PJM Warren CT -.128
PJM system .03
AP system .00
VAP system .00

Curtailment Option:
Cut IMO-FE transaction to effect 14.2 MW relief.
Raise FE system | lower IMO system
(-.04 dfax ) +(-.10 dfax ) = (-.14 dfax )
14.2mw/.14 dfax = 101.5 mw shift
101.5 mw cut reduces flow by 14.2 mw
FE still receiving 398.5 mw.

Redispatch Option:
keep existing transactions, reduce S. Ripley, FE provide energy to NYISO(S.Ripley) from IMO
line relief mw = X mw (lower @ S.Ripley raise @ IMO)
14.2 = X mw (.652 + .100)
14.2 = X mw (-.552)
X mw = 25.72

FE buys 525.72 mw from IMO
S. Ripley reduces 25.72 mw
FE provides 25.72 mw to S. Ripley (via NYISO)
Example 1
IMO - FE 500 MW Power Transfer

A 14.2 MW overload on South Ripley would require
- 101.5 MW IMO - FE cut (IMO-South Ripley = +10% & FE System - 4%)
  or
- S. Ripley Gen ↓ & IMO Generation ↑
(S. Ripley Gen - 65.2% plus +10%)

Factors based on PTDF Viewer Data file 2000
Power Transfer from IMO area to FE area
Example 1: Coordination Procedures

1. FE identifies dependency of 500MW (IMO energy) and notifies LESC’s via SCIS.

2. Lake Erie Security Coordinators (LESC) review dependency and projected system constraints. PTDF matrix, GSF matrix and IDC used to determine which transactions affect projected constraints and identify possible redispatch options. PJM is identified as the Constrained Security Coordinator (Constraint = South Ripley - Erie South 230 kV). The controlling Security Coordinator is identified as NYISO (Controlling Action Lower = South Ripley Gen).

3. LESC discuss dependency and options via LEER Hot-line (Conference Call). Affected parties are identified.

4. PJM determines current DFAX/GSF based on on-line/off-line studies (South Ripley NUG = 65% help)

5. FE, PJM, and NYISO agree upon GSF/DFAX and location of replacement energy. (IMO Replacement Energy = 10% hurt).
Example 1 (con’t)

6. FE notifies LESC via SCIS of agreed upon actions and protected transactions.

**Summary of Distribution Factor Effect**

**Redispatch Option:**

\[ X = \frac{(14\text{ MW constraint})}{(65\% \text{ Controlling Action} - 10\% \text{ Replacement Energy})} \]
\[ X = \frac{(14\text{ MW})}{(55\% \text{ Effect})} \]
\[ X = 25 \text{ MW replacement energy} \]
Lower South Ripley Gen by 25 MW.

**Curtailment Option:**

\[ X = \frac{(14\text{ MW constraint})}{(4\% \text{ FE Load} + 10\% \text{ IMO energy reduction})} \]
\[ X = \frac{(14\text{ MW})}{(14\%)} \]
\[ X = 100 \text{ MW reduction} \]

25 MW redispatch protects 100 MW of FE Load.
7. PJM (Constrained SC) directs LEER procedure at request of FE (Dependent CA).

8. PJM (Constrained SC) notifies FE (Dependent CA) when constraint is relieved.

9. PJM (Constrained SC) notified NYISO (Controlling SC) when controlling action is no longer required.

10. FE (Dependent SC) cancels replacement energy (if applicable) by notifying IMO.
LEER Drill Scheduled for June 6, 2001

- IMO acts as constraining CA
- IMO-MECS constraining facility
- MECS will act as dependent area
- Drill Start at ~0800 - 1130.
- Drill script finalized w/LESP Working Group - May 2001
Drill Scenario: / IMO-MECS Constrained with MECS as Dependent SC and CA

- **Constrained SC/Flowgate:** MECS/IMO-MECS
- Dependent System: MECS
- Potential Controlling SC Source (INC unit) – Sink (DEC unit) pairs:
  - **Source (INC unit CA’s):** AEP, MECS, NIPS
  - **Sink (DEC unit CA’s):** IMO, NYISO, MECS

Note: Times have been selected arbitrarily and can be changed to suit operating conditions at the time.

All times are based on Eastern Standard Time (EST)

Procedures:

1. 08:30 EST: The Dependent SC determines the dependency situation as follows:
Dependent Control Area: MECS

<table>
<thead>
<tr>
<th>CA Peak Load Forecast</th>
<th>MW</th>
<th>Hour Ending (EST):</th>
</tr>
</thead>
<tbody>
<tr>
<td>less Committed Resources</td>
<td>MW</td>
<td></td>
</tr>
<tr>
<td>Less Voltage Reduction “Control Action” relief</td>
<td>MW</td>
<td></td>
</tr>
<tr>
<td>Less Interruptible/Curtailable “Control Action” relief</td>
<td>MW</td>
<td></td>
</tr>
</tbody>
</table>

Control Area Total Dependency | MW

2. 08:45 EST: The Dependent SC (MECS) to Provide “Dependency” Data via SCIS’s “System Emergency” messaging page using the message as per template 1 in Appendix D:

3. 9:00 EST: The Dependent SC (MECS) establishes a conference call with the Constrained SC (MECS) and other (impacted) LEER participants using LEER Hotline (Selected based on participation involvement for the simulation only)

   Conference Call Agenda
   a. Role Call
   b. Discussion of MECS Dependency situation:
END