SOP-OUTSCH.0050.0020
Perform Complex Studies

Contents

1. Objective

The objective of this procedure is to document the responsibilities of ISO New England (ISO) staff and required controls to perform a special complex study of the power system.

Compliance with this procedure is necessary to ensure the reliable operation of the power system in accordance with ISO New England Operating Procedure No. 3 - Transmission Outage Scheduling (OP-3), ISO New England Operating Procedure No. 5 - Resource Maintenance and Outage Scheduling (OP-5), ISO New England Operating Procedure No. 19 - Transmission Operations (OP-19) and Master/Local Control Center Procedure No. 15 - System Operating Limits Methodology (M/LCC 15). This procedure does **not** in any way change the intent of OP-3, OP-5, OP-19 or M/LCC 15 but rather is intended to clarify some of the responsibilities delegated to ISO staff by those procedures. This procedure also supports the cost-effective operation of the power system. This procedure can affect Market operation and settlement.

2. Background

System demand, resource and transmission outages, generation and load patterns, new facilities, and unusual operating configurations can affect the reliability of the power system. These same issues can also affect the cost-effective operation of the power system.

Operating guides and thermal analysis of the power system adequately address a broad range of operating conditions. However, when actual or planned operating conditions are determined to potentially exceed the capability of operating guides and thermal analysis, a special complex study should be performed. The need to perform a complex study is determined in accordance with SOP-OUTSCH.0050.0010 - Determine Study Requirements. This procedure describes how a complex study is performed.

3. Responsibilities

1. The assigned Operations Support Services (OSS) Analyst/Engineer is responsible for executing this procedure.

4. Controls

1. Typically, ISO personnel performing a special complex study of the power system shall be authorized by one of the following OSS group personnel:

   - Director, Operations Support Services
   - Supervisor, Operations Technical Studies
   - Manager, Real-Time Studies

2. However, special studies performed by an on-call, full-time OSS group Analyst/Engineer do **not** require authorization by the above listed OSS group personnel before conducting complex studies requested by the Control Room staff and/or Outage Coordination group.

3. When time allows, peer review of study results with operations engineering staff and management should occur to improve resulting work product and result accuracy.

4. Additional peer review occurs during the review of any resulting changes to existing TOGs or creation of new TOGS using SOP-RTMKTS.0210.0020 - Develop, Revise & Control Transmission Operating Guides.

5. Instructions

5.1 Notification and Response Time

1. The assigned staff person shall perform this procedure when requested by the Director, Operations Support Services (or designee), Supervisor, Operations Technical Studies, or Manager, Real-Time Studies per SOP-OUTSCH.0050.0010 - Determine Study Requirements.

2. The assigned staff person shall perform the complex study:

   A. In the case of an actual operating condition, as soon as possible.

   B. In the case of a planned condition, in a timely manner that permits ISO to meet its various overall timing requirements.

5.2 Conduct a Complex Study

5.2.1 Review Relevant Information

1. Prior to conducting the complex study, the Analyst/Engineer shall perform the following:

A. Review the ISO New England Outage Application Summary Report and/or other relevant documentation.

B. Determine anticipated system conditions during the study period:

1) System configuration.

2) Generation pattern.

3) System demand.

C. Consider the following:

1) Relevant existing operating guides and their applicability under the study conditions.

2) The results of previous studies.

3) The extent to which the actual or planned conditions are non-typical.

4) Unusual or un-modeled contingencies.

5) The potential for abnormal voltage or voltage collapse.

6) The potential for instability or oscillatory behavior.

7) The potential for system protection problems.

8) The potential for overstressing equipment due to excessive fault current duty.

9) The needs of nuclear power stations.

10) Review potentially limiting contingencies including source contingencies.

11) Appropriate modeling for phase shifting transformers for the study conditions.

5.2.2 Perform a Complex Study

1. The Analyst/Engineer shall perform a complex study as follows:

A. Determine the studies and analyses necessary to verify that the power system can be reliably operated per the criteria set forth in OP -19 and M/LCC 15, giving consideration to the following:

- Load flow analysis
- Contingency analysis
- Transient stability study
- EMT (electromagnetic transient) study
- Special protective study
- Voltage/reactive study
- Control system transient performance study
- Short circuit and equipment duty study

A. Appropriately model anticipated conditions during the study period.

B. Perform the studies determined to be appropriate in Section 5.2.2.1.A utilizing the appropriate guides and tools including:

1) Off-line load flow analysis and stability software such as:

- Power System Simulator for Engineers (PSS/E)
- Power System Computer Aided Design (PSCAD)

2) On-line load flow analysis software such as:

- EMS Powerflow
- EMS Interface Limits Calculator (ILC)
- EMS Study Contingency Analysis (STCA)

C. Determine any new or special interface limits.

D. Determine any needed new or revised ILC points for limit determination

E. If requested, have an economic analysis performed by the Outage Coordinators.

5.3 Report Study Results

1. If appropriate, the Analyst/Engineer shall notify the Short-Term Outage Coordinator designated D1 to:

   A. Prepare an updated Generators Required for Transmission (GRT) spreadsheet to include updated limits resulting from the complex study and an explanation for the new limits.

   B. Provide a printed copy of the updated GRT to the Security Operator along with explanation for the new limits.

   C. Update the GRT on the RTSMDB Server and email the changes using the "GRT" email group listing in Outlook.

2. The Analyst/Engineer shall refer to SOP-RTMKTS.0210.0020 - Develop, Revise & Control Transmission Operating Guides and prepare applicable document:

   - A new operating guide
   - An interim operating guide
   - Other operating guidance as needed

NOTE

There are **no** signoff signatures required for SOP-RTMKTS.0210.0020 – Develop, Revise & Control Transmission Operating Guides, for an outage that does **not** involve any "Must-Run" or pre-contingency breaker opening.

3. If the study pertains to a transmission application, the Analyst/Engineer shall perform the following:

   A. Refer to SOP-RTMKTS.0210.0020 - Develop Revise & Control Transmission Operating Guides and use the TG template found in ODMS and perform the following:

      1) Fill in the required data

      2) Obtain the required Acknowledgement Signatures.

   B. Respond to any Short-Term or Long-Term Outage Request and request the Outage Coordinator to enter the following information into the "Notes to Participant" data field in the ISO Outage Scheduling software:

      1) A special study has been performed

      2) Instructions are posted to the web or to the outage application

   C. Post the instructions to ODMS for inclusion within SOLR.

D. Email notification of the special instructions pertaining to the transmission application to the following:

1) OPER - all groups

2) Market Admin Grp

3) Appropriate external contacts:

- Local Control Centers (LCCs)
- Transmission Operators (TOPs)
- Others

5. If the study does **not** pertain to current operations or **no** issue is found, perform the following:

A. Provide email notification to the party requesting the study

B. Indicate the system conditions (generation dispatch, load levels, topology, etc.,) used during the study.

6. On a periodic basis, review studied conditions resulting in changes to the system and determine if they are still pertinent.

A. When studied conditions **no** longer apply, notify the appropriate parties including Operations and Market Administrators.

7. Studied conditions resulting in change to system operations shall be archived and retrievable.

8. Each study, pertaining to a transmission application that is **no** longer in effect, shall be purged from the server that contains the outdated TOGs.

6. Performance Measures

None

7. References

ISO New England Operating Procedure No. 3 - Transmission Outage Scheduling (OP-3)

ISO New England Operating Procedure No. 5 - Resource Maintenance and Outage Scheduling (OP-5)

ISO New England Operating Procedure No. 19 - Transmission Operations (OP-19)

Master/Local Control Center Procedure No. 15 - System Operating Limits Methodology (M/LCC 15)

8. Revision History

Rev. No.	Date	Reason	Contact
- -	draft	For previous revision history, refer to Rev 10 available through Ask ISO;	Dean LaForest
11	01/18/17	Biennial review by procedure owner; Added required corporate document identity to all page footers; Section 1, 1st paragraph, modified the 1st sentence and deleted the 2nd sentence; Step 5.2.2.1/A and later where applicable, added M/LCC 15; Globally made minor editorial changes to correct typos and conform to present day conditions where necessary; Step 5.3.2, added new 3rd bullet; Step 5.3.3.A modified; Step 5..3.3.A.3) deleted; Step 5.3.3.B, modified and added sub-steps;; Section 7 added M/LCC 15 to list of References;	Dean LaForest
11.1	01/07/19	Periodic review performed requiring no changes; Made administrative changes required to publish a Minor Revision (including updating OP-5 title);	Dean LaForest
12	01/05/21	Change for issue identified with ILC point creation / use and biennial review	Dean LaForest
13	10/28/21	Revision due to internal audit recommendation to include explicit descriptions of controls for SOLs and IROLs reviewed	Dean LaForest
14	10/26/23	Biennial Review. No significant changes.	Dean LaForest

9. Attachments

None