
	© <i>ISO New England Inc. 2023</i>	<i>Procedure: Perform Long Term TARA Outage Reliability Analysis</i>
	<i>Process Name: Capture and Evaluate Outage Requests</i>	
	<i>Procedure Number: OUTSCH.0030.0024</i>	<i>Revision Number: 2</i>
	<i>Procedure Owner: Andrew Kopacka</i>	<i>Effective Date: July 27, 2023</i>
	<i>Approved By: Director, OSS</i>	<i>Valid Through: July 27, 2025</i>

SOP-OUTSCH.0030.0024 - Perform Long Term TARA Outage Reliability Analysis Contents

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1. Objective

The objective of this procedure is to provide, for a long term **transmission** outage request, instructions to perform a thermal analysis using Transmission Adequacy and Reliability Assessment - Outage Reliability Analysis (TARA - ORA).

2. Background


The ISO New England (ISO) Long Term Outage Coordination (LTOC) group uses the GE Energy Management System (EMS) to evaluate transmission equipment outages for thermal analysis. However, the EMS can only evaluate a single snapshot at a time. The PowerGem ORA application provides an Outage Coordinator the opportunity to evaluate multiple hours and days to develop a broader overall thermal analysis due to changing conditions (e.g., loads, hourly topology, Resource outages, etc).

3. Responsibilities

1. The Director, Operations Support Services (OSS) is responsible for verifying this procedure is adhered to and performed in conjunction with the LCCs and Resources to mitigate risk.
2. The Supervisor, LTOC group is responsible for responding to and completing each assigned Corrective Action Preventive Action (CAPA) issue.
3. The Outage Coordinator, LTOC group is responsible for:
 - Performing reliability studies of outage requests in accordance with OP-3 and OP-19 criteria.

4. Controls

1. An Outage Coordinator, LTOC group is responsible for performing the TARA-ORA analysis and performing any required corrective action.
2. Valid ISO employee access in Enterprise Access Management (EAM) is required to access TARA and CaseBuilder applications.
3. This SOP is periodically reviewed to verify consistency with current business practices and management expectations.

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5. Instructions

5.1 Perform TARA Outage Reliability Analysis (ORA)

1. The Outage Coordinator, LTOC group shall perform a TARA Outage Reliability Analysis as follows:

- A. Determine study period
- B. Export all Resource and transmission **outages** for the study period from CROW
- C. Create an all lines in basecase by referring to Section 5.3 in SOP-OUTSCH.0030.0025 - Perform Long Term Outage Coordination - Transmission Confidential for the instructions to create an EMS Basecase


- (1) From the 50/50 Study Load spreadsheet, determine the peak load for the study period located at http://isoweb.iso-ne.com/satellite/50_50_Study_Loads/

NOTE

An EMS Basecase (all lines in) must be created and used as a baseline to build each individual hourly model for the study period.

- D. Log into the EMS, select Case Directory, retrieve an EMS Basecase closest to the peak study load and verify the seasonal limits are proper.
- E. Import applicable LTT and DAM transmission outage requests using the OS Import tool in EMS
 - (1) On main PWR display select Data Retrieval button
 - (2) Select Get Outage Scheduler Data button
 - (3) Select Transmission Data tab
 - (4) Click Stop Process for Powerflow and OS Import
 - (5) Click Start Process for OS Import
 - (6) Enter a day within the study period for “Outage Effective Date”
 - (7) Deselect all outages except for LTT and DAM transmission outage requests

NOTE

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The case has solved successfully when **no** basecase (BC) violations and **no** study contingency analysis (STCA) violations are observed.

- F. Observe the case solution results and verify the case solves
- G. Save powerflow case as “ORA_BASECASE_*” as a NETMOM case
- H. Save powerflow case as an aux file for input into TARA
 - 1) Select “Data Retrieval” on the POWERFLOW display
 - 2) Enter the name into the “Enter Savecase Title” box and select ENTER
 - 3) Select the “Model File” button under Generate Powerworld Model File
- 2. The Outage Coordinator, LTOC group, shall create a new ORA study folder by performing the following:
 - A. Log into the “TARAENFPRD1”
 - B. Under D:\<username>\ORA_Studies\
 - (1) Create a duplicate study folder
 - (2) Rename copied folder (e.g., ORA_WE_0614)

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- (3) In the newly created study folder delete the following
 - a. Delete all hourly or daily AMB files
 - b. Delete all input files under the “INPUT_FILES” folder
 - c. Delete all contents of the “temp” folder
- 3. The Outage Coordinator, LTOC group, shall create input files for the specified study period by performing the following:
 - A. Call up the CaseBuilder program at “C:\IT DA Supported Apps\Shortcut to CaseBuilder”
 - B. Select “Export Files” button in upper left-hand corner of display (see screenshot below)

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- C. Select “Study Mode: TARA – Outage Reliability Review”
- D. Enter case name
- E. Using the browser button “...” select the INPUT_FILES folder created from step 5.1.2
- F. Select proper date range for “Study Date Range”
- G. For Direct Dispatch, select a period in the past with a similar date range
- H. Select the latest “ctgs_rtca_autorun_rtca_ems_N-1_and_N-2.aux” for contingency file
- I. Select the saved all-lines-in EMS case for Network model from step 5.1.1.G
- J. Select Run (Export)


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- 4. The Outage Coordinator, LTOC group, shall copy all input files from the newly created Casebuilder folder into the INPUT_FILES folder (see screenshot below)

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- 5. The Outage Coordinator, LTOC group, shall modify the input files in the newly created study folder by performing the following:
 - A. In the Direct Dispatch file:
 - (1) Open directdispatch.csv
 - (2) Inspect unit hourly output and modify as appropriate
 - a. Consider changing all 0 MW dispatch MW values to 0.1 MW so that TARA has the option to re-dispatch units to EcoMax values as needed
 - (3) Verify values for external transactions as appropriate (table below has recommended values.)

Table 1

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.I.HQHIGATE120 2	225
.I.HQ_P1_P2345 5	1200
.I.ROSETON 345 1	0
.I.SALBRYNB345 1	0

(4) Save directdispatch.csv file


B. In the Outage Override file:

- (1) Open outage_override.csv
- (2) On line 3 add “\” to comment out Trans_Outage.csv (this excludes all transmission outages from the hourly/daily AMB files)
- (3) Save outage_override.csv file

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C. Interface limits file

- (1) Open interface_limits.aux file
- (2) Modify interface limits
 - a. Check for all-lines-in stability limits and modify the file accordingly
 - b. Check for transmission equipment out-of-service stability limits and modify the file accordingly
 - c. Calculate optional second contingency TTC thermal limits and modify the file (e.g., Boston import limit, CT Import and Western CT limits, etc)
- (3) Save Interface_limits.aux file

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6. The Outage Coordinator, LTOC group, shall create hourly AMB (Automatic Model Builder) files for the study period as follows:
 - A. Log into the TARA program by performing the following actions:
 - (1) Open the “TARAviwer_vXXX” in created ORA study folder
 - B. Right click and select TARA Main Menu to view the user interface

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- C. Import Scenario Settings and modify accordingly by performing the following actions:
 - (1) Select “ContAnalysis + TARA Screen” button at top of “Input” display
 - (2) Select “Import Options File” button at bottom of display
 - (3) Select “Options_AMB.csv” from the study folder to import options
 - (4) Select “Change Initial Loading Options” at bottom of display
 - (5) On “General” tab, under Log File, select “Save As” button to save future log files in the users study folder under temp directory, save as taralog.txt (see screenshot below)

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- (6) Select “Change AMB Options”
- (7) Decide if the study will require hourly or peak hour (daily) analysis
 - a. Hourly - On “GeneralOpts” tab under “AMB Process Start Time”, select the “Calendar” button in the “Select Date and hour” field, and select the previous day and the last hour before the start of the specified study period

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- b. Daily - On “GeneralOpts” tab under “AMB Process Start Time”, select the “Calendar” button in the “Select Date and hour” field, and select the previous day and a peak hour (e.g., hour beginning 18) within that day, before the start of the specified study period as the AMB Start Date/Time (see screenshot)

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The figure above shows the AMB start time for a study period beginning 5/7/14


NOTE

Refer to Appendix X that contains screenshots for the proper options for setting up a case. The “max hourly snapshots” value is **not** to be changed, it is expected to be set at 744.

- (8) Select “Save Options” in “Change AMB Options” (the other parameters in the other tabs should **not** be changed once set)
- (9) Select “Save Options” in “Change Initial Loading Options”
- (10) As an option, select “Export Options File” and save as “Options_AMB” (override previously saved options file) in the study folder

D. Load Input Files by performing the following actions:


- (1) On “Input” tab select “Load Flow Case” import button and select the “network_model.aux” file from the “INPUT FILES” folder
- (2) Verify that “LF Case format” is set to “Powerworld AUX”
- (3) Under “Study Data File” select the file import button and select the “amb.sub” file located in the ORA study folder
- (4) Under “Monitor File” select the file import button and select the “amb.mon” file located in the ORA study folder
- (5) Under “Contingency File”, select the file import button and select the “Contingency.aux” file from the INPUT FILES folder
- (6) Select the “Load Input Files” button to load files
- (7) Select the “Utils” tab, select the “Reports” tab, select “Case Summary, “Input Warnings Summary” and “Input Warnings List” and select “Create Reports”

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- (8) Observe reports for any abnormal messages and verify a valid case solution (In particular, verify that **no** warnings have a severity level greater than 1 and if there are, investigate the issue)
- (9) Select “Export Options File” and save as “Options_AMB” (override previously saved options file) in the study folder

E. Create AMB files by performing the following actions:

- (1) Select “AMB” button on side-tab bar
- (2) Select “Run Automated Model Builder or Create AMB Input Data Reports”
- (3) Verify the “Hourly” or “Daily” button (as needed) at top of the display is set
- (4) On AMB Creator tab, under “Start snapshot”, select the “Calendar” button and select the first day of the study period, then select the first hour of that day, if studying all hours (For peak daily studies use any hour except 00)
- (5) Enter “Number of Snapshots”
 - a. For Daily peak study: input number of days in the study period for the Number of Snapshots
 - b. For hourly studies: the number of snapshots must equal the total number of hours for the entire study period (e.g. For a week long study the number of snapshots would be equal to 168)
- (6) Under “AMB Models Options”, select the directory for saving the AMB files created to: D:\<username>\ORA_Studies\ORA_WE_MM_DD_YY\DAILY_AMB (or HOURLY_AMB)
- (7) Select the “Save Options and Close” button at the bottom of the AMB display
- (8) On the Input tab, select “Export Options File” and save as “Options_AMB” (override previously saved options file) in the study folder
- (9) Select the AMB tab again
- (10) Select “Run Automated Model Builder” or “Create AMB Input Data Reports”
- (11) Select the “Create Models” button

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- (12) Verify models are being created by opening the “DAILY_AMB” file as they are being created

F. Load AMB files by performing the following actions:

- (1) On the Input tab, select Import Options File button and select the “Options_ORA” file
- (2) On the “Input” tab for “Load Flow Case” browse to find the first created AMB file in the “HOURLY AMB” folder

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- (3) Set the day/hour to “*” to select all AMB files


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- (4) Select Multiple Cases check box and ensure the number of files is equal to the number of AMB files created
- (5) Under “Study Data File” select the file import button and select the “ora.sub” file located in study folder
- (6) Under “Monitor File” select the file import button and select the “amb.mon” file located in study folder
- (7) Under “Contingency File”, select the file import button and select the “contingency.aux” file located in the INPUT FILES folder
- (8) Ensure the ORA (outage request) Analysis radial button is selected
- (9) Under “Outage Definitions File” select the file import button and select the “trans_outage.csv” file which is located in the INPUT FILES folder
- (10) Export Options file and override existing Options_ORA file
- (11) Select Load Input Files

G. Run ORA evaluation by performing the following actions:

- (1) Select the ORA_OutList excel tab
- (2) Select and right click on any outage cell and select “Automated STUDY outages Evaluation...”

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- (3) Click the Select All button in the Select STUDY Outages box
- (4) Deselect any outages that do **not** require evaluation (this will shorten the duration of the run)
- (5) Verify all hours to be studied are selected in the Select Snapshots box
- (6) Verify Solution Mode is SCRD for both Base Case and Outage Evaluation
- (7) Select reports as needed
- (8) Verify that the “Include PREAPPROVED” box is checked (these are outages in the Implemented state)
- (9) Verify “DECLINE the Outage” is selected for violation indication
- (10) Verify Enable Multi-Core Processing check box is checked
- (11) Select the “Evaluate and Create selected reports”

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H. Analyze results by performing the following actions:

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NOTE

ORA will generate the reports chosen and transmission violations (if any) will be labeled as follows:

Accepted

Outage caused small thermal & voltage impacts
No resulting overloads for which re-dispatch is required

Controlled

Outage caused overloads for which re-dispatch was required

Trending

No overloads but impacts requiring a multitude of re-dispatch

Voltviol

Small thermal impacts, **no** overloads requiring re-dispatch
 Caused voltage violation

Declined

Caused overloads and used generation re-dispatch but overload could not be resolved

Not Studied. Check for mapping or status errors.

Outage element could **not** be found in model

(1) For the ORA_AutoSum tab:


- a. Inspect the “New Status” column and filter on “Declined”
- b. Identify the relative thermal issue and evaluate as necessary that the binding constraint is valid
- c. Consider repositioning or canceling the associated outage
- d. Inspect ORA_SCD_ and adjust to view Resources that may have been re-dispatched to relieve the constraint

(2) For the ORA_Study_Flows:


- a. Sort descending on “LoadRes” column to see overloads based on evaluated contingencies
- b. Verify that the contingency causing the overload is honored and verified

(3) For the ORA_CustomStudyFlows:

- a. Sort descending on “AC Verified % Loading” column to see overloads based on evaluated contingencies

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- b. Verify that the contingency causing the overload is honored and verified
- (4) For the ORA_SCD_Adjust:
 - a. Inspect ORA_SCD_Adjust to view Resources that may have been re-dispatched to relieve the constraint
- (5) For the ORA_SCD_Binding:
 - a. Sort descending on “%Loading”
 - b. Verify contingencies which cause the most severe overloads

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6. Performance Measures

This procedure is considered to be properly followed as evidenced by the following:

- A. Goal for Corporate Customer Satisfaction Rating met.
- B. Corporate Goal for NPCC Criteria Compliance and Enforcement Program (CCEP) non-compliance letters received by ISO in regards to Area Transmission Review.
- C. Corporate Goal for NPCC CCEP non-compliance letters received by ISO in regards to Operating Reserve is met.
- D. The following are being tracked as leading indicators and responded to:
 - (1) Topology / device errors which are incorrectly entered in the ISO Outage Scheduling software
 - (2) If changes were required resulting from ISO and LCC network model differences
- E. Metric to measure the number of Business Days it takes to complete a Reliability Review from the time the LCC submits an outage request to the time the Long Term Outage Coordinator makes a determination placing the outage request in the Interim Approved, Negotiate or Denied state in the ISO Outage Scheduling software.
 - (1) Appropriate uses of the Negotiate state in the ISO Outage Scheduling software:
 - a. An Economic study is required.
 - b. Issues arise with the completed reliability study and a discussion is needed with the LCC (e.g., reposition the outage).
 - c. Issues arise with the completed reliability study and the Real Time Studies group needs to conduct its own studies.
 - d. The outage request falls within the Short-Term time period.
 - e. An LCC submits an outage request in the FCM monthly or annual moratorium.
 - (2) If the Negotiate state is used, the following notes should be entered into the Short and Long Term ISO Study tab in the ISO Outage Scheduling software:

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- a. Negotiate by (Initials) - Interim Approved Reliability – (Date) - Economic Study needed.
- b. Negotiate by (Initials) - (Summarize issues found in Reliability Study) - (Date) - LCC contacted.
- c. Negotiate by (Initials) - (Summarize issues found in Reliability Study) - (Date) - (RT Studies Engineer) contacted.
- d. Negotiate by (Initials) - Interim Approved Reliability - (Date) - Outage Request falls within Short-Term time period.
- e. Negotiate by (Initials) - LCC request within monthly FCM moratorium - (Date).

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7. References

ISO New England - ISO New England Inc. Transmission, Markets, and Services Tariff
Section III, Market Rule 1 - Standard Market Design (Market Rule 1)

ISO New England Information Policy

ISO New England Operating Procedure No. 1 - Central Dispatch Operating
Responsibilities and Authority (OP-1), Appendix A (OP-1A)

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

ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency
(OP-4)

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

ISO New England Operating Procedure No. 7 - Action in an Emergency (OP-7)

ISO New England Operating Procedure No. 14 - Technical Requirements for Generators,
Demand Response Resources, Asset Related Demands and Alternative Technology
Regulation Resources (OP-14)

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

Master Local Control Center No. 1 - Nuclear Plant Transmission Operations (M/LCC 1)

Master Local Control Center No. 7 - Processing Outage Applications (M/LCC 7)

Area TOGs

SOP-OUTSCH.0030.0010 - Evaluate Resource Outage Requests

SOP-OUTSCH.0030.0040 - Perform Long Term Resource Outage Coordination


SOP-OUTSCH.0030.0070 - Long Term Outage Economic Analysis

SOP-OUTSCH.0050.0010 - Determine Study Requirements

SOP-OUTSCH.0050.0020 - Perform Complex Studies


Powerflow Users Guide

Contingency Analysis Users Guide

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8. Revision History

Rev. No.	Date	Reason	Contact
0	01/21/16	Initial version	Mike Courchesne
0.1	10/27/17	Biennial review completed by procedure owner requiring no changes; Made administrative changes (added corporate identity to all document footers) required to publish a Minor Revision;	Mike Courchesne
0.2	07/31/19	Biennial review completed requiring no changes; Made administrative changes required to publish a Minor Revision (including updated procedure owner in headers and in Section 7, updated OP-5, OP-14, SOP- OUTSCH.0030.0010, and SOP- OUTSCH.0030.0040 titles);	Andrew Kopacka
1	07/28/21	Biennial review by procedure owner; Administrative changes; Added clarification to procedural steps to align with current work practices; Added 50/50 load link to section 5.1;	Andrew Kopacka
2	7/27/23	Biennial review by procedure owner; Globally changed “generator” to “Resource”; Made minor editorial changes.	Andrew Kopacka

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9. Attachments

Attachment A - TARA Options Screen Shots (Confidential)

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