 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	


Table of Contents

- 1. Responsibilities2**
- 2. Scope/Applicability.....2**
 - 2.1 Background.....2
 - 2.2 Scope / Applicability2
- 3. Procedure Detail3**
 - 3.1 Market Modeling Flowchart.....3
 - 3.2 Flowchart Details.....4
 - 3.3 Flowgate Enforcement.....5
 - 3.4 Accuracy Note.....6
 - 3.5 Transmission Corridor Update Process7
 - 3.6 Nomogram Update Process.....7
 - 3.7 Conforming Flowgates/TCORs/Nomograms Due to Outages.....8
 - 3.8 Contingency Define/Update Process.....8
 - 3.8.1 Contingencies for FNM Builds9
 - 3.8.2 Contingency Updates between FNM Builds10
 - 3.8.3 Contingency Definition/ Update in Real-Time.....10
 - 3.9 Flowgate Enforcement Status Guidelines.....11
 - 3.10 Flowgate Enforcement Status/Reason Update Guidelines12
 - 3.11 Communication with Market Participants.....12
 - 3.12 Review Process.....13
- 4. Supporting Information13**
 - Operationally Affected Parties13
 - References13
 - Definitions.....13
 - Version History.....14
- 5. Periodic Review Procedure15**
 - Review Criteria & Incorporation of Changes.....15
 - Frequency.....15
- Appendix15**

Purpose

This procedure provides guidelines for Base Contingencies, Operating Nomograms, Transmission Corridors (TCORs), and Minimum Online Commitment (MOC). The procedure also provides criteria for the default enforcement statuses of all Flowgates in the market.

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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

1. Responsibilities

CAISO Operations Engineering Services	In accordance with the Normal Operations Planning processes described in California ISO (CAISO) Operating Procedure 3200 Normal Operations Planning Process , maintain constraints such as nomograms, TCORs, flowgates, contingencies and MOCs in all CAISO bulk and regional procedures. Whenever the default enforcement status of a flowgate is changed, update flowgate enforcement and reason code in EMMS accordingly during DB promotion, unless urgent changes needed.
CAISO Transmission Dispatcher	Review Operations Engineer (OE) recommendations; coordinate with other CAISO operators and personnel to implement updates as needed.
CAISO Generation Dispatcher	Review OE recommendations; coordinate with other CAISO operators and personnel to implement updates as needed.
CAISO Network Applications Engineer	Review OE recommendations; coordinate with MES and other personnel to implement updates as needed.
CAISO Market Engineering Support (MES)	Review OE recommendations; coordinate with CAISO operators and other personnel to implement updates as needed.

2. Scope/Applicability


2.1 Background

Describes usage of Nomograms, Transmission Corridors (TCORs), Contingencies, Flowgates, and Minimum Online Commitment (MOC).

2.2 Scope / Applicability

This procedure is applicable to Nomograms, Transmission Corridors (TCORs), Contingencies, Flowgates, and Minimum Online Commitment (MOC).

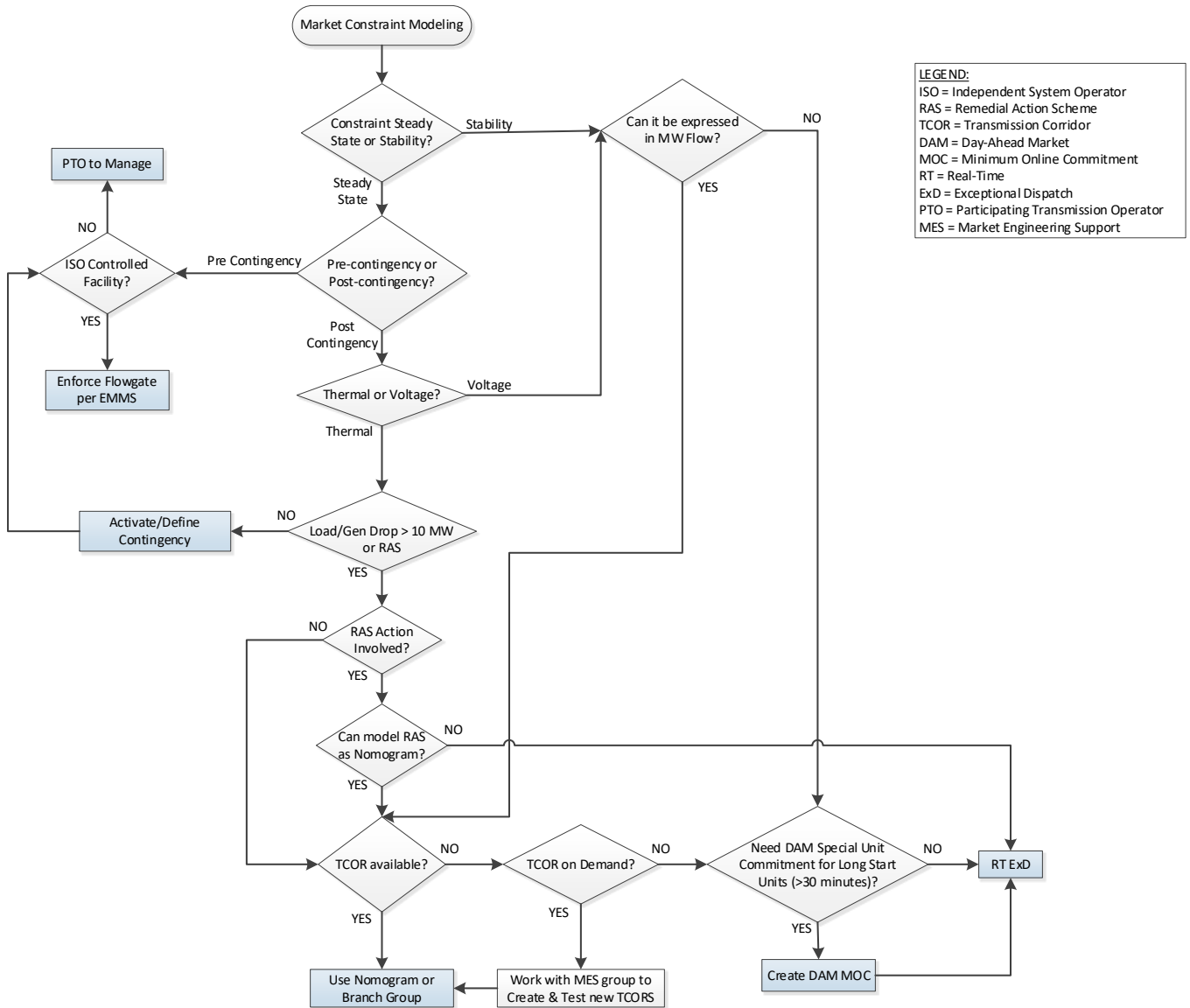
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 California ISO	Operating Procedure	Procedure No. 3610
		Version No. 10.4
		Effective Date 2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None


3. Procedure Detail

3.1 Market Modeling Flowchart

The following flowchart is a guideline for modeling a constraint for a Control Point (CP) in the market system. At least one of the action items highlighted in blue should be completed for a market constraint. Please note that if there is no generation mitigation for a CP or if the generation does not participate in the CAISO market (Ex. QF's, renewables, RMR condition 2, Biomass, generators without bids like hydro with water limitations), monitor it outside the market and no market constraint is needed.



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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

3.2 Flowchart Details

Use a Contingency if there is load drop or generation drop less than 10 MW, no voltage constraint, and no RAS.


Use a Nomogram if a contingency cannot be used and there are TCORs available. (If a necessary TCOR is not available, work with MES to create new TCOR with TCOR on demand tool.)

Use a MOC if a Nomogram cannot be used and there is a need for voltage support or to ensure N-1-1 obligation is covered. An exception may be made with management approval.

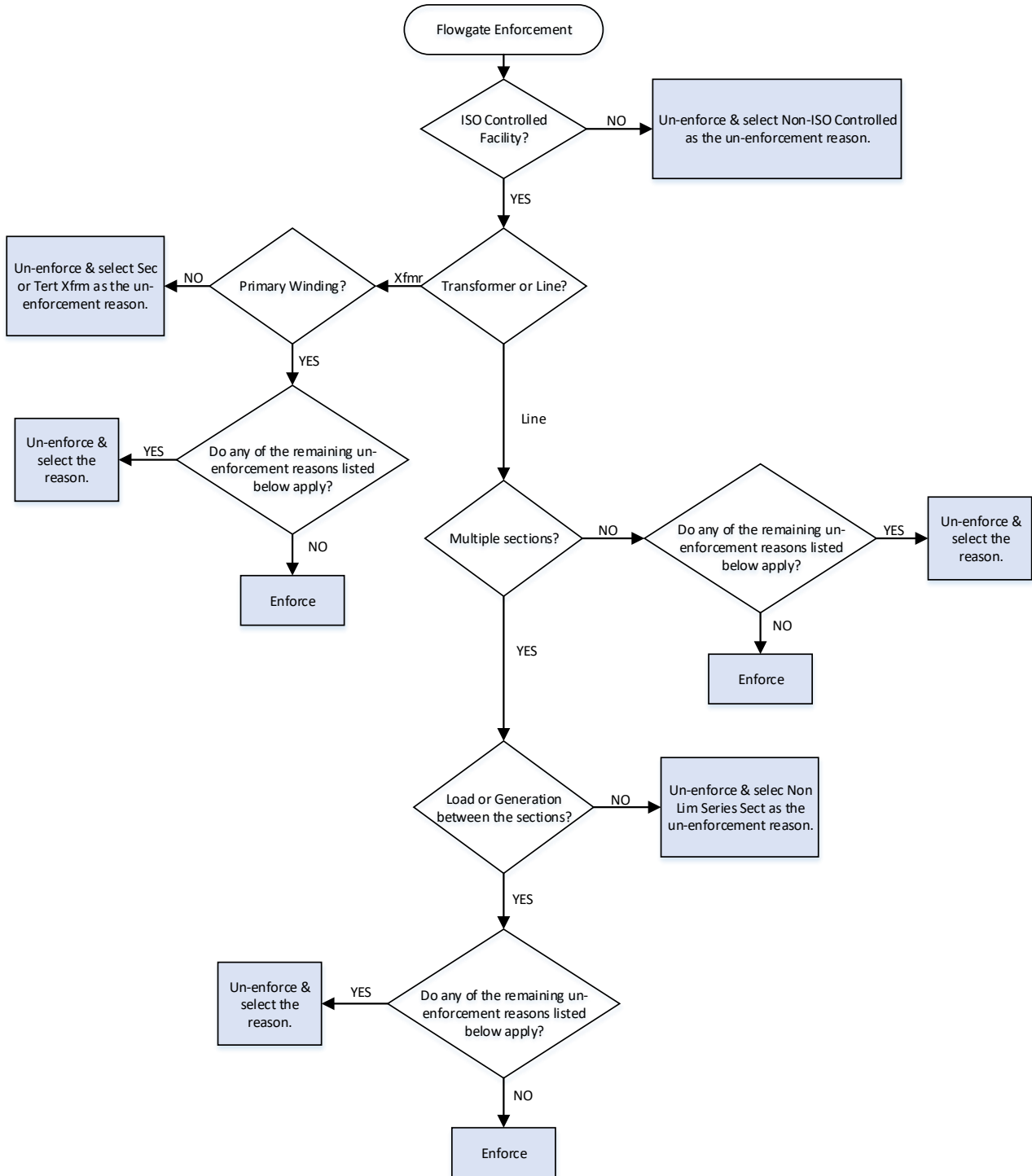
Note: *MOC is currently only utilized in the Day-Ahead Market. In Real-Time Market, Exceptional Dispatch (ED) may still be required if no Nomogram can be modeled and enforced.*

Use a branch group (BG) for non-TOP-007 paths and big area imports.


Note: *if a BG needs to be de-rated for a particular hour, that BG needs to have ETC on it. Otherwise, create a Nomogram instead of a BG.*

 California ISO	Operating Procedure	Procedure No. 3610
		Version No. 10.4
		Effective Date 2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None

3.3 Flowgate Enforcement



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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
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Additional Enforcement Notes:

- For 500 kV lines with series caps, enforce ONLY the line section if it is more limiting or has the same rating as the series cap section. If the series cap section is more limiting, then enforce both line and series cap since the more limiting series cap section is expected to bind. This would account for instances when the series cap section may be bypassed.
- If there is a before and after line (line with double modeling), enforce both. RIMS card will open one or the other so there is no double congestion.


List of un-enforcement reasons:

- **Sec or Tert Xfmr:** Secondary or Tertiary winding of a transformer. Primary winding is generally enforced.
- **Non-CAISO Controlled:** Gen ties would generally be Non-CAISO controlled. Use *Transmission Register* as reference.
- **Non Lim Series Sect:** Non Limiting Series Section - lines with multiple sections and series devices.
- **DAM Exception:** To be used for exceptions where DA flag is unenforced and RT is enforced.
- **RTM Exception:** To be used for Humboldt/Drum or other issues where RT flag is unenforced and DA flag is enforced.
- **Temp Modeling Inaccuracy:** Only to be used as an exception for modeling issues that may take longer to fix. OE will work with NetApps to validate the status (e.g., phase shifter modeling).
- **Non-Mkt Mitigation:** To be used when the only mitigation available is switching or using generation that is outside the market.
- **Contractual Agreements:** Ties that are CAISO-controlled are normally enforced unless there are contractual agreements not to enforce them.
- **Protected by RAS:** If the flowgate is protected by a RAS. This should be done on a case-by-case basis (e.g., could have a nomogram enforced already. Some lines are protected by RAS for normal overloads or for certain contingencies).
- **NEW:** Use when a new flowgate is introduced during DB Promotion. Flowgate status may be left as NEW until next DB promotion or until Transmission Register is updated with the CAISO control flag.

3.4 Accuracy Note

CAISO Siemens market software Flowgate/Nomogram/Contingency enforcement status should follow EMMS as being source of reference.

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 California ISO	Operating Procedure	Procedure No. 3610
		Version No. 10.4
		Effective Date 2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None

3.5 Transmission Corridor Update Process


Take the following actions to update a TCOR for use in the market:

CAISO Operations Planning
<ol style="list-style-type: none"> Follow MCR process for EMMS and Define the following attributes of the TCOR in EMMS: <ul style="list-style-type: none"> TCOR name. Reference OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention. Seasonal limits: Seasonal TCOR limits “to” and “from” if applicable. Set the limits to +/-9999 if there are no limits. Flowgate: Flowgate associated with the TCOR. STNAME: Station name where the flowgate will be measured. DA_ENABLE_FLAG and RT_ENABLE_FLAG. Coordinate with MES to test new TCOR <u>and</u> confirm if it is between DB promotion cycles. <p><i>Note: Creation of the new TCOR will follow regular EMMS process.</i></p>

3.6 Nomogram Update Process

CAISO Operations Planning
<ol style="list-style-type: none"> Define the following attributes of the Base Nomogram: <ul style="list-style-type: none"> Nomogram name. Reference OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention. RHS_Coeff: The right-hand side coefficient. Coeff: TCOR coefficient. Curve ID - Start and End Time: The period that the Nomogram is active in the market. If the Nomogram is continuously active, enter the end date to be 12/31/2025 23:59. Market Type: All market type, day-ahead, real-time, etc. Transmission Corridor Name: Transmission Corridor(s) associated with the Nomogram. Default Active: For procedure nomograms, check this flag. Monitor Only: This flag should be checked for procedure nomograms and outage nomograms. <ul style="list-style-type: none"> Reference OES-OEP-015 Nomograms Maintenance. Modify/delete existing Nomogram <u>or</u> create new Nomogram in the market systems.

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 California ISO	Operating Procedure	Procedure No. 3610
		Version No. 10.4
		Effective Date 2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None

CAISO Operations Planning
<p><i>Note: Lead Transmission Dispatcher (LTD) and RMOE can do this in real-time if necessary.</i></p> <ol style="list-style-type: none"> 3. Coordinate procedure nomogram changes with CRR group. 4. Approval has to be received from the Director/Manager/Lead OE from Operations Engineering Services Department for procedure nomograms.

3.7 Conforming Flowgates/TCORs/Nomograms Due to Outages

Take the following actions to conform flowgate, TCOR, or Nomogram due to an outage:


***Note:** A flowgate, TCOR, or Nomogram can be conformed in the Siemens market software.*

CAISO Operations Planning
<ol style="list-style-type: none"> 1. If an outage flowgate, TCOR, or Nomogram overrides an existing flowgate, TCOR, or Nomogram, <ul style="list-style-type: none"> • Update the notes for the outage and the PI display <u>and</u> • Inform the Lead Transmission Dispatcher.

CAISO Transmission Dispatcher
<ol style="list-style-type: none"> 1. If an outage flowgate, TCOR, or Nomogram overrides an existing flowgate, TCOR, or Nomogram, <ul style="list-style-type: none"> • Inform the appropriate Generation Dispatcher to conform the existing flowgate, TCOR, or Nomogram in real-time. 2. If the outage is finished early/extended, <ul style="list-style-type: none"> • Inform the appropriate Generation Dispatcher to conform the existing flowgate, TCOR, or Nomogram as necessary.

CAISO Generation Dispatcher
<ol style="list-style-type: none"> 1. If an outage flowgate, TCOR, or Nomogram overrides an existing flowgate, TCOR, or Nomogram, <ul style="list-style-type: none"> • Conform the existing flowgate, TCOR, or Nomogram in real-time as instructed by the Lead Transmission Dispatcher, per CAISO Operating Procedure 2220 Transmission Conforming. 2. If the outage is finished early/extended, <ul style="list-style-type: none"> • Conform the existing flowgate, TCOR, or Nomogram as necessary, as instructed by the Lead Transmission Dispatcher, per CAISO Operating Procedure 2220 Transmission Conforming.

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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

3.8 Contingency Define/Update Process


Contingencies and their default statuses for the market are defined and maintained in the Enterprise Model Management System (EMMS) and are pushed to downstream systems. Operations Engineers are responsible for defining and updating contingencies in EMMS as part of the FNM build process for new and modified transmission and generation facilities, and ensuring that contingencies are accurate in the RTCA. It may also be necessary to define or update contingencies in between FNM builds or in real-time due to operating conditions.

3.8.1 Contingencies for FNM Builds

Contingencies for new and modified transmission and generation facilities for network model builds will be defined or updated in EMMS and promoted through the standard FNM build process.

CAISO Network Applications Engineer
<ol style="list-style-type: none"> 1. Identify switch and circuit breaker changes and all the Contingencies that need to be updated due to network model changes during the network model promotion process. 2. Send the list of contingencies, switches and circuit breaker changes to the Operations Engineers.


CAISO Operations Planning
<ol style="list-style-type: none"> 1. Define/update the following attributes of the contingencies in the EMMS application: <ul style="list-style-type: none"> • CONTINGENCY_TITLE: Name of the Contingency (refer to OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention). • BREAKER NAME: Name of the breaker associated with the Contingency. • EQ STATUS: Status whether the breaker is open or closed. <p>Note: Refer to OES-OEP-034 EMMS Contingency and TCOR Management for a step-by-step process on how to enter a contingency in the EMMS application.</p> <ul style="list-style-type: none"> • Verify that the new contingency definition is available in EMM/RTCA/both depending on the selected flags.

 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
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3.8.2 Contingency Updates between FNM Builds

In addition to defining and updating contingencies with FNM builds, it may be necessary to define or update contingencies in between FNM builds due to system changes or other reasons, without waiting for the next DB promotion. In this scenario, the contingencies must be defined or updated in EMMS and in the RTCA Production environment.

CAISO Operations Planning
<ol style="list-style-type: none"> Define/update the following attributes of the contingencies in the EMMS application: <ul style="list-style-type: none"> CONTINGENCY_TITLE: Name of the Contingency (refer to OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention). BREAKER NAME: Name of the breaker associated with the Contingency. EQ STATUS: Status whether the breaker is open or closed. <p><i>Note: Refer to OES-OEP-034 EMMS Contingency and TCOR Management for a step-by-step process on how to enter a contingency in the EMMS application.</i></p> Define/update the contingencies in RTCA in the Production environment, if the contingency does not already exist in the RTCA.

 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

3.8.3 Contingency Definition/Update in Real-Time

Due to unexpected system conditions in real-time such as forced outages or other system emergencies, it may be necessary to define or update contingencies in real-time. Such changes will be handled by the Reliability and Market Operations Engineer (RMOE), and must be done directly in the market system (EMM). In addition, contingency changes entered in EMM, must also be entered in EMMS and in the RTCA Production environment. Note that because EMMS updates are sent to EMM only once per day, it will be necessary to define a temporary duplicate version of the contingency in EMM until the defined contingency in EMMS is sent from EMMS to EMM. Once EMM is up to date, the temporary version of the contingency will need to be deleted.


CAISO Reliability and Market Operations Engineer
<p>1. Define/update the following attributes of the contingencies directly in EMM Production environment:</p> <ul style="list-style-type: none"> CONTINGENCY_TITLE: Name of the Contingency (refer to OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention). <p><i>Note: In just EMM, add “_T” as an extension to the name of the contingency to indicate that this is a temporary duplicate version (E.g. PG1 Tesla-Bellota 230_T).</i></p> <ul style="list-style-type: none"> BREAKER NAME: Name of the breaker associated with the Contingency. EQ STATUS: Status whether the breaker is open or closed. <p>2. Define/update the contingencies in EMMS.</p> <p><i>Note: In EMMS, do not include the “_T” extension to the name of the contingency (E.g. PG1 Tesla-Bellota 230).</i></p> <p>3. Define/update the contingencies in RTCA in the Production environment, if the contingency does not already exist in the RTCA.</p> <p>4. Once the updated contingency in EMMS has been pushed into EMM with the daily EMMS to EMM update process,</p> <ul style="list-style-type: none"> Delete the temporary duplicate version of the contingency with the “_T” extension in EMM.

3.9 Flowgate Enforcement Status Guidelines

- If flowgate is under CAISO control, normally **enforce**.
- If flowgate is non-CAISO controlled, normally **unenforce**.

Follow the flowchart in [Section 3.3](#) to determine the default enforcement status for flowgates.

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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
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3.10 Flowgate Enforcement Status/Reason Update Guidelines


CAISO Operations Planning
<ol style="list-style-type: none"> 1. Define/update the flowgate enforcement status/reason code in EMMS. <ul style="list-style-type: none"> • Follow the guidelines in Section 3.3. 2. If the default enforcement status/reason code update is due to a TCR request, <ul style="list-style-type: none"> • Inform RMOE/TDs after submitting MCR in EMMS <u>and</u> • Update the TCR accordingly.
CAISO Reliability and Market Operations Engineer
<ol style="list-style-type: none"> 1. If the default flowgate enforcements status/reason code needs to be changed, <ul style="list-style-type: none"> • Coordinate with Transmission/Generation Dispatcher <u>and</u> • Create an OMS outage card with the enforcement change. 2. Submit a TCR for the change <u>and</u> 3. Inform Operations Planning group. 4. Once market receives an MCR with new default flowgate enforcement status and the change has been verified, <ul style="list-style-type: none"> • End the outage card.

3.11 Communication with Market Participants

After the results of the Day-Ahead Market are posted, the CAISO posts via CMRI the post-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the list of Transmission Constraints, including Contingencies and Nomograms that are enforced and not enforced in that day's Day-Ahead Market.

Subsequently and prior to the next Day-Ahead Market, the CAISO also posts the pre-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the daily list of information for the Transmission Constraints, including Contingencies and Nomograms, the CAISO plans to enforce or not enforce for the next day's Day-Ahead Market.

To the extent that the CAISO does not make either of these two reports available on any given Operating Day, the CAISO will instead provide only the list of Transmission Constraints, including Contingencies and Nomograms that were enforced or not enforced for the applicable Day-Ahead Market within the next thirty (30) days, after which the information will not be provided.

 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

3.12 Review Process

The procedure related Nomogram/TCORs and contingencies-flowgate pairs are reviewed during the seasonal assessment. The TCORs/Flowgates enforcement are also reviewed and updated in the DB promotion process.

4. Supporting Information

Operationally Affected Parties

Shared with the public.

References


Resources studied in the development of this procedure and that may have an effect upon some steps taken herein include but are not limited to:

CAISO Tariff	6.5.3.3 Communications with Market Participants 27.5.1 Network Models used in CAISO Markets 27.5.6 Management & Enforcement of Constraints in the CAISO Markets
NERC Standards	
CAISO Business Practice Manual	Managing Full Network Model
CAISO Operating Procedures	3200 Normal Operations Planning Process
Desktop Procedures	GOT-006 Transmission Constraints Management OES-OEP-015 Nomograms Maintenance OES-OEP-016 CTGS Group Definition, and CTG, Nomogram, TCOR and BG Naming Convention. OES-OEP-034 EMMS Contingency and TCOR Management

Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have that meaning when capitalized in this Operating Procedure.

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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
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The following additional terms are capitalized in this Operating Procedure when used as defined below:

Operating Nomograms	Operating Nomogram refers to any operating limits that can be expressed with a linear algebraic expression. Most flow based operating limits that use equipment Outage distribution factors or effectiveness factors are considered as Operating Nomograms. Variables in the Nomogram formula are pre-defined individual TCORs.
Transmission Corridors	TCORs - Transmission Corridor refers to a single transmission element or a number of transmission elements of which an operating limit in MW has been established in the direction defined by the reference station or voltage level.
Base Contingencies	A minimum set of single or double Contingencies selected by operating engineers that are included in Day-Ahead or Real-Time Market runs. Additional sets of Contingencies may be added to market runs based on system conditions. For the time being, the Base Contingency set does not include any Contingencies that may trigger RAS actions resulting in a loss of Load, Generation, and/ or transmission element(s).
Minimum Online Commitment	The Minimum Online Commitment (MOC) Tool is designed to model generation requirements into the Day-Ahead Market (DAM) as a reliability constraint. By modeling the generation commitment as a constraint, the DAM will be able to commit the most economical set of resources given the list of eligible generation resources and a corresponding generation commitment limit.

Version History

Version	Change	Date
9.1	Added Section 3.3 for Flowgate Enforcement. Updated role/title for ISO Operations Planning Desk. Minor grammar and format updates.	1/25/18
10.0	Periodic Review: Updated Sections 3.3, 3.5, 3.6, 3.8.1 and 3.10. Minor updates throughout. Removed references of OP 3610A, as it retired in July 2019. Replaced instances of ISO with CAISO. Minor format and grammar updates. Removed version history prior to 5-years.	1/28/21
10.1	Added new Section 3.11 to provide guidelines on updating flowgate enforcement status. Minor change to Operationally Affected Parties for consistency with other procedures.	5/12/21

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 California ISO	Operating Procedure	Procedure No.	3610
		Version No.	10.4
		Effective Date	2/22/24
Nomograms, TCORs, Flowgates, Contingencies and MOC		Distribution Restriction: None	

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10.2	Updated Sections 1, 3.1, 3.4, 3.5, 3.11 and Appendix section to accommodate the retirement of 3610B.	6/11/21
10.3	Removed Section 3.9, Master Flowgate List, as it is no longer applicable and renumbered following subsections. Section 3.12: rewrote section and updated title due to process changes.	10/20/22
10.4	Periodic Review: Updated from Generation and Transmission “Desk” to “Dispatcher”. Removed history prior to five years.	2/22/24

5. Periodic Review Procedure

Review Criteria & Incorporation of Changes

There are no specific review criteria identified for this procedure, follow instructions in CAISO Operating Procedure 5510.

Frequency

Every three (3) years.

Appendix

No references at this time.