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		Version No.	5.0
		Effective Date	4/01/2019
Load Management Programs and Underfrequency Load Shedding		Distribution Restriction: None	

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Purpose

Provides description and actions for Underfrequency load shedding and Load management programs.

1. Responsibilities

ISO Shift Manager Desk	Initiates implementation of Load management programs. Initiates response and restoration of load following an Underfrequency load shedding event.
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ISO System Operator	Hold authority, as delegated by the Executive Officers of the ISO, to take or direct timely and appropriate Real-Time actions necessary to ensure reliable operation of the ISO Controlled Grid, up to and including Shedding of firm Load to prevent or alleviate system operating limit or interconnection reliability operating limit violations. These actions may be performed without obtaining approval from higher-level personnel within the ISO.
Participating Transmission Owner (PTO)	Implement and direct local area Load Shedding plans at the direction of the ISO.
Utility Distribution Company (UDC)	Implement and direct local area Load Shedding plans at the direction of the ISO.


2. Scope/Applicability

2.1. Background

2.1.1 Flex Alert, RDRR, and UDC Interruptible Load Programs

- The Flex Alert is a communication program that leverages the news media to encourage energy conservation. It is intended to provide an additional level of Demand reduction on the system. The participants are not compensated for Load reduction and there is no obligation by program participants to reduce Demand by any set amount. There is no estimate of the amount of Demand relief that may be achieved under the Flex Alert. The ISO System Operators will follow ISO Operating Procedure§ [4420 System Emergency](#) and [4420B Alert/Warning/Emergency \(AWE\) Guide](#) to implement Flex Alerts.
- Reliability Demand Response Resources (RDRR) are use-limited demand resources that can participate economically in the Day-Ahead market (Similar to a Proxy Demand Resource) and as emergency demand response resources in the Real-Time Energy market. RDRR resources that participate economically in the Day-Ahead must make any remaining capacity not committed in the Day-Ahead available to the ISO in real-time to alleviate System Emergencies. Once the System Emergency has been resolved, RDRRs are deactivated from real-time participation in the market (until the next emergency), and can only participate economically in the Day-Ahead until then. The ISO System Operators will follow ISO Operating Procedure§ [4420 System Emergency](#) and [4420B Alert/Warning/Emergency \(AWE\) Guide](#) to implement Demand Response Resources.

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- The UDC Interruptible Load programs were developed through arrangements with subscribing end-use customers taking service under special UDC tariffs approved by the California Public Utilities Commission (CPUC). These programs may be called by the UDCs per their retail program rules or by ISO System Operators in the Day-Ahead, and/or in Real-Time upon issuing a Warning Notice, an Emergency Stage 2, or a Transmission Emergency. The ISO System Operators will follow ISO Operating Procedure§ [4420 System Emergency](#) and [4420B Alert/Warning/Emergency \(AWE\) Guide](#) to call on UDC Interruptible Load programs.

UDC Interruptible Load programs may require 30 minutes or more to fully implement, and therefore are most effective when their anticipated use is coordinated with the UDC in advance.

2.1.2 Under-Frequency Load Shedding

Following the 1996 WECC Interconnection disturbances, WECC developed the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Plan. This WECC plan provides for system-wide coordinated Load shedding, Load restoration, generator tripping, and Tie tripping.

2.2. Scope/ Applicability

This procedure applies to the ISO, as well as PTOs, UDCs, MSSs, and PGs within the ISO Balancing Authority Area.


3. Procedure Detail

3.1. Manual Load Shedding

Take the following steps when necessary to manually shed load:

During a Transmission or a Stage 3 emergency the ISO may direct PTOs or UDCs to shed load manually. This manual Load Shedding may include firm load and is done using each entity's established respective Manual Load Shedding procedures. The ISO shall shed customer load in sufficient amount and time to mitigate IROLs, before system separation or collapse occurs, rather than risk an uncontrolled failure of components, or cascading Outages of the Interconnection.

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Emergency manual Load shedding may be necessary to:

- Mitigate Line or facility overloading
- Mitigate Low voltage
- Mitigate voltage decline
- Mitigate Low frequency
- Mitigate frequency decline
- Ensure personnel safety
- Preserve system integrity
- Maintain or recover from generating (Supply) Capacity loss
- Mitigate System Operating Limit (SOL) overloads
- Mitigate Interconnection Reliability Operating Limit (IROL) overloads
- Prevent cascading outages
- Avoid a voltage collapse
- Prevent equipment damage
- Match load with available resources
- Minimize the risk of loss of generation
- Prevent localized or total system collapse

ISO Shift Manager Desk
<ol style="list-style-type: none"> 1. If need is system-wide and immediate, manually shed load as necessary to stabilize the system. 2. If need is system-wide and not immediate, OR after initial system stabilization, use the Load shedding tool (located within the FIT tool under the System Operations menu) to equitably distribute manual load shedding. <ul style="list-style-type: none"> • If the tool is unavailable, refer to ISO Operating Procedure 4510A Load Shed Calculation Guidelines. 3. If need is localized and immediate, manually shed load at locations that will mitigate the emergency. 4. If need is localized and not immediate OR after initial mitigation, use the Load shedding tool and select only the PTOs that can mitigate the emergency. <ul style="list-style-type: none"> • Refer to ISO Operating Procedure 4510A Load Shedding Calculation Guidelines.

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3.2. Underfrequency Load Shedding (UFLS)

3.2.1. Preliminary UFLS Operation Assessment

Take the following actions if a UFLS event occurs in the ISO Balancing Authority (BA):

ISO Shift Manager Desk, ISO Transmission Desk
<ol style="list-style-type: none"> 1. Evaluate and stabilize the ISO BA. 2. Determine Generation and Interconnection status. 3. Curtail Interchange Schedules as required.

ISO Transmission Desk
<ol style="list-style-type: none"> 1. Contact the Adjacent BA, TOP, and the RC. 2. Provide ISO BA status information to the Reliability Coordinator and Adjacent BAs and TOP as appropriate. 3. Request an assessment of conditions and updates as developing or significant events occur. 4. Provide a report of ISO BA conditions and updates as developing or significant events occur.

3.2.2. Declaration of ISO Emergency following UFLS Operation

Take the following actions if underfrequency load shedding (UFLS) occurs within the ISO Balancing Area and restoration of load will take a prolonged period of time:


ISO Shift Manager Desk
<ol style="list-style-type: none"> 1. Declare a Transmission Emergency or Emergency Stage 3 as appropriate for the conditions that initiated the UFLS event. 2. Refer to ISO Operating Procedure 4420B Alert/Warning/Emergency (AWE) Guide.

3.2.3. Conference Call Bridge for UFLS

Take the following actions if it is determined that events require a conference call bridge, or restoration can be more effectively managed by the use of a conference call:

ISO Shift Manager Desk
<ol style="list-style-type: none"> 1. Establish a conference call using the ISO's established conference call services

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ISO Shift Manager Desk
<p>with impacted BAs, TOPs, PTOs, UDCs and MSSs.</p> <ol style="list-style-type: none"> 2. Provide all participants with associated dial-in number and pass-code. 3. Conduct a public roll-call (to determine who is on line and to provide other participants the opportunity to know who else is listening). 4. Contact the RC and offer conference calling capabilities or participate in the conference call established by the RC. 5. Call participants not involved with conference call as resources are available with periodic updates that are relevant. 6. Send MNS and Reliability messaging system messages as appropriate.

3.2.4. Automatic Load Restoration Adjustment


Take the following actions to identify Automatic Load Restoration (ALR) status and to adjust the system:

ISO System Operator
<ol style="list-style-type: none"> 1. Refer to ISO Operating Procedure 4510C UFLS and Islanding Information by PTO Area for important frequency triggers and set points. <ol style="list-style-type: none"> 2. If ALR has been identified and may cause frequency decay or grid instability during restoration, direct Control Room operators of service territories where ALR is enabled to: <ul style="list-style-type: none"> • Disable ALR if possible without jeopardizing reliability and safety, or (where disabling is not possible), • Shed other Load in amounts necessary to maintain stable and sufficient frequency during ALR. 3. If ISO is operating in several islands and the interties are open, refer to ISO Operating Procedure 4610 System Restoration for additional guidance.

3.2.5. Generation Stabilization and Restoration

An Underfrequency event may cause Generating Units to trip or to be isolated in electrical islands. The following discusses potential actions in event of this occurrence.

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3.2.5.1. Status of Generating Units Determination

Take the following actions immediately if frequency decays to 59.5 Hz or lower:

Scheduling Coordinator (SC), Participating Generator (PG), Participating Transmission Owner (PTO)
1. If there is an indication of frequency decay, notify the ISO Generation Dispatcher.

ISO Generation Desk
1. If advised by a PTO, Scheduling Coordinator (SC) or Participating Generator (PG) that frequency at a Generating station decayed to 59.5 Hz or lower: <ul style="list-style-type: none"> • Evaluate immediately the status of Participating Generators. • Identify available Generating Capacity that may help stabilize and or restore frequency. • If the reporting Generating station is islanded, refer to ISO Operating Procedure 4510E Islanding Guide.
2. If there is no effective Generation available to restore frequency, manually shed load as per Section 3.1 Manual Load Shedding.

4. Supporting Information

Operationally Affected Parties


Shared with **the RC** and 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	
ISO Operating Procedure	
NERC Requirements	EOP-011-1 EOP-011-1 R1.2.5 EOP-011-1 R2.2.8

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WECC Criterion	
Other References	Transmission Control Agreement and Coordinated Functional Registration Agreement - Per the CFR with PG&E for NUC-001-3, R9.3.7, the TE is required to coordinate the NPIRs with transmission system special Protection Systems and Underfrequency and undervoltage load shedding programs. WECC Southern Island Load Tripping Plan

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.


The following additional terms are capitalized in this Operating Procedure when used as defined below:

None.

Version History

Version	Change	Date
1.0	Reformatting to new prototype	5/1/2011
1.1	On 5/1/11, 4510 (combined E-502, E-503, E-511) Added Responsibilities, Scope/Applicability, and Periodic Review Criteria. Added Policy section from E-511 to Scope/Applicability section 2.1.1. Policy from E-502 moved to section 2.1.2. Policy from E-503 moved to section 2.1.3. E-502 moved to section 3.2, E-503 moved to section 3.3, and E-511 moved to section 3.1. This update is a minor change and the effective date is to clarify the 5/1/11 reformatting.	6/10/2011
2.0	Annual review. Revised and re-organized all sections. Removed sections that overlapped with other procedures. 4510C: removed PG&E 40% import limit and removed the purpose.	7/23/2012
2.1	Changed Shift Supervisor "Designee" actions in section 3.2.1 to "Interchange Scheduler"	1/9/2014
2.2	Page 4: Added Section 2.1.1 RDRR Resources reference to DR and UDC Programs. Removed Emergency Stage 1. Added references to 4420 and 4420B in DR Program description. Changed WECC RC to Peak RC.	6/16/2015

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2.3	Page 7: Replaced WECCNet with Reliability Messaging Tool (RMT). Page 11: Added Definitions Section with reference to Reliability Messaging Tool (RMT).	5/23/2016
2.4	<ul style="list-style-type: none"> • Minor formatting changes. • Position title/role updates. 	11/16/2016
3.0	<ul style="list-style-type: none"> • Periodic Review; Throughout document replaced Shift Supervisor with Shift Manager and made minor format and grammar changes • References: Updated NERC standards 	12/20/2016
4.0	Annual Review: Added Updated Standards applicable with the 2016 Self Cert Audit. Updated all Role Title references. Updated grammar and formatting.	4/1/2017
5.0	Annual Review: Section 3.2.1, replaced "ISO Interchange Scheduler Desk" with 'ISO Transmission Desk'. Section 5: Updated procedure reference for Review Criteria. Replaced Peak RC with the RC and RMT with Reliability messaging system. Minor format and grammar updates.	4/01/2019

5. Periodic Review Procedure

Review Criteria & Incorporation of Changes

There are no specific criteria for reviewing or changing this document, follow instructions in **ISO Operating Procedure 5510**.

Frequency

Every 3 Years

Appendix

4510A Public Load Shed Calculation Guideline

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