
 California ISO Your Link to Power	OPERATING PROCEDURE	Procedure No.	G-200
		Version No.	2.6
		Effective Date	11/30/07
Generating Station Requirements and Communications		Distribution Restriction: NONE	

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Purpose

- Provides general instructions for Scheduling Coordinators (SC) and for generating stations that are owned and/or operated by Participating Generators (PG).
- Includes expectations of the PG by the CAISO, responsible Participating Transmission Owners (PTO) and Utility Distribution Companies (UDC).
- These operational expectations are especially useful during emergency operations, and during periods when communications are disrupted.

Procedure

- 1. Reporting Requirements/ Communications** It is essential that CAISO and Participating Generators promptly inform one another of any circumstance that may adversely affect the operation or reliability of the CAISO Balancing Area, or the integrity or capability of the PG's facilities, including, but not limited to:
- Power System Stabilizer status
 - Automatic Voltage Regulator status
 - Abnormal temperatures
 - Storms
 - Floods
 - Earthquakes
 - Equipment failures or malfunctions
 - Deviations from the Registered Data or operating characteristics
- Take the following actions to coordinate the transfer of information:

Step	CAISO and Participating Generators Actions
1	<p>Inform the other as promptly as possible of any incident or situation (including, but not limited to, equipment outages affecting Generation, over-loads, over/under-voltages, or alarm indications) that, in the case of a PG, is reasonably likely to threaten any of the following:</p> <ul style="list-style-type: none"> • The capability of the Generating Unit and facilities • The reliability of the CAISO Balancing Area • Schedules • Bids of Energy and/or Ancillary Services
2	<p>Notify the applicable PTO <u>and</u> the CAISO as soon as practical, but within 30 minutes of changes to the status of automatic voltage regulators (AVRs) or power system stabilizers (PSSs).</p>


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Step	CAISO Actions					
3	Communicate either through the SC, OR <u>directly</u> with the Generating Station Control Room, as described in section 3 of this procedure.					
4	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e0f7fa;">When...</th> <th style="background-color: #e0f7fa;">Then...</th> </tr> </thead> <tbody> <tr> <td> Notified of the loss of an automatic voltage regulator control (AVR), <u>And</u> the SC has <u>not</u> notified the PTO, </td> <td> Notify the applicable PTO of the status of the device (the TO will direct the Generator Operator to maintain or change either its voltage schedule or its Reactive Power schedule as appropriate). </td> </tr> </tbody> </table>		When...	Then...	Notified of the loss of an automatic voltage regulator control (AVR), <u>And</u> the SC has <u>not</u> notified the PTO,	Notify the applicable PTO of the status of the device (the TO will direct the Generator Operator to maintain or change either its voltage schedule or its Reactive Power schedule as appropriate).
When...	Then...					
Notified of the loss of an automatic voltage regulator control (AVR), <u>And</u> the SC has <u>not</u> notified the PTO,	Notify the applicable PTO of the status of the device (the TO will direct the Generator Operator to maintain or change either its voltage schedule or its Reactive Power schedule as appropriate).					

2. Communicating Operating Limits

To communicate promptly any changes in the Generating Unit Operating Limits (i.e., per unit) to the CAISO, take the following actions:

Step	Scheduling Coordinators (SCs) Actions					
1	Refer to CAISO Operating Procedure T-113: Outage Scheduling Procedure for guidance on reporting outages and de-rates.					
2	Include the full available capacity as the Operating Limit of the Unit being scheduled, in all Schedules (This does <u>not</u> reflect the sum of all of the energy and Ancillary Service Schedules). <i>Example: A Unit capable of regulating up to 480 MW may have a current Energy Schedule of 250 MW and an upper regulating Ancillary Service Schedule of 100 MW, the Operating Limit to be included on these Schedules is to be 480 MW (i.e., not 350 MW, which is the sum of accepted Schedules).</i>					
3	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e0f7fa;">If...</th> <th style="background-color: #e0f7fa;">Then...</th> </tr> </thead> <tbody> <tr> <td> A Unit is equipped with digital input or other (e.g., “thumb-wheel setters”) types of input devices used to transmit Operating Limits, </td> <td> Set the values to indicate the full Automatic Generation Control (AGC) capability of the Unit within its operating range (High or Low), rather than the value of the existing Schedules. </td> </tr> </tbody> </table>		If...	Then...	A Unit is equipped with digital input or other (e.g., “thumb-wheel setters”) types of input devices used to transmit Operating Limits,	Set the values to indicate the full Automatic Generation Control (AGC) capability of the Unit within its operating range (High or Low), rather than the value of the existing Schedules.
If...	Then...					
A Unit is equipped with digital input or other (e.g., “thumb-wheel setters”) types of input devices used to transmit Operating Limits,	Set the values to indicate the full Automatic Generation Control (AGC) capability of the Unit within its operating range (High or Low), rather than the value of the existing Schedules.					
<p><i>Note: Settlement payments for Ancillary Services may be affected by incorrect communication of Operating Limits, included within the Schedules submitted or by indication from setters.</i></p>						


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4	If...	Then...
	The Unit is restricted in its maximum output due to equipment out of service or other reasons,	Verify the communicated Operating Limit is reflective of this restriction.

3. **Voice Communication with Generating Unit Control Room Operator** If, for one of the following reasons, CAISO cannot feasibly communicate with the Scheduling Coordinator, take the following alternative course of action:


Step	CAISO Actions	
1	If...	Then...
	There is an emergency, OR system integrity is threatened and there is insufficient time to communicate with a Generating Unit through the SC, OR it is apparent that communications to an SC is not being conveyed to the Generating Unit in a timely manner,	Communicate directly with the Generating Unit Control Room Operator.
	Communications between the CAISO and a generating station is unavailable,	Relay communications through the appropriate PTO Control Center, as available.
Step	Participating Generator Actions	
2	Ensure only qualified and authorized control room operations personnel are involved in direct communication with the CAISO during emergency communications.	
3	If...	Then...
	The SC or PG is unable to contact the CAISO Folsom Control Room within five minutes,	Contact the CAISO Alhambra Control Room.

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4	If...		Then...	
	The SC or PG is unable to contact either of the Control Rooms (Folsom or Alhambra) after ten minutes of continuous attempts,		Contact the responsible PTO Control Center and ask to be “patched through” to the CAISO.	
	If...		Then...	
	A “patch” is infeasible,		Remain in contact with the PTO Control Center for directions (either “relayed” from the CAISO, or directly from the PTO if CAISO communication is not available).	
5	Continue attempts to contact the CAISO (either Folsom or Alhambra).			
6	If...		Then...	
	Direct communications between the CAISO and the Generating Unit Control Room Operator has occurred,		Advise the SC of the content, nature and time of the communications.	
Step	CAISO Actions			
7	Conduct periodic communication tests, as desired, with the Generator Control Room Operator to assure the viability of communication circuits and to maintain familiarity with direct CAISO Control Room Operator communications.			

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4. **Normal Operations** Under normal operating conditions, use the following guidelines to maintain Generating Station requirements:

Step	Participating Generators and SCs Actions
1	Maintain the capability for constant communication with the CAISO.
2	Adhere to all schedules.
3	Maintain normal frequency and voltage.
4	Maintain capability of providing immediate response to abnormal frequency.
5	Set governors to provide a five percent droop characteristic and to remain fully responsive to frequency excursions greater than 0.036 Hz.
6	Set load limit devices (i.e., Unit/governor blocks) at a point to enable a full available load (i.e., without substantial operator intervention) of each Unit to allow for maximum governor action upon the occurrence of low frequency.
7	Maintain Power System Stabilizers in service.

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5. **Emergency Operations- Low Frequency** For notification if the frequency level drops below 60 Hz, take the following steps:


Step	Participating Generator Actions					
1	Set Generating Units low frequency alarms to 59.5 Hz.					
2	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e0ffff;">If...</th> <th style="background-color: #e0ffff;">Then...</th> </tr> </thead> <tbody> <tr> <td>The system frequency should decay to 59.5 Hz as indicated by charts, frequency alarms, or Automatic Generation Control (AGC),</td> <td>Maximize all Generation currently synchronized to the system.</td> </tr> </tbody> </table>		If...	Then...	The system frequency should decay to 59.5 Hz as indicated by charts, frequency alarms, or Automatic Generation Control (AGC),	Maximize all Generation currently synchronized to the system.
If...	Then...					
The system frequency should decay to 59.5 Hz as indicated by charts, frequency alarms, or Automatic Generation Control (AGC),	Maximize all Generation currently synchronized to the system.					
3	Inform the respective SC of any frequency excursion.					
Step	Scheduling Coordinator Actions					
4	Contact the CAISO Generation Dispatcher to determine if a change in Schedules and/or services will be required.					
Step	Participating Generator Actions					
5	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e0ffff;">If...</th> <th style="background-color: #e0ffff;">Then...</th> </tr> </thead> <tbody> <tr> <td>The Unit was on AGC prior to the frequency excursion,</td> <td>Return to AGC.</td> </tr> </tbody> </table>		If...	Then...	The Unit was on AGC prior to the frequency excursion,	Return to AGC.
If...	Then...					
The Unit was on AGC prior to the frequency excursion,	Return to AGC.					
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If...	Then...					
The frequency decays further to 57.0 Hz, with no immediate recovery,	Separate the Unit(s) from the system and, if feasible, attempt to carry auxiliary load.					
8	Prepare to restart the Unit(s) and/or prepare to resynchronize to the system.					
9	Contact the CAISO Generation Dispatcher to provide start-up power requirements (if any) and for further instructions.					
10	Refer to CAISO Operating Procedure E-503 – Under Frequency Load Shedding.					

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6. Electric Grid Shutdown

If a total or partial Electric Grid shutdown occurs, as evidenced by zero voltage on the facilities interconnecting with the CAISO Balancing Area, then complete the following actions:

Step	Participating Generator Actions					
1	Advise the respective SC of this zero voltage condition.					
Step	Scheduling Coordinator Actions					
2	<table border="1" style="width: 100%;"> <thead> <tr> <th style="background-color: #e0ffff;">If...</th> <th style="background-color: #e0ffff;">Then...</th> </tr> </thead> <tbody> <tr> <td>The Generator has reported experiencing zero voltage at it's interconnection,</td> <td>Advise the Generating Unit to make contact as previously detailed in section 3, "Voice Communications with Generating Unit Control Room Operator", of this procedure.</td> </tr> </tbody> </table>		If...	Then...	The Generator has reported experiencing zero voltage at it's interconnection,	Advise the Generating Unit to make contact as previously detailed in section 3, "Voice Communications with Generating Unit Control Room Operator", of this procedure.
If...	Then...					
The Generator has reported experiencing zero voltage at it's interconnection,	Advise the Generating Unit to make contact as previously detailed in section 3, "Voice Communications with Generating Unit Control Room Operator", of this procedure.					
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If...	Then...					
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If...	Then...					
Unable to contact the CAISO,	Proceed as previously detailed in section 3, "Voice Communications with Generating Unit Control Room Operator" of this procedure.					
5	Prepare for start-up, AND initiate a start-up as soon as auxiliary power requirements can be met.					
Step	Participating Generators with Black Start Capabilities Actions					
6	Start all black-start capable Generating Units AND supply auxiliary power to the other Generating Units at the same Generating site.					
Step	CAISO Actions					
7	Refer to CAISO Operating Procedure E-501, System Restoration (not available for public distribution).					
8	Direct (as necessary) Generating Units with black-start capability to be started to supply start-up power at other stations, or for nuclear Generating Unit reactor safety (see T-112, Off Site Power Requirements for Nuclear Power Plants).					

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Supporting Information

- Affected Parties**
- Scheduling Coordinators
 - Participating Transmission Owners (PTO)

References

• CAISO Tariff	Section 5.2, 34.3, and Appendix Y
• CAISO Ops Procedure	E-501: System Restoration Procedure
• CAISO Ops Procedure	E-503: UF Load Shed Procedure
• CAISO Ops Procedure	N-703: Event Reporting and Notification Procedure
• CAISO Ops Procedure	T-107: HVAC Operating Procedure
• CAISO Ops Procedure	T-112: Off Site Power Requirements for Nuclear Power Plants
• CAISO Ops Procedure	T-113: Outage Scheduling Procedure
• CAISO Technical Standard	Monitoring and Communications Requirements for Generating Units Providing Only Energy and Supplemental Energy
• Participating Generator Agreement	
<i>General Instructions to Generating Stations and “Emergency Orders” (specific to each generating station) contained in:</i>	
• PG&E Dispatching Instructions	
• SDG&E Standard Operating Procedures	
• SCE System Standard Operating Procedures	

Policy

The CAISO has jurisdiction of all scheduled or bid Energy and Ancillary Services relating to the CAISO Balancing Area. Close coordination is required between PGs, the PTOs, the UDCs, and the CAISO to assure prudent and reliable operation of the CAISO Balancing Area.

The SC (or in the case of direct communications with the generating station, the Control Room Operator) will recognize and abide by the authority of the CAISO as the Balancing Authority. The CAISO will recognize the responsibility of the PG to operate in such a manner as to avoid injury to personnel and/or damage to facilities. If there is disagreement between the CAISO and the PG relative to the action most appropriate for the reliable operation of the CAISO Balancing Area or any sub-region thereof, and due to operating considerations there is insufficient time to reach concurrence, the CAISO will be the final authority. Inconsistent or otherwise questionable direction by the CAISO will be reviewed after the fact to improve

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coordination.

During an emergency (as declared by the CAISO), the CAISO jurisdiction is expanded to include all operations of the PG, which impact or may impact the CAISO Balancing Area and all Generating Units are subject to the directives of the CAISO as Balancing Authority.

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.

Automatic Generation Control (AGC)	An SC that allows the CAISO to remotely control their Generating Stations within a specified range of operation.
Black Start Generating Unit	Generating Unit that is capable of self-starting without a source of off-site electricity.
PG	Participating Generator, has an approved PGA (agreement).
Quick-Start Generating Unit	Generating Unit that (taking into account personnel and fuel availability, etc.) can be started (locally or remotely), synchronized to the system and available for loading in ten minutes or less.
Reactive Power	Generation or other equipment needed to maintain acceptable voltage levels on the CAISO Controlled Grid and to meet reactive capacity requirements at points of interconnection on the ISO Controlled Grid.

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Version	Change	By	Date
1.0	Drafted		9/3/98
2.0	Annual Update		3/19/02
2.1	Clarified Generator Regulating Setpoint		1/30/03
2.2	Annual update		2/25/04
2.3	Annual review		2/3/05
2.4	Minor updates to step/action intros.		2/8/05
2.5	Annual review		11/22/06
2.6	Added AVR & PSS comment to section 1.		11/13/07

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Technical Review

Reviewed By Content Expert	Signature	Date
Operations Support		11/13/07
Regional Transmission		11/13/07
Grid Ops		11/26/07
Market Ops		11/8/07
Scheduling		11/20/07

Approval

Approved By	Signature	Date
Director of Grid Operations		11/26/07
Director of Operations Support		
