
 California ISO Your Link to Power	OPERATING PROCEDURE	Procedure No.	T-102
		Version No.	7.3
		Effective Date	06/04/2008
COI/PDCI North of John Day Nomogram		Distribution Restriction: NONE	

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QUICK REFERENCE

Operations Summary For

The COI/NW-Sierra and the PDCI

Maximum SOL:	4800 MW N-S for COI/NW-Sierra 3675 MW S-N for COI/NW-Sierra 3100 MW N-S for PDCI (Power Order at Celilo) 2200 MW S-N for PDCI (Power Order at Sylmar)
Type of Limit:	Stability – 20 minutes to return within SOL or Nomogram line
Function of: (parameters)	Refer to BPA procedure DSO 306
EMS Screens:	North of John Day Nomogram
Curtailment Table:	---
Applicable Nomograms:	North of John Day Nomogram
Additional Information:	Pro-rata curtailments for COI/NW-Sierra controller adjustments based on maximum SOL. Example: The pro-rata share for the COI is determined by $4800/5100=94.1\%$ and for NW-Sierra is determined by $300/5100=5.9\%$. A 500 MW curtailment reduces SOL to 4300 MW (4800-500), COI flow is 4600 MW, and NW-Sierra flow is 200 MW. The pro-rata share of COI is $4300*0.941 = 4046$ MW, and the pro-rata share of NW-Sierra is $4300*0.059 = 254$ MW. The curtailment will all be made by the COI since the NW-Sierra flow is below its pro-rata share.
Related Procedure:	CAISO procedure S-315A for controller adjustment procedures

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PURPOSE

Provides guidelines for the CAISO, SMUD, and BPA to:

- Determine the impacts on, and the relationship between, COI/NW-Sierra, and PDCI Scheduling and Operating capabilities, because of flow limits from the Northwest.
- Prevent internal and external Outages in the Northwest and California from cascading and impacting the WECC System. This possibility exists during heavy North-to-South transmission loading in the Northwest (indicated by high flows across the North of John Day Cut Plane) and heavy flow on the COI/NW-Sierra and PDCI.

PROCEDURE


1. COI/NW-Sierra Scheduling Capability

1.1. System Operating Limit (SOL)

CAISO monitors the COI/NW-Sierra flows, the PDCI flows at Celilo, the percent “Northern California Hydro” Generation, and other parameters that affect the System Operating Limit (SOL) of the COI/NW-Sierra and the PDCI. CAISO also receives and monitors from BPA a COI/NW-Sierra (Path 66) Dynamic SOL, and operates to the most restrictive SOL. If the BPA Dynamic SOL is more restrictive than the CAISO SOL, then the CAISO must ensure that the Net Schedule on COI/NW-Sierra (Path 66) does NOT exceed the BPA SOL and will cut schedules as required.

NOTE: *The COI/PDCI Display in the Reliability Coordinator folder of the PI Process Book monitors the COI/NW Sierra CAISO SOL, BPA SOL and Net Schedule, and alarms when the NET Schedule exceeds either SOL value to initiate operator action to cut schedules. This action will take place following verbal communication with the BPA Dispatcher to see if any dynamic adjustment can be made to correct the dynamic SOL.*

The COI/NW-Sierra Schedule (or actual flow) and the PDCI power order at Celilo, must not exceed the limits published in BPA’s [DSO 306](#). The maximum PDCI power order capability at Celilo is 3100 MW N-S. Due to insufficient DSI loads in the Upper Northwest, the maximum PDCI power order capability at Sylmar is 2200 MW S-N. PDCI power order levels that are higher than the SOL are only allowed if an equipment Outage causes a curtailment on the COI/NW-Sierra, and studies indicate that the PDCI power order at Celilo can be operated above the SOL during this Outage.

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1.2. Firm Schedule Limits

The firm scheduling limits for COI/NW-Sierra may be lower than the maximum SOL to account for operating limitations caused by high Northern California Hydro Generation levels as described in CAISO Operating Procedure [T-116](#).

1.3. COI SOL Equals COI/NW-Sierra SOL

The COI SOL [SW section of the AC Inter-tie at the California – Oregon Border (COB)] and the COI/NW-Sierra SOL (NW section of the AC Inter-tie) must be equal. Mismatches in COI and the COI/NW-Sierra SOL's are only allowed if an equipment Outage causes a curtailment, and studies define different SOL's for the COI and the COI/NW-Sierra path.

Studies have shown that 1 MW on the NW-Sierra path is approximately equal to 1 MW on the COI. Consequently, for Nomogram and Outage conditions, the system is always operated safely if the sum of the COI and the NW-Sierra path (COI/NW-Sierra) is operated within limits defined for COI prior to energizing the NW-Sierra path.


2. COI/NW-Sierra Schedule Curtailments

2.1. Curtailments Due to Reduced SOL

Parties scheduling on the COI or NW-Sierra interconnections must also secure transmission capacity on the NW Section of the AC Inter-tie. The total Schedules on the COI and NW-Sierra interconnections must not exceed total Schedules on the NW Section of the AC Inter-tie. When curtailments on the COI/NW-Sierra path are required due to a reduction in the COI/NW-Sierra SOL, CAISO reallocates COI transmission capacity based on the revised SOL and curtails Schedules in excess of the revised allocations. In addition, BPA reallocates capacity on the NW Section of the AC Inter-tie and curtails Schedules in excess of the revised allocations. Because Schedules on the COI or NW-Sierra interconnections must also be scheduled on the NW Section of the AC Inter-tie, the total COI/NW-Sierra Schedules is below the SOL of the path.

2.2. Curtailments Due to Unscheduled Flow

When Schedule cuts are required for UN-scheduled flow, CAISO and BPA determine the amount of required curtailments. BPA curtails Schedules on the NW Section of the AC Inter-tie by the amount of required curtailments. The Schedules cut by BPA on the NW Section of the AC Inter-tie determines the level of curtailments on the COI and NW-Sierra interconnections.

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3. Real-Time Operating Capability

CAISO monitors the COI/NW-Sierra flows, the PDCI flows at Celilo, the percent “Northern California Hydro” Generation, and other parameters that affect the System Operating Limit (SOL) of the COI/NW-Sierra and the PDCI. CAISO also receives and monitors from BPA a COI/NW-Sierra (Path 66) Dynamic SOL, and operates to the most restrictive SOL. If the BPA Dynamic SOL is more restrictive than the CAISO SOL then the CAISO must ensure that the Net Schedule on COI/NW-Sierra (Path 66) does NOT exceed the BPA SOL and will cut schedules as required.

NOTE: The COI/PDCI Display in the Reliability Coordinator folder of the PI Process Book monitors the COI/NW Sierra CAISO SOL, BPA SOL and Net Schedule, and alarms when the NET Schedule exceeds either SOL value to initiate operator action to cut schedules. This action will take place following verbal communication with the BPA Dispatcher to see if any dynamic adjustment can be made to correct the dynamic SOL.


All “within-the-hour” controller adjustments on the COI/NW-Sierra path are completed between BPA, SMUD, CAISO, and Sierra (Balancing Area-to-Balancing Area), and are determined on a pro rata basis, from the maximum ratings of both paths. Refer to CAISO Operating Procedure [S-315A](#).

BPA takes specific actions based on one of the following conditions:

3.1. COI/NW-Sierra Limit Exceeds Horizontal Portion of the Nomogram when the Sum of the Flow on the Midpoint-Summer Lake Line is Positive

If the COI/NW-Sierra actual flow exceeds the Nomogram limits along the horizontal portion of the Nomogram when the sum of the Midpoint-Summer Lake line is positive, then the BPA dispatcher works with SMUD, CAISO, and Sierra dispatchers to reduce the COI/NW-Sierra flow (Balancing Area-to-Balancing Area responsibility) within 20 minutes. The COI/NW-Sierra path is curtailed to 50 MW vertically below the Nomogram.

If capacity is available on the PDCI, the PDCI is used to mitigate the unscheduled flow for the existing hour (and the next hour if the violation occurs close to the start of the ramp). BPA, Los Angeles Department of Water and Power (LADWP), and the CAISO work together for all changes on the PDCI when using the PDCI to mitigate unscheduled flow so that this operation does not cause Path 15’s Operational Transfer Capability to be exceeded.

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3.2. COI/NW-Sierra or PDCI Nomogram Limit Exceeds Diagonal Portion of Nomogram

If the COI/NW-Sierra and/or PDCI actual flow is within 50 MW of the Nomogram limits along the diagonal portion of the Nomogram, BPA attempts to shift Northwest Generation to reduce the North of John Day cut-plane flow. If Generation cannot be shifted, then the COI/NW-Sierra and/or PDCI are curtailed according to the Nomogram. The COI/NW-Sierra and/or PDCI are curtailed until the actual flows are 100 MW vertically below the appropriate Nomogram line(s).

3.3. COI/NW-Sierra or PDCI Nomogram Limit Exceeds Horizontal Portion of Nomogram when the Sum of the Midpoint–Summer Lake flow is Negative


If the COI/NW-Sierra and/or PDCI actual flow is within 50 MW of the Nomogram limits and when the sum of the Midpoint-Summer Lake line is negative, BPA attempts to shift Northwest Generation to reduce the North of John Day cut-plane flows. If the Generation cannot be shifted, then the following curtailments are necessary to get within the Nomogram:

- **Midpoint-Summer Lake Flow 101- 400 MW West-to-East**

Curtailments are shared on the COI/NW-Sierra, PDCI, and IPC-NW paths as appropriate (i.e., if the PDCI portion of the Nomogram is not violated the PDCI will not be curtailed). For every 3 MW curtailed on the COI/NW-Sierra and PDCI path, the IPC-NW path Schedules are curtailed 1 MW in the West-to-East direction until the actual flows are 100 MW vertically below the appropriate Nomogram line(s). The BPA dispatcher coordinates curtailments with SMUD, CAISO, IPC, LADWP, and Sierra dispatchers.

3.4. North of John Day Cut-plane Exceeds Maximum Limit (Refer to BPA's [DSO 306](#))

If the North of John Day cut-plane is within 50 MW of the North of John Day limit, BPA takes steps to shift Northwest Generation from the north to the south side of the North of John Day cut-plane. If Generation can be shifted, then BPA shifts Generation until the North of John Day cut-plane is 100 MW below the limit. Refer to BPA Standing Order [DSO 306](#). However, if Generation cannot be shifted to reduce the North of John Day cut-plane, additional curtailments of the COI/NW-Sierra and/or PDCI may be necessary depending on the conditions in the Northwest. The COI/NW-Sierra and the PDCI Schedules are curtailed 12 MW for every 10 MW the North of John Day cut-plane exceeds the limit until the North of John Day cut-plane is 100 MW below the limit. The COI/NW-

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Sierra and PDCI curtailment are based on their pro rata share of the sum of the actual flow.

3.5. COI/NW-Sierra Limit Exceeded during a COI/NW-Sierra Curtailment Due to Equipment Out of Service

If the COI/NW-Sierra is curtailed due to an equipment Outage or other system condition and the COI/NW-Sierra limit is exceeded, the BPA dispatcher works with CAISO, SMUD, and Sierra dispatchers to take steps to reduce COI/NW-Sierra below its curtailed limit. Since COI is a qualified path for Unscheduled Flow (USF) mitigation, USF mitigation procedures are utilized to reduce actual flow below its curtailed limit. For equipment Outage related curtailments, the COI/NW-Sierra SOL equals the COI SOL unless studies have been conducted to define separate SOL's.

3.6. Net West Side Load Exceeds Studied Level


If the Net West Side load exceeds the studied level, BPA reduces the COI/NW-Sierra/PDCI Nomogram limits 1 MW for every 2 MW the Net West Side Load exceeds the studied level. Refer to BPA [DSO 306](#) for the lines and transformers measured to calculate the West Side Load.

4. Palo Verde – COI RAS

The Palo Verde (PV) – COI RAS was implemented to mitigate the impact to the COI in the North-to-South direction since the COI SOL is normally limited by the loss of two Palo Verde Generating units. This application of Remedial Action Scheme (RAS) applies for all lines in service, as well as outage conditions in BPA, SMUD, and CAISO Balancing Areas.

Only two of the Palo Verde participants [Arizona Public Service Company (APS) and Salt River Project (SRP)] will participate in the current PV-COI RAS. The PV-COI RAS is armed when two Palo Verde Nuclear Generating Station (PVNGS) Units have a combined output above 2550 MW. The Load Shedding RAS occurs when both PVNGS Units have tripped within five minutes of each other. The 14 distribution substations have a minimum load of 158 MW, and a maximum Load of 683 MW.

If two Palo Verde Generating units have tripped (specifically Palo Verde Units 1 and 2 OR Palo Verde Units 2 and 3 when the total net generation output for the two units are over 2550 MW), and the RAS has occurred, the California/Mexico Reliability Coordinator (CMRC) will coordinate with the PNSC and RDRC to determine when the load tripped may be restored for the particular Balancing Area deficient of reserves. The Reliability Coordinators will notify their respective Balancing Areas for load restoration in order to minimize the time duration.

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5. Relationship to Other Operating/Scheduling Instructions

This Operating Procedure provides instructions for limiting the COI/NW-Sierra and PDCI North-to-South operating capabilities due to Northwest export limitations when all lines and equipment are in service. Refer to the CAISO's Operating Procedure [T-116](#) (AC/DC Nomogram) for instructions on limiting the COI/NW-Sierra and PDCI North-to-South operating capabilities due to the California import limitations.

Additional limitations may be necessary when equipment is out of service in either the Northwest or California. Additional curtailments due to equipment out of service in the Northwest will be administered by BPA. Curtailments due to equipment out of service in California are administered by the CAISO and SMUD, based on the CAISO's Operating Procedure [T-118A](#). When more than one Operating Procedure is relevant to actual system conditions, the most limiting capability becomes the operating capability.

6. Unstudied System Conditions

If actual system conditions are outside study assumptions, then the system must be adjusted to get inside the operating limits on the COI/NW-Sierra and the PDCI within 20 minutes. BPA is responsible for monitoring system conditions in the Northwest.

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SUPPORTING INFORMATION

Affected Parties


- COI Participants
- Participating Transmission Owners
- WECC Balancing Authorities

Responsibilities

CAISO	Monitors and abides by the scheduling and actual limits placed on the COI/NW-Sierra and PDCI to ensure reliable operation in the CAISO Controlled Grid and the WECC.
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References

<ul style="list-style-type: none"> • ISO Tariff 	
<ul style="list-style-type: none"> • CAISO Operating Procedure 	T-116, Northern CA Transfer Nomogram (AC-DC)
<ul style="list-style-type: none"> • BPA Dispatcher Standing Order 	DSO306 - BPA's COI NW-Sierra, PDCI, North of John Day Nomogram Operation with North-to-South Power Flow
<ul style="list-style-type: none"> • SMUD Operating Procedure 	COI Coordinated Operations
<ul style="list-style-type: none"> • CAISO Operating Procedure 	S-315, Overload Mitigation
<ul style="list-style-type: none"> • NERC Standards 	<ul style="list-style-type: none"> • FAC-011-1 R2.2, R2.3, R5, & E1 - System Operating Limits Methodology for the Operations Horizon • TOP-002-2 R2, R3, R4, R10, & R11 - Normal Operations Planning • TOP-004-1 R1, R2, R6 Transmission Operations • TPL-001-0 R1.1, R1.3.2, R1.3.5 to R1.3.9, R3 -System Performance Under Normal Conditions • TPL-002-0 R1.1, R1.3.1, R1.3.5-R1.3.12, R3 - System Performance Following Loss of a Single BES Element • TPL-003-0 R1.1, R1.3.1, R1.3.3, R1.3.5 to R1.3.12, R3 - System Performance Following Loss of Two or More BES Elements

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Policy

The CAISO operates based on the guidelines established to protect the WECC system during heavy export conditions from the Northwest to the Southwest from disturbances similar to those that occurred on July 2 and August 10, 1996.

The CAISO concurs with, and agrees to follow, the limits established in the operating protocols, procedures and operating orders already in service by the Balancing Authorities and Participating Transmission Owners that impact the CAISO Operation. In addition, in order to minimize SOL violations, the CAISO coordinates the COI/NW-Sierra mitigation with BPA.


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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Version History

Version	Change	By	Date
1.0	Drafted		10/31/98
	Revised		12/21/98
	1999 Spring Update		3/22/99
	1999 Summer Update		6/3/99
	1999/2000 Winter Update		9/30/99
	2000 Spring Update		4/1/00
	2000 Summer Update, Changed N-S OTC from 4800 to 4600 on Quick Reference		6/1/00
	2000-2001 Winter Update		9/30/00
	2001 Spring Update		2/28/01
	2001 Summer Update		4/30/01
	Stability Limit 10 to 20 minutes		7/26/01
	2001-2002 Winter Update		9/28/01
	2002 Spring Update		2/07/02
4.0	2002 Summer Update		4/26/02
4.1	2002-2003 Winter Update		9/25/02
4.2	2003 Spring Update		2/20/03
4.3	2003 Summer Update		4/29/03
4.4	2003-2004 Winter Update		9/30/03
4.5	Update for Under-Frequency Load Shedding		12/1/03
4.6	2004 Spring Update		3/17/04
5.0	Update for PV UFLS change to PV-COI RAS		5/5/04
6.0	2004 Summer Update & changes for the PDCI OTCs due to SRP		5/25/04
6.1	2004-2005 Winter Update		11/1/04
6.2	Reviewed, no changes.		4/5/05
6.3	Made changes for COTP in SMUD Control Area, plus other minor changes		12/1/05
6.4	Reviewed no Changes		3/31/06
6.5	Seasonal review, changed attachment title.		6/2/06
6.6	Seasonal changes		11/1/06
6.7	Minor changes		11/22/06
6.8	Seasonal changes		4/4/07
6.9	Summer review, no changes		6/1/07
6.10	Equation under Quick Reference represented $4300 * 0.941 = 4047$. Incorrect calculation, changed product to 4046.		7/11/07
6.11	Added instructions to monitor the OTC in real-time to section 3		7/27/07
7.0	Added comments to Section 3		7/30/07
7.1	2007-08 Winter Update		11/01/07
7.2	2008 Spring Update		4/2/08
7.3	2008 Summer Update		6/4/08

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TECHNICAL REVIEW

Reviewed By Content Expert	Signature	Date
Ops Support		6/4/08
Regional Transmission		6/4/08
Grid Ops		7/30/07
Outage Management		8/6/07
Market Ops		8/6/07
Scheduling		7/30/07

APPROVAL

Approved By	Signature	Date
Director of Regional Transmission - South		7/31/07
Director of Grid Operations		7/31/07

* Signed version 7.0 only, subsequent changes were minor and did not require full review/approval