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## Purpose

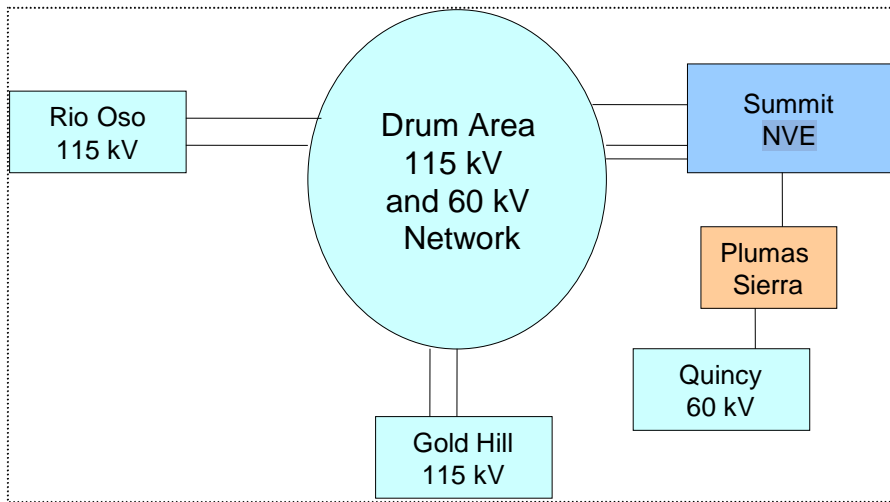
Describes mitigation measures for congestion in the Drum Area and the Summit Inter-tie.

## Background Information

### Area Description

As illustrated in Figure 1, the Drum Area consists of 115 kV and 60 kV networks and connect to the rest of the ISO controlled grid through the following circuits:


- Drum-Rio Oso #1 and #2 115 kV lines,
- Placer-Gold Hill #1 and #2 115 kV lines,
- The Drum – Summit Intertie (two 115 kV lines and one 60 kV line).
- Plumas –Sierra 60 kV Intertie (Connects PGAE’s 60 kV with NVE through the Plumas Sierra’s Marble substation).



**Figure 1. Drum Area Boundary**

During certain operating conditions, transmission lines in the Drum Area can become overloaded. These overload limitations may constrain the Import/Export TTC ratings on the Summit Inter-tie.

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## Drum Area Control Points

Depending on area Generation/load patterns, power may flow into or out of the Drum area. Control Points are imposed to protect the area transmission network against N-1 contingencies.

Each Control Point consists of the following transmission lines:

**CP #1:**

- Drum-Rio Oso #1 115 kV line (between Dutch Flat #2 and Brunswick).
- Higgins-Bell 115 kV line, at the Higgins end.

**CP #2:**

- Drum-Rio Oso #2 115 kV line, at the Drum end.
- Higgins-Bell 115 kV line, at the Higgins end.


Details for each Control Point are shown in Table 1.

**Table 1. Drum Area Control Points**

CP#	Control Point (MW)	Loading Equation
#1	74 Summer ** 100 Winter	Drum-Rio Oso #1 115 kV (→, @Drum)+Dutch Flat #2 Generation+0.36*Higgins-Bell 115 kV line(→,@Higgins)
#2	74 Summer ** 100 Winter	Drum-Rio Oso #2 115 kV (→, @Drum)+0.36*Higgins-Bell 115 kV line (→,@Higgins) (Wave trap limited at Rio Oso)

\*\* Control Points #1 and #2 are temperature adjusted in the summer (See [Table 2](#), following, for details).

**Note 1:** DA will use seasonal ratings.

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# 1. Normal Operations

## 1.1 Real-Time Monitoring & Mitigation

Monitor the Drum Area Control Points and mitigate as needed.


## 1.2 Control Point #1 & #2 Spill Conditions

During Drum hydro spill conditions, the Drum hydro generation is classified as “Regulatory Must Take” and has priority over imports on the summit Intertie (Path 24).

ISO Transmission Desk
<ol style="list-style-type: none"> <li>1. If the flow exceeds CP #1 or #2, <ul style="list-style-type: none"> <li>• <b>Request</b> NVE to reduce Summit Tie flow to the scheduled level.</li> </ul> </li> <li>2. <b>Curtail</b> Summit East-West intertie schedules, such that the flow remains below its Control Point with all the generation back as scheduled.</li> <li>3. <b>Reduce</b> effective Generation, as defined in ISO Operating Procedure <a href="#">7240 Drum Area / Summit Operations</a>, as an immediate action to mitigate the Control Point exceedance.</li> <li>4. If the Control Point is no longer exceeded, <ul style="list-style-type: none"> <li>• <b>Return</b> the Drum Generation as soon as practical followed by the Summit East-West Interchange to pre-scheduled levels.</li> </ul> </li> </ol>

## 1.3 Control Point #1 & #2 Non-Spill Condition

ISO Transmission Desk
<ol style="list-style-type: none"> <li>1. If the flow exceeds CP #1 or #2, <ul style="list-style-type: none"> <li>• <b>Inform</b> NVE to reduce Summit Tie flow to the scheduled level.</li> </ul> </li> <li>2. <b>Curtail</b> Summit East-West schedules and the effective Generation as defined in ISO Operating Procedure <a href="#">7240 Drum Area / Summit Operations</a>.</li> <li>3. If the Control Point is no longer exceeded, <ul style="list-style-type: none"> <li>• <b>Return</b> the effected Generation and the Summit East-West Interchange to pre-scheduled levels.</li> </ul> </li> </ol>

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## 2. Emergency Operations

### 2.1 Loss of the Drum-Higgins 115 kV line, Higgins-Bell 115 kV Line or Bell-Placer 115 kV line


**Note:** Loss of the Drum-Higgins 115 kV Line, Higgins-Bell 115 kV Line, or Bell-Placer 115 kV line may result in exceeding the normal rating of the Drum – Rio Oso #2 115 kV line when power flows outbound from the Drum Area (CP #1 or #2 flow is positive). This contingency may also result in exceeding the emergency rating if CP #2 is exceeded pre-contingency.

PGAE	
1.	<b>Monitor</b> the Drum – Brunswick 115 kV line sections.
2.	<b>Ensure</b> the loading does not exceed the Emergency Rating (see <a href="#">Table 2</a> ). <ul style="list-style-type: none"> <li>• If the loading exceeds the Emergency rating, <ul style="list-style-type: none"> <li>○ <b>Use</b> temperature-adjusted <u>Emergency</u> line ratings per PGAE Procedure <a href="#">O-50 Short Term Transmission Facility Ratings</a> outlined in <a href="#">Table 2</a> (Temperature is measured at Rio Oso).</li> </ul> </li> <li>• If the temperature-adjusted Emergency line rating is exceeded, <ul style="list-style-type: none"> <li>○ <b>Reduce</b> Drum Generation and Imports from NVE on the Summit Tie.</li> </ul> </li> </ul>
3.	<b>Reduce (within 4 hours)</b> the Drum-Brunswick loading to within the temperature-adjusted <u>Normal</u> line ratings per PGAE Procedure <a href="#">O-50 Short Term Transmission Facility Ratings</a> in <a href="#">Table 2</a> . <ul style="list-style-type: none"> <li>• If the temperature-adjusted Normal line rating is exceeded, <ul style="list-style-type: none"> <li>○ <b>Further Reduce</b> Drum Generation and Imports from NVE on the Summit Tie.</li> </ul> </li> </ul>

**Table 2. Temperature Adjusted Ratings for Drum – Rio Oso #1 or #2 Line, respectively**

3/0 CU Conductor at 115 kV		Unadjusted	<70°	<75°	<80°	<85°F	<90°F	<95°F	<100°F	<105°F	Winter Rating
Normal	Amperes	325	436	424	411	398	384	370	355	339	482/400
	MVA (@ 115 kV)	64.7	86.8	84.5	81.7	79.3	76.5	73.7	70.7	67.5	96
Emergency	Amperes	377	473	462	451	440	427	415	402	389	515/400
	MVA (@ 115 kV)	75	94.2	92.0	89.8	87.6	85.0	82.6	80.0	77.4	102.6

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## 2.2 Loss of One or Two of the Drum-Summit Tie-Lines

**Caution:** *The Summit Tie TTC can be further affected by additional transmission and/or Generation clearance(s) in the Drum Area.*

*Further OE studies may be required.*

ISO Transmission Desk
<p>1. When one or two of the following three Tie-lines are out of service:</p> <ul style="list-style-type: none"> <li>– Drum-Summit #1 115 kV</li> <li>– Drum-Summit #2 115 kV</li> <li>– Drum-Spaulding-Summit 60 kV <ul style="list-style-type: none"> <li>• The Drum-Summit Inter-tie TTC may be affected.</li> </ul> </li> </ul> <p>2. Use <a href="#">Table 3</a> to determine the appropriate TTC.</p> <p><b>Note:</b> <i>The methodology used to develop the transfer capabilities assume that NVE will not move the phase shifter at California Substation post-contingency to restore the Summit Tie to the scheduled Interchange or pre-contingency level. Non-compliance with this assumption will cause thermal overloading and severely damage PG&amp;E's equipment.</i></p>

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**Table 3. Path 24 TTC**


<b>Line Status</b>	<b>Drum-Summit 115 kV # 1</b>	In	In	In	Out	In (Limiting Element)	Out	Out
	<b>Drum-Summit 115 kV # 2</b>	In	In	Out	In	Out	In (Limiting Element)	Out
	<b>Drum-Spaulding-Summit 60 kV Line</b>	In	Out	In (Limiting Element)	In (Limiting Element)	Out	Out	In
<b>TTC*</b>	<b>West → East TTC</b>	100 MW (S) 100 MW (W)	100 MW (S) 100 MW (W)	100 MW (S) 100 MW (W)	100 MW (S) 100 MW (W)	75 MW (S) 100 MW (W)	70 MW (S) 70 MW (W)	0**
	<b>East → West TTC</b>	120 MW (S) 120 MW (W)	120 MW (S) 120 MW (W)	120 MW (S) 120 MW (W)	120 MW (S) 120 MW (W)	75 MW (S) 105 MW (W)	70 MW (S) 70 MW (W)	0**

\* Although this table lists Path 24 TTC, there is a bottleneck in Reno on the NVE side that can limit the TTC from 44 MW to 105 MW. Although the Marble tie is not part of Path 24, it is part of the bottleneck on the Reno side of Path 24. As a result of the Reno limitation, Marble flows and Summit flows make up the most conservative transfer capability that we operate to.

\*\* It is **not** recommended to operate the tie with only the Drum-Spaulding-Summit 60 kV line.

### 2.3 Ring Bus Breaker Clearances at Drum Substation

**Note:** A Regional Transmission study is required for a ring bus breaker clearance at Drum Substation. The next contingency of a 115 kV line loss at Drum could split the ring bus at the Drum Substation, potentially overloading the Drum-Grass Valley-Weimar 60 kV line. Depending on the system conditions, such as the area Load, Generation pattern, and the 60 kV configuration; the Summit Tie Import/Export TTC can be restricted.

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## 2.4 Gold Hill N-1-1 Conditions


Upon loss of either parallel Gold Hill #1 or #2 230/115 kV transformer bank, or parallel Placer-Gold Hill #1 or #2 115 kV line under heavy load conditions, loss of the remaining parallel bank or line could result in sustained severe overload of the Drum-Higgins 115 kV line and low area voltages.

ISO Transmission Desk
<ol style="list-style-type: none"> <li>1. If Gold Hill 230/115 kV Bank #1 or #2 is lost or removed from service, <ul style="list-style-type: none"> <li>• <b>Monitor</b> RTCA for loss of the remaining Gold Hill 230/115 kV bank.</li> <li>• <b>Consider</b> opening Bell-Placer 115 kV line if RTCA shows severe overload of Drum-Higgins 115 kV line or low area voltages.</li> </ul> </li> <li>2. If Placer-Gold Hill #1 or #2 115 kV line is lost or removed from service, <ul style="list-style-type: none"> <li>• <b>Monitor</b> RTCA for loss of the remaining Placer-Gold Hill 115 kV line.</li> <li>• <b>Consider</b> opening Bell-Placer 115 kV line if RTCA shows severe overload of Drum-Higgins 115 kV line or low area voltages.</li> </ul> </li> </ol>

## Version History

Version	Change	Date
6.2	Deleted reference to limit 3 and 4 from Drum Area Limits and from Normal Operations.	4/11/13
6.3	Updated logo, updated ISO action tables to show as "ISO Transmission Dispatcher Actions."	4/28/16
6.4	Periodic Review - Updated Table 3 and associated notes.	8/12/16
6.5	<p>Changed "SOL" (System Operating Limit) and "Limit" references to "CP" (Control Point).</p> <p>Changed "OTC" and "Scheduling Limit" references to "TTC"</p> <p>Updated Table 3 to reflect line limits for single line in service conditions.</p> <p>Added Section 2.4 to address Drum area N-1-1 conditions.</p> <p>Replaced CAISO with ISO in most instances.</p> <p>Replaced PG&amp;E with PG&amp;E in most instances.</p> <p>Replaced NVEnergy with NVE.</p>	9/22/17
7.0	Periodic Review: Minor format and grammar updates.	7/20/20

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## Technical Review

Reviewed By Content Expert	Date
Operating Procedures	7/15/20
Real-Time Operations	7/15/20
Operations Planning - North	7/15/20

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