

No.	Topic	Finding	Recommendation	Entity	PC Support	Response Activity
<b>NEXT DAY PLANNING</b>						
1	Failure to Conduct and Share Next-Day Studies	Not all of the affected TOPs conduct next-day studies or share them with their neighbors and WECC RC. As a result of failing to exchange studies, on September 8, 2011 TOPs were not alerted to contingencies on neighboring systems that could impact their internal system and the need to plan for such contingencies.	All TOPs should conduct next-day studies and share the results with neighboring TOPs and the RC (before the next day) to ensure that all contingencies that could impact the BPS are studied.	TOP	NO	N/A  NERC Standard TOP-002-2b <sup>1</sup> Requirement 11 seems to be applicable
2	Lack of Updated External Networks in Next-Day Study Models:	When conducting next-day studies, some affected TOPs use models for external networks that are not updated to reflect next-day operating conditions external to their systems, such as generation schedules and transmission outages. As a result, these TOPs' next-day studies do not adequately predict the impact of external contingencies on their systems or internal contingencies on external systems.	TOPs and BAs should ensure that their next-day studies are updated to reflect next-day operating conditions external to their systems, such as generation and transmission outages and scheduled interchanges, which can significantly impact the operation of their systems. TOPs and BAs should take the necessary steps, such as executing nondisclosure agreements, to allow the free exchange of next-day operations data between operating entities. Also, RCs should review the procedures in the region for coordinating next-day studies, ensure adequate data exchange among BAs and TOPs, and facilitate the next-day studies of BAs and TOPs.	TOP, BA, RC	NO	N/A

<sup>1</sup> NERC Standard TOP-002-2b: <http://www.nerc.com/files/TPL-002-0b.pdf>

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3	Sub-100 kV Facilities Not Adequately Considered in Next-Day Studies:	In conducting next-day studies, some affected TOPs focus primarily on the TOPs' internal SOLs and the need to stay within established Rated Path limits, without adequate consideration of some lower voltage facilities. As a result, these TOPs risk overlooking facilities that may become overloaded and impact the reliability of the BPS. Similarly, the RC does not study sub-100 kV facilities that impact BPS reliability unless it has specifically been alerted to issues with such facilities by individual TOPs or the RC has otherwise identified a particular sub-100 kV facility as affecting the BPS.	TOPs and RCs should ensure that their next-day studies include all internal and external facilities (including those below 100 kV) that can impact BPS reliability.	TOP, RC	NO	<p>The currently filed BES Exception / Inclusion process (FERC docket RM12-6 and 12-7)<sup>2</sup> should resolve this issue.</p> <p>The PC is also supporting the BES Definition Phase 2 work that is on-going (NERC Standards Project 2010-17)<sup>3</sup></p>
4	Flawed Process for Estimating Scheduled Interchanges:	WECC RC's process for estimating scheduled interchanges is not adequate to ensure that such values are accurately reflected in its next-day studies. As a result, its next-day studies may not accurately predict actual power flows and contingency overloads.	WECC RC should improve its process for predicting interchanges in the day-ahead timeframe.	WECC RC	NO	N/A

<sup>2</sup> FERC Docket RM12-6 and RM12-7, Revisions to Electric Reliability Organization Definition of Bulk Electric System and Rules of Procedure: <http://www.ferc.gov/whats-new/comm-meet/2012/062112/E-4.pdf>

<sup>3</sup> NERC Standards Project 2010-17, Proposed Definition of Bulk Electric System and Related Rules of Procedure, [http://www.nerc.com/filez/standards/Project2010-17\\_BES.html](http://www.nerc.com/filez/standards/Project2010-17_BES.html)

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<b>SEASONAL PLANNING</b>						
5	Lack of Coordination in Seasonal Planning Process:	The seasonal planning process in the WECC region lacks effective coordination. Specifically, the four WECC subregions do not adequately integrate and coordinate studies across the subregions, and no single entity is responsible for ensuring a thorough seasonal planning process. Instead of conducting a full contingency analysis based on all of the subregions' studies, the subregions rely on experience and engineering judgment in choosing which contingencies to discuss. As a result, individual TOPs may not identify contingencies in one subregion that may affect TOPs in the same or another subregion.	WECC RE should ensure better integration and coordination of the various subregions' seasonal studies for the entire WECC system. To ensure a thorough seasonal planning process, at a minimum, WECC RE should require a full contingency analysis of the entire WECC system, using one integrated seasonal study, and should identify and eliminate gaps between subregional studies. Individual TOPs should also conduct a full contingency analysis to identify contingencies outside their own systems that can impact the reliability of the BPS within their system and should share their seasonal studies with TOPs shown to affect or be affected by their contingencies.	WECC RE, TOP	YES	<p>This issue appears to be addressed under TPL-005-0<sup>4</sup> and TPL-006-0<sup>5</sup>, if RROs were applicable entities.</p> <p>This could be covered under present NERC Reliability Assessments for Summer and Winter, if a set of conditions representative of nonpeak (not light or minimum) load were assessed.</p>
6	External and Lower-Voltage Facilities Not Adequately Considered in Seasonal Planning Process:	Seasonal planning studies do not adequately consider all facilities that may affect BPS reliability, including external facilities and lower-voltage facilities.	Seasonal planning studies do not adequately consider all facilities that may affect BPS reliability, including external facilities and lower-voltage facilities.	TOP	YES	Current TPL standards do not require seasonal studies by entities, but many entities complete these studies on a defined basis.

<sup>4</sup> NERC Standard TPL-005-0: <http://www.nerc.com/files/TPL-005-0.pdf>

<sup>5</sup> NERC Standard TPL-006-0: <http://www.nerc.com/files/TPL-006-0.pdf>

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7	Failure to Study Multiple Load Levels:	TOPs do not always run their individual seasonal planning studies based on the multiple WECC base cases TOPs do not always run their individual seasonal planning studies based on the multiple WECC base cases	TOPs should expand the cases on which they run their individual planning studies to include multiple base cases, as well as generation maintenance outages and dispatch scenarios during high load shoulder periods.	TOP	YES	Current Reliability Assessment (RAS) <sup>6</sup> seasonal (summer and winter) assessments may want to investigate a scenario that includes 85-90% peak demand occurring during the shoulder seasons with maintenance and dispatch limitations to present representative conditions of occurrence.
8	Not Sharing Overload Relay Trip Settings:	In the seasonal planning process, at least one TOP did not share with neighboring TOPs overload relay trip settings on transformers and transmission lines that impacted external BPS systems.	TOPs should include in the information they share during the seasonal planning process the overload relay trip settings on transformers and transmission lines that impact the BPS, and separately identify those that have overload trip settings below 150% of their normal rating, or below 115% of the highest emergency rating, whichever of these two values is greater.	TOP	YES	The System Protection and Control Subcommittee (SPCS) <sup>7</sup> should review Zone 3 effort <sup>8</sup> to review if there are any open tasks and investigate if more facilities need to be reviewed or further work is required.

<sup>6</sup> Reliability Assessment Subcommittee: <http://www.nerc.com/filez/ras.html>

<sup>7</sup> System Protection and Control Subcommittee: <http://www.nerc.com/filez/spctf.html>

<sup>8</sup> Beyond Zone 3 – EHV Report: [http://www.nerc.com/docs/pc/spctf/Beyond\\_Zone\\_3-EHV\\_Report.pdf](http://www.nerc.com/docs/pc/spctf/Beyond_Zone_3-EHV_Report.pdf)

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9	Gaps in Near- and Long-Term Planning Process:	Gaps exist in WECC RE's, TPs' and PCs' processes for conducting near- and long-term planning studies, resulting in a lack of consideration for: (1) critical system conditions; (2) the impact of elements operated at less than 100 kV on BPS reliability; and (3) the interaction of protection systems. As a consequence, the affected entities did not identify during the planning process that the loss of a single 500 kV transmission line could potentially cause cascading outages. Planning studies conducted between 2006 and 2011 should have identified the critical conditions that existed on September 8th and proposed appropriate mitigation strategies.	WECC RE should take actions to mitigate these and any other identified gaps in the procedures for conducting near- and long-term planning studies. The September 8th event and other major events should be used to identify shortcomings when developing valid cases over the planning horizon and to identify flaws in the existing planning structure. WECC RE should then propose changes to improve the performance of planning studies on a subregional- and Interconnection-wide basis and ensure a coordinated review of TPs' and PCs' studies. TOPs, TPs and PCs should develop study cases that cover critical system conditions over the planning horizon; consider the benefits and potential adverse effects of all protection systems, including RASs, Safety Nets (such as the SONGS separation scheme), and overload protection schemes; study the interaction of RASs and Safety Nets; and consider the impact of elements operated at less than 100 kV on BPS reliability.	WECC RE, TOP, TP, PC	NO	N/A  Ongoing work of entities to respond to FERC Order 1000 <sup>9</sup> or ongoing work of Eastern Interconnection Planning Collaborative (EIPC) <sup>10</sup> is more applicable here.

<sup>9</sup> FERC Order 1000: <http://www.ferc.gov/whats-new/comm-meet/2012/051712/E-1.pdf>

<sup>10</sup> Eastern Interconnection Planning Collaborative: <http://www.eipconline.com/>

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10	Benchmarking WECC Dynamic Models:	The inquiry obtained a very good correlation between the simulations and the actual event until the SONGS separation scheme activated. After activation of the scheme, however, neither the tripping of the SONGS units nor the system collapse of SDG&E and CFE could be detected using WECC dynamic models because some of the elements of the event are not explicitly included in those models. Sample simulations of the islanded region showed that by adding known details from the actual event, including UFLS programs and automatic capacitor switching, the simulation and event become more closely aligned following activation of the SONGS separation scheme.	WECC dynamic models should be benchmarked by TPs against actual data from the September 8th event to improve their conformity to actual system performance. In particular, improvements to model performance from validation would be helpful in analysis of under and/or over frequency events in the Western Interconnection and the stability of islanding scenarios in the SDG&E and CFE areas.	TP	YES	The System Analysis and Modeling Subcommittee (SAMS) <sup>11</sup> and Model Validation Working Group (MVWG) <sup>12</sup> should develop a whitepaper proposal, which reviews current established model test procedures as well as procedures used or necessary to benchmark dynamic models.

<sup>11</sup> System Analysis and Modeling Subcommittee: <http://www.nerc.com/filez/sams.html>

<sup>12</sup> Model Validation Working Group: <http://www.nerc.com/filez/mvbwg.html>

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<b>SITUATIONAL AWARENESS</b>						
11	Lack of Real-Time External Visibility:	Affected TOPs have limited real-time visibility outside their systems, typically monitoring only one external bus. As a result, they lack adequate situational awareness of external contingencies that could impact their systems. They also may not fully understand how internal contingencies could affect SOLs in their neighbors' systems.	TOPs should engage in more real-time data sharing to increase their visibility and situational awareness of external contingencies that could impact the reliability of their systems. They should obtain sufficient data to monitor significant external facilities in real time, especially those that are known to have a direct bearing on the reliability of their system, and properly assess the impact of internal contingencies on the SOLs of other TOPs. In addition, TOPs should review their real-time monitoring tools, such as State Estimator and RTCA, to ensure that such tools represent critical facilities needed for the reliable operation of the BPS.	TOP	NO	N/A  NERC Standard TOP-002-2b <sup>13</sup> Requirement 11 seems to be applicable
12	Inadequate Real-Time Tools:	Affected TOPs' real-time tools are not adequate or, in one case, operational to provide the situational awareness necessary to identify contingencies and reliably operate their systems.	TOPs should take measures to ensure that their real-time tools are adequate, operational, and run frequently enough to provide their operators the situational awareness necessary to identify and plan for contingencies and reliably operate their systems.	TOP	NO	N/A

<sup>13</sup> NERC Standard TOP-002-2b: <http://www.nerc.com/files/TPL-002-0b.pdf>

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13	Reliance on Post-Contingency Mitigation Plans	One affected TOP operated in an unsecured N-1 state on September 8, 2011, when it relied on post-contingency mitigation plans for its internal contingencies and subsequent overload and tripping, while assuming there would be sufficient time to mitigate the contingencies. Post-contingency mitigation plans are not viable under all circumstances, such as when equipment trips on overload relay protection that prevents operators from taking timely control actions. If this TOP had used pre-contingency measures on September 8th, such as dispatching additional generation, to mitigate first contingency emergency overloads for its internal contingencies, the cascading outages that were triggered by the loss of H-NG might have been avoided with the prevailing system conditions on September 8, 2011.	TOPs should review existing operating processes and procedures to ensure that post-contingency mitigation plans reflect the time necessary to take mitigating actions, including control actions, to return the system to a secure N-1 state as soon as possible but no longer than 30 minutes following a single contingency. As part of this review, TOPs should consider the effect of relays that automatically isolate facilities without providing operators sufficient time to take mitigating measures.	TOP	NO	N/A  Applicable to the NERC Operating Committee <sup>14</sup>
14	WECC RC Staffing Concerns	WECC RC staffs a total of four operators at any one time to meet the functional requirements of an RC, including continuous monitoring, conducting studies, and giving directives. The September 8th event raises concerns that WECC RC's staffing is not adequate to respond to emergency conditions.	WECC RC should evaluate the effectiveness of its staffing level, training and tools. Based on the results of this evaluation, it should determine what actions are necessary to perform its functions appropriately as the RC and address any identified deficiencies.	WECC RC	NO	N/A  The NERC Operating Committee may want to review enhancements to current NERC Standards requirements

<sup>14</sup> NERC Operating Committee: <http://www.nerc.com/page.php?cid=1|9|117|161>

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15	Failure to Notify WECC RC and Neighboring TOPs Upon Losing RTCA	On September 8, 2011, at least one affected TOP lost the ability to conduct RTCA more than 30 minutes prior to and throughout the course of the event due to the failure of its State Estimator to converge. The entity did not notify WECC RC or any of its neighboring TOPs, preventing this entity from regaining situational awareness.	TOPs should ensure procedures and training are in place to notify WECC RC and neighboring TOPs and BAs promptly after losing RTCA capabilities.	TOP	NO	N/A  The NERC Operating Committee may want to review enhancements to current NERC Standards requirements
16	Discrepancies Between RTCA and Planning Models	WECC's model used by TOPs to conduct RTCA studies is not consistent with WECC's planning model and produces conflicting solutions.	WECC should ensure consistencies in model parameters between its planning model and its RTCA model and should review all model parameters on a consistent basis to make sure discrepancies do not occur.	WECC	YES	The MVWG should review this recommendation and provide any proposals for improvement to the SAMS by the December 2012 Planning Committee meeting

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<b>CONSIDERATION OF BES EQUIPMENT</b>						
17	Impact of Sub-100 kV Facilities on BPS Reliability	WECC RC and affected TOPs and BAs do not consistently recognize the adverse impact sub-100 kV facilities can have on BPS reliability. As a result, sub-100 kV facilities might not be designated as part of the BES, which can leave entities unable to address the reliability impact they can have in the planning and operations time horizons. If, prior to September 8, 2011, certain sub-100 kV facilities had been designated as part of the BES and, as a result, were incorporated into the TOPs' and RC's planning and operations studies, or otherwise had been incorporated into these studies, cascading outages may have been avoided on the day of the event.	WECC, as the RE should lead other entities, including TOPs and BAs, to ensure that all facilities that can adversely impact BPS reliability are either designated as part of the BES or otherwise incorporated into planning and operations studies and actively monitored and alarmed in RTCA systems.	WECC RE, TOP, BA	Possibly	<p>The FERC NOPR on the BES definition and exception process (docket RM12-6 and RM12-7) addresses the inclusion of pertinent sub-100 kV facilities in the BES.</p> <p>If the final promulgated rule indicates who should determine sub-100 kV facilities to be included in the BES, then no further work is needed by the PC.</p> <p>If the final rule does not specify this action, the PC may need to provide guidance to the industry on this topic.</p>
<b>IROL DEVIATIONS</b>						

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18	Failure to Establish Valid SOLs and Identify IROLs:	<p>The cascading nature of the event that led to uncontrolled separation of San Diego, IID, Yuma, and CFE indicates that an IROL was violated on September 8, 2011, even though WECC RC did not recognize any IROLs in existence on that day. In addition, the established SOL of 2,200 MW on Path 44 and 1,800 MW on H-NG are invalid for the present infrastructure, as demonstrated by the event.</p>	<p>WECC RC should recognize that IROLs do exist on its system and, thus, should study IROLs in the day-ahead timeframe and monitor potential IROL exceedances in real-time.</p> <p><i>AND</i></p> <p>WECC RC should work with TOPs to consider whether any SOLs in the Western Interconnection constitute IROLs. As part of this effort, WECC RC should: (1) work with affected TOPs to consider whether Path 44 and H-NG should be recognized as IROLs; and (2) validate existing SOLs, and ensure that they take into account all transmission and generation facilities and protection systems that impact BPS reliability.</p>	WECC RC, TOP	NO	<p>N/A</p> <p>This recommendation is an IROL standards issue with WECC entities.</p>

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<b>PROTECTION SYSTEMS</b>						
19	Lack of Coordination of the S Line RAS:	Several TOs and TOPs did not properly coordinate a RAS by: (1) not performing coordination studies with the overload protection schemes on the facilities that the S Line RAS is designed to protect; and (2) not assessing the impact of setting relays to trip generation sources and a 230 kV transmission tie line prior to the operation of a single 161/92 kV transformer’s overload protection. As a result, BES facilities were isolated in excess of those needed to maintain reliability, with adverse impact on BPS reliability.	The TOs and TOPs responsible for design and coordination of the S Line RAS should revisit its design basis and protection settings to ensure coordination with other protection systems in order to prevent adverse impact to the BPS, premature operation, and excessive isolation of facilities. TOs and TOPs should share any changes to the S Line RAS with TPs and PCs so that they can accurately reflect the S Line RAS when planning.	TO, TOP	NO	<p>N/A</p> <p>Ongoing NERC Standards work responding to FERC Order 754<sup>15</sup>, <sup>16</sup> may be applicable here as response to this recommendation.</p> <p>NERC Reliability Standard PRC-012-0<sup>17</sup>, Requirement R1.5 states “...demonstrate the proposed SPS will coordinate with other protection and control systems...”</p>

<sup>15</sup> NERC Standards Project related to FERC Order 754: [http://www.nerc.com/filez/standards/order\\_754.html](http://www.nerc.com/filez/standards/order_754.html)

<sup>16</sup> FERC Order 754: <http://www.ferc.gov/whats-new/comm-meet/2011/091511/E-4.pdf>

<sup>17</sup> NERC Standard PRC-012-0: <http://www.nerc.com/files/PRC-012-0.pdf>

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20	Lack of Coordination of the SONGS Separation Scheme	SCE did not coordinate the SONGS separation scheme with other protection systems, including protection and turbine control systems on the two SONGS generators. As a result, SCE did not realize that Units 2 and 3 at SONGS would trip after operation of the separation scheme.	SCE should ensure that the SONGS separation scheme is coordinated with other protection schemes, such as the generation protection and turbine control systems on the units at SONGS and UFLS schemes.	Southern California Edison	YES	<p>The SPCS should review this recommendation and provide any proposal(s) to the PC by December, 2012.</p> <p>NERC Reliability Standard PRC-012-0<sup>18</sup>, Requirement R1.5 states “...demonstrate the proposed SPS will coordinate with other protection and control systems...”</p> <p>The PC may develop input to current standards process (either through the Standards Authorization Request (SAR)<sup>19</sup> or other comment mechanism) and potentially develop a NERC Industry Advisory<sup>20</sup> or NERC Lesson Learned<sup>21</sup> to highlight this issue to the industry.</p>

<sup>18</sup> NERC Standard PRC-012-0: <http://www.nerc.com/files/PRC-012-0.pdf>

<sup>19</sup> NERC Standards Authorization Request: [http://www.nerc.com/files/SAR\\_Form\\_081011.doc](http://www.nerc.com/files/SAR_Form_081011.doc)

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21	Effect of SONGS Separation Scheme on SONGS Units	The SONGS units tripped due to their turbine control systems detecting unacceptable acceleration following operation of the SONGS separation scheme.	GOs and GOPs should evaluate the sensitivity of the acceleration control functions in turbine control systems to verify that transient perturbations or fault conditions in the transmission system resulting in unit acceleration will not result in unit trip without allowing time for protective devices to clear the fault on the transmission system.	GO, GOP	YES	<p>The SPCS should review this recommendation and provide any proposal(s) to the PC by December, 2012</p> <p>The proposal could include the development of NERC Lesson Learned for the industry on this issue.</p>

<sup>20</sup> About NERC Alerts, including Industry Advisory: <http://www.nerc.com/page.php?cid=5|63|253>

<sup>21</sup> About NERC Lesson Learned: <http://www.nerc.com/page.php?cid=5|385>

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22	Lack of Review and Studying Impact of SPSs	Although WECC equates SPSs with RASs, prior to October 1, 2011, WECC’s definition of RAS excluded many protection systems that would be included within NERC’s definition of SPS. As a result, WECC did not review and assess all NERC-defined SPSs in its region, and WECC’s TOPs did not perform the required review and assessment of all NERC-defined SPSs in their areas.	WECC RE, along with TOs, GOs, and Distribution Providers (DPs), should periodically review the purpose and impact of RASs, including Safety Nets and Local Area Protection Schemes, to ensure they are properly classified, are still necessary, serve their intended purposes, are coordinated properly with other protection systems, and do not have unintended consequences on reliability. WECC RE and the appropriate TOPs should promptly conduct these reviews for the SONGS separation scheme and the S Line RAS.	WECC RE, TO, GO, DP, TOP	YES	<p>WECC did not review the SONGS scheme because it was labeled a “safety net” and not an official RAS/SPS and therefore did not get the review required in current PRC standards.</p> <p>This issue highlights the need to review all Special Protection Systems (SPS) and Remedial Action Schemes (RAS)<sup>22</sup>.</p> <p>The PC may want to consider the development of a Compliance Application Notice (CAN)<sup>23</sup> that Regional Entities review all non-standard protection schemes through the regional processes until Project 2010-5.2 for SPS/RAS review is complete.</p>

<sup>22</sup> The NERC Glossary of Terms defines Special Protection System (Remedial Action Scheme) as an automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability. Such action may include changes in demand, generation (MW and Mvar), or system configuration to maintain system stability, acceptable voltage, or power flows. An SPS does not include (a) underfrequency or undervoltage load shedding or (b) fault conditions that must be isolated or (c) out-of-step relaying (not designed as an integral part of an SPS). Also called Remedial Action Scheme. [http://www.nerc.com/files/Glossary\\_of\\_Terms.pdf](http://www.nerc.com/files/Glossary_of_Terms.pdf)

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23	Effect of Inadvertent Operation of SONGS Separation Scheme on BPS Reliability	The inquiry's simulation of the event shows that the inadvertent operation of the SONGS separation scheme under normal system operations could lead to a voltage collapse and blackout in the SDG&E areas under certain high load conditions.	CAISO and SCE should promptly verify that the inadvertent operation of the SONGS separation scheme does not pose an unacceptable risk to BPS reliability. Until this verification can be completed, they should consider all actions to minimize this risk, up to and including, temporarily removing the SONGS separation scheme from service.	California ISO, Southern California Edison	YES	Same as recommendation for item 22.
24	Not Recognizing Relay Settings When Establishing SOLs	An affected TO did not properly establish the SOL for two transformers, as the SOL did not recognize that the most limiting elements (protective relays) were set to trip below the established emergency rating. As a result, the transformers tripped prior to the facilities being loaded to their emergency ratings during the restoration process, which delayed the restoration of power to the Yuma load pocket.	TOs should reevaluate their facility ratings methodologies and implementation of the methodologies to ensure that their ratings are equal to the most limiting piece of equipment, including relay settings. No relay settings should be set below a facility's emergency rating. When the relay setting is determined to be the most limiting piece of equipment, consideration should be given to reviewing the setting to ensure that it does not unnecessarily restrict the transmission loadability.	TO	NO	N/A  NERC Standard FAC-008-3 <sup>24</sup> , Requirement 2.3 requires the "Facility Rating shall respect the most limiting applicable Equipment Rating..."  Also, R2.4.1 states "The scope of equipment addressed shall include...relay protective devices..."

<sup>23</sup> NERC Compliance Application Notices: <http://www.nerc.com/page.php?cid=3%7C22%7C354>

<sup>24</sup> NERC Standard FAC-008-3: <http://www.nerc.com/files/FAC-008-3.pdf>

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25	Margin Between Overload Relay Protection Settings and Emergency Rating	Some affected TOs set overload relay protection settings on transformers just above the transformers' emergency rating, resulting in facilities being automatically removed from service before TOPs have sufficient time to take control actions to mitigate the resulting overloads. One TO in particular set its transformers' overload protection schemes with such narrow margins between the emergency ratings and the relay trip settings that the protective relays tripped the transformers following an N-1 contingency.	TOs should review their transformers' overload protection relay settings with their TOPs to ensure appropriate margins between relay settings and emergency ratings developed by TOPs. For example, TOs could consider using the settings of Reliability Standard PRC-023-1 R.1.11 even for those transformers not classified as BES. PRC-023-1 R.1.11 requires relays to be set to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest operator established emergency transformer rating, whichever is greater.	TO, TOP	NO	N/A
26	Relay Settings and Proximity to Emergency Ratings	Some TOs set relays to isolate facilities for loading conditions slightly above their thirty minute emergency ratings. As a result, several transmission lines and transformers tripped within seconds of exceeding their emergency ratings, leaving TOPs insufficient time to mitigate overloads.	TOs should evaluate load responsive relays on transmission lines and transformers to determine if the settings can be raised to provide more time for TOPs to take manual action to mitigate overloads that are within the short-time thermal capability of the equipment instead of allowing relays to prematurely isolate the transmission lines. If the settings cannot be raised to allow more time for TOPs to take manual action, TOPs must ensure that the settings are taken into account in developing facility ratings and that automatic isolation does not result in cascading outages.	TO, TOP	Yes	<p>SPCS Development of NERC Lesson Learned / Advisory by December 2012 PC Meeting</p> <p>This issue may require a NERC advisory or Lesson Learned if PRC-001 was deemed to not be applicable.</p> <p>The NERC Advisory could state that relay settings must be taken into account when determining emergency ratings.</p>

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<b>ANGULAR SEPARATION</b>						
27	Phase Angle Difference Following Loss of Transmission Line	A TOP did not have tools in place to determine the phase angle difference between the two terminals of its 500 kV line after the line tripped. Yet, it informed the RC and another TOP that the line would be restored quickly, when, in fact, this could not have been accomplished.	TOPs should have: (1) the tools necessary to determine phase angle differences following the loss of lines; and (2) mitigation and operating plans for reclosing lines with large phase angle differences. TOPs should also train operators to effectively respond to phase angle differences. These plans should be developed based on the seasonal and next-day contingency analyses that address the angular differences across opened system elements.	TOP	YES,  Joint with NASPI	<p>The PC should research this issue further, possibly via a PC task force with a proposal for uses of PMU data and angles.</p> <p>This issue ties with the NASPI<sup>25</sup> effort, and how to effectively use Phasor Measurement Unit (PMU) data to monitor and use angle differences in real-time operations.</p>

<sup>25</sup> North American SynchroPhasor Initiative: <http://www.naspi.org>