149 FERC ¶ 61,189
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Cheryl A. LaFleur, Chairman;
Philip D. Moeller, and Tony Clark.

California Independent System Operator Corporation — Docket No. IN14-10-000

ORDER APPROVING STIPULATION AND CONSENT AGREEMENT

(Issued November 28, 2014)

1. The Commission approves the attached Stipulation and Consent Agreement (Agreement) between the Office of Enforcement (Enforcement), the North American Electric Reliability Corporation (NERC), and the California Independent System Operator Corporation (CAISO). This order is in the public interest because it resolves on fair and reasonable terms an investigation of CAISO, conducted by Enforcement in coordination with NERC and the Commission's Office of Electric Reliability (OER), into possible violations of Reliability Standards associated with CAISO's operation of a portion of the Bulk-Power System (BPS) and a blackout that occurred on September 8, 2011. CAISO agrees to pay a civil penalty of $6,000,000, of which $2,000,000 will be paid to the United States Treasury and NERC, divided in equal amounts, and $4,000,000 will be invested in reliability enhancement measures that go above and beyond mitigation of the violations and the requirements of the Reliability Standards. CAISO also agrees to commit to mitigation and compliance measures necessary to mitigate the violations described in the Agreement, and to make semi-annual compliance reports to Enforcement and NERC for at least one year.

I. Background

2. CAISO runs the primary market for wholesale electric power and open-access transmission in California, and manages the high-voltage transmission lines that make up approximately 80 percent of California's power grid. CAISO's peak load is in excess of 45,000 MW. It operates day-ahead and real-time markets, and schedules power in real-time as necessary. Among other NERC registrations, CAISO is a Planning Coordinator and Balancing Authority (BA) for most of California, including the San Diego area. It also acts as a Transmission Operator (TOP) under Coordinated Functional Registrations for several entities within its footprint, including San Diego Gas and Electric (SDG&E) and Southern California Edison Company (SCE) (sometimes referred to as Participating Transmission Owners, or PTOs). CAISO engages in modeling and planning functions in order to ensure long-term grid reliability, as well as

identifying infrastructure upgrades necessary for grid function. CAISO is subject to the Commission's regulation under section 215 of the Federal Power Act (FPA).[1]

3. On March 16, 2007, in Order No. 693,[2] the Commission approved the initial Reliability Standards, which became mandatory and enforceable within the contiguous United States on June 18, 2007.

4. The investigation of CAISO arose out of a system disturbance that occurred on the afternoon of September 8, 2011 in the Pacific Southwest, which resulted in cascading outages and left approximately 2.7 million customers (equivalent to five million or more individuals) without power, some for multiple hours extending into the next day. The total load loss for the event was in excess of 30,000 MWh. The event started with a three-phase fault which led to the loss of Arizona Public Service Company's (APS) Hassayampa-N. Gila 500 kV transmission line (H-NG). This transmission line is a segment of the Southwest Power Link (SWPL), a major transmission corridor transporting power in an east-west direction, from generators in Arizona, through Imperial Irrigation District's (IID) service territory, into Southern California.

5. With the SWPL's major east-west corridor broken by the loss of H-NG, power flows instantaneously redistributed throughout the electric system in the Pacific Southwest and Southern California, increasing flows through lower voltage systems parallel to the SWPL as power continued to flow on a hot day during hours of peak demand.

6. These redistributed flows traveled through IID's and Western Area Power Administration-Desert Southwest Region's facilities, onto Western Electricity Coordinating Council (WECC)[3] Path 44, an aggregation of five 230 kV transmission lines that deliver power in a north-south direction from SCE's territory in Los Angeles to San Diego. The increased power flows parallel to the SWPL, together with lower than

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[1] 16 U.S.C. § 824o (2012).

[2] *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, FERC Stats. & Regs. ¶ 31,242, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

[3] At the time of the event, WECC was registered with NERC as the Reliability Coordinator (RC) for all of the entities affected by the event, as well as serving as the Regional Entity (RE) under a delegation agreement with NERC. Since the event, the Regional Entity and Reliability Coordinator functions have been bifurcated, with WECC remaining the Regional Entity, and Peak Reliability becoming the independent Reliability Coordinator. *See Order on Compliance*, 146 FERC ¶ 61,092 (2014) (accepting compliance filings submitted by NERC and WECC and eliminating all final obstacles to bifurcation).

peak generation levels in California and Mexico, led to significant voltage deviations and transmission equipment overloads. The flow redistributions, voltage deviations, and resulting overloads had a cascading effect, as transmission and generation equipment tripped offline in a relatively short time period. Just seconds before the blackout, Path 44 carried all flows into San Diego as well as parts of Arizona and Mexico. This excessive loading on Path 44 initiated an intertie separation scheme owned and operated by SCE at the San Onofre switchyard. CAISO is responsible for many of the TOP functions for SCE under a Coordinated Functional Registration. Initiation of this intertie separation scheme separated SDG&E from Path 44, contributed to tripping the San Onofre Nuclear Generating Station (SONGS) nuclear units offline, and eventually resulted in the complete blackout of San Diego and Comisión Federal de Electricidad's (CFE) Baja California Control Area in Mexico.

7. CAISO monitored the rating of Path 44 throughout the short period between the loss of H-NG and the activation of the intertie separation scheme at the San Onofre switchyard and took steps to reduce additional MW flow on Path 44 resulting from the loss of the H-NG during that period. While monitoring the Path 44 rating, however, CAISO did not monitor the intertie separation scheme, which had a higher threshold than the path operating limit, and although it attempted to bring on additional generation, it did not attempt corrective action specifically to avert the operation of the intertie separation scheme. Operation of the intertie separation scheme would isolate five 230 kV lines and separate SDG&E from Path 44 and the SONGS nuclear units, but CAISO operators on duty September 8th were not uniformly aware of the 8,000 amp threshold for operation of the scheme. The intertie separation scheme was not monitored in real time, whether in amps (as the scheme was measured) or some other measurement converted in real time to amps. CAISO operators had no alarm capable of alerting them if operation of the intertie separation scheme was imminent, although they did have alarms for, and were actively monitoring, the Path limit for Path 44, which was 2500 MW, or 686 MW lower than the MW equivalent of the threshold for operation of the intertie separation scheme. Based on the information regarding external facilities included within CAISO's models in September of 2011, CAISO derived System Operating Limits (SOLs) for Path 44 that did not plan for the unscheduled loss of APS's H-NG line as an N-1 contingency[4] that could result in cascading outages.

II. Investigation

8. On September 9, 2011, the Commission and NERC announced a joint inquiry to determine how the blackout occurred and to make recommendations to avoid similar

[4] A contingency is the unexpected failure of an electrical system component. TOPs like CAISO are expected to operate so that the loss of any single contingency does not cause instability, uncontrolled separation or cascading. This is known as the "N-1 criterion."

situations in the future. The inquiry team, comprised of Commission and NERC staff, used on-site visits and interviews, detailed computer modeling, event simulations, and system analyses to make its findings and recommendations for preventing similar events in the future. The inquiry determined that entities responsible for planning and operating the BPS were not prepared to ensure reliable operation or prevent cascading outages in the event of a single contingency. On May 1, 2012, the inquiry team published a report entitled *Arizona-Southern California Outages on September 8, 2011, Causes and Recommendations* (the Report), which is hereby incorporated by reference.[5] The Report discusses a detailed sequence of events, simulations, and findings related to the causes of the cascading outages. The Report also makes twenty-seven recommendations related to next-day planning, seasonal planning, near- and long-term planning, situational awareness, consideration of bulk electric system (BES) equipment, SOLs and Interconnection Reliability Operating Limits (IROLs), and protection systems.

9. Following publication of the Report, Enforcement, OER, and NERC staff reviewed the data gathered during the inquiry for compliance implications. At the direction of the Commission, Enforcement initiated non-public investigations of several entities, including CAISO, under Part 1b of the Commission's regulations, 18 C.F.R. Part 1b (2014), which were conducted jointly with NERC.

10. Enforcement and NERC determined that CAISO violated the Transmission Operations (TOP-) and Facilities Design, Connection and Maintenance (FAC-) groups of Reliability Standards. The TOP standards cover the responsibilities and decision-making authority for reliable operations and aim to ensure that the transmission system is operated within operating limits. The FAC standard involved aims to ensure that SOLs are determined based on an established methodology.

11. Enforcement and NERC determined that CAISO violated three Requirements of three Reliability Standards: FAC-014-2 R2, TOP-004-2 R2, and TOP-006-1 R5—stemming from its role in the September 8 event.

12. FERC and NERC found that CAISO failed to monitor the current flow on Path 44 in amps, or by any other method that would alert operators to the need for corrective action to avert operation of the separation scheme at the San Onofre switchyard, in violation of TOP-006-1 R5, and failed to operate so that instability, uncontrolled separation and cascading outages would not occur as the result of a single contingency, in violation of TOP-004-2 R2.

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[5] *Arizona-Southern California Outages on September 8, 2011, Causes and Recommendations* (April 2012), *available at* http://www.ferc.gov/legal/staff-reports/04-27-2012-ferc-nerc-report.pdf.

13. Enforcement and NERC found that the SOL CAISO established for Path 44 was not consistent with the WECC RC methodology, because while CAISO was operating to that SOL on September 8, a single contingency caused instability, uncontrolled separation and cascading outages, in violation of FAC-014-2 R2.

III. Stipulation and Consent Agreement

14. Enforcement, NERC, and CAISO resolved this matter by means of the attached Agreement. CAISO stipulates to the facts recited in the Agreement and agrees to pay a civil penalty of $6,000,000, of which $2,000,000 will be paid to the United States Treasury and NERC, divided in equal amounts, and $4,000,000 will be invested in reliability enhancement measures that go above and beyond the requirements of the Reliability Standards, as described in the Agreement. CAISO also agrees to mitigation measures, and to submit to compliance monitoring, as specified in the Agreement. CAISO neither admits nor denies that its actions constituted violations of the Reliability Standards.

15. In consideration of the appropriate sanction, Enforcement considered that CAISO has made significant efforts to date to address reliability concerns identified in the inquiry and investigation and also by CAISO on its own initiative. CAISO also fully and comprehensively cooperated with Enforcement and NERC during the investigation.

IV. Determination of the Appropriate Sanctions

16. The civil penalty amount is consistent with the Penalty Guidelines.[6] Enforcement considered that the event caused a loss of 10,000 or more MWh of firm load, and CAISO was allocated a share of the base penalty. CAISO also has a prior history of violations of the Reliability Standards.[7] The civil penalty amount reflects credit for CAISO's full cooperation during the course of the investigation, as well as credits for avoiding a trial-type hearing and having an effective compliance program.

17. The Commission concludes that the penalties and other sanctions set forth in the Agreement are a fair and equitable resolution of this matter and are in the public interest. The Commission also concludes that the reliability enhancement and mitigation measures set forth in the Agreement will enhance the reliability of the BPS and are therefore also fair and in the public interest.

[6] *Enforcement of Statutes, Orders, Rules and Regulations,* 132 FERC ¶ 61,216 (2010).

[7] *In re California ISO,* 141 FERC ¶ 61,209 (2012).

The Commission orders:

The attached Stipulation and Consent Agreement is hereby approved without modification.

By the Commission. Commissioner Bay is not participating.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Docket No. IN14-10-000

STIPULATION AND CONSENT AGREEMENT

I. INTRODUCTION

1. Staff of the Office of Enforcement (Enforcement) of the Federal Energy Regulatory Commission (Commission), the North American Electric Reliability Corporation (NERC), and the California Independent System Operator Corporation (CAISO) enter into this Stipulation and Consent Agreement (Agreement) to resolve a non-public investigation conducted by Enforcement and NERC pursuant to Part 1b of the Commission's regulations, 18 C.F.R. Part 1b (2014). The investigation examined possible violations of NERC Reliability Standards by CAISO related to a system event in the Pacific Southwest on September 8, 2011 (September 8 event or event). CAISO neither admits nor denies that it violated the Reliability Standards described in the Agreement, but agrees to a total civil penalty of $6,000,000, of which $2,000,000 will be paid to the United States Treasury and NERC, divided in equal amounts, and $4,000,000 invested in reliability enhancement measures identified below that go above and beyond the Agreement's mitigation commitments or what the Reliability Standards require (Reliability Enhancements). CAISO also commits to mitigation and compliance measures, subject to compliance monitoring, as detailed in the Agreement.

II. STIPULATED FACTS

2. Enforcement, NERC, and CAISO hereby stipulate and agree to the following facts.

1. A. CAISO

3. CAISO runs the primary market for wholesale electric power and open-access transmission in California, and manages the high-voltage transmission lines that make up approximately 80% of California's power grid. CAISO's peak load is in excess of 45,000 MW. It operates day-ahead and real-time markets, and schedules power in real-time as necessary. Among other NERC registrations, CAISO is a Planning Coordinator and Balancing Authority (BA) for most of California, including the San Diego area. It also acts as a Transmission Operator (TOP) under Coordinated Functional Registrations for several entities within its footprint, including San Diego Gas and Electric (SDG&E) and Southern

California Edison Company (SCE) (sometimes referred to as Participating Transmission Owners, or PTOs). CAISO engages in modeling and planning functions in order to ensure long-term grid reliability, as well as identifying infrastructure upgrades necessary for grid function.

B. Event Description

4. During an 11- minute period on the afternoon of September 8, 2011, a system disturbance occurred in the Pacific Southwest, resulting in cascading outages and leaving approximately 2.7 million customers without power, some for multiple hours extending into the next day. The total load loss for the event was in excess of 30,000 MWh. The event started with a three-phase fault which led to the loss of Arizona Public Service's (APS) Hassayampa-N. Gila 500 kV transmission line (H-NG). This transmission line is a segment of the Southwest Power Link (SWPL), a major transmission corridor transporting power in an east-west direction, from generators in Arizona, through the service territory of Imperial Irrigation District (IID), into Southern California.

5. With the SWPL's major east-west corridor broken by the loss of H-NG, power flows instantaneously redistributed throughout the electric system in the Pacific Southwest and Southern California, increasing flows through lower voltage systems parallel to the SWPL as power continued to flow on a hot day during hours of peak demand.

6. These redistributed flows traveled through IID's and Western Area Power Administration – Desert Southwest Region's facilities (Western-DSW), onto Western Electricity Coordinating Council's (WECC)[1] Path 44, an aggregation of five 230 kV transmission lines that deliver power in a north-south direction from SCE's territory in Los Angeles to SDG&E. The increased power flows parallel to the SWPL, together with lower than peak generation levels in California and Mexico, led to significant voltage deviations and transmission equipment overloads. The flow redistributions, voltage deviations, and resulting overloads

[1] At the time of the event, WECC was registered with NERC as the Reliability Coordinator (RC) for all of the entities affected by the event, as well as serving as the Regional Entity (RE) under a delegation agreement with NERC. Since the event, the Regional Entity and Reliability Coordinator functions have been bifurcated, with WECC remaining the Regional Entity, and Peak Reliability becoming the independent Reliability Coordinator. *See Order on Compliance,* 146 FERC ¶ 61,092 (2014) (accepting compliance filings submitted by NERC and WECC and eliminating all final obstacles to bifurcation). The Agreement will refer to WECC when relevant to the event, and will otherwise refer to the relevant function (RE or RC) rather than using the entity names WECC or Peak Reliability.

had a cascading effect, as transmission and generation equipment tripped offline in a relatively short time period. Just seconds before the blackout, Path 44 carried all flows into San Diego as well as parts of Arizona and Mexico. This excessive loading initiated an intertie separation scheme owned and operated by SCE at the San Onofre switchyard. CAISO is responsible for many of the TOP functions for SCE under a Coordinated Functional Registration. Initiation of the intertie separation scheme at the San Onofre switchyard separated SDG&E from Path 44, contributed to tripping the SONGS nuclear unit offline, and eventually resulted in the complete blackout of San Diego and Comisión Federal de Electricidad's Baja California Control Area.

7. CAISO's role in the September 8 event centers primarily on Path 44 and the intertie separation scheme at the San Onofre switchyard. CAISO monitored the rating of Path 44 throughout the short period between the loss of H-NG and the activation of the intertie separation scheme at the San Onofre switchyard and took steps to reduce additional MW flow on Path 44 resulting from the loss of the H-NG during that period. While monitoring the Path 44 rating, however, CAISO did not monitor the intertie separation scheme, which had a higher threshold than the path operating limit, and did not attempt corrective action specifically to avert the operation of the intertie separation scheme. Operation of the intertie separation scheme would isolate five 230 kV lines and separate SDG&E from Path 44 and the SONGS nuclear units, but CAISO operators on duty September 8 were not uniformly aware of the 8,000 amp threshold for operation of the scheme. The intertie separation scheme was not monitored in real time, whether in amps (as the scheme was measured) or some other measurement converted in real time to amps. CAISO operators had no alarm capable of alerting them if operation of the intertie separation scheme was imminent, although they did have alarms for, and were actively monitoring, the Path limit for Path 44, which was 2500 MW, or 686 MW lower than the MW equivalent of the threshold for operation of the intertie separation scheme (3,186 MW, 8,000 amps at 230 kV nominal voltage). Between the loss of H-NG and the time that the intertie separation scheme operated, CAISO operators were monitoring the Path 44 rating, but because they were not monitoring the separation scheme, were not aware that the current on Path 44 was approaching the threshold for operation of the scheme. After the path rating for Path 44 was exceeded, CAISO operators did attempt to bring on additional generation to return flows on Path 44 to within its Path rating. However, a Path rating exceedance does not have the same effect on the Bulk-Power System (BPS) as the potential operation of an intertie separation scheme that would isolate five 230 kV lines. Based on the information regarding external facilities included within CAISO's models in September of 2011, CAISO derived System Operating Limits (SOLs) for Path 44 that did not plan for the unscheduled loss of APS's H-NG line as an N-1 contingency that could result in cascading outages.

III. INQUIRY AND INVESTIGATION

8. On September 9, 2011, the Commission and NERC announced a joint inquiry to determine how the blackout occurred and to make recommendations to avoid similar situations in the future. The inquiry team, comprised of Commission and NERC staff, used on-site visits and interviews, detailed computer modeling, event simulations, and system analyses to make its findings and recommendations for preventing similar events in the future. The inquiry determined that entities responsible for planning and operating the BPS were not prepared to ensure reliable operation or prevent cascading outages in the event of a single contingency. On May 1, 2012, the inquiry team published a report entitled *Arizona-Southern California Outages on September 8, 2011, Causes and Recommendations* (the Report), which is hereby incorporated by reference.[2] The Report discusses a detailed sequence of events, simulations, and findings related to the causes of the cascading outages. The Report also makes twenty-seven recommendations related to next-day planning, seasonal planning, near- and long-term planning, situational awareness, consideration of Bulk Electric System (BES) equipment, SOLs and Interconnection Reliability Operating Limits (IROLs), and protection systems.

9. Following publication of the Report, Enforcement and NERC reviewed the data gathered during the inquiry for compliance implications. As a result of that review, Enforcement and NERC initiated non-public investigations of several entities, including CAISO, under Part 1b of the Commission's regulations, 18 C.F.R. Part 1b (2014). Enforcement and NERC determined that CAISO violated three Requirements of three Reliability Standards, and found these violations undermined the reliability of the BPS and contributed to the September 8 event. Enforcement and NERC recognized, however, that after the event, and during the inquiry and investigation, CAISO voluntarily began making improvements in its planning and operations, and implementing recommendations from the Report, that addressed many of the findings arising from the Report. CAISO undertook an active leadership role by leading a task force of entities involved in the event to study, analyze and determine the causes of the September 8 event, in cooperation with the FERC and NERC inquiry, and voluntarily shared the task force's modeling and sequence of events with Enforcement and NERC. Immediately after the event, in parallel with the FERC and NERC inquiry, CAISO assembled its own internal task force to conduct a lessons-learned analysis and identify potential improvements in its operations. This task force was comprised of experts from the

[2] *Arizona-Southern California Outages on September 8, 2011, Causes and Recommendations* (April 2012), *available at* http://www.ferc.gov/legal/staff-reports/04-27-2012-ferc-nerc-report.pdf.

relevant departments of CAISO, including personnel involved in infrastructure development, real-time operations, operations engineering, transmission planning, outage management, information technology, power system technology development, operations process and procedures, and program management. CAISO voluntarily made improvements beyond the recommendations of the Report that addressed the findings arising from the Report, and began implementing certain improvements before the issuance of the Report. CAISO has continued to exercise a leadership role in reliability matters in the Western Interconnection. CAISO fully cooperated with Enforcement and NERC during the investigation.

10. As part of the investigation, Enforcement and NERC reviewed CAISO's compliance program and found that CAISO satisfies the criteria for an effective compliance program under the Commission's Penalty Guidelines.[3] Enforcement and NERC considered the elements of CAISO's compliance program set forth in this paragraph. CAISO uses due diligence to avoid hiring personnel whose past behavior is inconsistent with an effective compliance program. CAISO has a documented established formal program that it disseminates through a variety of means including orientation, mandatory annual training which must be acknowledged in writing, training targeted to specific job functions, an internal website with links to important documents and announcements, and informal training via meetings, emails, announcements, and manuals. CAISO's program prevents and detects violations by utilizing targeted and random sampling, documentation requirements, establishing reporting requirements for employees who become aware of non-compliance, and hosting an anonymous compliance hotline for employees. It contains positive reinforcement and negative consequences that promote compliance such as compensation incentives and disciplinary action. It has measurable compliance goals such as improved compliance with Reliability Standards with a medium or high risk ranking. The CAISO Board appoints the Chief Compliance Officer, who has independent access to the CEO and Board of Governors. The Compliance Committee meets quarterly to review compliance reports and activities and consists of executive- and director-level employees with oversight of all compliance programs, assessment, and reporting. The Compliance Committee reports directly to the Chief Compliance Officer and does not have direct responsibility over business units whose day-to-day duties require compliance with Reliability Standards. CAISO also has a Reliability Issues Steering Committee that is comprised of two standing committees that advise senior management regarding potential violations of applicable regulatory requirements or company policies. One of these standing

[3] *Enforcement of Statutes, Orders, Rules and Regulations,* 132 FERC ¶ 61,216, § 1B2.1 (2010).

committees meets on a bi-weekly basis thus enabling CAISO to identify and address issues on an ongoing basis, and the other standing committee meets when necessary to provide input on how to respond to potential Reliability Standard s violations. In addition, the compliance team works with over 60 subject matter experts who have full or part-time responsibility for ensuring compliance with the Reliability Standards. CAISO periodically reviews its compliance program, approximately every two years, so that it remains effective and aligned with CAISO's risk priorities. As discussed below, following the September 8 event, on its own initiative, CAISO took several measures to study, analyze, and determine the causes of the event, and made recommendations for potential improvements. In addition, CAISO has procedures in place for when violations are discovered, such as conducting investigations and modifying the compliance program if necessary. After the inquiry began, CAISO self-reported to WECC a violation of COM-002-2 R2 related to the event.

IV. VIOLATIONS

11. Enforcement and NERC determined that CAISO violated three Requirements of three Reliability Standards: FAC-014-2 R2, TOP-004-2 R2, and TOP-006-1 R5. Enforcement and NERC found that CAISO violated FAC-014-2 R2 by establishing a SOL for Path 44 that was not consistent with the WECC Reliability Coordinator (RC) methodology, because while CAISO was operating to that SOL on September 8, a single contingency caused instability, uncontrolled separation and cascading outages (which Enforcement and NERC found to also violate TOP-004-2 R2). FERC and NERC found that CAISO violated TOP-006-1 R5 by failing to monitor the current flow on Path 44 in amperes, or by any other method that would alert operators to the need for corrective action to avert operation of the separation scheme at the San Onofre switchyard. In addition to the three violations determined by Enforcement and NERC, CAISO self-reported to WECC a violation of COM-002-2 R2 related to the September 8 event. WECC determined that CAISO violated COM-002-2 R2, which is included in the Agreement (in lieu of a separate proceeding) for administrative ease and due to its relationship to the event.

V. REMEDIES AND SANCTIONS

12. CAISO stipulates to the facts as described in Section II of this Agreement, but neither admits nor denies Enforcement's and NERC's findings and conclusion that it violated the Reliability Standards specified in Section IV. For purposes of settling any and all civil and administrative disputes within the jurisdiction of the Commission arising from the reliability issues related to the September 8 event,

Enforcement's and NERC's investigation, and the violation of COM-002-2 R2 CAISO self-reported to WECC in connection with the event, CAISO agrees to the remedies set forth in the following paragraphs.

A. Civil Penalty

13. CAISO agrees to a total civil penalty of $6,000,000, of which $2,000,000 shall be paid, divided in equal amounts, to the United States Treasury and NERC, within ten days of the Effective Date. Enforcement and NERC agree to give CAISO a partial civil penalty offset for the remaining $4,000,000 in exchange for CAISO agreeing to implement the Reliability Enhancements as set forth in section V.B. The value of the Reliability Enhancements is expected to substantially exceed the amount of the offset.

B. Reliability Enhancements

14. In exchange for the $4,000,000 offset, CAISO has completed or shall complete the following Reliability Enhancements

a. Enhance the full network model for its day-ahead application, including a fully looped representation of the entire Western Interconnection. Upon completion of the full network model enhancement, CAISO shall provide Enforcement and NERC staff with the results of its day-ahead, current-day, and real-time analysis. The improved model shall:

   i. reduce compensating injections associated with loop flows,

   ii. enable expanded flow-based and contract-based congestion management and energy balancing WECC-wide both in day-ahead and real-time,

   iii. explicitly model high voltage direct current links, and

   iv. enable better outage and day-ahead analysis.

b. Enhance and expand its real-time contingency analysis (RTCA) to account for the external model changes so that operators are aware of the impact of any external contingencies to CAISO's transmission operations as well as the impact on external transmission systems of contingencies on CAISO's system, and expand the RTCA user interface to allow for better operator situational awareness with alarms, sorting, and historical capability.

c. Enhance its Energy Management System (EMS) and Supervisory Control and Data Acquisition systems by adding detailed network models for IID, NV Energy, APS/Yuma, Western Area Power Administration Lower Colorado and Sierra Nevada regions, Los Angeles Department of Water and Power, Sacramento Municipal Utility District, Modesto Irrigation District and Turlock Irrigation District.

d. Implement the Contingency Modeling Enhancement Project to ensure that the CAISO market procures the appropriate resources that have the correct characteristics to ensure the ability to recover from a contingency and be ready for the next N-1 contingency as soon as possible but no longer than 30 minutes.

e. CAISO commits to continue working with the RC and other TOPs on the RC's efforts to establish a mandatory periodic design review process for key Remedial Action Schemes (RASs) within the Pacific Southwest region and eventually for the entire Western Interconnection.

15. CAISO shall provide Enforcement and NERC with satisfactory evidence, as determined by Enforcement and NERC, of the completion of the Reliability Enhancements. CAISO has provided Enforcement and NERC with satisfactory evidence that its investments to date in the Reliability Enhancements have exceeded $4,000,000.

C. Completed Mitigation

16. CAISO represents that it has already completed all of the mitigation measures for the Reliability Standard violations described in this Agreement and to improve overall reliability of the BPS. CAISO will provide evidence to Enforcement and NERC to prove its completion of the mitigation measures, so that Enforcement and NERC can verify its completion of mitigation. CAISO shall continue operating under the practices and procedures implemented as part of the mitigation, until such time as it implements improved practices and procedures in accordance with the Reliability Standards. Until Enforcement and NERC determine that CAISO has completed all mitigation and Reliability Enhancements set forth in Section V, any changes in the mitigation measures required in Section V.C. shall be approved by Enforcement and NERC staff, with such approval not to be unreasonably withheld.

i. Seasonal, Next-Day and Current-Day Planning

17. Before September 8, CAISO already included in its seasonal and next-day

studies all sub-100 kV facilities within its footprint that affect the BPS. Since the September 8 event, CAISO added the IID and APS/Yuma sub-100kV facilities to its seasonal and next-day studies, and CAISO's seasonal assessment has been expanded to cover multiple scenarios including scheduled generation maintenance and transmission outages during shoulder periods. In addition, transfer analyses with varying load, generation and transfer levels are now included in CAISO's seasonal assessments.

18. CAISO revised its Normal Operations Planning Process Operating Procedure to provide additional procedures for coordination in the next-day and current-day planning process, including the direction to upload its next-day analysis to the secure RC website. Before finalizing the next-day plan, the procedure requires the CAISO analysis to be evaluated against the RC's Next-Day Reliability Analysis, which includes contingencies in the areas of neighboring TOPs, and any inconsistencies must be resolved. In addition, the procedure contains specific provisions for coordinating outages with neighboring BAs and TOPs, as well as the RC. CAISO also began providing the RC with next-day generation and dispatch with unit-by-unit granularity.

19. CAISO agrees to continue to provide other BAs or TOPs, both internal and external to the CAISO footprint, with information needed for those entities' next-day and current-day studies and will exercise its best effort to provide that information timely enough for the information to be used in the other entities' next-day and current-day studies.

20. CAISO's seasonal assessment has been expanded to cover multiple scenarios including scheduled generation maintenance and transmission outages during shoulder periods and transfer analyses with varying load, generation and transfer levels.

21. CAISO participates in the Pacific Southwest Next-Day Study Group and the WECC Next-Day Study Task Force.

ii. Transmission Operation within SOLs and IROLs

22. Before the September 8 event, CAISO included in its computer models all sub-100 kV facilities within its TOP area that affect the BPS. Following the event, CAISO improved its computer models as stated above to include all IID and APS-Yuma facilities under 100 kV that affect the BPS in its next-day studies. CAISO also trained its operators to apply the RC methodology for identifying SOLs and IROLs and to take actions to restore operations to applicable limits within the required time.

23. In addition, after the event, CAISO provided technical support to create a

SWPL nomogram to establish reliable operating limits for the SWPL and then identified the installation of capacitor banks at the Bouse and Kofa substations as a more permanent solution.

iii. Situational Awareness

24. Shortly after the event, CAISO increased its RTCA frequency from approximately 15 minutes to approximately five minutes to increase its situational awareness, and developed an additional alarm alerting operators when the RTCA is unavailable in real time.

25. Before the event, CAISO had established practices and procedures to alert operating personnel to important deviations in operating conditions and to monitor flow on Path 44. After the event, CAISO added additional capability to monitor Path 44 in amperes. In addition, CAISO is now monitoring ampere readings on the other paths within its footprints that have intertie separation schemes.

26. In addition, CAISO updated its procedures to require notification of the RC and neighboring BAs and TOPs if CAISO loses use of its RTCA or any other real-time tools, and strengthened its policies for when system conditions are such that a contingency is imminent and there are no available resources to mitigate the flows to prevent cascading outages.

iv. Modeling

27. Before the event, CAISO's models included all non-radial sub-100 kV facilities within its TOP area. After the event, CAISO added to the models used for next-day, current-day and seasonal studies sub-100 kV facilities of IID and APS/Yuma, as noted above.

v. Long-Term Planning

28. Before the event, CAISO ensured that planning studies and assessments met all Table 1 Category B and Category C or more severe contingencies (as required by the NERC Transmission Planning Reliability Standards), addressed all critical system conditions including transfers above firm, and considered the impact of elements both internal and external to CAISO's system as well as the interaction of protection systems and control devices. After the event, CAISO has continued to include or consider these requirements in the context of its annual transmission plan. CAISO will continue to work with the RE, the RC, neighboring entities, and sub-regional planning groups, as appropriate, to coordinate system planning studies and assessments, and to incorporate RASs into the Western Interconnection-wide model(s).

vi. Angular Separation

29. After the event, CAISO enhanced its EMS to include phase-angle differences as obtained from phasor measurement unit (PMU) data or calculated by the state estimator. This information provides greater visibility about real-time closing angles on the SWPL and other major transmission lines. CAISO has implemented a new tool as part of its RTCA which alarms when the pre- and post-contingency angles are greater than the relay's ability to close. If CAISO detects an actual or potential phase-angle difference, it consults with the RC to determine the appropriate mitigation.

vii. Protection Systems

30. To assist PTOs within the CAISO TOP area in the performance of their responsibilities to design protection systems, develop their settings, and develop transmission facility continuous and short-term emergency ratings, CAISO performed a comprehensive review of Special Protection Systems (SPSs), also referred to as RASs, as part of the reliability assessment in its 2012-2013 and 2013-2014 transmission planning process. The review of the existing SPSs considered the performance, operation and design of each in light of planned transmission developments, changes in transmission utilization, or changes in risk tolerance. CAISO provided recommendations for each SPS for maintaining reliability of the CAISO TOP area and coordination with adjacent interconnected systems, with recommendations to leave the SPS unmodified, remove it from service, modify its functionality, or replace it with a transmission capital solution.

31. The PTOs within the CAISO TOP area have now disabled the automatic intertie overload protection schemes for Path 26, Path 41, Path 44, and Path 61. CAISO provided them with the necessary technical assistance to support such actions. CAISO commits to continuing to provide technical assistance and support to the PTOs with respect to the review and potential disabling or modification of any remaining such schemes to the extent that the applicable owner seeks and obtains approval to disable them through the applicable WECC process, or chooses to modify them.

D. Compliance Monitoring

32. CAISO shall make semi-annual reports to Enforcement and NERC for twelve months or until all of the Reliability Enhancements, described above, have been implemented, whichever is later. The first semi-annual report shall cover the first six-month period after the Effective Date of this Agreement and shall be submitted to Enforcement and NERC staff within thirty days later. The subsequent report(s) shall be due in six month increments thereafter. Each report shall detail the following: (1) actions taken as of the date of the report to satisfy

the terms of the Agreement, including all Reliability Enhancements; (2) actions taken to improve reliability compliance, including investments in new measures and training activities during the reporting period; and (3) any additional violations of Reliability Standards that have occurred and whether and how CAISO has addressed those new violations. The reports must include an affidavit executed by an officer of CAISO that the compliance reports are true and accurate and also include corroborative documentation or other satisfactory evidence demonstrating or otherwise supporting the content of these reports. Enforcement and NERC may require additional semi-annual reporting if circumstances indicate the need for further monitoring.

VI. TERMS

33. The "Effective Date" of the Agreement shall be the date on which the Commission issues an order approving the Agreement without material modification. When effective, the Agreement shall resolve all reliability matters relating to the September 8 event within the jurisdiction of the Commission and/or NERC, and that arose on or before the Effective Date, as to CAISO or any affiliated entity.

34. Commission approval of the Agreement without material modification shall release CAISO and forever bar the Commission and NERC from holding CAISO, any affiliated entity, and any successor in interest to CAISO liable for any and all administrative or civil claims arising out of the reliability issues related to the September 8 event or conduct addressed and stipulated to in this Agreement that occurred on or before the Agreement's Effective Date. This release and bar includes the COM-002-2, R.2 self- report identified in paragraph 11.

35. Failure to make timely civil penalty payments or to comply with the Reliability Enhancements and monitoring agreed to herein, or any other provision of the Agreement, shall be deemed a violation of a final order of the Commission issued pursuant to the Federal Power Act (FPA), 16 U.S.C. §792, *et seq.*, and may subject CAISO to additional action under the enforcement provisions of the FPA.

36. If CAISO does not make the civil penalty payment described above at the time agreed by the parties, interest payable to the United States Treasury and NERC shall begin to accrue pursuant to the Commission's regulations at 18 C.F.R. § 35.19(a)(2)(iii) (2014) from the date that payment is due, in addition to the penalty specified above and any other enforcement action and penalty that the Commission or NERC may take or impose.

37. The Agreement binds CAISO and its agents, successors, and assignees. The Agreement does not create any additional or independent obligations on

CAISO, or any affiliated entity, its agents, officers, directors, or employees, other than the obligations identified in the Agreement.

38. The signatories to the Agreement agree that they enter into the Agreement voluntarily and that, other than the recitations set forth herein, no tender, offer or promise of any kind by any member, employee, officer, director, agent or representative of Enforcement, NERC, or CAISO has been made to induce the signatories or any other party to enter into the Agreement.

39. Unless the Commission issues an order approving the Agreement in its entirety and without material modification, the Agreement shall be null and void and of no effect whatsoever, and Enforcement, NERC, and CAISO shall not be bound by any provision or term of the Agreement, unless otherwise agreed to in writing by Enforcement, NERC, and CAISO.

40. CAISO agrees that the Commission's order approving the Agreement without material modification shall be a final and unappealable order assessing a civil penalty under the Federal Power Act. CAISO waives findings of fact and conclusions of law, rehearing of any Commission order approving the Agreement without material modification, and judicial review by any court of any Commission order approving the Agreement without material modification.

41. The Agreement can be modified only if in writing and signed by Enforcement, NERC, and CAISO, and any modifications will not be effective unless approved by the Commission.

42. Each of the undersigned warrants that he or she is an authorized representative of the entity designated, is authorized to bind such entity and accepts the Agreement on the entity's behalf.

43. The undersigned representative of CAISO affirms that he or she has read the Agreement, that all of the matters set forth in the Agreement are true and correct to the best of his or her knowledge, information and belief, and that he or she understands that the Agreement is entered into by Enforcement and NERC in express reliance on those representations.

44. The Agreement may be signed in counterparts.

45. The Agreement is executed in triplicate, each of which so executed shall be deemed to be an original.

Agreed to and accepted:

Larry D. Gasteiger
Acting Director, Office of Enforcement
Federal Energy Regulatory Commission

Date: November 18, 2014

Charles A. Berardesco
Senior Vice President, General Counsel and Corporate Secretary
North American Electric Reliability Corporation

Date: 11/18/14

Stephen Berberich
President and Chief Executive Officer
The California ISO

Date: 11/13/2014

Document Content(s)