

149 FERC ¶ 61,157  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

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

Western Area Power Administration –  
Desert Southwest Region

Docket No. IN14-9-000

ORDER APPROVING STIPULATION AND CONSENT AGREEMENT

(Issued November 24, 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 Western Area Power Administration – Desert Southwest Region (Western-DSW). This order is in the public interest because it resolves on fair and reasonable terms an investigation of Western-DSW, conducted by Enforcement in coordination with NERC and the Commission’s Office of Electric Reliability (OER), into possible violations of Reliability Standards associated with Western-DSW’s operation of a portion of the Bulk Power System (BPS) and a blackout that occurred on September 8, 2011. Western-DSW 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. The Western Area Power Administration (WAPA) is one of four power marketing administrations within the United States Department of Energy. It markets and transmits electricity to a fifteen-state region from various hydroelectric power facilities. Western-DSW is one of four regions carrying out this mission for WAPA, serving customers in Arizona, Southern California, and Southern Nevada. It is registered with NERC as a Balancing Authority, Load Serving Entity, Planning Authority, Transmission Owner, Transmission Operator, Transmission Planner, and Transmission Service Provider for its footprint. Western-DSW sells more than ten billion kilowatt hours of hydroelectric power to approximately seventy municipalities, cooperatives, federal and state agencies, and irrigation districts. Most of this power comes from plants operated at the Hoover, Parker, and Davis dams. In order to transmit this power, Western-DSW operates and maintains more than forty substations and 3,100 miles of transmission lines. Western-

DSW is subject to the Commission's regulation under section 215 of the Federal Power Act (FPA).<sup>1</sup>

3. On March 16, 2007, in Order No. 693,<sup>2</sup> 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 Western-DSW 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 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-DSW's facilities, onto Western Electricity Coordinating Council (WECC)<sup>3</sup> Path 44, an aggregation of five 230 kV transmission lines that deliver power in a north-south direction from Southern California Edison's (SCE) territory in Los Angeles to San Diego. 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.

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<sup>1</sup> 16 U.S.C. § 824o (2012).

<sup>2</sup> *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).

<sup>3</sup> 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 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. The California Independent System Operator (CAISO) is responsible for many of the Transmission Operator functions for SCE under a Coordinated Functional Registration. Initiation of this intertie separation scheme separated San Diego Gas & Electric (SDG&E) from Path 44, contributed to tripping the 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. Following the loss of H-NG, Western-DSW experienced significant voltage depression on its 161 kV system. Western-DSW operated to a voltage system operating limit (SOL) of 0.9 p.u. and, less than a minute after the loss of H-NG, its voltage had dropped to 0.882 p.u. per unit at Blythe and Knob, 0.888 p.u. per unit at Kofa, and 0.894 p.u. at Gila and Gold Mine Tap. During the event, Western-DSW eventually needed another entity to shed load in order to mitigate against its declining voltage.<sup>4</sup> As a result of the voltage depression and overloads on its system, Western-DSW lost 74 MW of firm load during the event.

8. Enforcement and NERC determined that Western-DSW's failure to prevent SOL violations stemmed in part from its failure to maintain sufficient situational awareness prior to and during the event. Prior to the event, and continuing during the event, Western-DSW's State Estimator stopped solving.<sup>5</sup> As a result, Western-DSW failed to sufficiently identify, study, and mitigate post-contingency SOL violations affecting its system, and it did not notify the RC that it would need assistance identifying issues on its system.

## **II. Investigation**

9. 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,

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<sup>4</sup> At Western-DSW's request, between 15:36:48 and 15:36:52, SCE directed Metropolitan Water District operators to drop 80 MW of pumping load attached to the Gene substation to improve 230 kV voltage support in an attempt to arrest declining voltages.

<sup>5</sup> State Estimator is a monitoring tool that gathers measurements from throughout an electric system and calculates real-time values, such as system voltages. These values can then be utilized by contingency analysis tools, including Real-Time Contingency Analysis (RTCA), to identify potential system disturbances and institute appropriate mitigating measures.

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.<sup>6</sup> 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.

10. 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 Western-DSW, under Part 1b of the Commission's regulations, 18 C.F.R. Part 1b (2014), which were conducted jointly with NERC.

11. Enforcement and NERC determined that Western-DSW violated the Transmission Operations (TOP-) and Voltage and Reactive Control (VAR-) 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 VAR standards aim to maintain BPS facilities within voltage and reactive power limits to protect equipment and ensure reliable operation of the Interconnection.

12. Enforcement and NERC determined that Western-DSW violated four Requirements of three Reliability Standards—TOP-004-2 R1, TOP-004-2 R2, TOP-008-1 R2, and VAR-001-1 R9—stemming from its role in the September 8 event.

13. Enforcement and NERC determined that Western-DSW did not operate its 161 kV system within the established voltage SOLs following the single contingency loss of H-NG, in violation of TOP-004-2 R1. Enforcement and NERC also determined that Western-DSW did not operate its system to prevent severe low voltage conditions and resulting loss of load following the loss of H-NG, in violation of TOP-004-2 R2. In addition, Enforcement and NERC determined that Western-DSW did not operate to prevent SOL violations on its 161 kV system following the loss of H-NG, in violation of TOP-008-1 R2.

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<sup>6</sup> *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>.

14. Enforcement and NERC determined that Western-DSW did not maintain sufficient reactive resources to support its voltage under first contingency conditions, i.e., following the single contingency loss of H-NG, in violation of VAR-001-1 R9.

### **III. Stipulation and Consent Agreement**

15. Enforcement, NERC, and Western-DSW resolved this matter by means of the attached Agreement. Western-DSW stipulates to the facts recited in the Agreement and agrees to mitigation measures, and to submit to compliance monitoring, as specified in the Agreement. Western-DSW neither admits nor denies that its actions constituted violations of the Reliability Standards.

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

### **IV. Determination of the Appropriate Sanctions**

17. The Commission concludes that the 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 mitigation measures set forth in the Agreement will enhance the reliability of the BPS and are therefore also fair and in the public interest.

#### **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 )

Kimberly D. Bose,  
Secretary.

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Western Area Power Administration       )  
– Desert Southwest Region

Docket No. IN14-9-000

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 Western Area Power Administration – Desert Southwest Region (Western-DSW) 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 Western-DSW related to a system event in the Pacific Southwest on September 8, 2011 (September 8 event or event). Western-DSW neither admits nor denies that it violated the Reliability Standards described in the Agreement, but agrees to mitigation and compliance measures, subject to compliance monitoring, as detailed in the Agreement.

**II. STIPULATED FACTS**

2. Enforcement, NERC, and Western-DSW hereby stipulate and agree to the following facts.

**A. Western-DSW**

3. The Western Area Power Administration (WAPA) is one of four power marketing administrations within the United States Department of Energy. It markets and transmits electricity to a fifteen-state region from various hydroelectric power facilities. Western-DSW is one of four regions carrying out this mission for WAPA, serving customers in Arizona, Southern California, and Southern Nevada. It is registered with NERC as a Balancing Authority, Load Serving Entity, Planning Authority, Transmission Owner, Transmission Operator, Transmission Planner, and Transmission Service Provider for its footprint. Western-DSW sells more than ten billion kilowatt hours of hydroelectric power to approximately seventy municipalities, cooperatives, federal and state agencies, and irrigation districts. Most of this power comes from plants operated at the Hoover, Parker, and Davis dams. In order to transmit this power, Western-DSW

operates and maintains more than forty substations and 3,100 miles of transmission lines.

## **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-DSW's territories, onto Western Electricity Coordinating Council's (WECC)<sup>1</sup> Path 44, an aggregation of five 230 kV transmission lines that deliver power in a north-south direction from Southern California Edison's (SCE) territory in Los Angeles to San Diego Gas & Electric (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 had a cascading effect, as transmission and generation equipment tripped offline in a relatively

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<sup>1</sup> 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.

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 Nuclear Generating Station (SONGS). The California Independent System Operator (CAISO) is responsible for many of the Transmission Operator functions for SCE under a Coordinated Functional Registration.<sup>2</sup> Initiation of the intertie separation scheme at SONGS 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. Western-DSW's role in the event centered on its location between two parallel high voltage paths—the SWPL and Path 44—into the San Diego area. Western-DSW and IID (also located between the two parallel paths) were forced to carry 23 percent of the redistributed power flow that had initially been carried by H-NG. Carrying this extra power flow led to voltage deviations and overloads on Western-DSW's system. Following the loss of H-NG, Western-DSW experienced significant voltage depression on its 161 kV system. Western-DSW operated to a voltage system operating limit (SOL) of 0.9 p.u. and, less than a minute after the loss of H-NG, its voltage had dropped to 0.882 p.u. per unit at Blythe and Knob, 0.888 p.u. per unit at Kofa, and 0.894 p.u. at Gila and Gold Mine Tap. During the event, Western-DSW eventually needed another entity to shed load in order to mitigate against its declining voltage.<sup>3</sup> As a result of the voltage depression and overloads on its system, Western-DSW lost 74 MW of firm load during the event.

### 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,

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<sup>2</sup> JRO00009 was originally entered into on September 11, 2008 and most recently updated on May 24, 2012. JRO00009 delineates compliance responsibility for the Standards and Requirements associated with the TOP function between CAISO and SCE.

<sup>3</sup> At Western-DSW's request, between 15:36:48 and 15:36:52, SCE directed Metropolitan Water District operators to drop 80 MW of pumping load attached to the Gene substation to improve 230 kV voltage support in an attempt to arrest declining voltages.

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 Bulk-Power System (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.<sup>4</sup> 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 initiated non-public investigations of several entities, including Western-DSW, under Part 1b of the Commission's regulations, 18 C.F.R. Part 1b (2014), which were conducted jointly with NERC. Enforcement and NERC determined that Western-DSW violated four Requirements of three Reliability Standards and found that these violations undermined the reliability of the BPS. Enforcement and NERC recognized, however, that after the event, and during the inquiry and investigation, Western-DSW voluntarily began making improvements in its planning and operations procedures, and implementing recommendations from the Report, that addressed many of the findings arising from the Report. In addition, Western-DSW fully cooperated with Enforcement and NERC during the investigation.

10. As part of the investigation, Enforcement and NERC reviewed Western-DSW's compliance program and found that Western-DSW satisfies the criteria for an effective compliance program under the Commission's Penalty Guidelines.<sup>5</sup> Enforcement and NERC considered the elements of Western-DSW's compliance program set forth in this paragraph: Western-DSW's compliance staff includes Reliability Standard Owners (RSOs), who are responsible for compliance with

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<sup>4</sup> *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>.

<sup>5</sup> *Enforcement of Statutes, Orders, Rules and Regulations*, 132 FERC ¶ 61,216, § 1B2.1 (2010).

particular standards. The RSOs have the most expertise and the greatest scope of work to meet the requirements and demonstrate compliance with each standard. Their responsibilities for meeting compliance are clearly defined and documented. Western-DSW provides annual compliance training to all maintenance, planning, operations, security, and power marketing employees. Western-DSW has several mechanisms for monitoring compliance, including annual internal assessments, as well as external assessments conducted every three years by representatives from all WAPA regions and peer utilities. Western-DSW also has effective tools for responding to and reporting potential compliance violations. Western-DSW employees have various methods of reporting potential compliance violations, including through an area on the company's Reliability Compliance webpage. Employees can report potential abuses anonymously and they receive training on the various reporting options. Supervisors are instructed to immediately forward any compliance reports or issues to the Regional Compliance Manager for assessment.

#### **IV. VIOLATIONS**

11. Enforcement and NERC determined that Western-DSW violated four Requirements of three Reliability Standards—TOP-004-2 R1, TOP-004-2 R2, TOP-008-1 R2, and VAR-001-1 R9—stemming from its role in the September 8 event.

##### **A. Violations Related to Transmission Operations**

12. Three of Western-DSW's violations relate to Enforcement and NERC's determination that Western-DSW failed to operate its portion of the transmission system within SOLs following the loss of H-NG. Enforcement and NERC determined that Western-DSW violated TOP-004-2 R1 because it did not operate its 161 kV system within the established voltage SOLs following the single contingency loss of H-NG. Enforcement and NERC found that the voltage in Western-DSW's Blythe, Kofa, Knob, Gila, and Gold Mine Tap areas dropped below established voltage SOLs after the loss of H-NG. Enforcement and NERC also determined that Western-DSW violated TOP-004-2 R2 because, following the loss of H-NG, it did not operate its system to prevent severe low voltage conditions and resulting loss of load. In addition, Enforcement and NERC determined that Western-DSW violated TOP-008-1 R2 because it did not operate to prevent SOL violations on its 161 kV system following the loss of H-NG.

13. Enforcement and NERC determined that Western-DSW's failure to prevent SOL violations stemmed in part from its failure to maintain sufficient situational awareness prior to and during the event. Prior to the event, and continuing during the event, Western-DSW's State Estimator stopped solving. As a result, Western-DSW failed to sufficiently identify, study, and mitigate post-contingency SOL

violations affecting its system, and it did not notify the RC that it would need assistance identifying issues on its system.

### **B. Violations Related to Voltage and Reactive Control**

14. Enforcement and NERC determined that Western-DSW violated VAR-001-1 R9 because it did not maintain sufficient reactive resources to support its voltage under first contingency conditions, i.e., following the single contingency loss of H-NG.

## **V. REMEDIES AND SANCTIONS**

15. Western-DSW stipulates to the facts as described in Section II of the Agreement, but neither admits nor denies Enforcement and NERC's findings that its conduct 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 and Enforcement and NERC's investigation, Western-DSW agrees to the remedies set forth in the following paragraphs.

### **A. Completed Mitigation**

16. Western-DSW represents that it has already completed all of the mitigation measures for the Reliability Standard violations described in the Agreement and to improve overall reliability of the BPS. Subject to validation by Enforcement and NERC, Western-DSW has already implemented mitigation measures prior to entering into the Agreement, but shall continue operating under the practices and procedures implemented as part of the mitigation, until such time as it implements improved practices and procedures, as determined by Enforcement and NERC and in accordance with the Reliability Standards that are mandatory and enforceable at that time. Western-DSW will also report on the status of all mitigation items described in this Section and submit evidence that it has completed the mitigation measures described in the Agreement as part of its compliance monitoring reports to be submitted to Enforcement and NERC pursuant to Section V.B of the Agreement.

#### **i. Transmission Operation Within SOLs and IROLs**

17. During the first quarter of 2013, Western-DSW revised its practices for setting SOLs and IROLs to ensure it uses valid limits. Under these new practices, Western-DSW performs seasonal, next-day, and RTCA studies under various system conditions to ensure the validity of SOLs and IROLs, and it corroborates the study results with studies of neighboring Transmission Operators as well as the RC.

18. Following the September 8 event, Western-DSW began conducting its own studies and analyses to ensure the validity of SOLs on critical external transmission lines and Paths, including H-NG, and collaborating with neighbors and the RC on areas of concern. Western-DSW also improved its models to be more consistent with results obtained by the RC, CAISO, APS, and other neighboring entities.

19. During the first quarter of 2013, Western-DSW further improved the content of its models by adding critical external facilities and facilities operated below 100 kV that can impact its transmission area SOLs and IROLs. These improvements will help ensure that its SOLs and IROLs more accurately reflect next-day and real-time system conditions and topology.

20. In addition to measures aimed at improving the validity of its own SOL and IROL calculations, since the September 8 event Western-DSW has improved its practices and processes related to coordination of SOLs and IROLs with neighboring entities. Specifically, Western-DSW's real-time system operators participate in daily coordination meetings conducted by the RC for the Desert Southwest footprint to improve awareness of abnormal system operating conditions and Path constraints, which can affect its SOLs and IROLs. Western-DSW has also started meeting with the other Desert Southwest entities every two weeks to discuss outages and potential contingencies affecting SOLs and IROLs, as well as mitigation plans for the outages and contingencies.<sup>6</sup>

21. Since the September 8 event, Western-DSW has also implemented several steps to better prepare its operators for unstudied system conditions that can lead to SOL and IROL violations. Western-DSW has created alarms, which alert its system operators in real-time when a non-converged solution has occurred. In June 2013, Western-DSW revised its Real-Time Study Procedure to provide guidance to operators on determining and responding to unstudied system conditions. This Real-Time Study Procedure describes how the operators should respond to such occurrences. In addition, in April 2014 Western-DSW developed and implemented a new training program to prepare its real-time system operators to effectively respond to unstudied conditions.

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<sup>6</sup> The other Desert Southwest entities include APS, El Paso Electric Company, Gila River Indian Community Utility Authority, NV Energy, Public Service Company of New Mexico, Salt River Project, and Tucson Electric Power Company.

22. In April 2013, Western-DSW revised its procedure used to mitigate SOL and IROL violations. It also coordinated this procedure with the RC and other Transmission Operators and worked with these entities to revise their mitigation procedures.

**ii. Voltage and Reactive Control**

23. Following the September 8 event, Western-DSW conducted an analysis to determine whether it needed additional reactive support for its 161 kV system. It determined, for instance, that it needed a certain amount of shunt capacitance to support voltage on its 161 kV system for the loss of the SWPL. In April 2013, the owners of the SWPL installed 45 MVAR of shunt capacitance at Kofa, which went into service in June 2013. The SWPL owners also constructed an additional 45 MVAR of shunt capacitance at Bouse, which went into service in October of 2013.

24. In the first quarter of 2013, Western-DSW added two operations support engineers to its Operations Support Group (OSG). These engineers are responsible for near-term planning and operations processes related to voltage support. They provide real-time engineering support for operations, current and next-day studies for reliability, seasonal studies for heavy winter and heavy summer cases, and outage coordination study support. OSG, together with neighboring entities, the RC, and Western-DSW's Long Range Planning Group assesses Western-DSW's processes related to monitoring, controlling, and maintaining voltage flows. OSG performs seasonal studies on a biannual basis and holds outage coordination meetings twice a month to discuss upcoming outages and study work required by Western-DSW and/or neighboring utilities. Seasonal study cases are coordinated through the Southwest Area Study Group (SASG) that includes the other Desert Southwest entities noted above. Planned outages that last through the majority of the season are modeled in the seasonal study cases. In the case of unscheduled outages, Western-DSW communicates with the RC and any impacted entities via phone call and/or e-mail. Unscheduled outages typically occur in the real-time system operating condition; therefore, outages are captured in the current-day and next-day study cases in Transmission Security Management (TSM) program study results.

25. During the first quarter of 2013, Western-DSW improved its monitoring of internal and external real-time voltage and MVAR flows that could impact its system. Western-DSW had monitored the voltage and MVAR flows since before the September 8 event, but its monitoring of external data points has improved significantly with the exchange of data that has occurred between neighboring entities since the event.

26. In March 2013, Western-DSW revised its mitigation procedure to ensure it has adequate mitigating actions to prevent voltage collapse. Also, since the September 8 event, and continuing on an on-going basis, Western-DSW has been creating mitigation procedures or guides for its system operators to respond to contingencies that could impact its transmission system voltage. Western-DSW identifies the contingencies through its TSM program study results. Western-DSW documents the study results and mitigation plans in its Next-Day Study Procedure.

27. Since the September 8 event, Western-DSW has reviewed and revised its plans for load shedding and voltage support to ensure their adequacy. It modified its plan for voltage support based on the newly installed shunt capacitor banks at Kofa and Bouse. Western-DSW arranged these new shunt capacitor banks to be controlled automatically to ensure that voltage support is not delayed by manual insertion.

28. In addition to improving its ability to monitor and control voltage on its system, Western-DSW has also improved its efforts to coordinate voltage issues with its neighbors. Since the September 8 event, Western-DSW has documented in its Next-Day Study Procedure the steps for sharing and coordinating operational information with its neighbors. Western-DSW exchanges and coordinates its next-day study results with neighboring Transmission Operators and the RC on a daily basis. It resolves any contingencies with the impacted entities and the RC. Western-DSW also directly provides its next-day study results to Western-DSW's real-time transmission operator.

29. Western-DSW continues to ensure its system operators are trained on manual load shedding procedures during emergency restoration training courses, which occur on an annual basis. In addition, in April 2014 Western-DSW hired new training staff that developed and implemented a new training program to enhance its real-time system operators' knowledge in the use of TSM.

### **iii. Long-Term Planning**

30. In October 2012, Western-DSW included a post-transient voltage analysis in its annual long-term studies that increased loads to stress transfers to address expected system transfers above firm. In addition, since the end of 2013, Western-DSW now includes in its long-term studies additional sensitivities by varying generation and load to stress system transfers.

31. To ensure it considers expected internal and external generation dispatch in its long-term planning studies, following the September 8 event, Western-DSW began analyzing stressed generation dispatch scenarios by implementing a

contingency list to simulate combinations of various generator outages in Arizona and neighboring areas, including portions of New Mexico, California, and Nevada.

32. Western-DSW has also made improvements in its long-term planning process to ensure that it considers internal and external facilities operated below 100 kV. For example, in November 2012, Western-DSW began using cases developed by the Southwest Area Transmission Planning Group to monitor for potential performance issues on neighboring 69 kV systems. In addition, at the end of 2013 Western-DSW completed a process whereby it now monitors contingencies involving facilities operated at 69 kV and above in APS's, IID's, and SCE's territories that have an impact on Western-DSW's system. Also, in January 2014, Western-DSW began utilizing WECC's new base case coordination system to develop cases that include 69 kV facilities.

33. In December 2011, Western-DSW improved its contingency files of Western-DSW's various Special Protection Systems (SPS) and Remedial Action Schemes (RAS) for its annual long-term planning studies to determine the impact of active control devices that affect the BPS. Also, it will continue to work with the RC and/or RE, as needed, to ensure that SPSs and RASs are modeled into base cases.

34. In September 2013, after the RC completed phase 2 of its SOL methodology revision, Western-DSW reviewed and revised its SOL methodology for the planning horizon, and shared revisions to its methodology with neighboring Transmission Planners, Planning Authorities, Transmission Operators, and the RC.

35. Since February 2014, Western-DSW has worked with WECC staff to benchmark the September 8 event and future load shedding events. This activity takes place through participation in model validation activity under WECC's guidance.

#### **iv. Situational Awareness**

36. Following the September 8 event, Western-DSW implemented various mitigating measures to strengthen its situational awareness, for example, by expanding the list of critical facilities it monitors and improving its monitoring and alarming tools. Initially, Western-DSW undertook efforts to identify internal and external elements, including facilities operated below 100 kV that impact its portion of the BPS, and included such elements in its models. As part of these efforts, Western-DSW used an engineering software product called Modelex to identify external elements impacting its transmission area. After identifying the elements that impact its system, Western-DSW incorporated these elements into its models and now monitors them in its seasonal, next-day, and real-time studies.

Western-DSW has also received and continues to receive Inter-Control Center Communications Protocol (ICCP) data from neighbors to further improve its transmission models with real-time, verified data on facilities that impact its system.

37. Western-DSW has improved its monitoring tools since the September 8 event so that it can more effectively observe and assess critical elements that impact its system. While prior to the event Western-DSW used its RTCA program only for day-ahead planning, it has made improvements to the tool so that it now uses it for real-time monitoring as well. Western-DSW runs its RTCA once every five minutes and saves a case each hour. It displays the RTCA results on a screen so system operators can monitor and assess approaching SOL and IROL violations.

38. Western-DSW has also installed an alarm function on its RTCA, alerting operators to SOL violations and the need for corrective actions. This alarming system includes an initial alarm, signaling that Western-DSW is approaching a normal rating, and a second alarm, alerting operators to a breach of an emergency rating.

39. Western-DSW's improved RTCA includes actual voltage data, including MVAR flows, and Western-DSW's system operators monitor this data in real time. Western-DSW's operators also monitor SCADA displays to ensure adequate real-time reactive reserves are available throughout the Western-DSW system, as well as adequate capacity and energy resources.

40. Western-DSW has verified that metering and metering instrumentation are properly designed to function under normal and emergency conditions. Western-DSW also performs metering maintenance and calibration on a scheduled basis, and support personnel are available to respond to loss of metering on Western-DSW's equipment.

41. Following the September 8 event, Western-DSW also expanded the displays on its SCADA and TSM to include electrical status of sub-100 kV equipment on its system. These displays improve Western-DSW's operators' ability to determine the causes of SOL and IROL violations.

42. Following the September 8 event, Western-DSW has improved its operators' awareness of important deviations, failures, or degradation of critical facilities. Western-DSW's operators now receive real-time status updates every two seconds showing changes in loading and voltage. The status updates are also reflected in Western-DSW's RTCA study results.

43. Since the September 8 event, Western-DSW has improved its training program to ensure its operators can effectively use its array of monitoring tools, including TSM and RTCA. Since the event, Western-DSW's system operators have attended a class on TSM and RTCA operation, and Western-DSW is working to develop a second class to enhance the system operators' TSM software application skills. Western-DSW completed the TSM software application skills training module in December 2013 and all operators satisfactorily completed the training in April, 2014.

44. Western-DSW also made improvements to its procedures for responding to the impairment of its monitoring capabilities. These procedures maintain plans for the loss of SCADA, TSM, and the loss of communication. They also cover plans for communicating with the RC and neighboring entities in case Western-DSW loses situational awareness. Western-DSW also revised its procedures governing the exchange of information regarding the loss or change in service status of critical facilities with the RC and other impacted entities. Western-DSW completed operator training on all of these new processes in April, 2014.

#### **v. Modeling**

45. Since the September 8 event, Western-DSW has improved its models by coordinating configuration changes with regional study groups to ensure its models have been updated to include: (1) elements that affect BPS reliability, including internal and external elements, and elements operated below 100 kV<sup>7</sup>; and (2) SPSs, RASs, and other automated control devices that impact Western-DSW's system. Western-DSW has started to review its models at least on a seasonal basis to reflect topology changes. Western-DSW has also adopted a procedure requiring a minimum of a seasonal review of all of its operational models. Western-DSW documented procedures to ensure both timely acquisition of data from neighboring entities and sufficient access to data from its system for neighboring entities.

#### **vi. Angular Separation**

46. Following the September 8 event, Western-DSW started using next-day and current-day studies to predict system performance following the loss of a

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<sup>7</sup> Western-DSW models and monitors the sub-100 kV Western-DSW buses and external sub-100 kV buses that impact its system in its next-day, RTCA, and seasonal study cases. In addition, Western-DSW has started to model all 69 kV buses in the Yuma and Yucca areas as well as some 92 kV buses in IID's territory.

transmission line specifically to ensure that angular separation is not a system reliability issue following the loss of the line.

47. Western-DSW has also added an alarm to its SCADA system to notify system operators when a breaker cannot be reclosed due to angular separation following the loss of a transmission line.

48. At the end of 2013, Western-DSW reviewed its SOL methodology for the operations planning horizon in accordance with phase 2 of the RC's SOL methodology to determine whether it is necessary to consider angular separation as a limiting factor to be included in its SOL or IROL methodology. The review concluded that Western-DSW should continue to perform system analyses based on the RC's Reliability SOL Methodology for the Operations Horizon. Western-DSW performs seasonal studies for the peak load condition for the summer and winter seasons. In the seasonal studies, an N-1 contingency is taken to screen for potential thermal and voltage violations within the Western-DSW and neighboring transmission systems. Western-DSW also performs Transient Stability analysis on selected N-1 contingencies based on engineering experience and judgment, to screen for potential frequency, voltage, and rotor angle violations within the Western-DSW and neighboring transmission systems. In the real-time operation, Western-DSW Operators have the ability to determine the angular difference prior to reclosing interconnected systems. Western-DSW's SCADA currently indicates excessive phase angles in real-time on all major BES lines across open breakers within the Western-DSW and neighboring transmission systems, and its RTCA calculates and alarms for excessive phase angles for N-1 conditions every five minutes across open major BES breakers within the Western-DSW and neighboring transmission systems.

## **B. Compliance Monitoring**

49. Western-DSW shall make at least two semi-annual reports to Enforcement and NERC staff. The first semi-annual report shall cover the first six month period after the Effective Date of the Agreement and shall be submitted to Enforcement and NERC staff thirty days later. The subsequent report(s) shall be due in six month increments thereafter. Each report shall detail the following: (1) evidence that Western-DSW has completed the mitigation measures described in the Agreement; (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 Western-DSW has addressed those new violations. The reports must include an affidavit executed by an officer of Western-DSW 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 staff may require additional semi-annual reporting if circumstances indicate the need for further monitoring or if Western-DSW has not yet completed all the mitigation measures described in this Section.

## **VI. TERMS**

50. 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 that arose on or before the Effective Date, as to Western-DSW or any affiliated entity.

51. Commission approval of the Agreement without material modification shall release Western-DSW and forever bar the Commission and NERC from holding Western-DSW, any affiliated entity, and any successor in interest to Western-DSW liable for any and all administrative or civil claims arising out of the reliability issues related to the September 8 event or the conduct addressed and stipulated to in the Agreement that occurred on or before the Agreement’s Effective Date.

52. Failure to comply with the mitigation 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 Western-DSW to additional action under the enforcement provisions of the FPA.

53. The Agreement binds Western-DSW and its agents, successors, and assignees. The Agreement does not create any additional or independent obligations on Western-DSW, or any affiliated entity, its agents, officers, directors, or employees, other than the obligations identified in the Agreement.

54. 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 Western-DSW has been made to induce the signatories or any other party to enter into the Agreement.

55. 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 Western-DSW shall not be bound by any provision or term of the Agreement, unless otherwise agreed to in writing by Enforcement, NERC, and Western-DSW.

56. Western-DSW agrees that the Commission's order approving the Agreement without material modification shall be a final and unappealable order. Western-DSW waives findings of fact and conclusions of law in this proceeding, 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.

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

58. 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.

59. The undersigned representative of Western-DSW 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.

60. The Agreement may be signed in counterparts.

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

Agreed to and accepted:



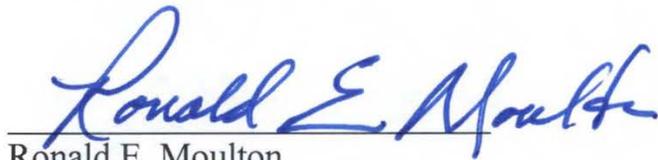
Larry D. Gasteiger  
Acting Director, Office of Enforcement  
Federal Energy Regulatory Commission

Date: November 3, 2014



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

Date: 10/30/2014



Ronald E. Moulton  
Senior Vice President & Desert Southwest Regional Manager  
Western Area Power Administration

Date: 10/27/2014