Federal Energy Regulatory Commission

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

STATEMENT

May 1, 2012
Contacts: Mary O'Driscoll, FERC (202) 502-8680
Kimberly Mielcarek, NERC (202) 383-2622

Arizona-Southern California Outages on September 8, 2011
Prepared Remarks of Heather Polzin, FERC Lead

On behalf of the Inquiry team, I am pleased to announce the issuance today of a report by a joint FERC-NERC Inquiry team on the power outages that affected San Diego, the Imperial Irrigation District, Yuma, Arizona, and Baja California, Mexico, on September 8, 2011. This report describes what happened and explains why approximately 2.7 million electric customers lost service that day. The report also includes 27 recommendations to help industry operators prevent similar outages in the future.

The Inquiry team was composed of members from NERC (my fellow lead Dave Nevius is here with us) and three Commission offices. The team began work the day after the outages, and issued detailed data requests, made site visits, interviewed witnesses, compiled a precise sequence of events, constructed and validated a detailed modeling case, and ran multiple power flow and dynamic stability analyses using the modeling case. The team reviewed over 20 gigabytes of data to support the detailed findings and recommendations in the report.

We've all heard that the outage began with a single 500 kV line, the Hassayampa to North Gila, tripping during maintenance work. That's true. But the bulk electric system is required to be operated so that the loss of a single line, or the occurrence of any other single contingency, such as loss of a generator or a transformer, does not result in instability, uncontrolled separation or cascading. This is known as the "N-1" criterion. What happened on September 8 was that the system was not being operated in that manner. A single contingency occurred (the loss of Hassayampa – North Gila) and it resulted in instability, uncontrolled separation and cascading.

System operators use "system operating limits" or "SOLs" to operate the system within the N-1 criterion. If SOLs are set correctly, operating within the SOLs will satisfy the N-1 criterion. But on September 8, system operators were operating well within important SOLs like those for the Hassayampa-North Gila and for Path 44, which is 5 230 kV lines south of the SONGS nuclear plant. Path 44 is important because a protection system that measured the amperage on Path 44 (the SONGS separation scheme) activated and cut San Diego off from all 5 of those lines, leading to the blackout seconds later. Interconnection reliability limits (IROLs)are SOLs that, if violated, could expose a widespread area of the system to instability, uncontrolled separation or cascading outages. Because of the instability, uncontrolled separation and cascading outages seen on September 8, SOLs were incorrectly set and/or IROLs existed.

After the Hassayampa-North Gila line tripped, all of the power that had been flowing on it (1,391 MW) instantaneously redistributed throughout the system. The increased flow immediately overloaded 230/92 kV transformers at Coachella Valley in the Imperial Irrigation District (IID). These transformers were intended to serve IID's local customers. However, IID's system (as well as that of its neighbor, Western Area Power Administration-Lower Colorado (WALC)), is "in parallel" with, or experiences loop flows from, 2 high voltage power corridors: the Southwest Power Link (SWPL), which includes Hassayampa-North Gila, to the south, and Path 44, to the north. Loop flow and parallel path flow refer to power flowing along transmission paths that are in parallel with the most direct geographic or contract path. Because IID and WALC lie between and are

interconnected with these high-voltage power corridors (SWPL and Path 44), they are forced to carry additional power flow when one of those paths is interrupted. For example, on September 8, approximately 12% of the flow from Hassayampa-North Gila ended up on IID's 92 kV system.

Increased flow on lower-voltage systems, combined with lower-than-peak generation, a hot day and peak demand (evening peak begins at 3 pm), created voltage deviations and equipment overloads which had a ripple effect. It was worsened by the action of protection systems, which take automatic actions that are intended to isolate certain electrical system components in the case of faults, overloads or other unusual system conditions. On September 8, even though protection systems operated as designed, they made matters worse, which calls into question whether they were properly designed, studied or coordinated.

The report makes the following key findings and recommendations:

- Studies used by transmission operators to plan for the next day don't accurately reflect next-day operating conditions outside their system. For example, several transmission operators did not know that over 600 MW of generation in a key location was out for maintenance and did not reflect this in their planning studies. We recommend that transmission operators and the balancing authorities responsible for ensuring that demand and resources are balanced get the necessary data and update their studies to reflect operating conditions external to their system. The reliability coordinator, Western Electricity Coordinating Council (WECC), may need to help encourage and enable data sharing.
- The transmission operators had limited real-time visibility outside their systems, causing a lack of situational awareness. They should engage in more real-time data-sharing to increase their visibility and situational awareness of external contingencies that could impact the reliability of their systems. For example, entities other than the owner of the Hassayampa-North Gila 500 kV line generally weren't aware that the line had tripped in real time, even though its loss affected their systems, and many entities weren't aware of the status of IID's Coachella Valley transformers, even though their loss affected the bulk electric systems of others.
- Throughout the areas of the Western Interconnection that we examined, entities did not consistently recognize the impact that facilities below 100 kV could have on the reliability of the bulk power system. The Coachella Valley transformers, as 230/92 kV transformers, are viewed as being below 100 kV and therefore not considered part of the bulk electric system. This means they are not studied or monitored as they would be if they were considered part of the bulk electric system. We recommend that WECC, the regional reliability entity, work with all the other entities to ensure that all sub-100 kV facilities that can adversely impact the reliability of the bulk power system are either designated as part of the bulk electric system, or otherwise incorporated into planning and operations studies and actively monitored and alarmed in real-time contingency analysis (RTCA) systems.
- As discussed above, either SOLs were incorrectly set or IROLs existed on September 8. We recommend that WECC study IROLs in the day-ahead timeframe and monitor IROLs in real-time. In the past, WECC has taken the position that IROLs do not exist in the Western Interconnection as long as entities are operating under conditions they have studied. The September 8 event calls this philosophy into question. WECC does have a proposed new procedure (effective in June) to begin identifying and monitoring IROLs.
- There were several instances of protection systems not being studied or coordinated. Protection systems, including the SONGS separation scheme and the S Line RAS, played a key role in worsening system conditions after the Hassayampa-North Gila line tripped. Before October 2011, WECC did not generally require several types of protection systems to be studied. We recommend that transmission owners and operators, generation owners and operators, and the WECC reliability coordinator work together to study and coordinate protection systems, especially the SONGS separation scheme and the S Line RAS, evaluate whether they are still effective and necessary, and determine if they have adverse or unintended effects on reliability.

I'd now like to turn to my fellow Inquiry Lead, NERC Senior Vice President Dave Nevius, for his remarks. After that, we'll be happy to take your questions.