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NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL
Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

October 2, 2003

The Honorable John D. Dingell
U.S. House of Representatives
2328 RHOB
Washington, D.C. 20515-6115

Dear Congressman Dingell:

During the September 3, 2003 hearing of the Committee on Energy and Commerce concerning the August 14th blackout in the upper Midwest and Northeast United States and eastern Canada, you requested that I supply additional information regarding the nature of the violations that NERC had found through its compliance enforcement program.

This letter provides that additional information. At the outset I must emphasize that neither NERC nor the U.S.-Canada Joint Task Force on the Power Outage has completed its investigation of the blackout. Further, the violations described in this letter were not a product of that investigation; rather, these violations were found through NERC's ongoing compliance program.

At the hearing you asked whether any of the violations that NERC found through its compliance program imposed risk to the system, including the possibility of a shutdown of the kind we experienced on August 14th. NERC found several types of violations that exposed the interconnected system to serious risk. A description of those violations and the nature of the risks they present follow.

- **Operating portions of the transmission system beyond their "first contingency" rating.** NERC's planning standards and operating policies require that the transmission system be planned and operated to withstand the failure of any single element without affecting other portions of the transmission system. Some control areas and reliability coordinators reported specific situations during which they operated beyond the first contingency rating of a portion of their transmission system. In 2002, NERC referred to this rating as the "operating security limit." Violating this limit increases the possibility that a disturbance to the transmission system could result in a widespread cascading failure. If portions of the system are being operated beyond their first contingency rating and the contingency occurs (such as a storm damaging a transmission line or a generating plant shutting down because of a boiler tube leak), then other portions of the transmission system could well be affected. Depending on the circumstances, such an occurrence could precipitate a cascading failure of a portion of the system. NERC's planning

standards and operating policies require that a system operator know the first contingency ratings of the portion of the system under its control, that the system operator regularly assess system conditions, and that the system operator take corrective action to promptly bring the system back within first contingency ratings when those ratings are exceeded.

- **Exceeding control performance limits.** NERC operating policies require that each control area maintain a constant balance between its generation and demand within specified limits, recognizing that customer demand is constantly changing and generation control is never perfect. Operating outside those limits is considered a violation of these control performance policies and places a burden on the entire Interconnection as it feeds power to, or absorbs power from, the non-compliant control area. NERC expects control areas to comply with these control performance policies at all times, even when generation is limited. That expectation might require a control area to curtail customer demand through public requests for conservation, voltage reductions, and even load shedding. NERC performs monthly surveys that track each control area's compliance with NERC's control performance policies. Although most control areas fully comply with these policies, we have seen obvious instances of non-compliance that resulted in noticeably lower frequency in the Interconnection. Non-compliance with the control performance standards can also result in unscheduled flows on the transmission system as the entire Interconnection responds to correct the imbalance. These unscheduled flows may overload portions of the system. Because the flows are unscheduled and therefore unknown to the system operators, it may be more difficult to resolve the overload because the system operators do not know what is causing it.

- **Failure to return generation-demand balance within 15 minutes following the sudden failure of generation.** Generating unit failures cause an instant imbalance between a control area's generation and its customer demand, resulting in a decrease in system frequency. NERC's control performance operating policies require that a control area return to a balance between its generation and customer demand within 15 minutes following the sudden generating unit failure. Many control areas pool their generation reserve in a reserve-sharing group to quickly restore this balance. Until that balance is achieved, the entire interconnection feeds power to the deficient control area as a result of automatic controls on the generators. Our monthly surveys show that most control areas comply with this policy. Those that do not are required to carry additional operating reserves. Until balance is restored, unscheduled flows occur on the system, presenting the same potential for overloads discussed in the prior example.

- **Lack of NERC-certified system operators.** Since January 1, 2001, NERC has required that all control center operators be NERC-certified. NERC certification requires that the system operators pass an examination based on our operating policies as well as a general knowledge of interconnected system operations. Not having NERC-certified system operators may place the system at risk because the non-certified operator may lack a sufficient understanding of interconnected system operations and the operating policies necessary for interconnected operations. The system operator may not appreciate the risk of operating in a particular manner. In the event of a system disturbance, the system

operator may not understand the steps needed to bring the system back within acceptable operating parameters.

- **Non-compliance with regional underfrequency load shedding programs.** Underfrequency load shedding systems help provide a quick generation-demand rebalance when a portion of the Interconnection becomes isolated from the rest of the system. This underfrequency load shedding is accomplished automatically in fractions of a second. Each of the Regional Councils has established underfrequency load shedding requirements for its control area members. This load shedding must occur prior to generating units tripping offline to protect generating equipment and attempt to arrest a decline in system frequency. Not complying with these standards can result in insufficient underfrequency load shedding, or load shedding that doesn't occur until the frequency has declined too far. Once frequency declines to a certain point, relays designed to protect equipment on the system from physical damage begin to disconnect equipment (such as generating units) from the system, causing frequency to decline even further as demand and the resources available to meet it get even further out of balance.

- **Lack of system studies.** NERC planning standards require that utilities model their systems under normal, single contingency, and severe contingency situations. Studying the effects of contingencies on transmission system models helps the utilities and reliability coordinators understand how those systems are likely to respond under a range of normal to stressful situations. Lacking those studies means that the system operators may be faced with events whose outcomes might be unknown, i.e., operating in an unstudied state. Without such studies, system operators may not realize that they are operating beyond first contingency ratings, or system operators may not understand the limits they need to impose on transfers across the system to avoid a voltage collapse.

The 444 violations of NERC Operating Policies included in the 2002 Compliance Report break down in the following manner:

Control performance standards, CPS-1 and CPS-2: 25
Disturbance control standard: 8
Formal policies and procedures to address the execution and coordination of activities that affect transmission system security: 11
Operating security limit:
  Violation of first contingency limit: 15
  Violation of regional criteria that are more stringent than NERC criteria: 98
  Path being up-rated (old limit violated — new limit not violated): 12
Adequate facilities for system operators to monitor specific system parameters: 8
Control area and operating authority to provide system data to reliability authority: 10
Operators must implement and communicate emergency plan: 1
Emergency operation plans developed and maintained: 15
System restoration plans: 27
System operator authority: 12
Operator certification violation: 193

Reliability authority to perform next-day study: 8
Issuance of energy emergency alerts: 1

The 97 violations of NERC Planning Standards included in the 2002 Compliance Report break down in the following manner:

System performance under normal conditions with reporting requirements: 11
System performance under single contingency with reporting requirements: 12
System performance under extreme contingency conditions: 18
Recorded fault and disturbance data: 5
Develop and maintain a library of dynamic models: 2
Consistency of entities with regional underfrequency load shedding program: 44
Analyze and document regional underfrequency load shedding program performance: 2
Analysis and documentation of under-voltage load shedding event: 2
Regional assessment of special protection system coordination and effectiveness: 1

I hope this additional information is useful to the Committee. Please contact me if you have additional questions relating to the reliability of the bulk electric system.

Very truly yours,

cc: The Honorable W. J. "Billy" Tauzin