Testimony of James W. Glotfelty
Director, Office of Electric Transmission and Distribution
U.S. Department of Energy

Before the
U.S. Senate Committee on Governmental Affairs
Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia
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Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to testify here today and outline the findings of the U.S.- Canada Power System Outage Task Force investigating the blackout on August 14, 2003.

Three months ago today, large sections of the United States and Canada were still recovering from one of the largest power blackouts in our nation's history. Since the blackout, hundreds of technical experts have worked tirelessly to help the U.S-Canada Task Force determine how and why it occurred.

Yesterday, the Task Force released an Interim Report that marks our progress to date in the search for answers about what happened that day.

This Interim Report focuses on the events, actions, failures, and conditions that led to the blackout and caused it to cascade over such a large region, as well as questions relating to nuclear power operations during the blackout and to the security of the grid control systems

It presents facts collected by the investigation team and does not offer speculative or unconfirmed information or hypotheses.

Without going though a line-by-line review of how the system failed that day, I would like to walk you through the three causes of this blackout.

Before I do this, I want to make clear that it is the control area operators who have the primary responsibility to maintain system reliability, regardless of conditions. They are required to have the tools to ensure the grid is reliable. There were three groups of causes:

Group 1 - FirstEnergy didn't properly assess changing conditions on its system, which degraded as the afternoon progressed. In particular:

- FE didn't ensure the security of its transmission system because it didn't use an effective contingency analysis tool routinely.
- FE lost its system monitoring alarms and lacked procedures to identify that failure.
- After efforts to fix those alarms, FE didn't check to see if the repairs had worked.
- FE didn't have effective backup monitoring tools to help operators understand system conditions after their main monitoring and alarm tools failed.

Group 2 - FE failed to adequately trim trees in its transmission rights-of-way.

- Overgrown trees under FE transmission lines caused the first three FE 345 kV line failures.
- These lines tripped when contacting trees that had grown past their maximum allowable limits in their rights of way.
- Trees found in FE right-of-way areas are not a new problem
    - The investigation found one tree over 42' tall; one 14 years old; another 14 inches in diameter were found in FE rights-of-way.
    - There also was extensive evidence of prior tree-line contacts.

Group 3 - Reliability Coordinators did not provide adequate diagnostic support to assist FE in responding to problems.

- MISO's state estimator failed because of a data error.
- MISO's flowgate monitoring tool didn't have real-time line information to detect growing overloads. (The flowgate tool was still under development at the time of the blackout.)
- MISO operators couldn't easily link breaker status to line status to understand changing conditions. (The EMS tool was still under development at the time of the blackout.)
- PJM and MISO lacked joint procedures and wide grid visibility to coordinate problems affecting their common boundaries.

According to NERC, these failures violate a number of reliability standards. Specifically,

- FE violated at least four NERC reliability standards.
- MISO violated at least two standards.

A critical reference point in this investigation is 3:05 p.m. At that time, the investigations extensive modeling determined that the system was capable of being operated reliably. That fact alone eliminates a number of possibilities as causes of the blackout. They include:

- High power flows to Canada,
- System frequency variations,
- Low voltages earlier in the day or prior days,
- Low reactive power output from IPP's, and
- Existing outages of individual generators or transmission lines that had occurred well in advance of the blackout.

Finally, the Task Force report finds that:

- Procedures at the nuclear plants were followed and worked well on August 14th.
- The nuclear plants all shut down safely when they detected a disturbance,
- And were restarted safely when the grid was restored.
- In addition, no deliberate damage or tampering has been found in any equipment in affected areas of the grid.
- And no computer viruses or any sort of illicit cyber activities have been identified as factors.

In closing, Phase One of our Task Force investigation, and the public's response to it, will give us a wealth of information that will be the basis for formulating recommendations on ways to make our electric system stronger.

Phase Two of this investigation will include three public forums in Cleveland, New York City and Toronto. These public forums will offer an opportunity to all of those listed in this report, as well as other interested parties, to provide the Task Force with comments and recommendations.

The Task Force will then issue a final report containing our recommendations for improving the electric system and for any appropriate follow-up

Thank you Mr. Chairman. I will be happy to answer any questions you may have.

Summary of the major events that occurred
on August 14, 2003

- 12:15 - Eastern Daylight Time (EDT) - inaccurate input data rendered MISO's state estimator (a system monitoring tool) ineffective.

- 13:31 EDT - FE's Eastlake 5 generation unit tripped and shut down automatically.

- 14:14 EDT - the alarm and logging system in FE's control room failed and was not restored until after the blackout.

- 15:05 EDT - 3 of FE's 345-kV transmission lines began tripping out because the lines were contacting overgrown trees within the lines' right-of-way areas.

- 15:46 EDT - FE, MISO and neighboring utilities had begun to realize that the FE system was in jeopardy. The only way that the blackout might have been averted would have been to drop at least 1,500 to 2,500 MW of load around Cleveland and Akron -- and at this time the amount of load reduction required was increasing rapidly. No such effort was made.

- 15:46 EDT - the loss of key FE 345-kV lines in northern Ohio caused its underlying network of 138-kV lines to begin to fail, leading, in turn, to the loss of FE's Sammis-Star 345-kV line.

- 16:06 EDT - the Sammis-Star line tripped and triggered the cascade by shutting down the 345-kV path into northern Ohio from eastern Ohio. Although the area around Akron, Ohio was already blacked out due to earlier events, most of northern Ohio remained interconnected and electricity demand was high. The loss of the heavily overloaded Sammis-Star line instantly created major and unsustainable burdens on lines in adjacent areas, and the cascade spread rapidly as lines and generating units automatically took themselves out of service to avoid physical damage.