



The NRC and Grid Stability

Commissioner Jeffrey S. Merrifield

**ANS Executive Meeting
Denver, Colorado
July 24, 2006**



August 14, 2003



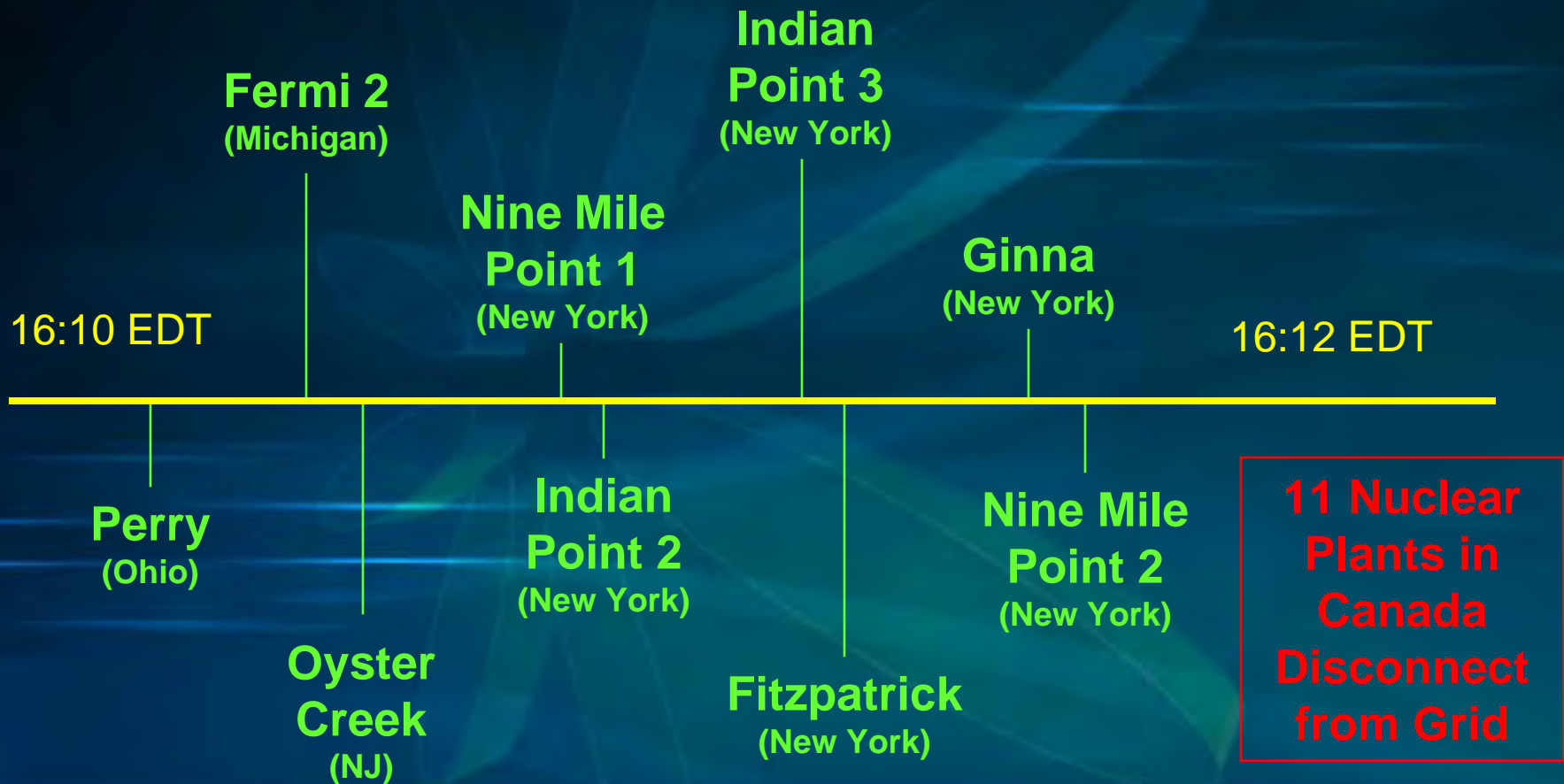
- Started out as just another day at the NRC...
- A typical day of meetings, including one on trends in loss-of-offsite-power events
- Around 4:00 pm we received reports that several nuclear plants had tripped offline simultaneously

- NRC technical experts assembled in the Operations Center to understand what happened
- As the evening wore on, we learned 9 US nuclear units and 11 in Canada, as well as a host of fossil units had tripped offline due to a grid problem
- The cause? Poor maintenance, poor communications, and lack of understanding of system interdependencies





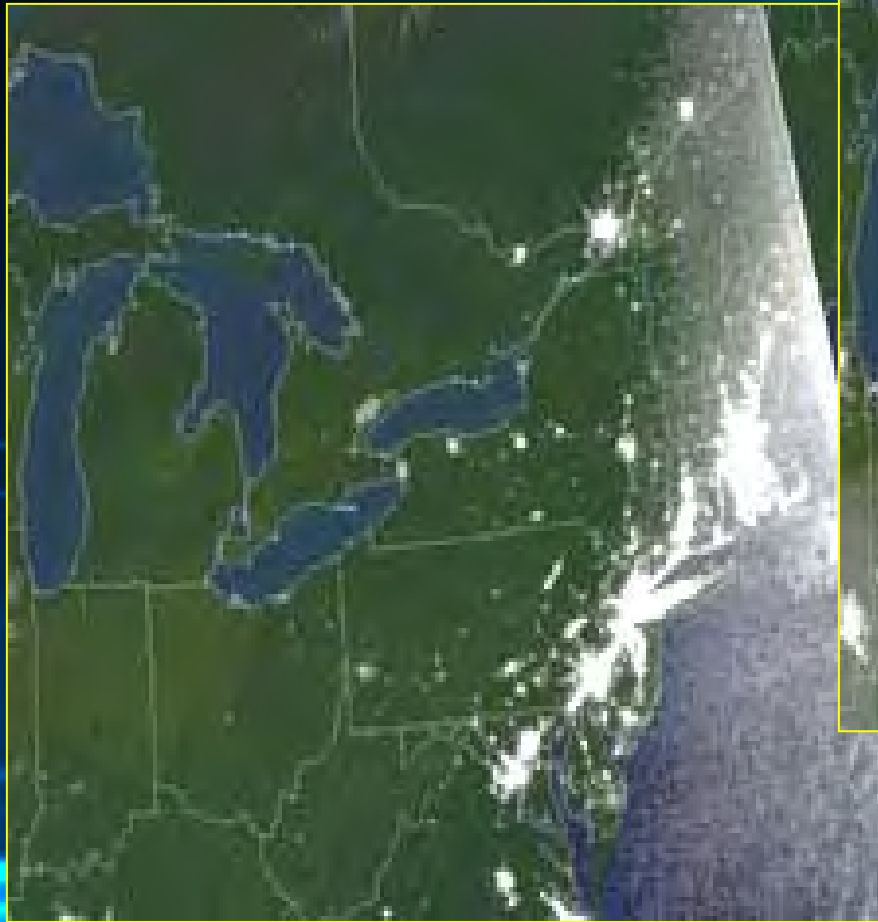
In Only 2 Minutes...





The Northeast Corridor – Before and After

August 13, 9:21pm



August 14, 9:03pm



August 15, 2003 – The Aftermath

By Friday morning, NRC began getting questions about restarting the nuclear units

Restarting a nuclear power plant is not as simple as flipping a switch

NRC received calls from the White House asking how soon the nuclear plants could return to service

After safety checks were performed on the units, most were able to restart within 3 days, and power was restored to millions of customers within the week





The Importance of Grid Stability

Both the occurrence and the duration of Station Blackout events should be minimized to avoid unnecessary challenges to emergency power systems

Our risk-informed regulations assume that station blackouts are rare events of short duration

Deregulation of the electric energy market in 1997 has led to a decrease in the number of such events, but an increase in the duration of these events

In 1999, Callaway switchyard voltage fell below minimum requirements for 12 hours, due to peak electrical loading and the transport of large amounts of power on the grid adjacent to the plant





Bilateral Response to the Blackout

- A joint US/Canada task force was formed, led by Spencer Abraham and John Elford, to review the cause of the blackout and make recommendations to avoid a recurrence
- 3 Working Groups were established:
 - Nuclear
 - Electrical System
 - Security
- Then-NRC Chairman Nils Diaz and Linda Keen, CEO of the CNSC, led the Nuclear Working Group
- The Group concluded that nuclear plants responded as designed to the grid conditions and did not cause the outage, nor contribute to its spread

U.S.-Canada Power System Outage Task Force

**Final Report on the
August 14, 2003 Blackout
in the
United States and Canada:**

**Causes and
Recommendations**



Canada

April 2004



NRC Interaction with Licensees

- Developed Temporary Instructions for our inspectors to review the readiness of plants for the peak Summer cooling season. These procedures have been used every Spring the last 3 years to ensure our licensees are prepared for the Summer months.
- Issued Generic Letter 2006-02, asking licensees for information on:
 - Communication protocols with grid operators to determine operability of offsite power system
 - Use of analysis tools to monitor grid conditions for consideration in maintenance risk assessments
 - Offsite power restoration procedures
 - Loss-of-site power events caused by grid failures



NRC Interaction with Others

NRC meeting with FERC – April 24, 2006

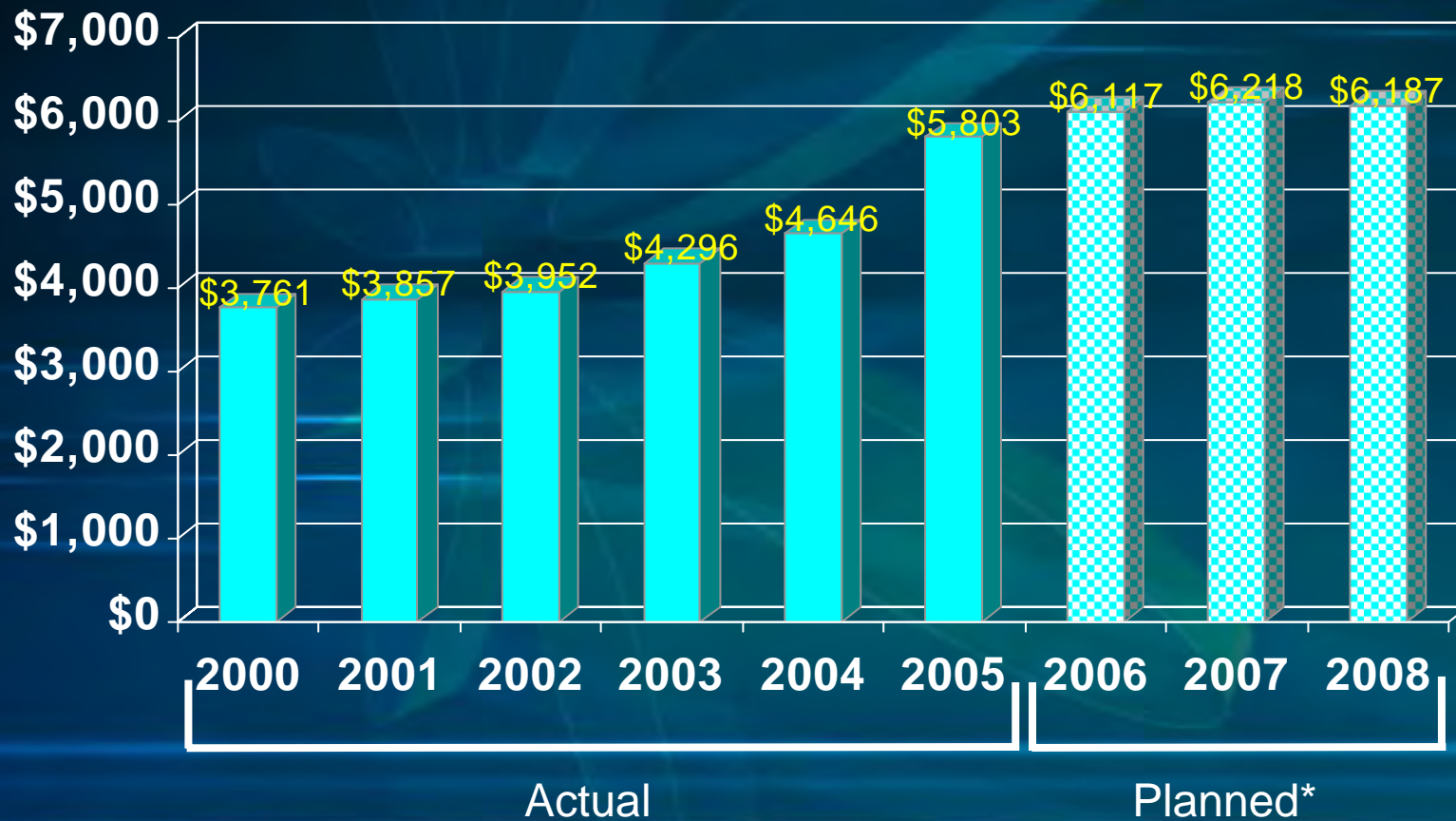


- Enhanced communications with FERC and NERC following the blackout
- Held 2 meetings with FERC to discuss the relationship between grid stability and nuclear power plant safety. NRC agreed to share information on loss-of-offsite-power events and human reliability research
- Commented on FERC rulemaking creating an Electric Reliability Organization, as authorized by the Energy Policy Act of 2005



Transmission Investment

Investor-Owned Electric Utilities (Millions of constant 2005 dollars)



* Source: Edison Electric Institute



Licensee Accomplishments

- INPO published an addendum to SOER 99-1 "Loss of Grid Addendum" in December 2004 for addressing offsite power concerns in response to the northeast blackout.
- NERC and NEI are working on a standard for implementing the necessary protocols between nuclear stations and Grid Operators for ensuring reliable offsite power and reducing risk from maintenance activities.
- In August 2005, NEI sponsored a workshop with Grid Operators and Nuclear Station Operators to enhance the understanding on offsite power requirements for the nuclear stations.
- Industry raised the concerns on communication problems with the Grid Operators and facilitated the issuance of an interpretive order from FERC (Docket No. RM01-10-005).
- The offsite power requirements for the nuclear stations were addressed in NERC planning & operations committee meetings. Regional reliability councils conducted separate sessions for the development of regional protocols with nuclear stations.
- NERC revised the audit procedures to include the review of Grid Operator's protocol with nuclear stations.



What's Next?

- Maintain focus on nuclear power plant safety
- Develop consistent communication protocols between transmission grid operators and nuclear plant operators
- Continue to interact with FERC and NERC to ensure that decisions designed to protect the grid during off-normal conditions do not have a negative impact on nuclear power plants
- Encourage open discussion of the potential effect of “largest single contingency” constraints on nuclear power plants
- Questions for new reactor designs –
 - Should the reactor be designed to withstand a 100% load reject without shutting down?
 - What will be the effect of these large baseload units (> 1,200 MW) on grid conditions?



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