

# **RIC 2005**

## **Session C1: Grid Reliability**

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# **STATUS OF THE ASSESSMENT OF GRID OPERATING DATA FOR CHANGE AND EMERGING TRENDS**

**William S. Raughley**

**Division of Systems Analysis and Regulatory Effectiveness**

**Office of Regulatory Research**

**US Nuclear Regulatory Commission**

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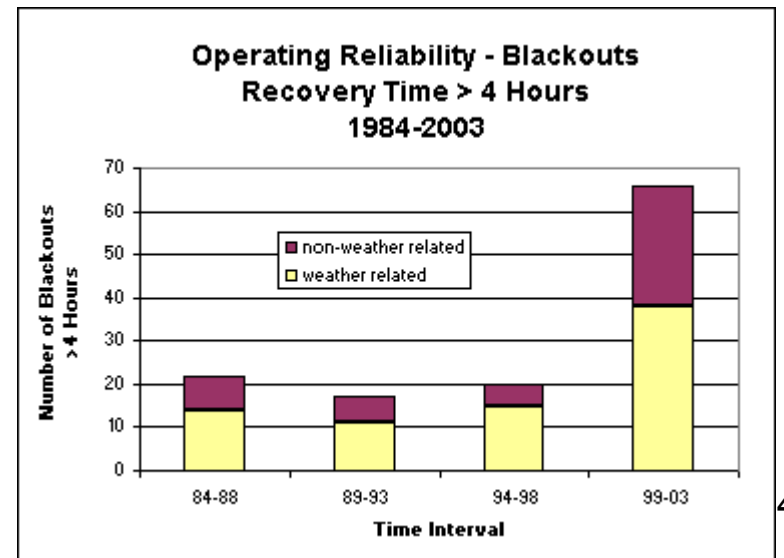
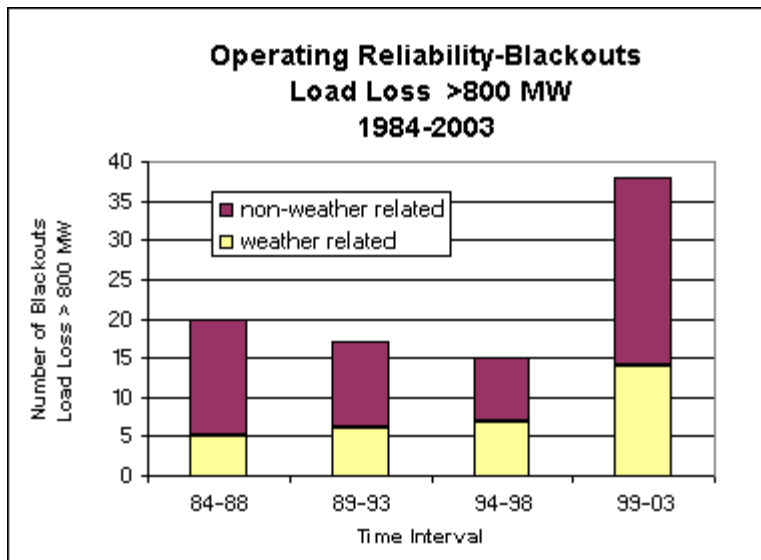
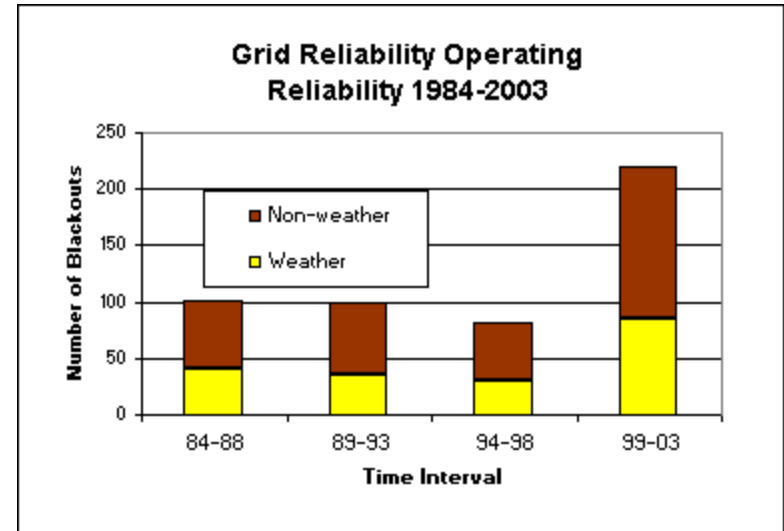
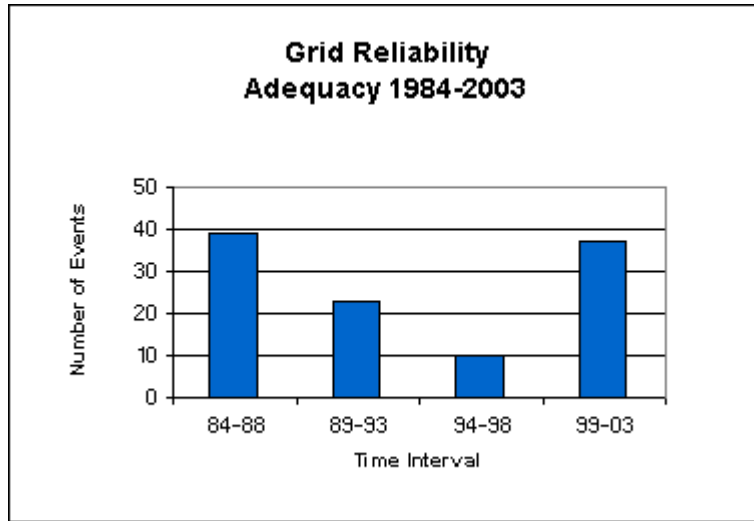
## Overview –Draft Status Report (ML043010496)

- **Purpose** - Review grid data for signs of change or emerging trends that may be masked by investigating NPP data alone.
- **Background** – As a generator and load on the grid, the nuclear power plant (NPP) is subject to the same conditions that affect the grid.
- **Objectives** – Use grid data to identify and assess:
  - Sensitivity of the NPP to changes in grid performance
  - Percent of the time grid is degraded near an NPP
  - Insights from consideration of the offsite power supply as a complex system
- **Use** – Evaluate effectiveness of electric power regulatory documents and protective features, and revisit the assumptions about the grid in risk analyses
- **Summary** - Developed indices and insights to gauge the impact of changes in transmission system loading and grid reliability using operating data.
  - Transmission system congestion has increased.
  - Grid reliability has changed; increase in the number of larger and larger blackouts.
  - Both the grid and the NPP’s offsite power supply tend to be complex systems.
- **Status and Next Steps**

# Grid Reliability Trends

- **Developed grid reliability trends using NERC definitions of reliability and data from grid events reported to DOE (10 CFR 205.351) and NERC**
- **NERC reliability definitions**
  - Operating reliability of the power system to withstand a sudden disturbance
  - Adequacy of generation to supply to demand to its customers
- **Approximately 600 grid events from 1985-2003 that meet screening criteria. NERC data mostly blackouts and these are not the same as NRC station blackout**

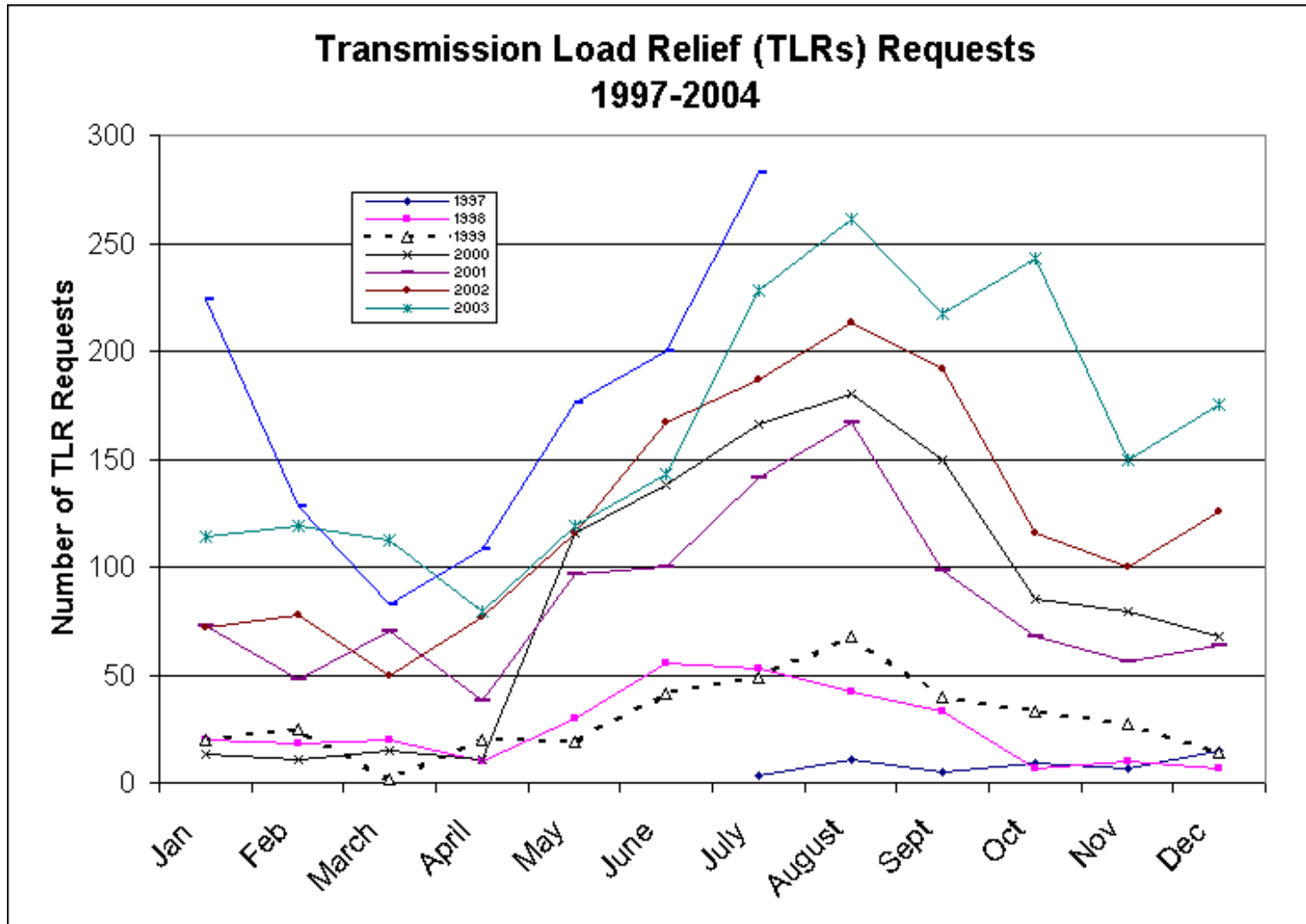
**Observations – Grid reliability has changed since 1999. The data since 1999 may reflect true grid performance and challenge the NRC assumptions that use grid data before 1999.**



# Trends From Changes in Transmission System Operation

- **Developed transmission system trends using NERC transmission load relief (TLR) request trends and data.**
- **Changes in transmission system operation**
  - Open access of generators to the transmission system from deregulation (FERC Order 888) results in new power flows regardless of deregulation status.
  - Experience shows reactor trip with congestion can degrade NPP voltages
  - Blackout Task Force - absence of major transmission projects of last 10 -15 years have increased utilization of existing transmission facilities to meet demand
- **NERC provides a graded system for reliability coordinators to manage congestion to protect operating reliability limits in the Eastern Interconnection.**
- **Approximately 7000 TLR records from 1999-2004 varying in level**
  - Level 1, Notify
  - Levels 2 to 6, Hold or curtail transactions, reconfigure, emergency

# Observation-Increased transmission line loading since 1999



# Observations - Grid and NPP offsite power tend to be complex systems

- Adopted from work by the U.S. Canadian Blackout Task Force Report, and Oak Ridge National Laboratory and others using NERC data.
- Complex systems described by power laws.
- **Insight:**
  - LOOP and blackout size rather than NRC cause classification (plant, weather, grid) may also be informative characterization of LOOPS for PRA.

