



Nuclear Plant Operation Joint FERC/NRC Meeting

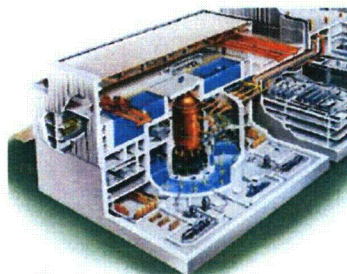
Dan Dorman, Deputy Director
Engineering and Corporate Support
Office of Nuclear Reactor Regulation

June 15, 2012

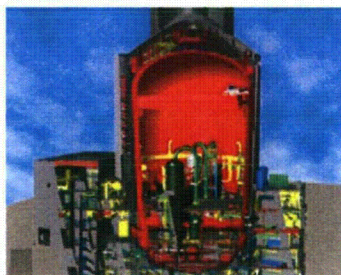
Discussion Points

- **Operations of Nuclear Plants**
- **Cyber Security Activities**
- **Station Blackout Rulemaking and Grid Reliability Standards Activities**

New Reactor Applications



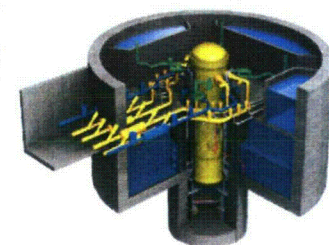
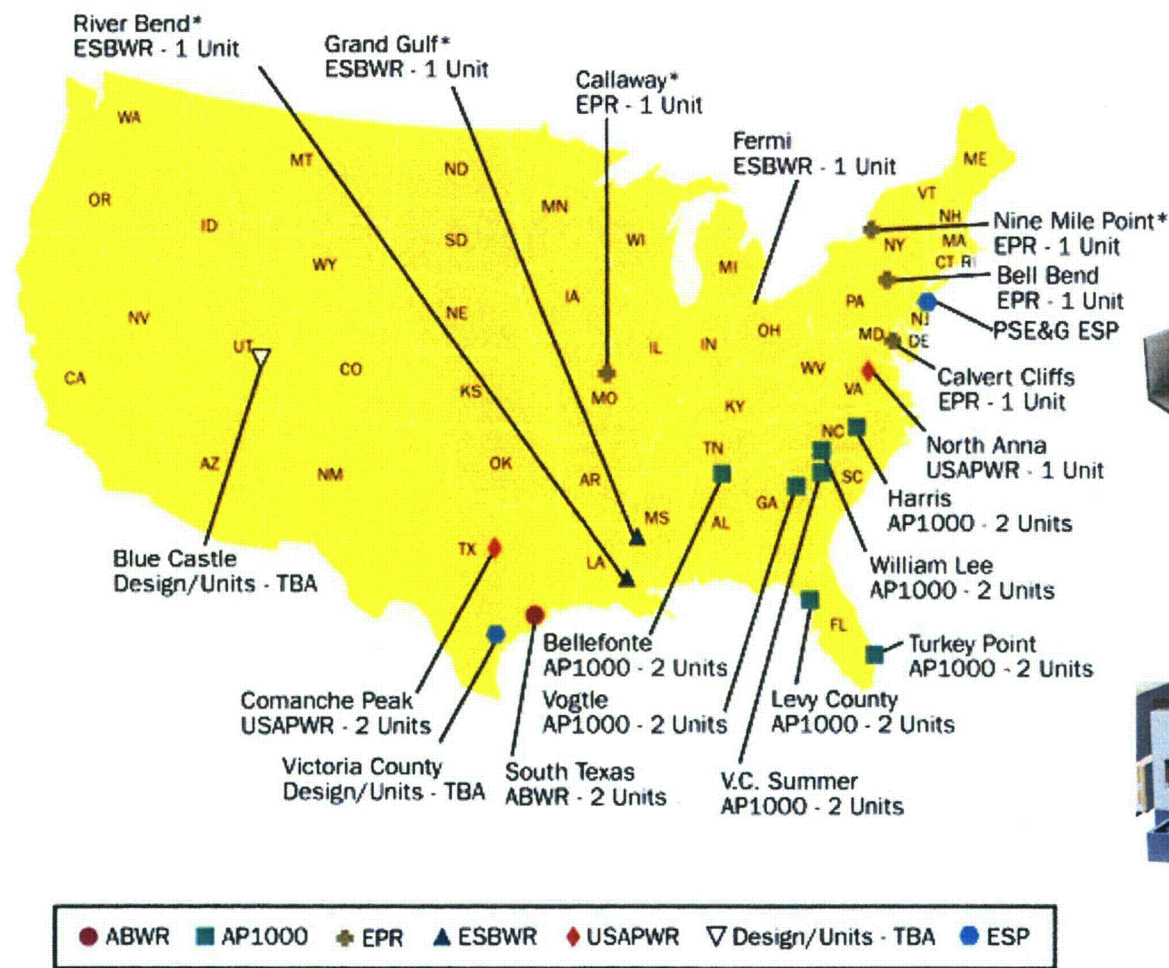
ABWR



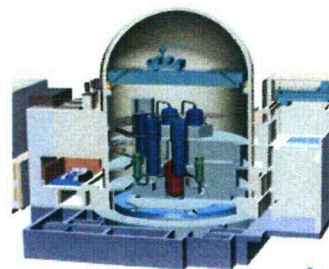
AP1000



EPR



ESBWR

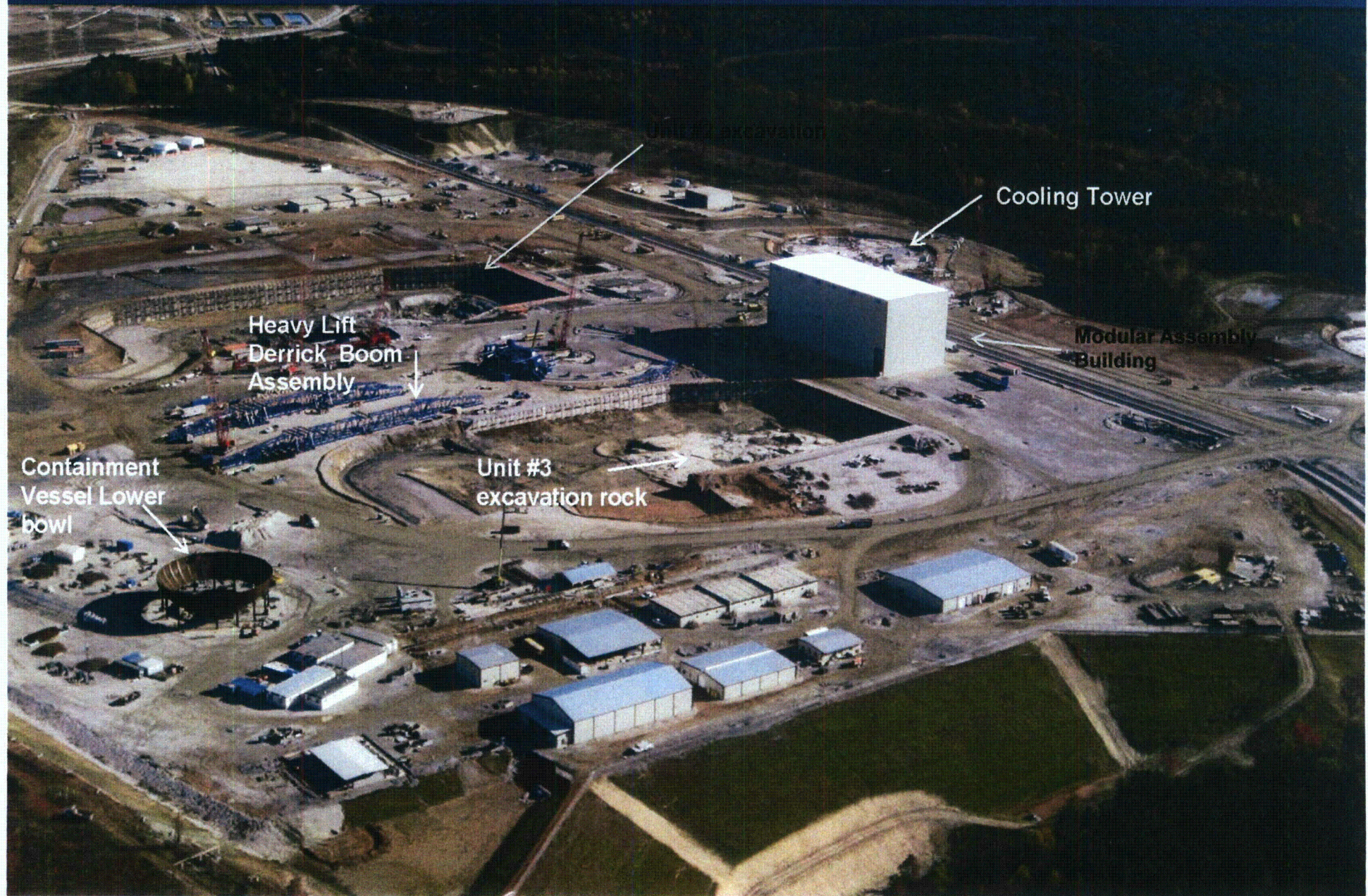


USAPWR

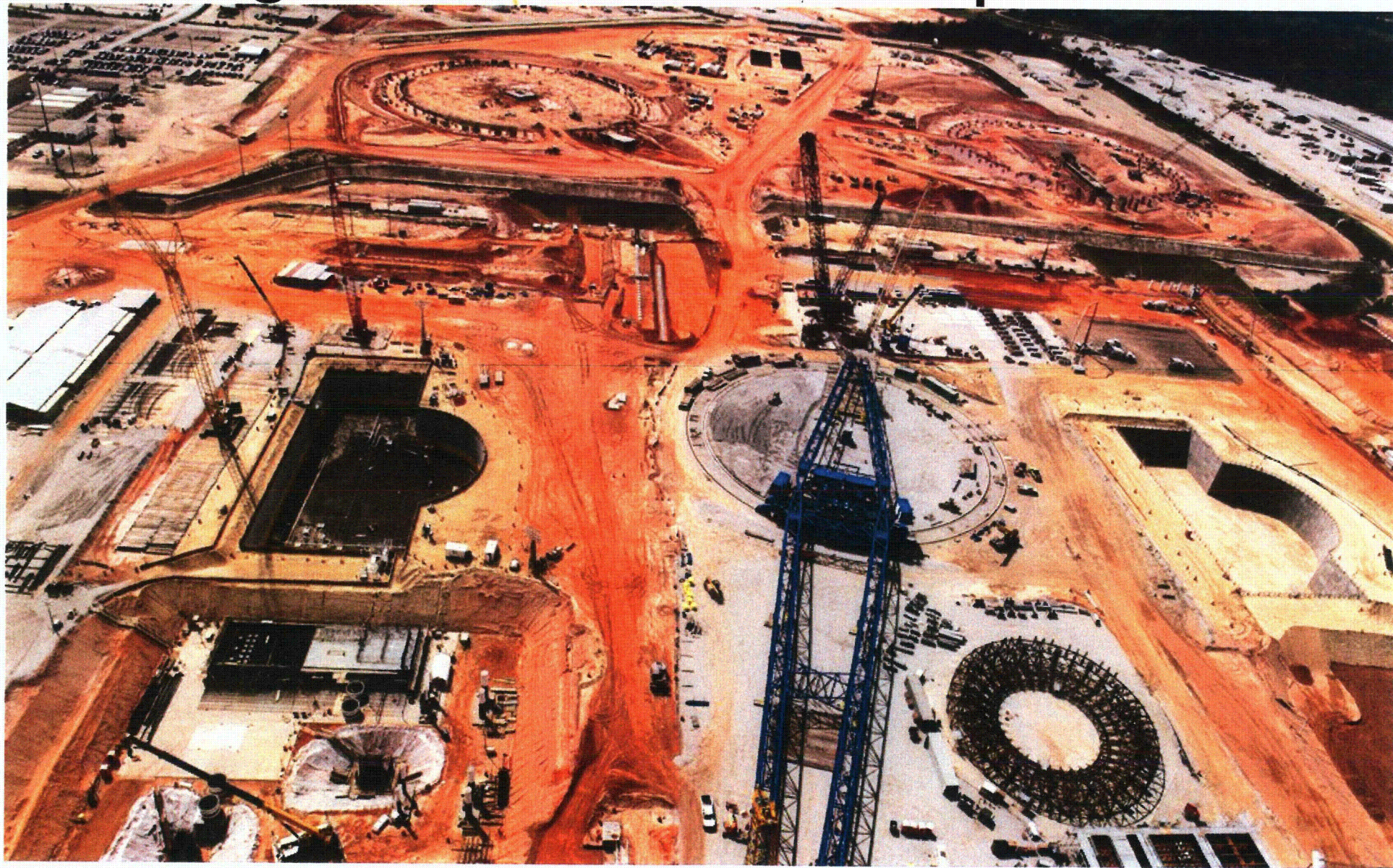
*Review Suspended by Applicant

*Large LWRs-- Large Light-Water Reactors, generally of the order of 1000 MW(e) or more

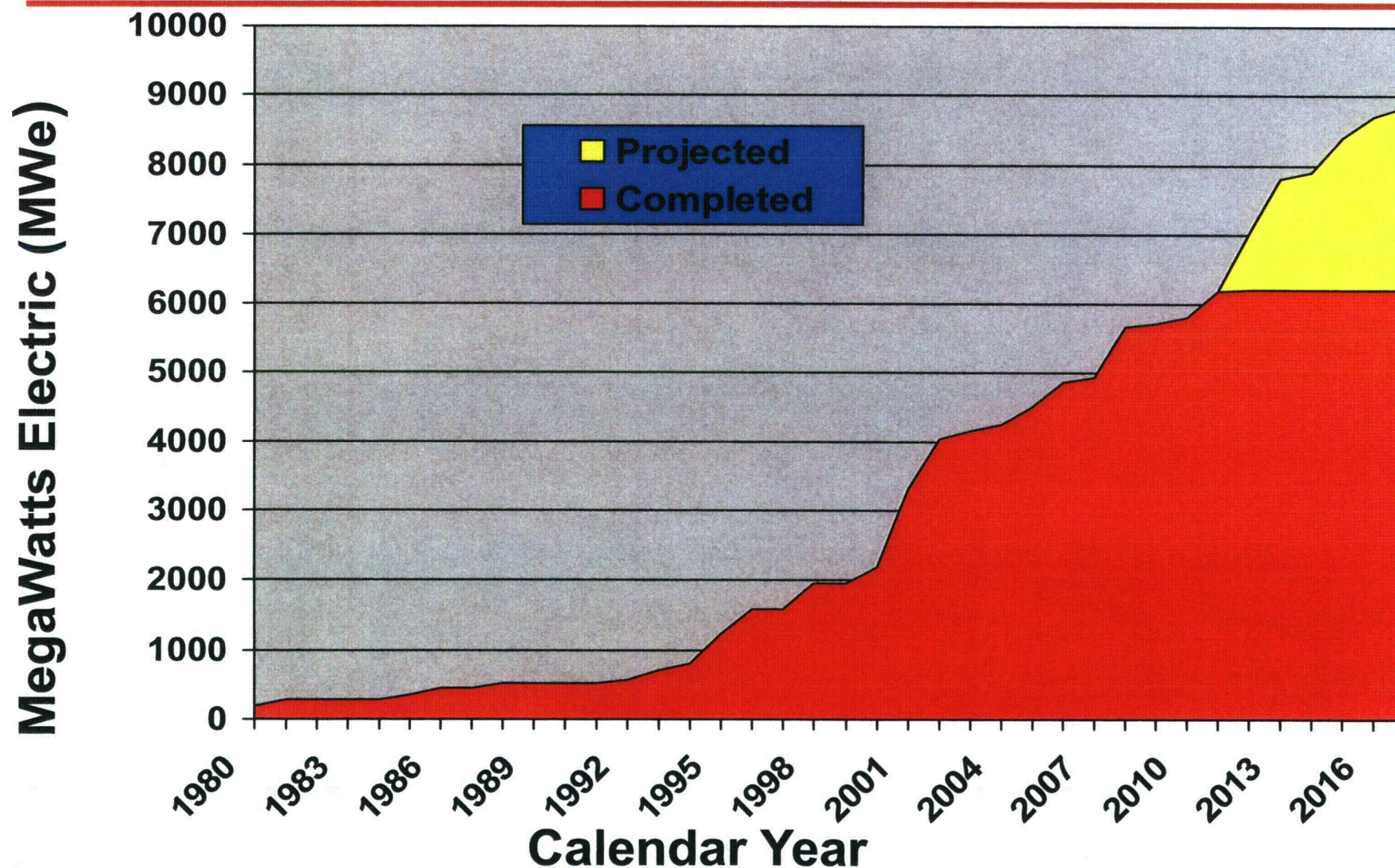
VCS 2 & 3 Aerial View - October 2011



Vogtle Construction Update



Additional Power From Upgrades





Existing Plant Operations

- Nuclear Plants and Load Following
- NRC Staff uses grid assessments as part the evaluation of power uprate license amendments
- NRC Staff continues to utilize support (as needed) from NERC and FERC Staff for enforcement discretion cases at NPPs which involve consideration of grid reliability and its relationship to nuclear safety.



NRC/FERC Staff Interactions

- NRC, FERC and NERC staff continue to meet on quarterly basis to share ongoing issues
- FERC supports NRC in the inspection and evaluation of dams under NRC jurisdiction
- NRC participated in Joint Grid Event Investigations related to Southern California Blackout.



Cyber Security Activities

Joint FERC/NRC Meeting

Marc Dapas, Deputy Director
Office of Nuclear Security and Incident
Response

June 15, 2012



Guidance Development

- 10 CFR 73.54, “Protection of Digital Computer and Communication Systems and Networks”
 - Scope of Systems
 - Regulatory Guide 5.71 “Cyber Security Programs For Nuclear Facilities”
- Memorandum of Agreement with FERC
- Memorandum of Understanding with NERC
- Bright-Line process
- NEI 10-04, “Identifying Systems and Assets Subject to the Cyber Security Rule”
 - Includes scoping criteria for SSCs in the BOP



Program Implementation

- Interim Milestones 1-7 (12/31/2012)
 - addresses key threat vectors for all CDAs, including BOP SSCs
 - emphasis on target set equipment and associated threats
- Milestone 8 (site specific date)
 - full cyber security program implementation
 - policies and procedures: training, attack mitigation, incident response, continuity of operations, etc.
 - completion of all design remediation actions including those that require a refuel outage for implementation.

Oversight Activities

- Inspection Program
 - Temporary Instruction
 - Training
- Significance Determination Process
- Pilot process
- Full Implementation



Station Blackout Rulemaking and Grid Reliability Standards Activities Joint FERC/NRC Meeting

Dan Dorman, Deputy Director
Engineering and Corporate Support
Office of Nuclear Reactor Regulation

June 15, 2012

Discussion Points

- **Lessons learned from Fukushima – station blackout rulemaking and activities**
- **Geomagnetic disturbances (GMDs) and long-term coping for loss of electrical power**



Lessons Learned from Fukushima

- **Actions Being Taken Without Delay Based on the Near Term Task Force (NTTF) Report:**
 - Seismic and flood hazard reevaluations
 - Seismic and flood walkdowns
 - Station blackout regulatory actions
 - Mitigating strategies for beyond design basis events
 - Reliable hardened vents for Mark I containments
 - Strengthening and integration of emergency procedures
 - Emergency preparedness regulatory actions

Geomagnetic Effects

- The NRC staff is participating with other federal agencies in evaluating the effects of GMDs
- Any recommendations from the NERC led Task Force will be considered for applicability to transmission system elements pertinent to nuclear plants

Geomagnetic Effects (cont.)

- Current NRC guidance and practice does not require evaluation of GMDs
- NRC evaluated performance capabilities of safety significant equipment
- NRC evaluating long term shutdown capability (beyond 7 days) without offsite power for existing plants

Acronyms

- **BOP** - Balance of Plant
- **CDA** - Critical Digital Asset
- **CSP** - Cyber Security Plan
- **IAW** - In Accordance With
- **SRM** - Staff Requirements Memorandum
- **SSC** - System, Structure, or Component
- **SSEP** - Safety, Important to Safety, Security, and Emergency Preparedness



Critical Infrastructure Protection Standards

Ted Franks

***Federal Energy Regulatory
Commission***

Office of Electric Reliability

June 15, 2012

Disclaimer

***The content of this presentation
does not necessarily represent
the opinions of the Federal Energy
Regulatory Commission or any
individual commissioners.***

Background

- ***Order No. 706***
 - ***Issued January 2008***
 - ***Approved Version 1***
 - ***103 directives to enhance standards***
- ***Versions 2 and 3***
- ***Order 706-B***

Order No. 761

- ***Issued April 2012***
 - ***Approved Version 4***
- ***Critical Asset Identification***
 - ***Brightline replaces Risk Based Assessment Methodology***
 - ***Adds clarity and consistency***
- ***Same controls as Versions 1 – 3***
 - ***Critical Cyber Assets require protection***

Order No. 761

- ***Commission guidance for remaining 706 directives***
 - ***Connectivity***
 - ***NIST framework***
 - ***Regional perspective***
- ***Deadline imposed for Version 5***

Version 5

- ***Address remaining directives from 706***
- ***Applies some level of protection for all BES Cyber Systems***
 - ***High, medium, low***
- ***Recent ballots (average)***
 - ***January 2012 – 29%***
 - ***May 2012 – 52%***



Joint FERC – NRC Meeting

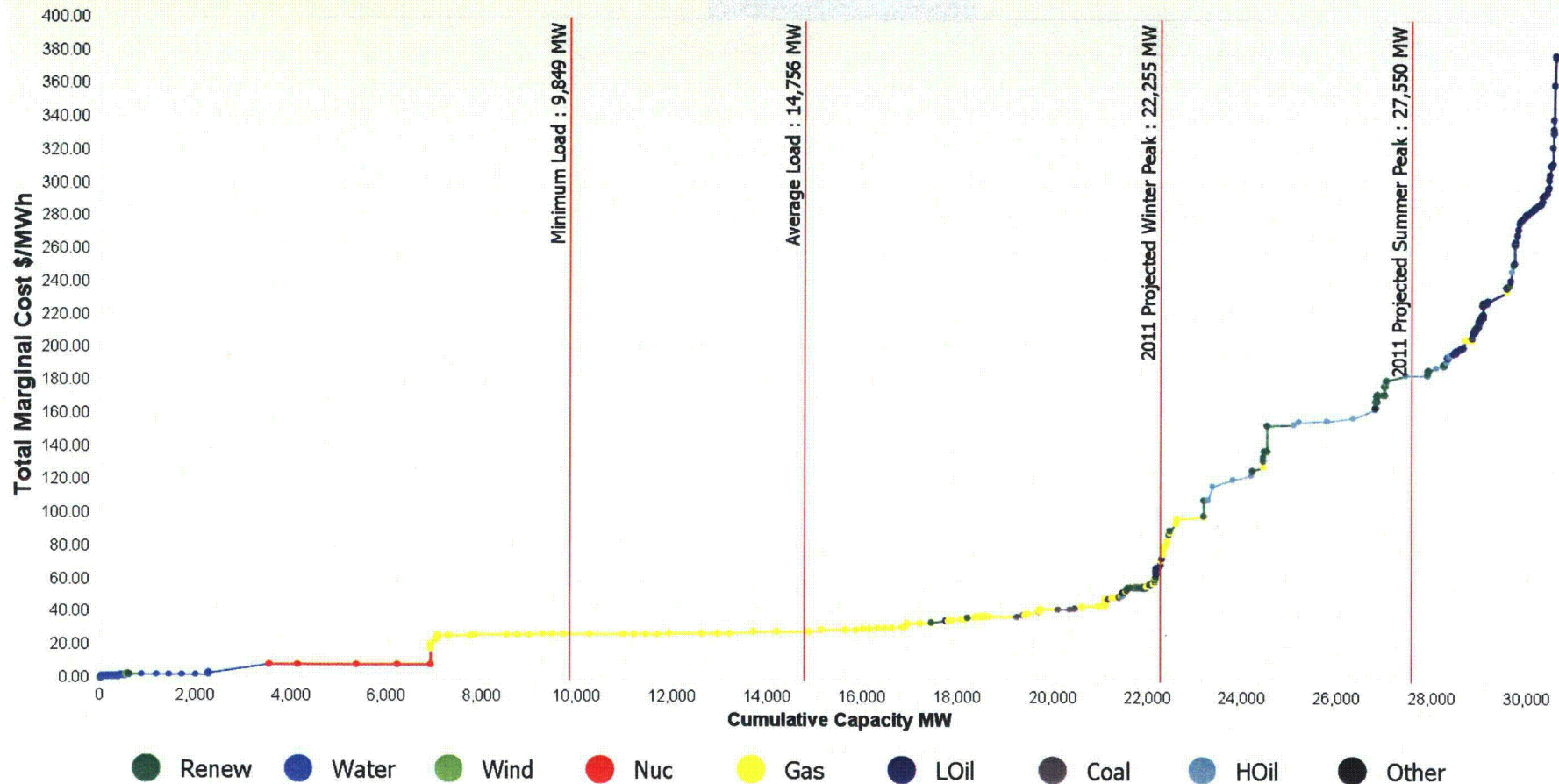
Robert Snow, PE

Office of Energy Policy and Innovation

Federal Energy Regulatory Commission

June 15, 2012

Generator Bids



Contingencies

Nuclear Plants
Size By Operating Cap. MW

1,500 to 2,000
1,000 to 1,500
500 to 1,000

Transmission Lines
Type
Type
Type

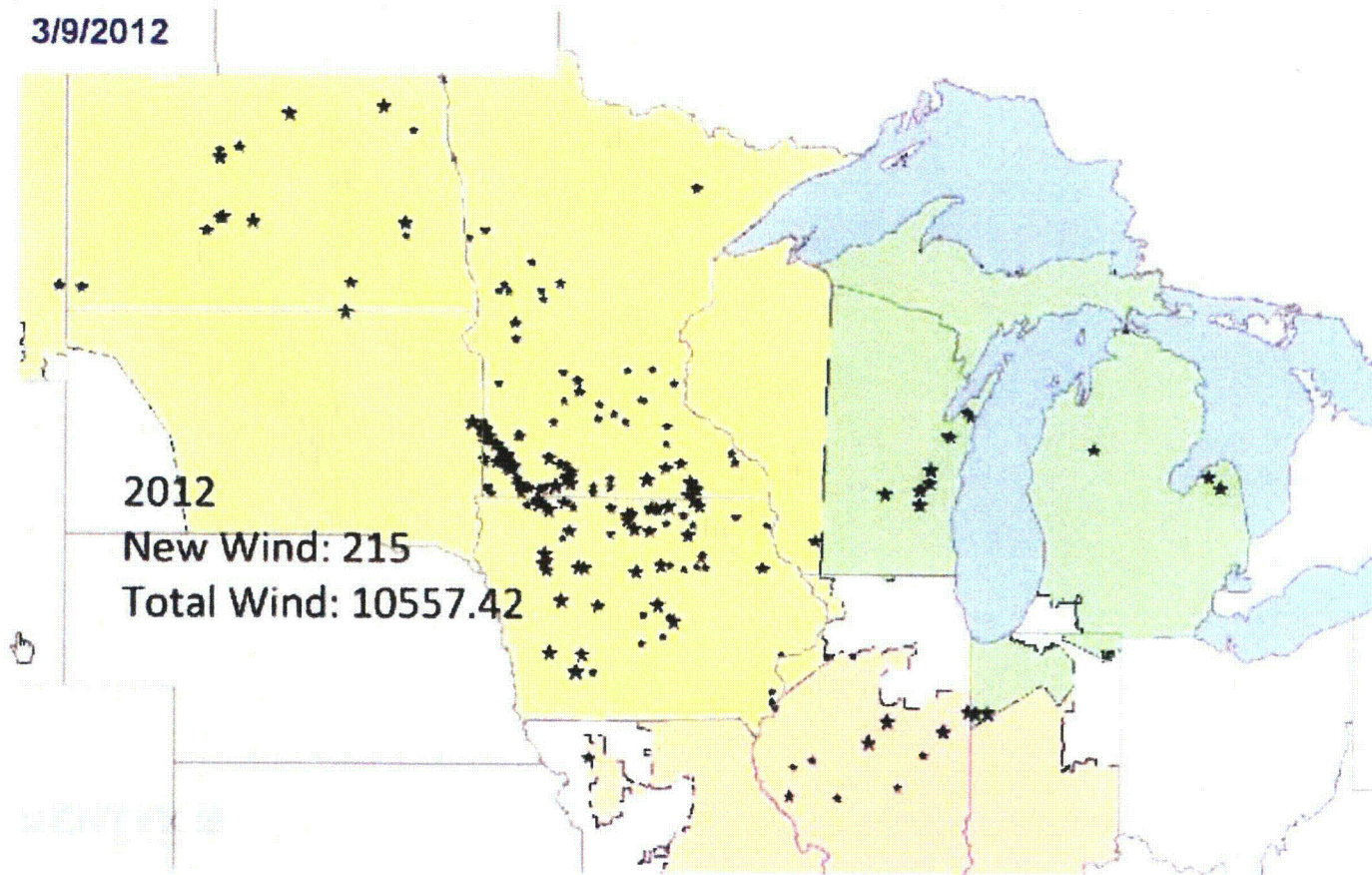
Substations
Type
Type

Transmission Lines
Voltage Class kV

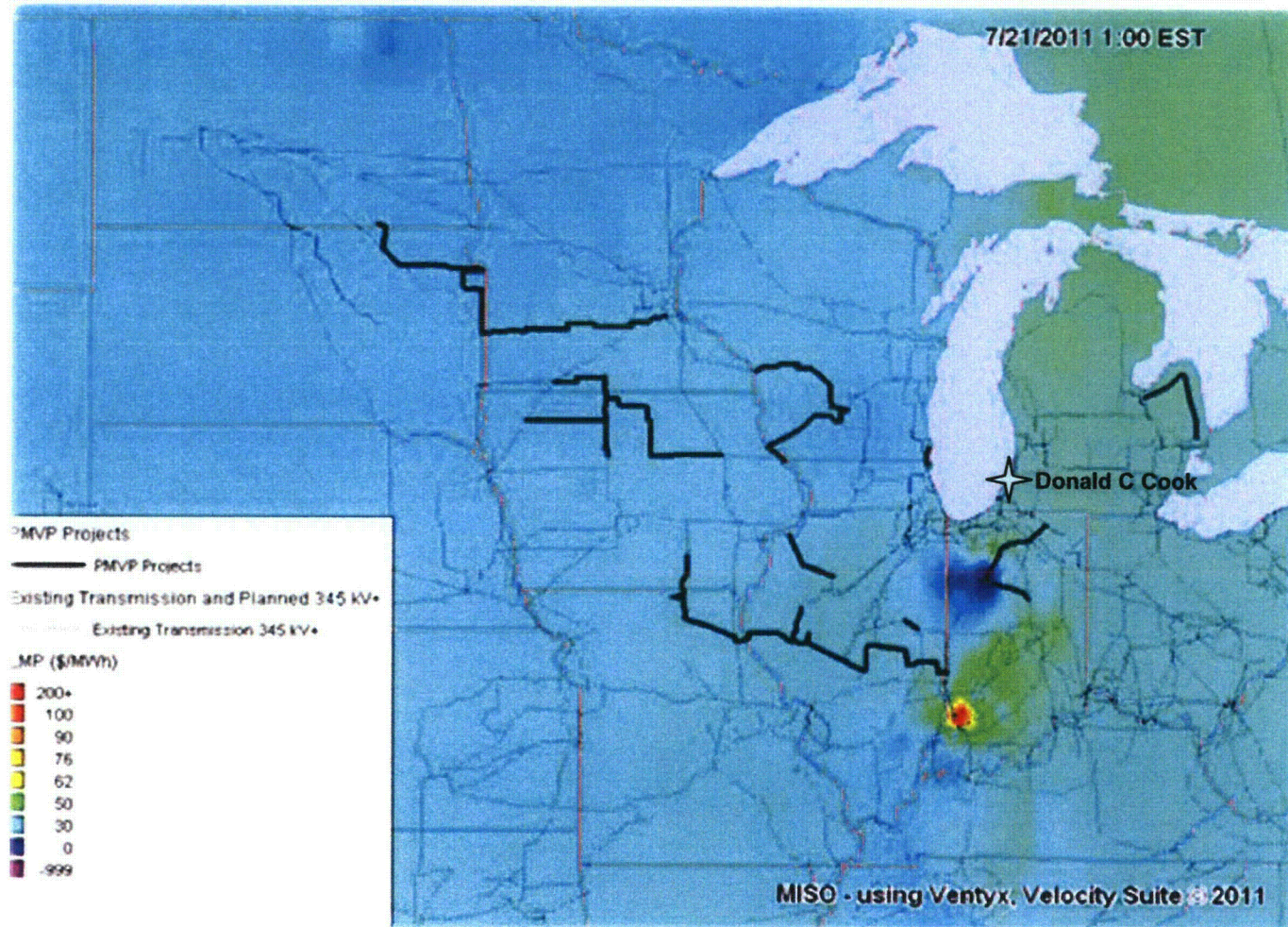
Under 100
100-150
200-250
345
500
765 kV AC
DC Line
Proposed
Underground

MSO

Wind Resources

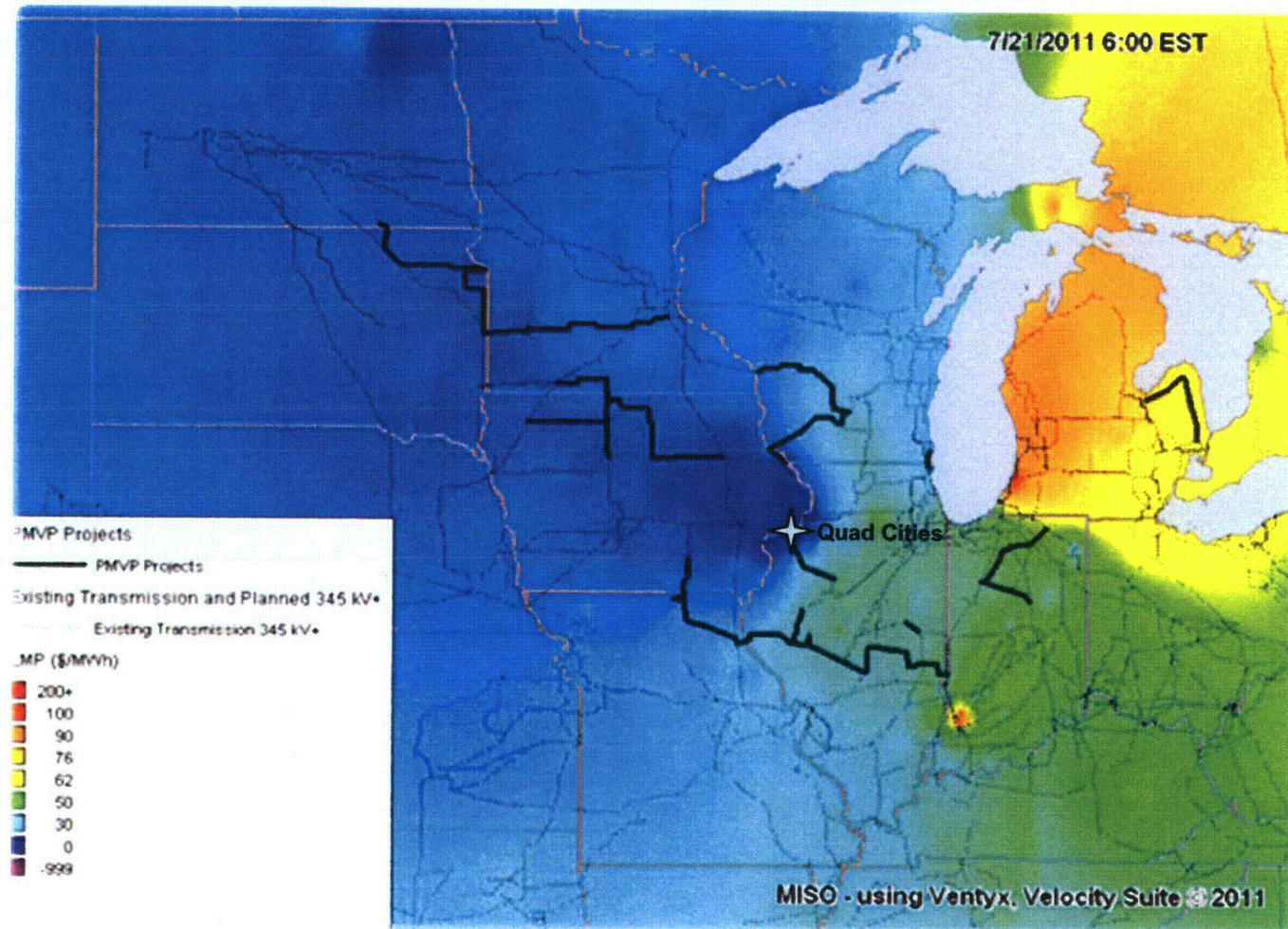


July 21, 2011 1:00 AM



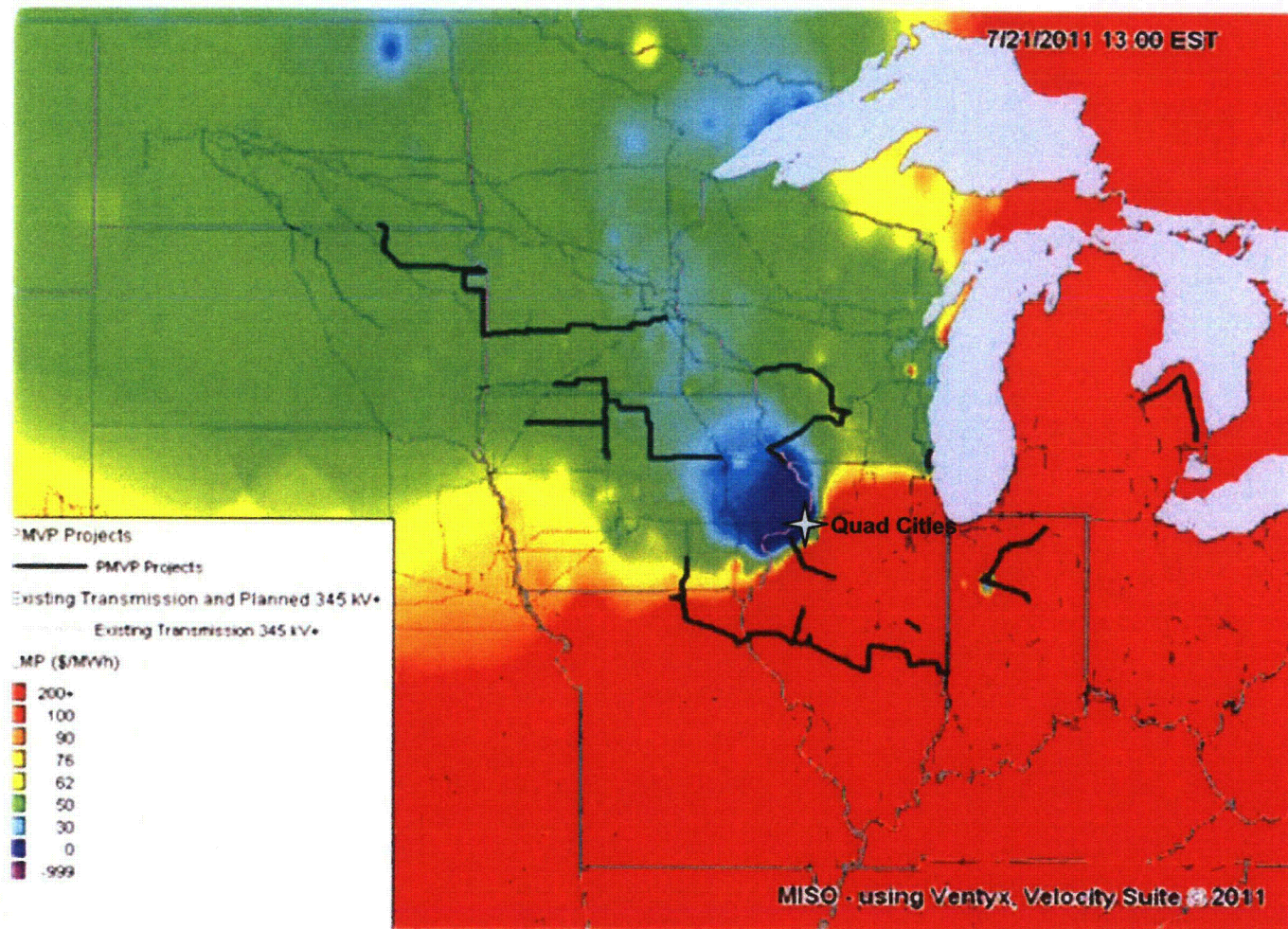
Slide 5

July 21, 2011 6:00 AM



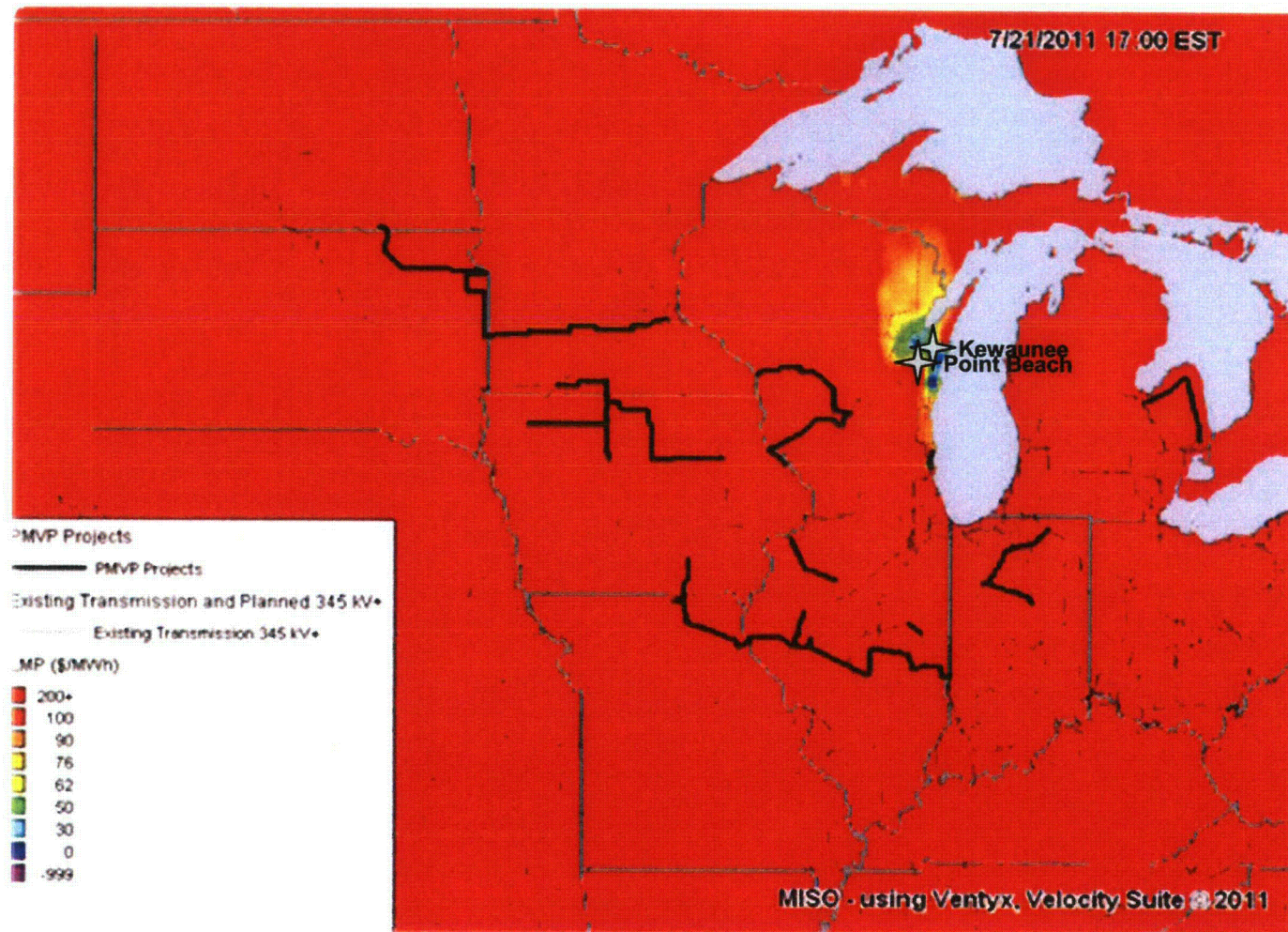
Slide 6

July 21, 2011 1:00 PM



Slide 7

July 21, 2011 5:00 PM



Slide 8

Summary

- **Operators direct changes to the power system to reliably serve consumers at lowest possible prices**
- **Insights into the resulting range and location of price impacts are available**
- **Flexible generation, storage, and load resources at strategic locations can affect market prices**

Questions?



Geomagnetic Disturbances

***Regis Binder
Federal Energy Regulatory
Commission
Office of Electric Reliability
June 15, 2012***

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Geomagnetic Disturbances

- ***Coronal mass ejections from the sun send gusts of ionized particles into space***
- ***Earth's magnetic field captures ionized particles causing varying magnetic fields on Earth's surface***
- ***Changing fields induce voltage in the Earth (V/km) and cause DC electrical flows called Geomagnetically Induced Current (GIC) in the Bulk Power System***

Geomagnetic Disturbances

- ***Threats to the BPS***
 - ***Damage/destruction of equipment***
 - ***Transformers***
 - ***Generators***
 - ***Breakers trying to operate***
 - ***Capacitors***
 - ***Increased VAR consumption***
 - ***System voltage instability***
 - ***Blackouts***
 - ***Creation of harmonics***
 - ***Incorrect operation of protection systems***

Conflicting Results

- **Oakridge National Laboratory Study**
 - **Predicts that well over 300 EHV transformers will be at-risk for failure or permanent damage**
- **NERC Interim Report**
 - **Most likely worst-case system impacts from a severe GMD event and corresponding GIC flow is voltage instability**

Mitigation Steps

- **Hardware solutions**
 - **Series blocking capacitors**
 - **Neutral devices**
 - **Blocking capacitors**
 - **Reducing resistors**
 - **Increased GIC withstand capability**
- **Operations solutions**
 - **Reduced loading and load shedding**
 - **Increased reactive generation reserve**

GMD Staff Tech Conference

- ***Held April 30, 2012***
- ***Panel I: Assessment of GMD Risks***
 - ***DHS, researchers, NERC, industry***
- ***Panel II: Moving Forward on GMD***
 - ***NOAA, NRC, UK Dept. of Energy and Climate Change, researcher, NERC, industry***
- ***Written comments accepted thru May 21***

GMD Staff Tech Conference

- ***General agreement on:***
 - ***Knowledge can be improved as urgent actions are taken***
 - ***Standards are necessary to protect grid from GMDs***
 - ***Grid collapse is unacceptable***
 - ***GMD must be addressed regionally***
 - ***Vulnerable & critical assets should be examined/protected***

Potential Approaches to GMD

- ***Encourage voluntary action***
- ***Industry development of standard(s)***
- ***FERC order to develop reliability standard(s)***
- ***Some combination***

Geomagnetic Disturbances

- ***Thank you, and I look forward to discussing any questions.***

FOUNDATION FOR RESILIENT SOCIETIES

From: Thomas S Popik [<mailto:thomasp@resilientsocieties.org>]

Sent: Tuesday, June 12, 2012 12:01 PM

To: jon.wellinghoff@ferc.gov; cheryl.lafleur@ferc.gov; philip.moeller@ferc.gov; john.norris@ferc.gov; gregory.jaczko@nrc.gov; kristine.svinicki@nrc.gov; george.apostolakis@nrc.gov; william.magwood@nrc.gov; william.ostendorff@nrc.gov

Subject: Questions for the Joint Meeting of NRC and FERC on June 15

FERC Chairman Wellinghoff and Commissioners LaFleur, Moeller, and Norris; NRC Chairman Jaczko and Commissioners Apostolakis, Magwood, Ostendorff, and Svinicki:

We are writing in advance of the Joint Meeting of the Nuclear Regulatory Commission and the Federal Energy Regulatory Commission to be held on June 15, 2012.

The design of the current fleet of U.S. nuclear power plants was based on assumptions that the electric grid would be highly reliable, that outages would be of short duration, and that outages could be local but not regional or national in geographic scope. Forty years of subsequent operational experience and scientific study has shown these assumptions to be invalid. The widespread Northeast Blackout of 2003, as well as weather-related blackouts, have shown that outages can last for days or weeks and be regional in scope. The 1989 Hydro-Quebec Blackout and retrospective scientific studies have shown the potential for widespread blackout due to solar geomagnetic storms. Recently, it has become apparent that the U.S. electric grid could be vulnerable to cyber-attacks; if these attacks result in loss of critical equipment with long replacement times, widespread and long-term electric outage could result. Finally, increasing use of non-dispatchable wind and solar power, along with retirement of coal-fired generation plants, increase the chance of rolling blackouts due to unexpected events—so-called “single contingencies.”

Probabilistic studies and Severe Accident Mitigation Alternatives (SAMA) for nuclear plant licensing consistently show that the greatest risk to nuclear power plants comes from Loss of Outside Power (LOOP). Yet these studies and plans do not explicitly include the initiating events of severe solar storms or cyber-attack, or rolling blackouts due to shortage of dispatchable power. The events at Fukushima Dai-ichi in Japan amply show the consequences of extended LOOP and associated Station Blackout (SBO). Likewise, the 2003 Northeast Blackout caused an unprecedented nuclear safety event.

The NRC and FERC Commissioners should utilize the June 15 joint meeting to examine if the current regulatory system for electric grid reliability is sufficient to assure safe operation of nuclear power plants. In particular, we ask that these questions be addressed at the joint meeting:

- Twenty-three years after the Hydro-Quebec Blackout, the North American Electric Reliability Corporation (NERC) has not established a reliability standard for protection against solar geomagnetic storms. What effect would a widespread blackout due to solar storm have on nuclear power plants and associated spent fuel pools?
- Four years after FERC ordered enhanced cyber security standards for electric generation and transmission companies, multiple ballots to establish cyber security standards recently failed at NERC. What effect would a blackout caused by cyber-attack have on nuclear power plants?
- Rolling blackouts in Texas during February 2011 were partially due to inadequate reserve margins. Nonetheless, reserve margins for Texas (ERCOT) are still set lower than for other electric grid

interconnections. What effect would future rolling blackouts due to inadequate reserve margins in Texas have on safety for the South Texas and Comanche Peak nuclear power plants?

- Will retirement of coal-fired plants affect reserve margins and increase the likelihood of rolling blackouts? Do diesel generators at nuclear power plants have sufficient reliability to cope with increased incidence of rolling blackouts?
- How will greater proportions of non-dispatchable solar and wind generation affect electric grid reliability and nuclear safety?
- With increasing interdependence between electric generation and natural gas delivery, what studies has NERC conducted to examine the effect of gas-electric interdependence on blackout duration and blackstart operations? Could the duration of blackstart operations persist beyond the seven days of diesel generator fuel commonly stored on-site at nuclear power plants?

The answers to these and other questions may indicate that the self-regulatory system for electric grid reliability, dependent on voluntary action by NERC and its members, is simply inadequate for nuclear safety. Should this be demonstrated by testimony on June 15, we urge the NRC and FERC Commissioners to jointly recommend legislative and administrative enhancements to electric grid reliability and nuclear safety.

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