



November 1st Public Meeting



North Anna Power Station Restart Readiness

***David A. Heacock,
President & Chief Nuclear Officer***

North Anna Inspection Summary

Process

- More than 100,000 hours
- \$21 million in inspection, testing, & evaluation
- Exceeded NRC endorsed guidance
- Restart readiness plan complete

Findings

- No functional damage to safety systems
- Units ready for restart

Forecasting Seismic Damage

Key factors

- Acceleration (vertical, north/south, east/west)
- Frequency of the vibration
- Duration of strong motion

Seismic acceleration response spectra

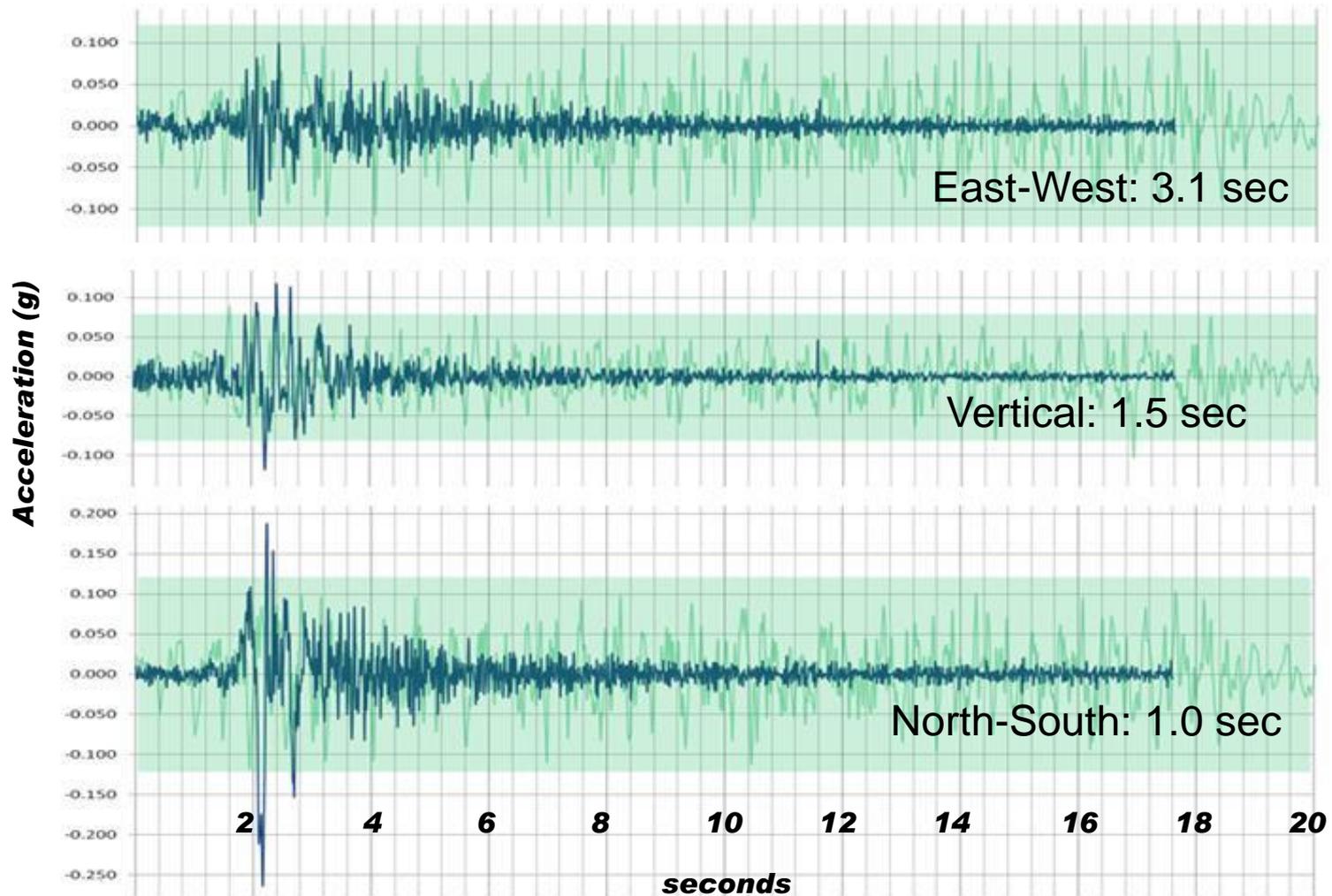
- Used to conservatively design plants
- Does not account for duration

Cumulative Absolute Velocity (CAV)

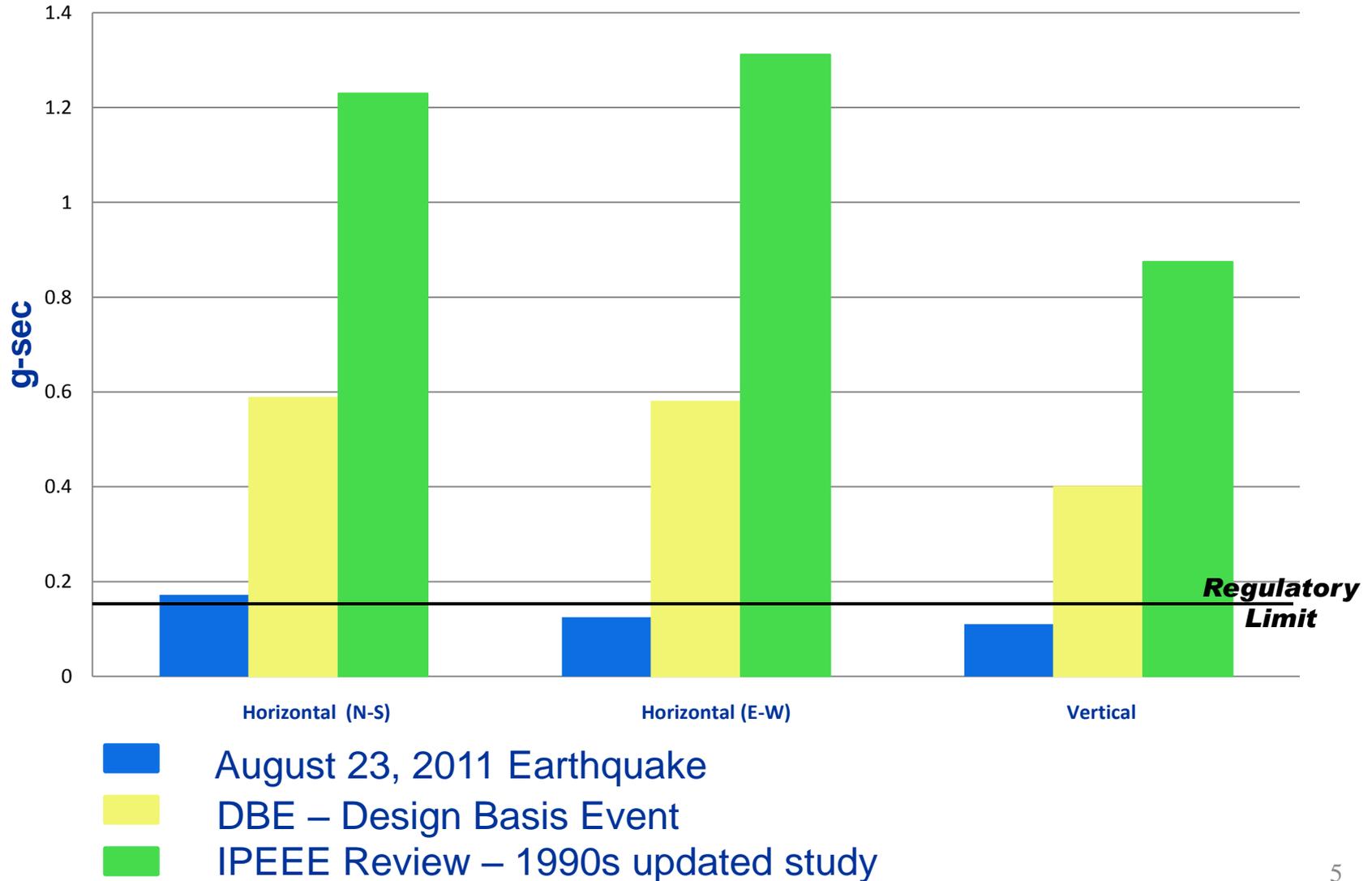
- Integrates all three factors
- Best indicator of energy imparted
- Best indicator of damage

August 23:

A strong, but very short event



CAV Comparisons: Regulatory Guide Slightly Exceeded in One Dimension



North Anna Has Significant Design Margin

- Conservatism in analytical methods
- Conservatism in American Society of Mechanical Engineers Code
- Accident load design of greater capacity
- Conservatism in seismic test standards

Previous Evaluations Established Significant Margins Beyond Design Basis

The Plant Tells the Story

Unit 2 Turbine Building



Non-Safety Related
Demineralizer
Tanks

Base Pedestal



Turbine Building Hallway

Crack In
Unreinforced
Non-Safety
Related
Block
Wall



Unit 1 Containment



Surface Crack In Interior Containment Wall

Dry Cask Storage



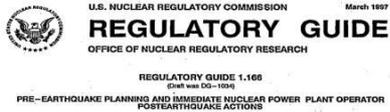
Casks moved
between 1 and
4½ inches



***Dominion Complied with –
and Went Beyond –
Regulatory Guidance***

Regulatory Guidance

Station restart readiness assessment actions based on NRC-endorsed guidance



RG 1.166, *Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions*, March 1997



RG 1.167, *Restart of a Nuclear Power Plant Shut Down by a Seismic Event*, March 1997

EPRI

Guidelines for Nuclear Plant Response to an Earthquake

WARNING: Please read the Export Control Agreement on the back cover.

Technical Report

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REGULATORY GUIDE 1.167
Date: March 1997

RESTART OF A NUCLEAR POWER PLANT SHUT DOWN BY A SEISMIC EVENT

INTRODUCTION

(3) of Appendix S, "Earthquake for Nuclear Power Plants," to Atomic Licensing of Production Sites," requires shutdown of the reactor ground motion exceeding basic earthquake ground motion if significant plant damage occurs. If significant plant damage occurs, the licensee must shut down the reactor if functional damage has been determined to be necessary for continued operation to the health and safety of the public.

The information contained in this regulatory guide is acceptable to the NRC and must be used in the design, construction, and testing of equipment and structures prior to reactor shutdown by a seismic event.

The Electric Power Research Institute has developed guidelines that will enable licensees to quickly identify and assess earthquake effects on nuclear power plants in EPRI NP-6695, "Guidelines for Nuclear Plant Response to an Earthquake," December 1989. This regulatory guide addresses sections of EPRI NP-6695 that relate to postshutdown inspection and tests, inspection criteria, inspection personnel, documentation, and long-term evaluations.

Regulatory Guide 1.167, Revision 2, "Nuclear Power Plant Restart After an Earthquake," describes seismic instrumentation acceptable to the NRC staff.

EPRI reports may be obtained from the Electric Power Research Institute, 3701 South Central Expressway, P.O. Box 217099, Phoenix, AZ 85021-7099.

EPRI NP-6695, *Guidelines for Nuclear Plant Response to an Earthquake*, December 1989

What is Functional Damage

“Significant damage to plant systems, components, and structures, either physical or other, which impairs the operability or reliability of the damaged item to perform its intended function. Minor damage such as slight or hairline cracking of concrete elements in structures does not constitute functional damage.”

(from EPRI NP-6695)

Let the Plant Tell the Story

Recommended actions ... are based on the following concepts:

“The plant itself, not damage information from nearby communities or recorded distant ground motion, is the best indicator of the severity of the earthquake at the plant site.” (from EPRI NP-6695)

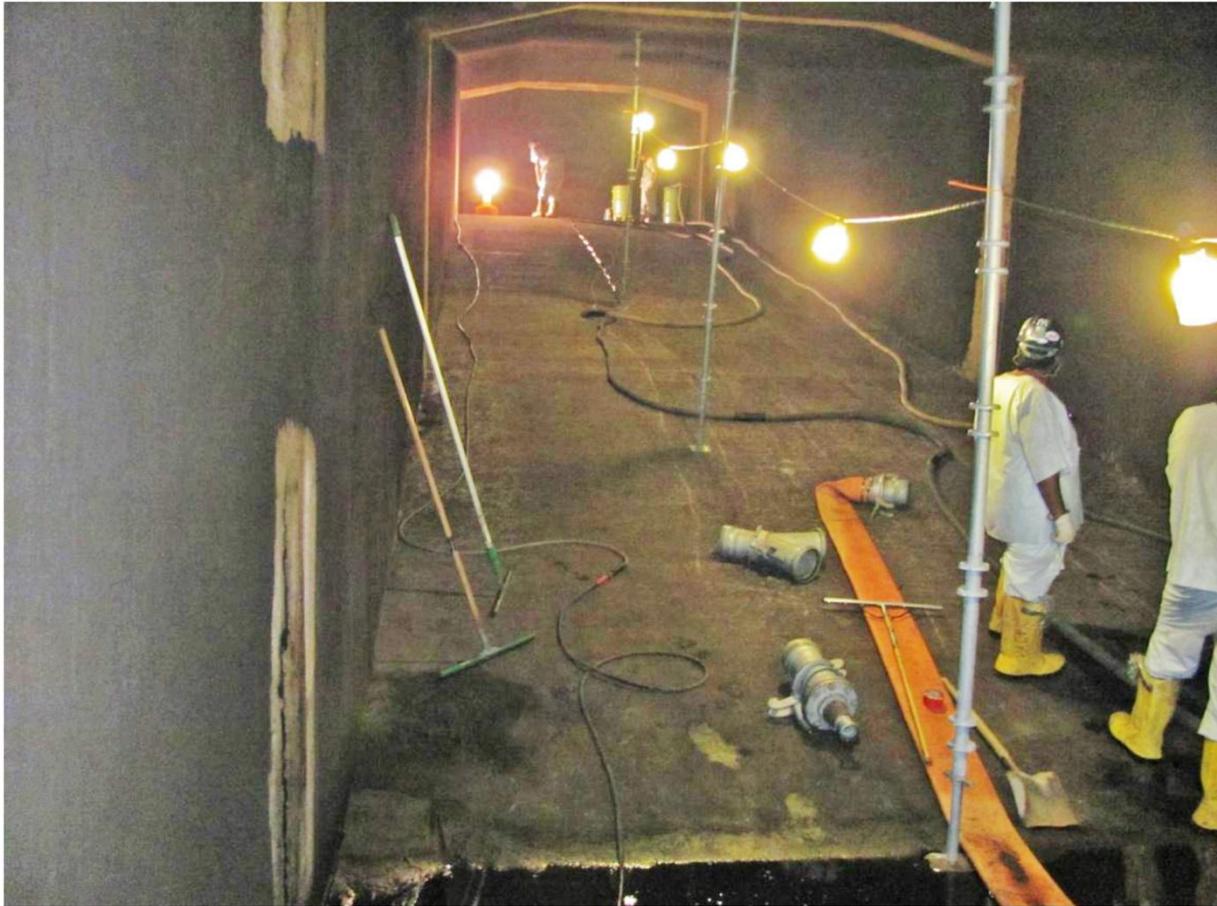
Inspections and Tests:

11,000+ Dominion Hours,

100,000+ Hours by Contractors,

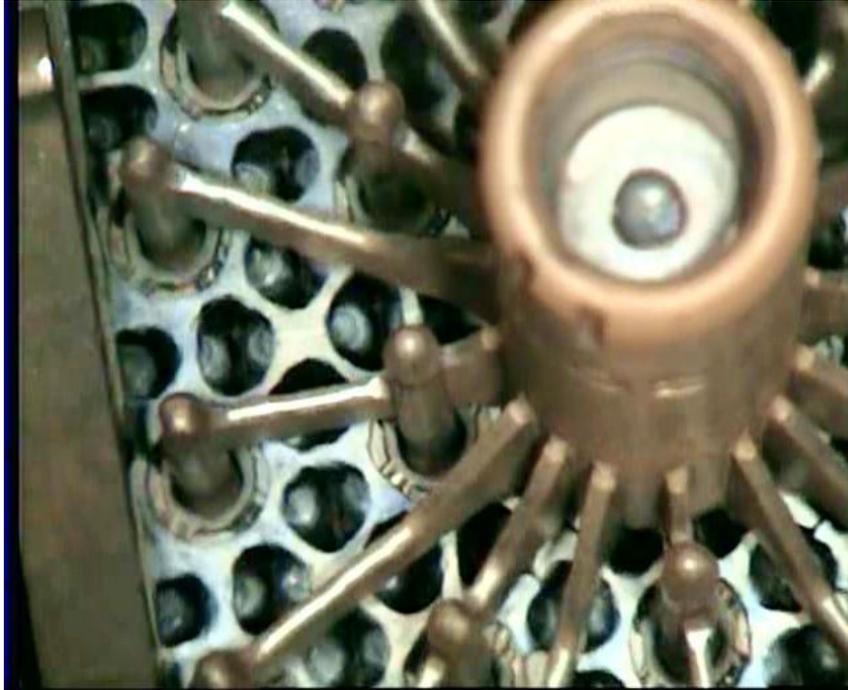
Multiple External Consultants

Investigating Components Most Likely to be Damaged

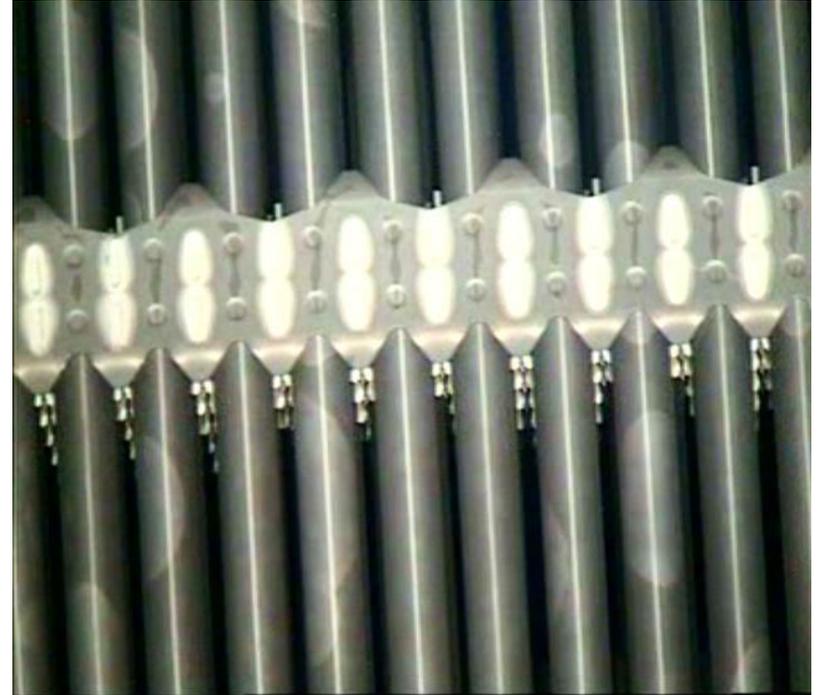


Unit 2 Tunnel Inspection

Extensive Fuel Inspections



Visual inspection of RCCA hubs



Examination of underside of
a mid-span mixing grid

Buried Piping



~ 100 ft of safety-related buried pipe visually inspected with wall thickness verified by Ultrasonic Testing

Next Steps

Short-Term Actions



- ✓ Installed Key Seismic Monitoring Equipment
- ✓ Revised Procedure to Respond to Earthquake
- ✓ Complete Start-Up Surveillances



Long-Term Actions

- Install permanent free-field seismic monitoring instrumentation
- Re-evaluate safe shutdown equipment (components with identified lower margins)
- Perform seismic analysis of recorded event consistent with EPRI guidance
- Maintain seismic margins in future modifications
- Revise the North Anna Safety Analysis Report

Summary

- Acceleration criteria were briefly exceeded in certain directions and frequencies by a strong, but very short duration earthquake
- Previous evaluations establish safe shutdown systems, structures and components can handle peak accelerations above design basis
- No safety-related systems, structures or components required repair due to the earthquake
- No significant damage was found or should have been expected and results of expanded tests and inspections have confirmed expectations

Conclusion:

The Plant Is Safe to Operate

Consistent With Federal Law:

- Restart Readiness Demonstration Complete
- No Functional Damage to Safety Systems
- Units Ready For Restart