

Bozin, Sunny

From: Bowman, Gregory ^{ETD}
Sent: Tuesday, August 30, 2011 10:27 AM
To: Nieh, Ho; Sosa, Belkys
Subject: FW: FYI - Slides on North Anna/GI-199
Attachments: GI 199.pptx; North Anna Earthquake.pptx

I sent the e-mail below to Nan and Mike, but got out of office replies, so I figured I'd pass them along to you for information. They're presentations the staff is going to use for upcoming briefings on North Anna and GI-199.

From: Bowman, Gregory
Sent: Tuesday, August 30, 2011 10:17 AM
To: Hipschman, Thomas; Marshall, Michael; Castleman, Patrick; Gilles, Nanette; Orders, William; Franovich, Mike
Subject: FYI - Slides on North Anna/GI-199

The attached slide presentations will be used for upcoming briefings for individual Commissioners on GI-199 and earthquake impacts at North Anna. I'm passing these along for information only. If you have any questions, please let me know.

Greg

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Generic Safety Issue 199 Briefing

Presentation to the Commissioners
August 30 and September 1, 2011

NRE

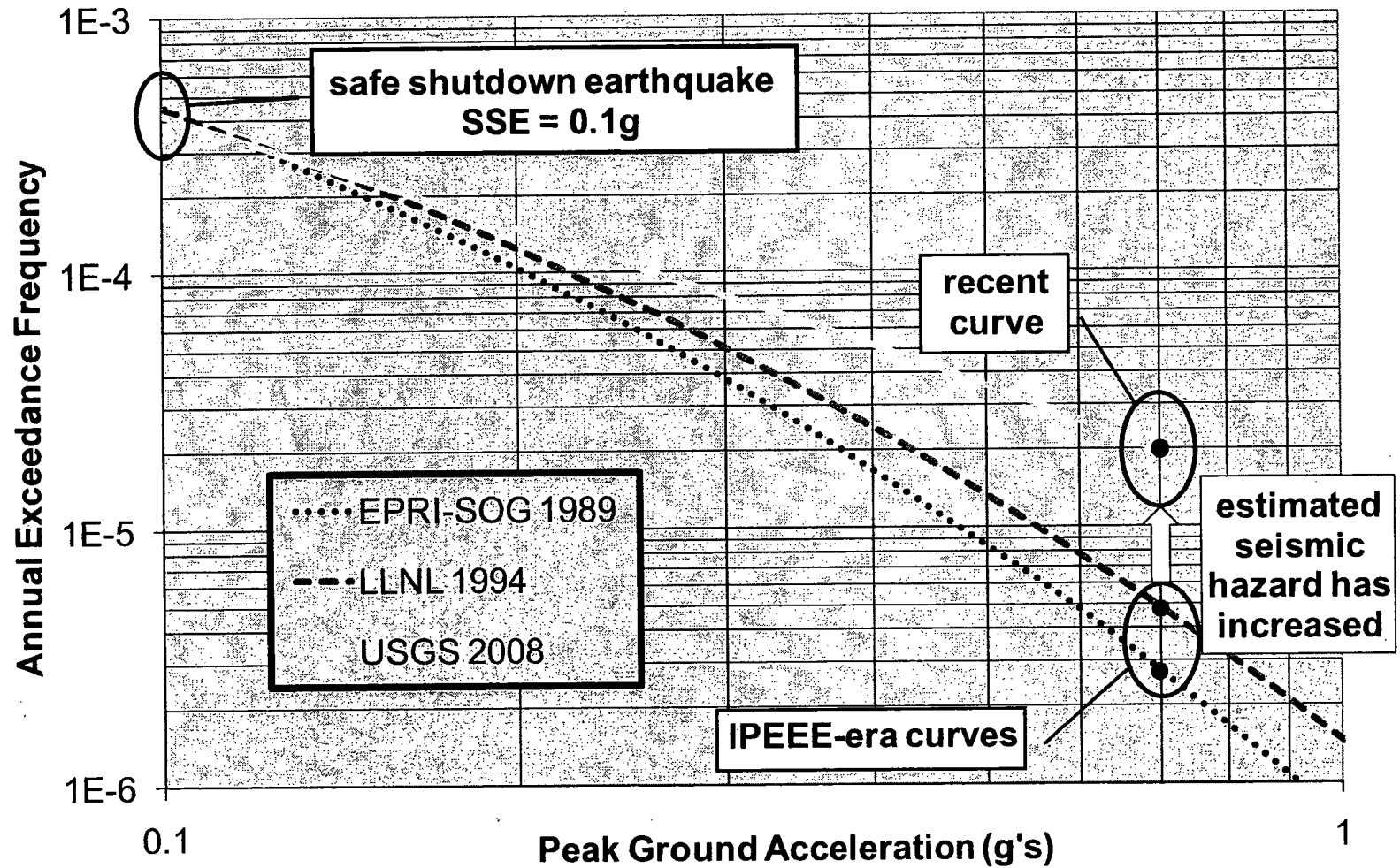
Generic Issues Program Stages

1. Identification
2. Acceptance
3. Screening
4. Safety/Risk Assessment
 - Issue Analyzed
 - Paneled, Report Issued
 - Recommendations Endorsed
5. Regulatory Assessment

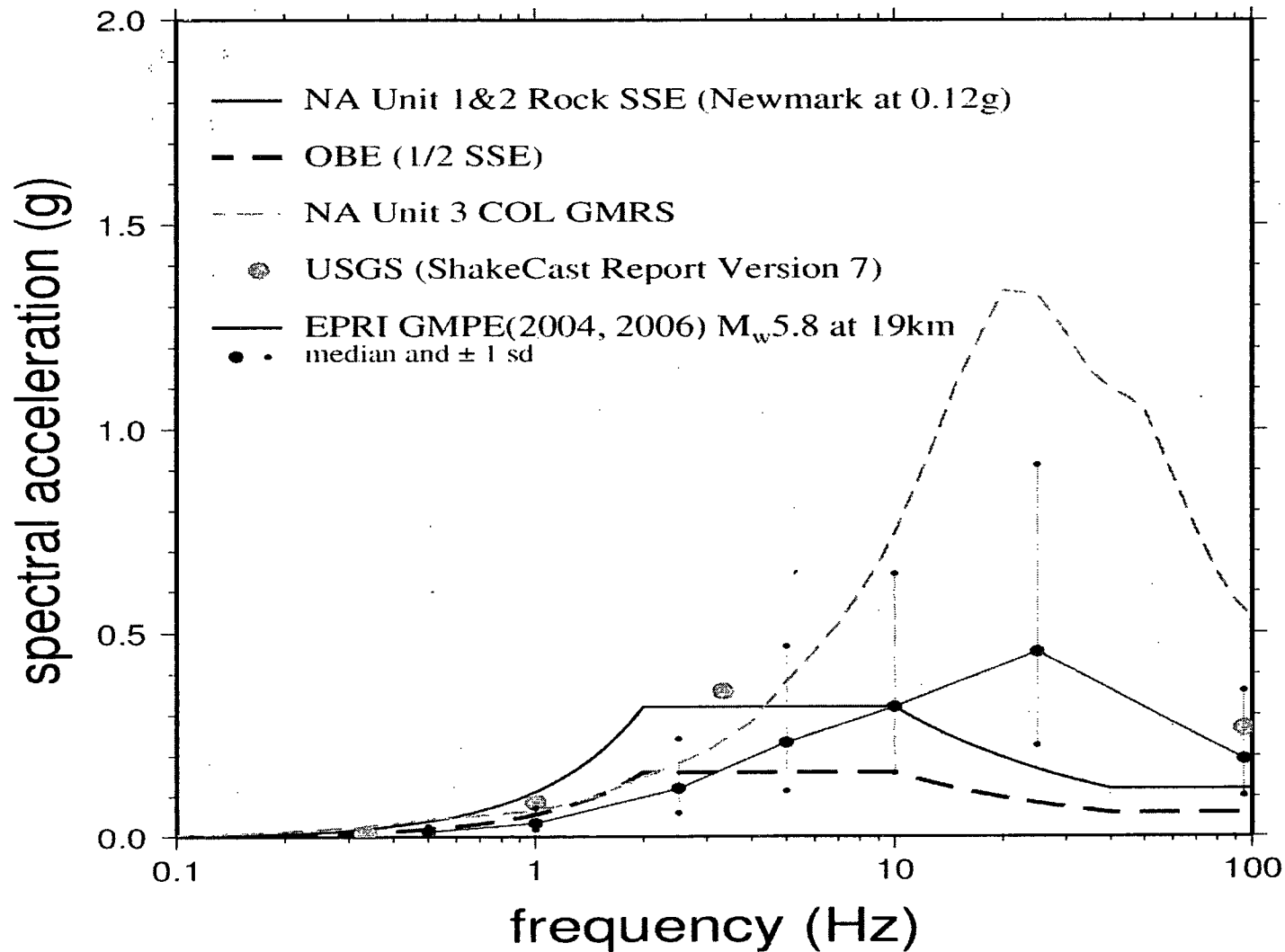
Genesis of GI-199

- **During reviews of COL and ESP applications, NRC staff identified increased seismic hazard estimates that may result in a greater likelihood of exceeding the safe shutdown earthquake (SSE) at operating nuclear power plants in the CEUS.**

What is GI-199 About?



GI-199 Safety/Risk Assessment



GI-199 Safety/Risk Assessment

Safety/Risk Assessment Stage Goals:

- Determine, if risk associated with GI-199 warrants further investigation for potential imposition of cost-justified backfits.
- Provide recommendation for the next step, i.e. continue to the Reg. Assessment stage for identification of potential, cost-justified backfits, be dropped due to low risk, or have other actions taken outside the GIP.

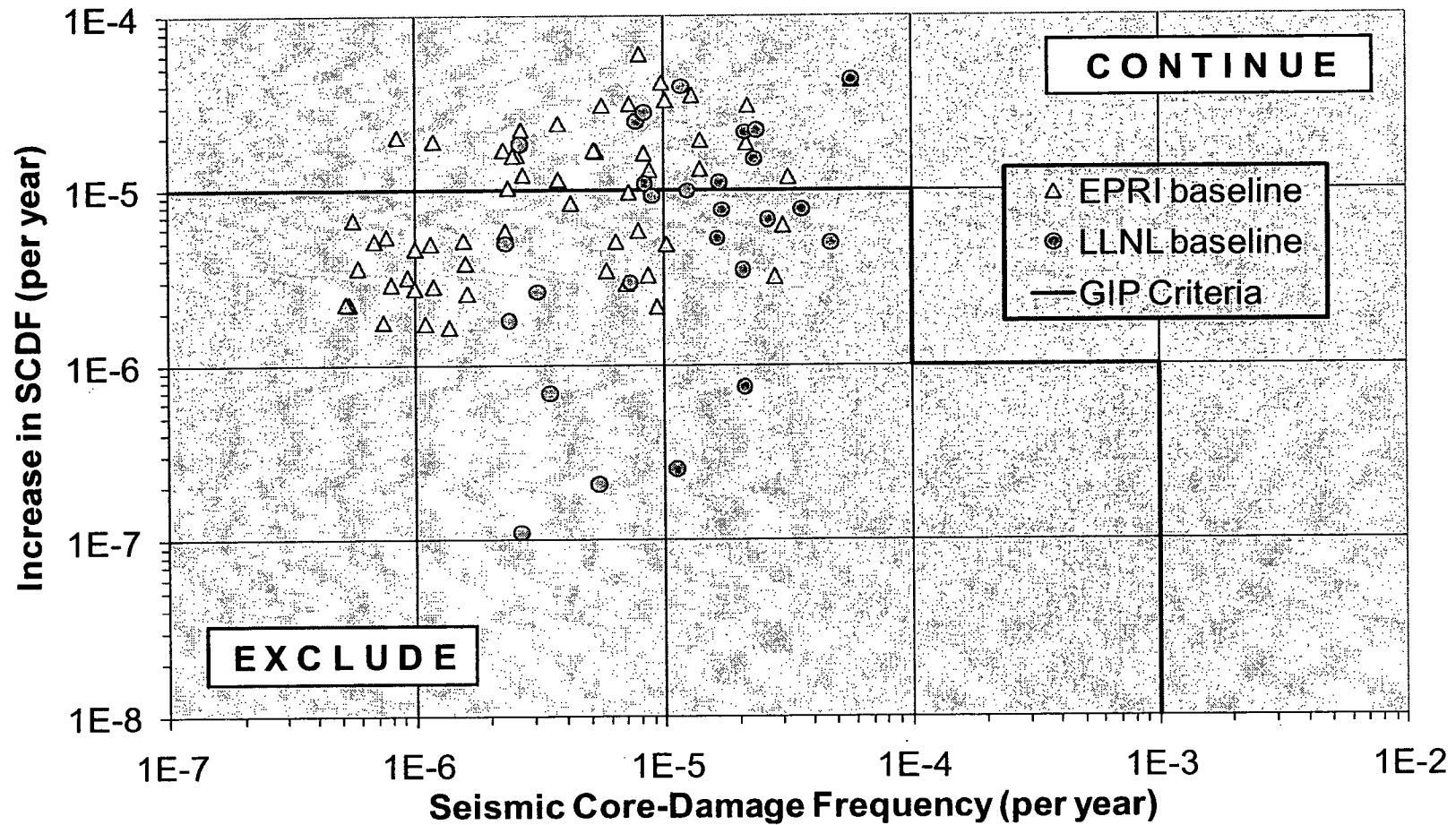
GI-199 Safety/Risk Assessment

Performed Two Tasks:

1. Compared updated seismic hazard estimates (USGS and ESP/COL) to design (SSE) and previous review levels (IPEEE-RLE).
2. Evaluated changes in seismic risk metric (SCDF) consistent with MD 6.4.

Performed for all 96 NPPs in CEUS

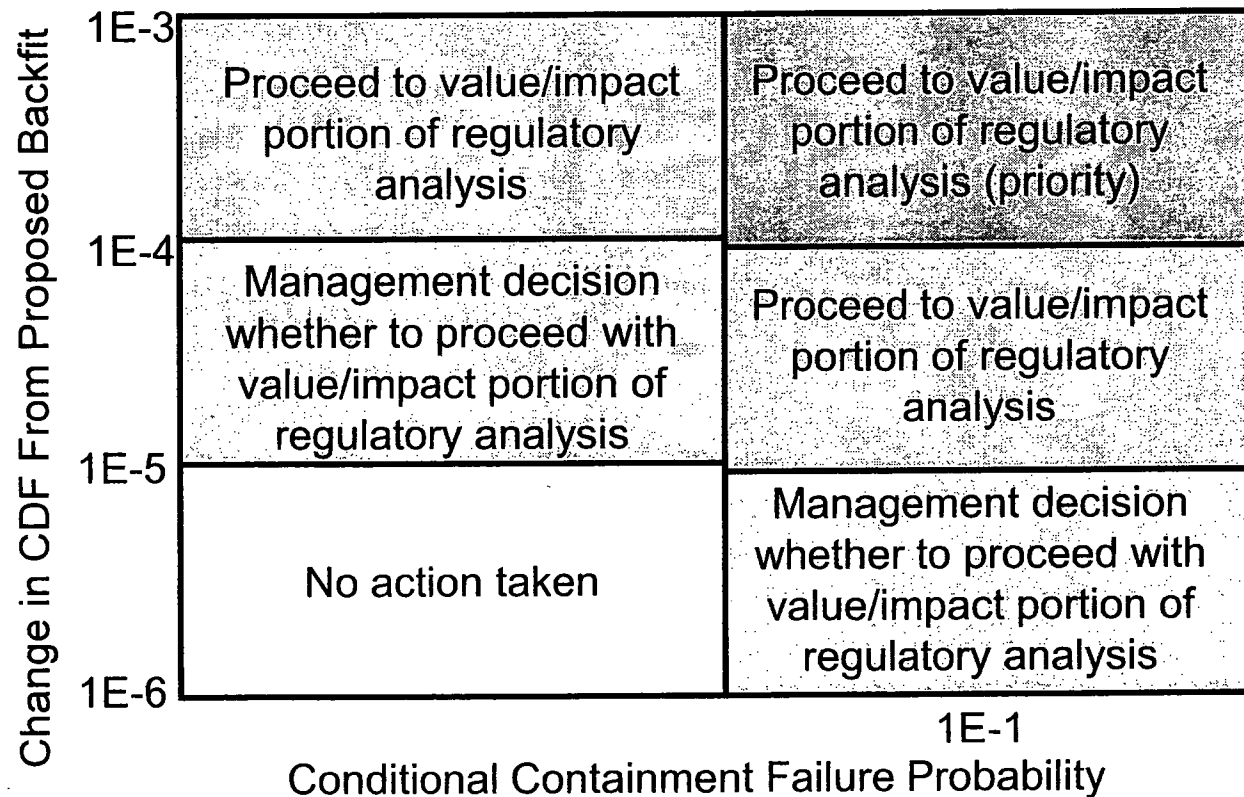
Task 2: Evaluated Changes in SCDF



Do We Need to Consider Backfits?

Cost-Justified Backfits That Provide Substantial Safety Enhancements Safety Goal Evaluation Screening Criteria (NUREG/BR-0058)

Distribution of GI-199
Safety/Risk
Assessment Results



Background to support GL

Background:

- Individual Plant Examination for External Events (IPEEE) provided initial basis for current assessment
- GI-199 Safety/Risk assessment provided the basis to proceed with the GL in accordance with GIP

Regulatory Insight

- No imminent seismic safety concern
- Current data indicates the probability for ground shaking above the seismic design basis in CEUS has increased
- GI-199 Safety/Risk assessment indicated changes in SCDF estimates for some plants lie in the 10^{-5} to 10^{-4} per year; meets risk criteria to continue to regulatory assessment stage of the GIP
- Approach to estimate SCDF in GI-199 extrapolated from IPEEE submittals, but lacked insight which SSC important to seismic risk
- Information needed as basis for considering potential plant backfits commensurate with reduction of seismic risk

Expected Information

Requested Response:

- Within 90 days, provide results of action taken to eliminate or reduce plant seismic vulnerabilities (anomalies, outliers & other findings) identified by IPEEE
- Within 180 days, provide seismic hazard curves over a range of spectral frequencies, and site specific GMRS and SSE
- Within 1 year (SMA), provide description of methodology to quantify seismic margin HCLPF capabilities of SSC, detailed list of SSC seismic margin values, bases for screening SSCs, description of the SMA and its logic models,..etc.
- Within 2 years (SPRA), provide significant contributors to SCDF, methodologies to estimate SCDF (e.g. seismic fragilities of SSC, dominant failure modes, location of components), findings from walk-downs

Information Needs

Justification for Information:

- From the IPEEE effort, potential for a decrease in safety margin for some currently operated plants
- SCDF estimates developed using 2008 USGS seismic hazard information and data from IPEEE submittals are higher by 10^{-5} to 10^{-4} per year when compared to past seismic hazard information
- Simplified staff analysis indicate a safety benefit may be achieved by increasing plant-level seismic fragility by even a small amount
- NRC doesn't have sufficient information to determine and quantify, on a plant specific basis, current seismic design margin and potential safety benefits from increasing plant-level seismic fragility

Concluding Remarks

- Generic Letter(GL) is consistent with the intent of Task force recommendations
- Evaluation of the North Anna Nuclear Power Plant for the recent earthquake event falls within the scope of requested actions in the GL



North Anna Nuclear Power Plant Seismic Event

Presentation to the Commissioners
August 30 and September 1, 2011

North Anna Design Basis

- North Anna Nuclear Power Plant (NANPP) has two Design Basis Earthquake (DBE)* values
- Structures, systems, and components (SSCs) founded on top of rock, anchored at 0.12 g
 - SSCs founded on top of soil, anchored at 0.18 g
- NANPP has two corresponding Operating Basis Earthquake (OBE) values, anchored at 0.06 g for rock and 0.09 g for soil (OBE is ½ of the DBE)

* Design Basis Earthquake means the same as Safe Shutdown Earthquake

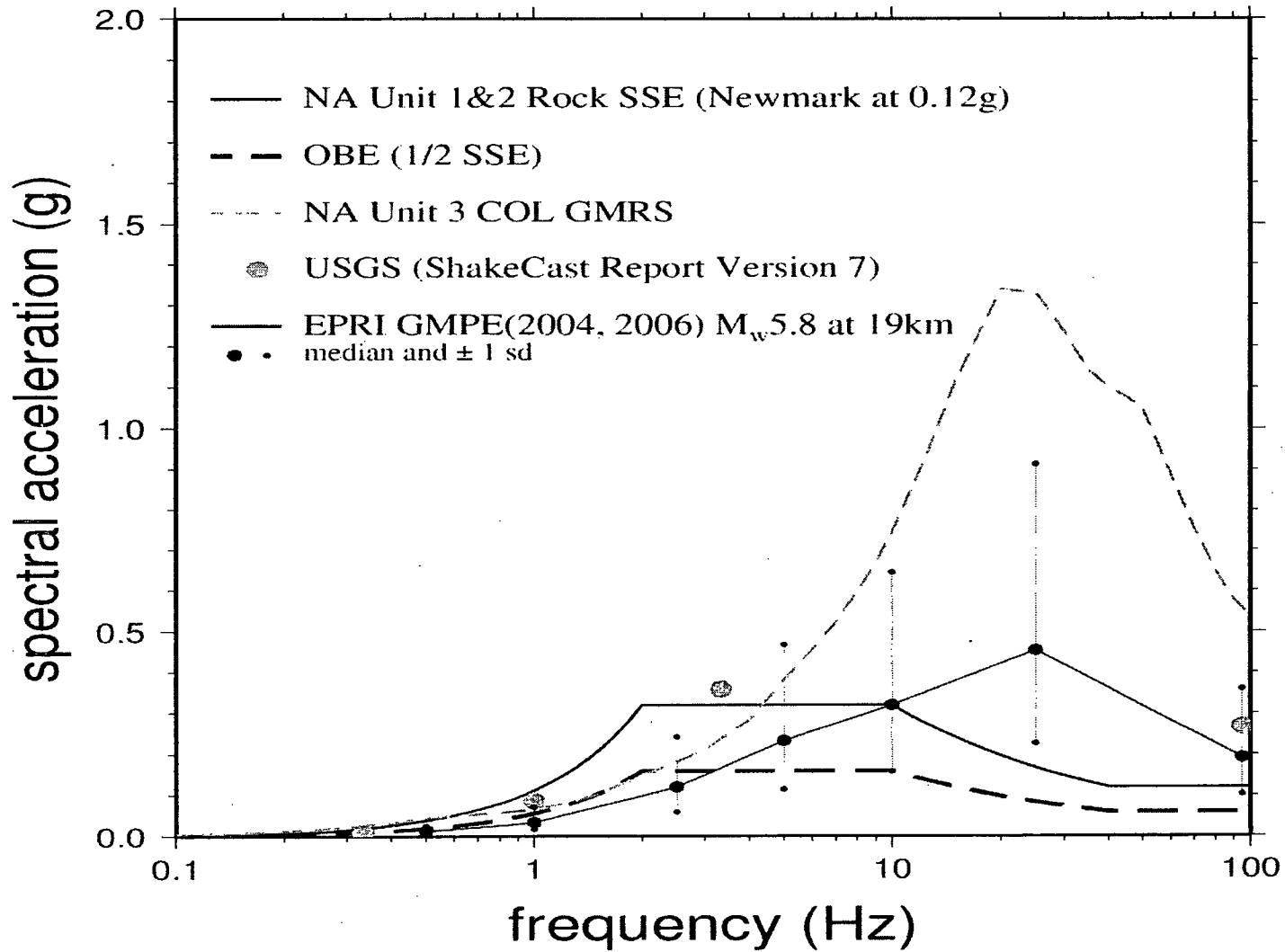
Sequence of Events

- On August 23, 2011, North Anna Power Station declared an Alert due to significant seismic activity onsite from an earthquake which had a measured magnitude of 5.8.
- The licensee conducted the 1st general walkdown of the plant as required by the North Anna Power Station abnormal procedure for seismic event.
- The licensee conducted the 2nd walkdown after the magnitude 4.5 aftershock.
- Seismic Response Spectrum Recorder (scratch plate) readings identified that the Design Basis Earthquake had been exceeded at certain frequencies.
- On August 26, the licensee declared all safety-related SSCs of Units 1 and 2 inoperable and issued a 10 CFR 72 Notification

Initial Staff Assessment

- Exceedance of the DBE is an unprecedented event at an operating unit
- However, while Perry Unit was under construction, an earthquake occurred that exceeded SSE at high frequency (15hz)
 - A special safety inspection was conducted by the NRC's Region III Staff on February 5-7, 1986. See Inspection Reports 50-440/86005 and 50-440/86006. This included a post-earthquake walkdown and visual inspection of an extensive list of safety-related systems and components.
- NRC staff performed independent analysis (See Figure 1)

Figure 1



Regulatory Framework

- Appendix A to Part 100—Paragraph V(a)(2), “Determination of Operating Basis Earthquake” (this regulation does not specifically address beyond design basis events.)
- RG 1.166, “Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions” references EPRI NP-6695, “Guidelines for Nuclear Plant Response to an Earthquake”
- RG 1.167, “Restart Of A Nuclear Power Plant Shut Down By A Seismic Event”

NRC Ongoing Evaluations

- The staff will use RG 1.166, "Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions" as guidance in evaluating the licensee's response to the seismic event.
- Information from NANPP's seismic recordings will be utilized by the staff to assist in the assessment of the licensee's operability determination
 - The staff will use RG 1.167, "Restart of a Nuclear Power Plant Shutdown by a Seismic Event" as guidance in evaluating the licensee's response to the seismic event.

Augmented Inspection Team

- AIT was dispatched today, which will be conducted in accordance with MD 8.3, "NRC Incident Investigation Program."
- Objectives of the AIT include:
 - Collect, analyze and document factual information and evidence
 - Assess licensee's actions and plant equipment response during the earthquake and aftershocks
 - Identify generic issues associated with the event
 - Conduct independent extent of condition review
 - Collect information to support final determination of risk significance of event

Issues Surrounding Plant Restart

- Appendix A to Part 100—Paragraph V(a)(2) states, *"If vibratory ground motion exceeding that of the Operating Basis Earthquake occurs, shutdown of the nuclear power plant will be required.*
 - *Prior to resuming operations, the licensee will be required to demonstrate to the Commission that no functional damage occurred to those features necessary for continued operation without undue risk to the health and safety of the public."*
- Staff will utilize RG and EPRI guidance to assess whether Appendix A to Part 100 criteria are met.

Possible Regulatory Paths Forward

- Staff will utilize appropriate regulatory actions to ensure that the licensee takes adequate actions to ensure that the regulatory requirements in Appendix A of Part 100 are met.
 - Confirmatory Order
 - Order/Adequate Protection

Other Potentially Affected Plants

- The list below provides the plants and the associated distance from the Epicenter:
 - North Anna is 18 km from the Epicenter
 - Surry is 139 km from the Epicenter
 - Calvert Cliffs is 141 km from the Epicenter
- NRR will confirm that the OBE was not exceeded at Surry and Calvert Cliffs.