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Sent:	Monday, August 29, 2011 7:24 AM
To:	McCree, Victor; Leeds, Eric; Giitter, Joseph; Hiland, Patrick; Thomas, George; Kulesa, Gloria; Martin, Robert
Cc:	Franke, Mark
Subject:	Earthquake at North Anna Summary Report - Friday 8-26 (3).docx
Attachments:	Talking Points for North Anna NPP Seismic Event final word.docx; Earthquake at North Anna Summary Report - Friday 8-26 (3).docx

Here are documents that will be used for this morning's presentation regarding North Anna earthquake issue. We will provide hard copies at the meeting...thanks

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Talking Points for North Anna NPP Seismic Event

Design Basis

- North Anna Nuclear Power Plant (NANPP) has two Design Basis Earthquake (DBE) ground motion, one for structures, systems, and components (SSCs) founded on top of rock, which is anchored at 0.12 g, and the other is for SSCs founded on top of soil, which is anchored at 0.18 g.
- NANPP has two corresponding Operating Basis Earthquake (OBE) ground motion, anchored at 0.06 g for rock and 0.09 g for soil.

Seismic Event

- Earthquake of August 23 occurred at a close distance (approx. 18 km) to the plant with a magnitude of 5.8 at a relatively shallow depth. Approximately 11 aftershocks have followed since then, the worst one of which was of magnitude 4.5.

Seismic Impact at NANPP

- Initial interpretation of data obtained from the licensee's seismic Response Spectrum Recorder (scratch plates) located in the auxiliary building (at top of basemat (EL 241 ft) and at EL 273 ft) indicate that the acceleration experienced at the NANPP Auxiliary Building has exceeded the corresponding DBE spectrum in at frequencies above 8 Hz, by a factor of approximately 1.5 to 2, in the vertical and horizontal directions.
- The USGS estimates, as of August 26, indicate the peak ground acceleration (PGA) at the North Anna site between 0.20g and 0.27g .The response spectrum corresponding to these estimated PGA values exceed the NANPP DBE spectrum over some frequency range. Data from the seismic response spectrum recorders in the Unit 1 containment are currently being interpreted.
- 25 of 27 vertical casks at the ISFSI have displaced horizontally 0.5 to 3 inches.
- After the initial walkdown, the licensee generated a Condition Report to describe all the discrepancies identified.
- On August 26, the licensee declared all safety-related SSCs of Units 1 and 2 inoperable, based on growing pieces of evidence that the DBE may have been exceeded at the site.

NRC Evaluations

- NRC staff performed an independent analysis using the best estimate of the earthquake location and magnitude together with the EPRI ground motion prediction equations. The staff's calculation is lower than USGS' estimate on the ground motion at the site (see attached Figure).
- The staff will confirm that the licensee is performing plant walk downs in accordance with RG 1.166, "Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions," which endorses sections of EPRI NP-6695, "Guidelines for Nuclear Plant Response to an Earthquake," with certain exceptions. RG 1.166 also refers to RG 1.167.
- Information from NANPP's seismic recordings will provide the basis for the staff's assessment of the licensee's operability determination of the affected structures and components.
    - The staff will confirm that the licensee is following the guidance in RG 1.167, "Restart of a Nuclear Power Plant Shutdown by a Seismic Event," regarding the exceptions to the EPRI NP-6695 document prior to recommending plant restart.

Significant Information Outstanding for Assessing Seismic Motions and Effects

- Results from seismic response spectrum recorders (scratch plates) and other seismic instrumentation in Unit 1 containment.
- Validation of onsite instrumentation and outputs
- ISFSI response
- Results of initial walkdowns inside containment

Actions for Seismic Spectrum Beyond Design Basis

- Appendix A to Part 100—Paragraph V(a)(2), "Determination of Operating Basis Earthquake" (this regulation does not address beyond design basis events.)
- RG 1.166, "Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions"
- RG 1.167, "Restart Of A Nuclear Power Plant S*h*ut Down By A Seismic Event"

Licensee Actions

- As of August 26, the licensee was in the process of coming down to a safe shutdown condition.
- The licensee will begin making the 50.72 reports (at least one 1 hr call) that are required now that this determination has been made and ensuring compliance with the applicable TS action statements.
- Licensee is currently in the process of developing plans and procedures for detailed walkdowns and other evaluations and actions to be taken prior to restart.

NRC Actions

- Region II with NRR/NRO support will be conducting an AIT at the North Anna site, in accordance with MD 8.3, "NRC Incident Investigation Program." The AIT will be led by Mark Franke. The entrance meeting is scheduled for August 30. The AIT is being chartered to collect data and determine the facts and circumstances related to the North Anna Nuclear Power Plant seismic event associated with the August 23 earthquake. Upon completion of the inspection, the NRC will issue an inspection report.

Plant Restart

- Appendix S 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."***
- NRR agrees with OGC that the NRR Director would be the authorized official to approve plant restart.

Potentially Affected Plants

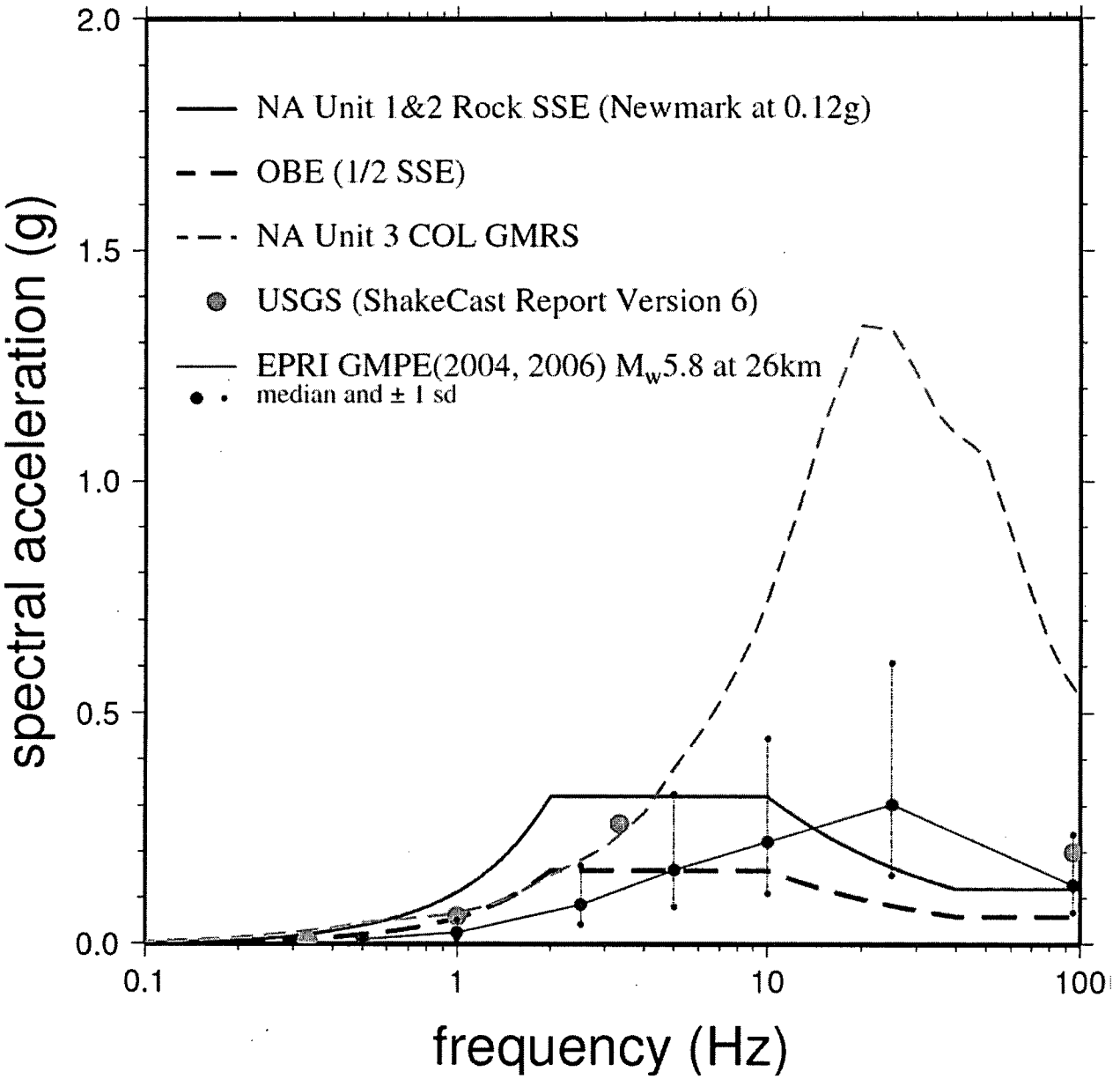
The list below provides the plants and the associated distance from the Epicenter:

North Anna is 18 km from the Epicenter
Surry is 139 km from the Epicenter
Calvert Cliffs is 141 km from the Epicenter

DE will work with DORL Project Managers to confirm that the OBE was not exceeded at Surry and Calvert Cliffs.

Relation to GI-199

The potential for the occurrence of an earthquake larger than the recent event is within the scope of GI-199 Generic Letter (GL), where licensees are requested to perform seismic risk evaluation based on latest seismic hazard estimates. The GL provides a systematic process to perform the requested evaluations and determine the delta increase in seismic core damage frequency.


NA Unit 1&2 Rock SSE (Newmark at 0.12g)
OBE (1/2 SSE)
NA Unit 3 COL GMRS
USGS (ShakeCast Report Version 6)
EPRI GMPE(2004, 2006) M_w5.8 at 26km
median and ± 1 sd
spectral acceleration (g)
frequency (Hz)
2.0
1.5
1.0
0.5
0.0
0.1
1
10
100

Report on Status of Activities at the North Anna Site (August 25 & 26, 2011)

Yong Li and George Thomas from NRR/DE were at the North Anna site on 8/25 and 8/26 to evaluate the issues related to the recent earthquake. They were briefed by the licensee, and presented questions from NRR/NRO/RES to the licensee, and collected documents. They looked at Earthquake instrument panel in the control room, and conducted walkdowns of the Turbine Building, Aux. Building, Spent Fuel Pool (SFP) and the transformer yard. A summary of the status of the visit, to date, is provided below:

- The licensee conducted the 1st general walkdown of the plant with focus on functionality and damage to safety-related SSCs (except inside the containment) within 8 hours as required by the North Anna Power Station abnormal procedure for seismic event. The walkdown was performed in accordance with the station guidance document for Systems Engineering Walkdowns. From the walkdown, the licensee identified many discrepancies for which condition reports have been written. The damages noted were generally minor.

- Among the items identified through the initial walkdown, the bushing of all four transformers were found to be damaged and the oil leaked from the transformer which caused the turbine generator to trip, resulting in shutdown of the reactor. The other items were identified to be "superficial," such as, minor cracks on walls, loose insulation, conduits coming lose, sliding of some baseplate supports of tanks/valves, 25 of 27 ISFSI vertical casks moved horizontally 0.5 inches to 4 inches, etc. A ripple effect was observed in the SFP during the earthquake and the water turned cloudy. No weepage, wet areas or cracks were observed in the service water reservoir earthen dam.

- The licensee conducted the 2nd walkdown after the magnitude 4.5 aftershock triggered at 2 am on 8/25/11; however, no additional discrepancies were identified. In the mean time, the licensee is in the process of developing specific guidance in preparation for detailed walkdowns, as well as walkdown of containment.

- The licensee indicated that all seismic monitors are contained in the Unit 1 containment at different levels of the structures as well as in the auxiliary building. No seismic monitors are located in the Unit 2 building. Seismic instrument panel in the control room lost power for 8.2 seconds.

- Seismic Response Spectrum Recorder (Scratch plates) readings from the auxiliary building basemat and that at an upper elevation were sent to California to be interpreted by a vendor. We were informed that the strip chart time histories recorded on magnetic tapes initially sent to Calvert Cliffs were also sent to California to be interpreted. Those interpretations were received by the licensee for the auxiliary building. Scratch plates from Unit 1 containment basemat and operating floor levels have been sent to California on 8/26 for interpretation.

- Since the licensee doesn't have a seismic monitor located in the free field on the free surface, therefore, a strict comparison of ground motion for SSE and OBE is difficult. However, the staff confirmed with the licensee that design response spectra at the mat and different levels are available and a comparison can be carried out between the original design and the recorded data when all the seismic readings from the seismometers are confirmed.

- On August 26, the licensee declared all safety-related SSCs of Units 1 and 2 inoperable, based on growing pieces of evidence that the DBE ground motion may have been exceeded at the site.