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DCP/NRC0588  
Docket No.: STN-52-003

August 26, 1996

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

ATTENTION: T. R. QUAY

SUBJECT: NRC POLICY ON MAGNITUDE OF SSE GROUND MOTION

Dear Mr. Quay:

In response to an action from the July 17, 1996 Westinghouse/NRC AP600 Senior Management meeting, Westinghouse is documenting our position on site specific seismic analyses.

On a number of occasions, NRC staff have stated the position that ALWRs, including the AP600, must be designed for a 0.3g earthquake at all sites. That is, if a site specific seismic analysis must be performed because of soil conditions that do not meet the interface, then the seismic analysis must be done using site specific soil conditions and a 0.3g ground motion regardless of local conditions that would support a lower ground motion or different ground response spectrum. The staff has not identified a specific document that identifies this position as a regulation.

The Westinghouse position is that the appropriate way to consider site specific soil conditions outside of the soils interface criteria is to perform a site specific analysis using site soils and site specific ground motion and spectra. The response spectra developed by this process would then be compared to the design response spectra at 4 selected locations. If the site specific spectra are bounded by the design response spectra, then the site is acceptable for the location for an AP600. This approach is outlined in subsection 2.5.4.5.5 of the AP600 SSAR. The use of site specific ground motion is intended to qualify the AP600 design for selected sites. Successful completion of the site specific evaluation would neither require nor permit design changes of structures, systems, or components. The AP600 does not include provisions to provide a site-specific piping design.

We have reviewed NRC, EPRI and ABB Combustion Engineering documents to find the source of the position that all sites must use a ground motion of 0.3g to qualify for use of the AP600. The results of the review are attached.

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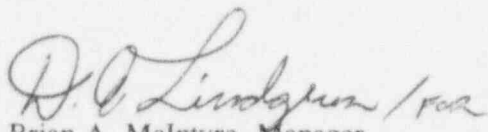
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We believe that the results of the review support the Westinghouse position and that the information outlined here will permit the NRC staff to support this position also. That position is that the standard AP600 certified design may be safely located on some sites that require a site-specific evaluation of the soil conditions and ground motions with a ground motion of less than 0.3g. Also the AP600 design is not required to sustain arbitrary high seismic ground motions at all sites to be qualified for design certification.

Westinghouse personnel are available to discuss or clarify the information contained within the attachment and the Westinghouse position on use of site-specific evaluation.

If you have any questions, please contact D. A. Lindgren at (412) 374-4856.



Brian A. McIntyre, Manager  
Advanced Plant Safety and Licensing

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Attachment

cc: G. Bagchi, NRC  
T. Cheng, NRC  
D. Jackson, NRC

## ATTACHMENT TO NSD-NRC-96-4804

### NRC Policy On Magnitude of SSE Ground Motion

#### SECY-93-087

This letter raises a few issues that have a connection with the magnitude of SSE ground motion. None of these issues would require universal application of 0.3g ground motion.

#### Item I. M. Elimination of OBE

The resolution of this issue is to include in the fatigue analysis for components an earthquake that is a fraction of the SSE. This approach has been incorporated into the SSAR. Site specific seismic conditions that result in response spectra bounded by the design response spectra would not require any additional consideration of component fatigue evaluation.

#### Item II. C. Seismic Hazard Curves

This item was related to the appropriate curves to use in a seismic PRA and was resolved by the use of the seismic margins analysis.

#### Item II. N. Site Specific Probabilistic Risk Assessments and Analysis of External Events.

The policy for this issue delineated in the staff requirements memorandum for this SECY was that a Seismic Margins Analysis may be done in lieu of a seismic PRA. The seismic margins evaluation is to be done at 1.67 of the Design Basis SSE. Design Basis SSE is not defined.

1. This policy is written for the review of design certification for AP600 not for the application of the AP600 to a specific site.
2. For the purposes of site specific seismic margins analysis, a design basis earthquake at a specific site could be defined at less than 0.3 g ground motion.
3. Since the loads imposed on equipment by a seismic event are determined by the response of the structure, comparison of the site specific response spectra to the design response spectra is an appropriate way to verify that the conclusions of the seismic margins analysis for 1.67 times the generic design certification SSE are valid for an event of 1.67 times the site specific SSE.

#### EPRI ALWR Utility Requirements Document, Volume III

The URD for the ALWR passive plant identifies site design parameters that envelop most, but not all, sites for operating reactors. The requirements document identifies provisions for evaluation of actual site parameters and the potential for modification of design parameters. (Chapter 1, Section 2, Paragraph No. 2.3.1.9)

NUREG-1242 Final Safety Evaluation Report (FSER) on the EPRI Requirements Document for Passive Plant Design

In Section 4.5.2 of the FSER for the EPRI requirements document, the staff observed that the seismic conditions included in the requirements may not envelop all sites in the United States. In particular, the staff noted that the amount of high-frequency ground motion in Eastern United States earthquakes could limit the sites at which the designs developed using a 0.3g zero period Regulatory Guide 1.60 response spectrum could be located. The FSER includes the following commitment. "The staff will review the site specific SSE with respect to the design basis at the time of siting."

ABB Combustion Engineering SAR and SER

For System 80+ provisions are included for a site specific structural dynamic analysis using site specific response spectra to qualify a site that does not meet the seismic site interface criteria in Section 2.5 of the CESSAR. See Page 3-43 of NUREG-1462. There is no requirement for a 0.3 g ground motion mentioned. The one place that a 0.3 g requirement is mentioned in System 80+ documentation is in an option outlined (Option 4, Page 3.9A-6 of CESSAR) for a site specific analysis to support site specific piping design. AP600 is not proposing provisions for site specific piping design. This option would not apply to AP600.

Proposed Appendix B To Part 52 -- Design Certification Rule for the System 80+ Design

"Item 5.(c)(7) The probabilistic risk assessment (PRA) required by 10CFR50.47 (a)(1)(v) must include an assessment of internal and external events. ... For earthquakes, seismic margins analysis must be based on a review earthquake level of one and two-thirds the acceleration of the safe shutdown earthquake (i.e. review earthquake level of 0.5g.)" The term review earthquake level is not defined in the rule.

The seismic margins analysis for the AP600 design certification is done for a level of 0.5g. As noted in Item II N, this design certification seismic margins analysis bounds the site specific margin for a site that meets the design response spectra at the designated locations.

The definition of a safe shutdown earthquake from Appendix A of 10 CFR, Part 100 repeated below, identifies the safe shutdown earthquake as a site specific condition.

- (c) The Safe Shutdown Earthquake<sup>(1)</sup> is that earthquake which is based upon an evaluation of the maximum earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake which produces the maximum vibratory ground motion for which certain structures,

systems, and components are designed to remain functional. These structures, systems, and components are those necessary to assure:

- (1) The integrity of the reactor coolant pressure boundary,
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of this part.

<sup>(1)</sup> The Safe Shutdown Earthquake defines that earthquake which has commonly been referred to as the Design Basis Earthquake.