

Draft Outline of Industry Presentation on “SSE & OBE Definitions” For the NRC Meeting of May 31, 2007:

The premise for this presentation is that the COL applicant has successfully demonstrated that their site is acceptable for the Certified Design per Figures 1 & 2 of Appendix D of SRP 3.7.1, i.e., “CSDRS is adequate.” In a separate attachment is the document “Performance-Based Spectra Definitions and Site Acceptability for Standard Nuclear Plants.” This document provides many of the definitions of the ground motion terms used in this presentation.

1. **Requirements for the seismic design ground motion per 10 CFR Part 52 for a COL referencing a CD: Industry understands that the CSDRS is a part of the design requirements of a CD; and therefore, the COL applicant must maintain the CSDRS as a design input unless a request for exemption is granted to use a different design response spectrum.**
2. **Clarification of “SSE” terminology and application:**

Industry position is the term “SSE” should be used for site-specific ground motion consistent with 10 CFR 100.23 accounting for site geology, seismology, and uncertainly defined by a site-specific PSHA plus 10 CFR Appendix S Part 50 for design applications. Using performance-base implementation we call this design ground motion the GMRS.

The use of the term “SSE” in a standard design is a site-independent design response spectrum, which forms part of the design input requirements for a CD under 10 CFR Part 52. The design response spectrum is not related to 10 CFR 100.23 and therefore should not be identified as the SSE at a COL site referencing a CD. Instead the term CSDRS is used to define the CD design response spectrum to help make that distinction.

Regulatory guidance provided in RG 1.208 and NUREG-0800 section 2.5.2 rev. 4 provides current guidance on determination of GMRS, section 3.7.1 rev. 3 provides current guidance for determining the design response spectra consistent with the GMRS together with guidance on Part 52 review process for a COL referencing a CD. This guidance is very helpful. But the industry does not believe defining CSDRS as the SSE for the site properly represents the site-specific ground motion, i.e., GMRS, and it applications for site-specific evaluations.

For a COL for a site referencing a CD, the COL applicant must use the CSDRS at that site as the design response spectrum to maintain the approved certified design of the CD. But there are site-specific features at the site were the site-independent CSDRS would not be the correct design response spectrum.

For seismic evaluations of site-specific features the appropriate seismic design response spectrum would be the GMRS or a FIRS depending on the location of interest within the soil profile. Of course the first application of the GMRS is to demonstrate that the CD CSDRS envelops the GMRS or site-specific seismic analysis using the GMRS produces seismic responses enveloped by the CD seismic responses. See Figures 1 & 2 of Appendix D of SRP 3.7.1.

Any site-specific seismic evaluation using the GMRS would require meeting the minimum SSE requirements of 10 CFR Appendix S Part 50.

Another application of the GMRS is site-specific soil liquefaction and slope stability analyses to demonstrate no potential for soil liquefaction or slope failure. These analyses would also include demonstration of adequate seismic margin.

During plant operation there may be a situation where a condition is identified that is not in compliance with the CD. A safety or operability evaluation is required to determine if the plant can continue to operate before the condition is corrected to bring the CD plant back into its certified design configuration. To assure adequate public safety at the site, the site-specific ground motion response spectrum, i.e., the GMRS would be the correct response spectrum to use for the safety evaluation.

Other possible future applications of the site-specific ground motion, i.e., GMRS could be seismic design of ISFS facility (dry cask storage).

Also, if there were ever a need to perform a site-specific PSA, the site seismic hazard, updated as necessary, would be used. Of course the CD portion of the plant would always be maintained at certified design level, i.e., CSDRS.

It is concluded that it is important to appropriately maintain a clear distinction between the standard design response spectra specified for the CD (CSDRS) and the response spectrum that truly satisfies site-specific SSE Ground Motion per 10 CFR 100.23 and 10 CFR Appendix S Part 50 (the GMRS).

3. OBE ground motion is used as a damage parameter to determine the need to shut down the plant if at the site there is a measured earthquake ground motion. Since OBE is not explicitly a design loading it must be defined as one-third of the design ground motion or less.

In Appendix B of RG 1.166 it states "The value of the OBE is set by the applicant." Also in section 4.1.1 of RG 1.166 allows the lower of 1) the spectrum used in the certified standard design, or 2) any other spectrum used in the design of any other Seismic Category 1 structure.

For the CD the design response spectrum is the CSDRS. For site features like soil liquefaction there is no design but instead a site-specific evaluation of safety margin against the GMRS. These site-specific evaluations can demonstrate significant safety margin. For example a rock site that has well compacted engineered backfill for the side soil there may be no potential for soil liquefaction. For this condition the CSDRS would be considered the lower bound ground motion for the site. It would then be reasonable to define the OBE as one third of the CSDRS. Another possible condition is a site where liquefaction is possible but one could double the GMRS and still demonstrate no potential for liquefaction. Since OBE is used only as a damage parameter and site evaluation at 2 times the GMRS demonstrates no potential failure of the site features the site OBE could be defined as one third of 2 times the GMRS.

It is concluded that defining OBE for a site be based on one third of the value of the lower bound ground motion for which safety related SSCs and site features that affect the Safety related SSCs have been demonstrated to be acceptable.