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Subject:

Pressurized Water Reactor Owners Group Comments to Draft Generic Letter
"Seismic Risk Evaluations for Operating Reactors" (Docket ID NRC-2011-0204), PA-
RMSC-0699

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*SUNSI Review Complete
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December 15, 2011

OG-11-402

Ms. Cindy Bladey
Chief, Rules, Announcements, and Directives Branch (RADB)
Office of Administration
U.S. Nuclear Regulatory Commission
MS TWB-05-B01M
Washington, DC 20555-0001

Subject: **Pressurized Water Reactor Owners Group**
Comments to Draft Generic Letter "Seismic Risk Evaluations for Operating Reactors" (Docket ID NRC-2011-0204), PA-RMSC-0699

Reference: (1) Nuclear Regulatory Commission Proposed Generic Communication "Seismic Risk Evaluations" notice of opportunity for public comment, September 1, 2011.

On September 1, 2011, the Nuclear Regulatory Commission released a draft generic letter for public comment entitled, "Seismic Risk Evaluations for Operating Reactors (Reference 1):" Attachment 1 transmits a set of technical comments from the Pressurized Water Reactor Owners Group directed at the current form and timing of the proposed generic communication on Reference 1.

For any technical questions regarding this letter and its contents please contact Jeff Stone at (410) 495-6510. If you have any questions regarding all other aspects of this letter, please do not hesitate to contact me at (704) 382-8619 or Mr. W. Anthony Nowinowski of the PWR Owners Group Program Management Office at (412) 374-6855.

Sincerely yours,

Melvin L. Arey, Chairman
PWR Owners Group

MLA:TZ:rfn

Attachment

cc: PWROG Risk Management Subcommittee
PWROG Licensing Subcommittee
PWROG Systems & Equipment Engineering Committee
PWROG PMO
M. Dingler, WCNOC
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Comments on the draft Generic Letter for Generic Issue 199 (GI-199)

The following comments to the draft generic letter on GI-199 are provided for the following areas:

- A. Scope
- B. Schedule
- C. Standard Compliance
- D. Technical Limitations
- E. Requests for clarification

A. Scope

As a general note, it is recommended that every effort be made to avoid imposing rework on utilities due to conflicting priorities between GI-199 resolution and other initiatives such as post-Fukushima, post-North Anna, and Next Generation Attenuation (NGA) relationship for the Central and Eastern United States (i.e., NGA east) program.

A.1 There is apparent inconsistency with the scope of the analysis described in the draft GL as Step 11 states: "If SCDF is greater than 10^{-5} per year or the plant level high confidence of low probability of failure (HCLPF) value is less than the review-level earthquake (RLE), addressees are requested to submit plans for actions that lower seismic risk. These actions may include an additional detailed analysis, such as an SPRA, or plant modifications." This contradicts the earlier back-fit discussion that states: "This GL also does not contain any direction or suggestion that the addressees should consider developing or implementing changes to the design or procedures necessary to operate their nuclear power plants in light of the information requested by this GL."

A.2 The current draft GL does not recognize the reality of "reduced scope plants," which start from a lower level of pre-existing data and analysis and are therefore expected to be heavily challenged in meeting either the one-year expectation for seismic margin analysis (SMA) or the two-year expectation for a seismic probabilistic risk assessment (SPRA). Even though some reduced scope plants appeared among the 27 "continue zone plants" in the initial safety/risk assessment performed by the Nuclear Regulatory Commission (NRC), this is judged (and recognized by the NRC) as being due more to the limitation in the original term of the comparison than to the actual hazard increase. The difference in original starting point (i.e., Individual Plant Examination – External Events (IPEEE) status) should be factored into the GI-199 resolution path.

A.3 The level of plant-specific information required to support the requests of the draft generic letter is not clear. As "plant-specific" is mentioned in Item (2) and (3) at page 5 of the draft GL, Step 2 in the Enclosure indicates that regional and local refinements are not necessary. Additionally, the degree of availability of data required for the ground motion response spectra (GMRS) to safe-shutdown earthquake (SSE) comparison may vary at different plants and soil sites may

require longer time period to develop new control point elevation hazard curves. This needs to be factored in the allowed timing.

A.4 When the IPEEEs were conducted, plants already performed an evaluation to a review level earthquake (RLE) (generally > SSE). Step 3 should state $GMRS \leq SSE$ or RLE_{IPEEE} . If $GMRS \leq RLE_{IPEEE}$ and the review of IPEEE on the basis of Step 1 does not invalidate the IPEEE RLE, there should be reasonable assurance that the plant is safe.

B. Schedule

The proposed schedule appears to be extremely challenging for an industry-wide initiative. The principal objections to the currently envisioned schedule are the following:

B.1 There is no provision for uncertainties in the publication of the Central and Eastern United States Seismic Source Characterization (CEUS SSC) project from the Electric Power Research Institute (EPRI). Although there is confidence in the release by EPRI sometime in late 2011/beginning 2012, it is apparent that this aspect is outside the control of utilities and should therefore be factored into the schedule. Given that the aggressive schedule for the comparison between GMRS and SSE does not allow for any significant floating, it is recommended to reset the time for response to the GMRS versus SSE, and subsequent steps starting from the full availability of EPRI data, which is currently envisioned for late January/beginning of February 2012¹ (while the report is expected in January, the full web-based database is expected to be available in February) or to delay the release of the GL until full CEUS SSC data are made available.

B.2 The difference in allowed time between an SPRA and a fault-based SMA approach (assumed to be synonymous of PRA-based SMA) does not appear to be warranted by the limited difference in complexity between the two techniques. The limited difference was also mentioned during the May 2011 public meeting on GI-199 (see Mr. Chokshi's remarks starting at page 151, line 10 of ML11256A124 - May 18 2011 public meeting transcript) and has been independently estimated to be on the order of 10% to 15% of the effort between the two technologies (given that the hazard development is essentially required now in both cases at a previous step). Given that the majority of the SMA plants adopted the EPRI success path SMA method for their IPEEE, which is not apparently recognized as an

¹ The NRC should officially notify the industry via a Regulatory Information Summary (RIS) or Federal Register Notice when the new industry seismic curves are available.

acceptable method, significant re-work is expected for SMA plants. The same time frame of a full scope SPRA should also be allowed for the fault-based SMA approach.

B.3 Lessons learned from a recent pilot at Surry of the SPRA Standard, which is referenced in the draft GL, indicate that the schedule proposed is extremely challenging. In particular, from the experience of the Surry pilot, it is doubtful an SPRA or SMA could be developed that meets all of the requirements in the ASME/ANS PRA Standard within the one- or two-year timeframe requested. Many of the supporting requirements (SRs) can likely be met in the PRA areas. However, those relating to seismic hazard analysis and fragilities cannot likely be met as they involve a significant amount of Engineering Mechanics and other engineering expertise. Judging from the past work on Surry, these tasks generally require a significant amount of time to complete.

B.4 The draft GL does indicate that "an alternative course of action" can be taken along with estimated completion dates. Two high-level alternative courses can be envisioned:

- a. A relaxation of the current requirements on the technical adequacy to maintain the schedule requested. This approach would provide simplified seismic risk assessments (i.e., not fully consistent with the requirements of the ANS/ASME PRA Standard) to identify risk contributors to be provided to the NRC. The limitations of this approach are in some extent reduced in importance by the fact that the seismic hazard would still be preliminary (i.e., not including NGA-East considerations) and that the seismic portion of the AMSE/ANS PRA Standard is still being modified. This is based on the consideration that developing the changes to the PRA is relatively straight forward and can probably be completed within the two-year period; however, the plant-specific fragilities typically take a significant amount of time to complete. Therefore, a SPRA using the HCLPFs, median capacities from the IPEEE, or from generic industry data could be used to obtain risk insights and allow for the prioritizing of plant-specific fragility calculations.
- b. A relaxation of the envisioned schedule to allow for other parallel activities to be fully developed and addressed in SPRA and PRA-based SMA fully compliant with the requirements of the ANS/ASME PRA standard.

C. Peer Review and PRA Standard Compliance

C.1 A Pressurized Water Reactor Owners Group (PWROG) activity is now being completed that addresses guidance for external events (including seismic) PRA peer review process; nevertheless, industry guidance for performing external event PRA peer reviews has not been completely developed and piloted. The limited pool of expertise is a challenge not only for the development of a significant number of SPRAs or SMAs, but also for the performance of a significant number of peer reviews. Under this point of view, a regulatory push for SPRA

with full-scope Regulatory Guide (RG).1.200 style peer review can be considered similar to the National Fire Protection Association (NFPA) 805 push for development and peer review of fire PRAs. Under the PWROG, Westinghouse planned for the implementation of the Nuclear Energy Institute (NEI) fire PRA peer review process assuming the possibility of performing up to three peer reviews a week for two weeks every month (assuming the availability of volunteers and outside subject matter experts). In fact, from 2007 to the end of 2011, the process was re-adjusted on a pace that is essentially based on available expertise, and only 17 fire PRA peer reviews were performed in this time frame. Considering the even more limited pool of seismic expertise available, that a full peer review pilot has not yet been performed, and the industry's inexperience with SPRA peer reviews, this does not encourage the implementation of the aggressive schedule assumed in the draft GL.

C.2 Beyond the short allowed schedule already discussed above, it is important to remember that there is no RG.1.200 peer review process for an SMA, as the SMA (i.e., Part 10 of the ASME/ANS PRA Standard) is not currently endorsed by RG. 1.200.² While it can be envisioned that an adaptation of the SPRA peer review process can support an SMA peer review, this needs to be factored into the requirements of the draft GL and the associated schedule.

C.3 Given the above, alternative options to the peer reviews that can be considered are:

- a. Use the ASME/ANS PRA Standard as guidance only.
- b. Perform a self-assessment against the requirements in the ASME/ANS PRA Standard, Part 10 (SMA).
- c. Have an independent seismic expert review the SMA.

C.4 The GL indicates consistency with the requirements of ANS/ASME RA-Sa-2009 and RG.1.200 Rev. 2 as acceptance criteria for the development of SPRA, without specifying any Capability Categories; it is therefore expected that Capability Category I is acceptable for most, if not all, SRs.

C.5 The current timing of the GL does not allow for an endorsement of Addendum B of the PRA Standard; the review of the PRA Standard will provide significant clarifications on debated SRs, as well as updated references. The GL should be flexible enough to allow for the insights from PRA Standard updates to be considered as inconsistencies between Addenda A and B may be problematic. The PRA peer review process will likely be geared toward Addendum B, but even with the optimistic assumption of a fast track release of Addendum B, the current understanding is that the NRC will not endorse it in a revision of RG 1.200 in a time frame that would support the currently envisioned schedule for closure of GI-199, but rather will develop Interim Staff Guidance in the June 2012 time frame, which

² The NRC has offered to review and endorse this section if it is separated from the rest of the standard. NRC staff expects that SMA will follow Part 10, thus in effect endorsing Part 10 of the ASME/ANS PRA Standard.

will address also seismic requirements. The draft GL timing should include considerations of this additional guidance being released in a short term.

D. Technical Issues

Some miscellaneous technical considerations that are currently debated over in the industry and that have direct linkage with the requests of the draft generic letter are:

D.1 The current ASME/ANS Part 5 Working Group is still debating the technical adequacy of the SPRA Standard in its current format (i.e., Addendum A) and the appropriateness of how some of the lessons learned from the recent EPRI Surry SPRA pilot have been incorporated into the PRA Standard. Even a fast track release of Addendum B will not incorporate all the lessons learned from the Surry pilot. While it is not appropriate and realistic to wait for a "perfect standard," it appears to be counterproductive to require all plants to use Addendum A (or even Addendum B), thus forcing all plants into a "guaranteed re-work" when future clarifications will be available. A staggering of the effort may be more beneficial as the plants on the lower tail of the effort would not be required to perform such re-work. This is even more significant considering the future publication of the new Ground Motion Equation (i.e., NGA East project), which will become available roughly the time that GI-199 is closed (according to the current proposed schedule) and will therefore again require almost guaranteed re-work with little benefit for the actual safety of the plants.

D.2 A check point should be defined after the completion of Step 3 so that an appropriate prioritization of the plants based on the comparison between GMRS and SSE (e.g., an update of the initial screening performed in the initial safety assessment – ML100270639 – can be used as basis for the prioritization) can be agreed between NRC and industry. Such prioritization would allow deployment of the limited resources needed for this effort to the plants that would benefit the most in terms of public safety increase/reassurance.

D.3 Seismic Human Reliability Analysis (HRA). The draft GL puts emphasis on the need for a better consideration of non-seismic failures and human performance during a seismic event. Treatment of seismic-related HRA is one of the more controversial issues in the current version of the PRA Standard and, while current research is in progress, even a full-scope, but rushed, SPRA may be significantly simplified in the HRA portion, to reflect the current status of the technology.

D.4 Step 14 of the enclosure requires that the "SMA must use a composite spectrum RLE, defined as the maximum of the GMRS and SSE at each spectral frequency." The GMRS is being developed on the best available data that supersedes the information used in the development of the SSE. Therefore, the RLE used for the SMA should simply be the GMRS at each spectral frequency regardless of whether it is higher or lower than the current SSE. Combining the maximum of the GMRS and SSE, while conservative, would result in a

convoluted basis (i.e., comparing apples and oranges) and would further complicate future analyses when new seismic data becomes available.

E. Requested Clarifications

Finally, the following are requested for clarifications pertaining to the current language of the draft GL:

E.1 The purpose of this GL is to identify any vulnerabilities of a nuclear power plant as a result of the revised CEUS hazard curves. Though the term "vulnerability" is not specifically used, the GL's intent is parallel and closely aligned with the Supplement 4 of GL 88-20, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities." Similar to GL 88-20, the term "vulnerability" is not defined, though, in the draft GL, it is equated with terms such as "anomalies," "outliers," and "other concerns," and is clearly the result of Step 11 of Enclosure 1 of this GL. Accordingly, this GL does not require any explicit (or implicit) plant change, whether driven by risk insights or not. This is further supported by the back-fit discussion included in the draft GL. As such, the supporting risk assessment (SMA or SPRA) does not appear to rise to the level of a RG 1.200 risk-informed application and therefore does not require the full burden (e.g., peer reviews) of the ASME/ANS PRA Standard for the submitted analysis. Provide justification as to why this is considered to be a RG 1.200 risk-informed application.

E.2 For both SMA and SPRA, the draft GL requires identifying key assumptions. In the definition section of the PRA standard, the definition of "key assumption" is left to the context of a specific risk-informed application. A specific definition of key assumptions in the context of a risk-informed approach to the closure of GI-199 may be needed.

E.3 Step 5 of the enclosure states in part "... after demonstrating sufficient safety margin exist." Please define "sufficient safety margin" so that a precise success criteria is available to licensees. The lack of well-defined success criteria, acceptable to the NRC staff, could lead to endless rework and considerable uncertainty within the industry and the public at large.

E.4 It is not clear whether the results from this draft GL will become the new licensing basis for the plant. Please clarify if the NRC staff's review of the information submitted will result in the issuance of a safety evaluation for the site, thus changing the plant's licensing basis, or take some other form.