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From: Niles Chokshi *NCS*
To: George Hubbard, Goutam Bagchi *NCS*
Date: Thu, Aug 3, 2000 8:16 AM
Subject: Re: Spent Fuel Pool Decommissioning: Seismic Screening

Based on our discussions at the meeting yesterday, and follow on discussions with Bob Kennedy and Goutam, I would like to propose the attached outline for our white paper. Note that I have added a section on Use of Seismic Risk Information in Decision-Making. Please look at my **preliminary** rationale and give us comments. I think it is very important we properly characterize seismic risk and outline a decisional framework. I do not think that we need or should use a precise numerical target value to outline the decision process.

I will need a high level user's need memorandum very soon to try to arrange for needed resources.

Outline

Current Staff approach

>>> Goutam Bagchi 08/02 4:14 PM >>>

George,

After our meeting this morning, I reviewed the sources of conservatism in the seismic failure probability estimates with Robert Kennedy and Niles. I need to inform you that there can be a substantial amount of conservatism in the use of PGA vs spectral acceleration. However, Bob Kennedy used spectral acceleration for his failure probability estimates; so this factor is not present in the Table 3 of his report. Another source of conservatism is the fragility assumption. Here too, the margin for out of plane shear failure is minuscule. The last source that we examined is the hazard estimate itself. We can justifiably use a geometric mean of the LLNL and the EPRI hazard values (we would have to provide qualitative arguments to take care of Gareth's concern). The results of the use of geometric mean of EPRI and LLNL are provided in the NEI correspondence dated November 2, 1999. According to this information assuming the HCLPF value of 1.2 g spectral acceleration, the failure probability is 1×10^{-6} with 5 to 6 sites as outliers.

This is the same kind of result that we got, i.e., 3 operating plants are outliers for 4.5×10^{-6} using LLNL curves. If 1×10^{-6} result does not buy us anything for the partial drain down condition, I would much rather stick with what I gave you - 4.5×10^{-6} .

Thank you,
Goutam
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CC: David Diec, Diane Jackson, Gareth Parry, Glenn ...

R/22

Outline- White Paper on Seismic Risk of Spent Fuel Pool in Decommissioning

Current Approach:

Brief description to the extent necessary to relate to discussions on conservatism, uncertainties, etc.

Approach:

Key assumptions:

Hazard - Use of Livermore

Fragility - Generic, Spectral Acceleration, etc.

Others - Thermal Hydraulic, release, consequence, etc. (If necessary, this to be provided by others)

Key Results:

Sources of Conservatism and Uncertainties:

Hazard:

Two estimates

Site Specific Considerations: For example, potential benefits of newer ground motion models.

Fragility/Capacity:

Generic vs. Plant Specific

Other Factors: Thermal/hydraulic, timing, etc. (to be provided by others)

Discussion of Conservatism and Potential Approaches:

Hazard:

Discuss in context of two available methods

Bring in discussions from NEI responses

Show separate results (as a matter of discussion we can include what happens if we treat EPRI and LLNL estimates as two valid estimates and use of geometric and arithmetic means)

Site-specific refinements - costly, potential benefits very site-specific and unclear.

Fragility/Capacity:

Expect plant-specific capacity to be higher than generic

Will require detailed plant-specific analysis

Non-uniform conservatism, PWRs likely to show much larger margins with relatively little less effort. Some BWRs may not get much benefit.

Other Factors: To be discussed by others

Overall Conclusion: Plant-specific analysis will be needed to remove conservatisms, benefits are non-uniform (and in my opinion not needed for decision-making).

Decision-Making Framework for Seismic Risk:

1. Display separate results for both LLNL and EPRI as indicators of range of results
2. Display mean and median (may require additional calculations) results to highlight uncertainties, sources of uncertainties, and to provide a perspective on seismic risk when compared to other initiators (important in context of item 4 below)
3. Display the nature of uncertainties, show how the uncertainties in hazard drives the overall uncertainties. (Display NEI results of ground motion attenuation effects)
4. Considering the above three factors (i.e., knowing the bounding range, sources of uncertainties, and nature of uncertainties), the most useful index for risk-informed decision is the capacity measure.

That is, if a plant demonstrates or confirms that the plant HCLPF is greater than 1.2g spectral (~0.5g peak ground acceleration), the seismic risk is acceptably low and should be treated in the same fashion as other low-risk initiators. The seismic risk should not be a determinant of requirements for EP, insurance, etc.

(Note that in the ASME/ANS Standard parlance, in my view, our generic analyses, or for that matter NEI's, do not meet the standard of a good quality PRA (in terminology of ANS and Column B for ASME). Our analysis is appropriate for risk categorization and does provide some addition insights.

Conclusions and Recommendations:

1. How our current approach fits in the above decision-making process and results.

How checklist and walkdown will confirm seismic capacities and, hence, low seismic risk

Only three Eastern US plants may require additional analysis

2. Refinements will not lead to a different conclusion as the results will be very plant specific and factors greater than 5 (for example) will be difficult to obtain because of hazard driven uncertainties.
3. Retain current approach.