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Secretary
U.S. Nuclear Regulatory Commission
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ATTENTION: Rulemakings and Adjudications Staff

SUBJECT: NEI[1] comments on the Notice of Proposed Rulemaking on 10 CFR 50.44, *Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors,* and Supporting Documents (ref. 67 Fed. Reg. 50374, dated August 2, 2002)

The industry supports the rulemaking proposals to improve 10 CFR 50.44, *Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors,* for existing licensees. We have a few minor comments in specific areas of the Statement of Consideration and the proposed guidance. We have provided suggested changes in the enclosure.

Our principal concerns are with the requirements and guidance on future reactor designs. While we support the development of a generic set of requirements for all types of future reactor designs, the proposed rule is applicable only to light-water reactors. We recommend that §50.44(c) should be amended to clarify that its requirements relate only to light-water reactors.

The NRC staff has embarked on a project to develop a generic set of regulations that would be applicable to all types of reactor designs, i.e., a technology neutral set of requirements. Technology neutral regulations could be an optional replacement for the future reactor requirements proposed in the §50.44 rulemaking.

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including regulatory aspects of generic operational and technical issues. NEI members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

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Technology neutral requirements should be developed once the policy issues associated with generic requirements for all future reactors have been resolved. The industry fully supports these efforts.

We are concerned by the last paragraph in Section B, DG 1117, relating to risk-informed regulations. As written, any component that mitigates any severe accident would be categorized as risk significant. This is contrary to the proven methodologies for determining risk-significant structures, systems and components (SSC). As proposed, it introduces inconsistency into the regulatory process. We have suggested alternative language in the enclosure.

If there are any questions on these comments, please contact Adrian Heymer of the NEI staff (202-739-8094, aph@nei.org) or me.

Sincerely,

Anthony R. Pietrangelo

Enclosure

Detailed Comments on the Notice of Proposed Rulemaking on 10 CFR 50.44

Consistent Terminology

Consistent terminology should be used in risk-informed regulation improvement activities. At present, some projects use terms such as safety-significant, others use the term risk-significant, and others use the term high and low safety/risk significant. To avoid future misinterpretation and misunderstandings we should only have one set of terms. The industry prefers the terms safety-significant and industrial.

Safety Categorization of Hydrogen Mixing Systems

In the discussion on large dry containments, SECY 00-198 noted that in some large dry containment plants atmospheric mixing systems may be categorized as low safety-significant.

> "The requirement to ensure a mixed containment atmosphere was also imposed in the original rule prior to the TMI-2 accident to address the slow evolution of hydrogen from a design basis LOCA accident. Ensuring a well mixed containment atmosphere during a core melt accident is also important because if local pockets of combustible gases accumulate they can form detonable mixtures. However the results of the risk studies noted above indicate that hydrogen combustion is not a significant contributor to CLERP or CLLRP. This statement is true even when uncertainties are considered. This requirement is, therefore, not risk significant for this group of containments."

Also, page 5-8, the document states:

> "The large volume and relatively open geometry of large dry containments makes the accumulation of high concentrations of hydrogen unlikely in these plants. This open geometry also supports atmospheric mixing brought about by the phenomena of the core melt accident itself, such as blowdowns from pipe ruptures or reactor vessel failure. During the IPE process licensees with large dry containments were asked to evaluate their containments for susceptibility to local hydrogen concentration. These evaluations indicated that either no possibility for local hydrogen accumulation was identified, or that locations where accumulations could occur did not contain equipment whose failure (as a result of hydrogen combustion) would affect plant risk. Therefore, for large dry containments the risk-significance of ensuring a mixed atmosphere is relatively low even with no dedicated hydrogen control systems in place, as long as the open geometry is maintained."

The Statement of Consideration, Sections IIIA and IV, refer to hydrogen mixing systems. In some large dry containments the hydrogen mixing systems are in addition to the containment fan cooler units that are the prime mode of ensuring a mixed containment atmosphere. In these instances, the hydrogen mixing systems are classified as low safety-significant. The Statement of Consideration and the draft guidance state that the hydrogen mixing systems are safety-significant and impose requirements. The documents need to be reworded so as to only impose the requirements on that set of containment atmospheric mixing system components that are safety-significant. Such action would make the proposals consistent with the principles of risk-informed regulation: regulatory requirements should not be imposed on low safety-significant equipment.

Changes to DG 1117, Section B

The regulatory landscape has changed significantly since guidance was developed for the three certified advanced light-water reactor designs: ABWR, System 80+, and AP600. The regulatory process will continue to change as we move closer to a more complete adoption of risk-informed, performance-based requirements. In this transition, the scope of structures, systems and components that are subject to NRC special treatment requirements is being changed and improved. Similar changes are being planned for the technical requirements. It is important to maintain a consistent approach, definitions and methodologies when adopting improved, risk-informed regulations.

There is a well proven method for determining the safety-significance (risk-significance) of equipment using risk-insights. Guidance on what constitutes safety-significant equipment and events should be based on established risk-informed regulatory activities. The proposals in Section B introduce a new definition of what constitutes safety-significant equipment and introduces inconsistency into the regulatory process.

We recommend that the last paragraph in Section B should be changed to:

> "The treatment requirements for the safety-significant components in the combustible gas control systems, the atmospheric mixing systems and the provisions for measuring and sampling are delineated in Section C, Regulatory Position."

High Point Vents

Section IIIF in the Statement of Consideration states, "... venting noncondensible gases from the vessel allows emergency core cooling flow to reach the damaged core and thus prevents further accident progression." A more complete statement would be that the purpose of the high point venting is to ensure that natural circulation

cooling is an option for maintaining a long term safe stable state following a core damage accident in which significant amounts of noncondensible gases, such as hydrogen might be generated and retained in the reactor coolant system.

Ambiguity in DG 1117

The Introduction states, "...[the] regulation will be applicable to all construction permits or operating licenses under this part, and to all design approvals, design certifications, combined licenses or manufacturing licenses under part 52 of this chapter, any of which are issued after the effective date of the rule." Yet Section B discusses BWR Mark I, Mark II and Mark III plants as well as ice-condenser plants and existing reactors. Section C discusses both existing and future reactor designs and combustible gas control systems.

It is unclear what parts of the draft regulatory guide are applicable to existing reactors and what parts are applicable to future reactors. The draft regulatory guide needs to be amended to clearly separate existing reactors from future reactors.

Future reactor requirements

The proposed language, the draft regulatory guide and the proposed change to the Standard Review Plan assume that all new reactor designs will be light-water reactors and will present the same combustible gas hazard. This is incorrect. Future reactors, whether light-water or non-light-water may use different materials, cooling, or moderating mediums that may not result in the production of the same combustible gases, or quantities of combustible gas as the current light water reactor designs.

Recent regulatory interactions on gas reactor designs have demonstrated that non-light-water reactor designs are an option for the future. The regulatory interactions on these reactors provide a clear indication that non-light-water reactor designs do not present the same combustible gas hazard profile as the recently certified light-water reactor designs.

The discussions on a new technology neutral regulatory framework for future (light-water and non-light-water) reactors have just begun. Policy issues associated with the development of a risk-informed, performance-based regulatory framework and generic requirements for all future reactors need to be resolved before amended or new requirements are introduced for all future reactor designs. Examples of future reactor regulation policy issues include:

- Should there be a common or multiple set of regulations for light-water and non-light-water reactors?

- Should the design bases for future light-water reactors reflect risk-informed insights?
- Are there sufficient technical bases to support draft guidance on non-light-water design and licensing submittals?

The rulemaking package references statements in SECY 93-087, which predate the advent of risk-informed, performance-based regulation. We believe that the application of risk-informed, performance-based concepts would modify such statements. One area where there could be significant differences is in the treatment and consideration of design bases.

DG 1117 and the proposed section of the Standard Review Plan assume the design bases for future plants will be the same as for light-water reactors. As noted above, this is incorrect. Further, the development of risk-informed, performance-based regulation and the increased capability to perform detailed integrated plant analyses will change the prominence given to design bases in the existing regulatory framework. Our thoughts on design bases, as currently defined and used in the regulatory process, are similar to those of several members of the Advisory Committee of Reactor Safeguards who stated their opinions in a recent letter to the NRC staff dated July 18, 2002:

> "...Design-basis accidents are prominent features of the regulatory process for existing reactors. The design-basis accident concept, which originated in the 1950s, was an important element of reactor safety analysis in an era when comprehensive, integrated analyses involving wide ranges of accident initiators and the possibility of multiple systems failures were not practical undertakings. It can be argued that design-basis accidents have served the safety regulation of the current generation of nuclear power plants well. It must also be acknowledged that the accident at Three Mile Island revealed deficiencies of the design-basis accident concept. Design-basis accidents divert safety focus toward stylized accidents that, by definition, have exceptionally low probabilities at the expense of ensuring plants have capabilities of coping with more likely events.
>
> The conduct of comprehensive, integrated plant analyses is now well-developed and, indeed, such analyses are essential features of the regulatory process for advanced reactors. These analyses supplant the need for design-basis accidents in the regulatory process for advanced reactors. Specialized attention to a few, low probability accidents do not add to plant safety if integrated, comprehensive accident analyses are done well. Design-basis accidents do create unnecessary burdens for both licensees and regulators. Design-basis accidents, then, should not be considered in the Advanced Reactor Research Plan..."

The proposed Standard Review Plan, Section 6.2.5, references General Design Criteria (GDC) requirements. It is unclear whether an improved generic regulatory framework for all future reactors would include general design criteria requirements, as delineated in Appendix A to Part 50.

Despite these reservations, we believe the rule should be issued to prevent impacting on-going design reviews, such as AP1000. We proposed the following minor changes to the title and first paragraph of §50.44(c):

> "(c) Requirements for future *light-water reactor* applicants and licensees. The requirements in this paragraph apply to all *light-water reactor* construction permits or operating licenses under this part, and to all *light-water reactor* design approvals, design certifications, combined licenses or manufacturing licenses under part 52 of this chapter, any of which are issued after [EFECTIVE DATE]."