



NUCLEAR ENERGY INSTITUTE

Adrian P. Heymer
Director, New Plant Deployment
E-mail: aph@nei.org
Tel: 202-739-8094

August 27, 2004

Mr. Stuart D. Rubin
Advanced Reactor and Regulatory Effectiveness Branch
Division of Systems Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research
Mailstop T-10E32,
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Rubin:

This letter provides comments from the Nuclear Energy Institute (NEI)¹ on the NRC proposals made in the presentation, *Non-LWR Containment Functional Performance Requirements and Criteria*, at the July 28, 2004 public workshop. NEI appreciates the opportunity to provide input to the NRC development of criteria for non-LWR containment functions and recognizes the extensive work that went into development of the potential options.

SECY-04-103 notes the Commission's expectations to receive options and recommendations on containment functional performance requirements by late 2004. The industry agrees with the necessity to develop performance criteria for non-LWR containment functions, but such information needs to be included in a broader project of developing a technology-neutral framework, requirements and guidance documents. NEI therefore recommends that the NRC should, as it has correctly proposed in discussions on the new regulatory framework, adopt a 'top-down' approach to first develop a high-level regulatory framework and then address containment performance requirements and criteria within the context of the broader framework.

¹ NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's 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.

Mr. Stuart D. Rubin

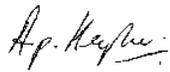
August 27, 2004

Page 2

In the absence of a clear understanding on the new regulatory framework, NEI believes that Option 1, *Dose Criteria are Met*, is the only practical option for a generic, technology-neutral regulatory framework. The attachment to this letter provides comments on issues raised in your presentation and addresses the various questions that you posed.

The industry will continue to actively support NRC efforts and projects centered on the development and issuance of the new framework, the accompanying regulations and implementation guidance documents. If you have any questions on our comments please contact Clifton Farrell at 202-739-8098; cwf@nei.org or me.

Sincerely,



Adrian P. Heymer

c. Dr. Farouk Eltawila, Division of Systems Analysis and Regulatory
Effectiveness

Attachment

COMMENTS ON THE NRC STAFF PRESENTATION ON THE NON-LWR CONTAINMENT FUNCTIONAL PERFORMANCE REQUIREMENTS AND CRITERIA

General Comments

For LWRs, 'containment' has traditionally been defined as a set of structures, systems and components (SSCs) designed to inhibit releases of radionuclides to the environment if the primary retention mechanisms in the fuel and reactor pressure boundary fail to perform as designed. For advanced reactors with innovative designs, inherent safety features, passive safety systems and large margins to fuel failure, a traditional LWR-type 'containment building' may no longer be required, and may be counterproductive in the main 'containment' performance function, the prevention of fission product releases to the environment.

In a technology-neutral framework for the licensing and regulating future reactors, 'containment' should be considered as a plant-wide function to contain or retain radioactive material and is not necessarily limited to a single system, structure or set of SSCs. This function will include multiple fission product barriers, and the reactor building could be one of these fission product barriers.

Depending on the design, a reactor building may serve as a barrier; perform functions that protect other barriers; or may have important functions other than prevention or mitigation of fission product releases from other barriers. For example, it may provide structural support for the reactor vessel and coolant pressure boundary, cooling system and major components to maintain core geometry and passive heat removal during Design Basis Events (DBEs). Also, it may provide structural protection of the reactor vessel and safety-related SSCs from external and internal hazards during DBEs. In both cases the reactor building would likely be classified as a safety-significant system. Its role in the prevention and mitigation of accidents should be expected to vary from reactor to reactor and from event sequence to event sequence.

NEI believes that for non-LWRs, the principal role of the reactor building must be broadened beyond the criterion that the building's sole purpose is for radionuclide retention and the importance of other performance requirements must be recognized.

Functional performance requirements that address the containment function should be stated at a high-level and in a manner that is technology-neutral. Design-specific regulatory guides will provide specific design and functional performance criteria. These design-specific criteria would be approved and codified as part of the design certification process.

Established LWR design requirements – including the prescriptive need for an essentially leak-tight containment structure – may be unnecessary or even counterproductive for non-LWR reactor designs. The evolution of deterministic requirements for LWR containments was centered on the need to provide reasonable assurance of protection of public health and safety from LWR-specific events, such as, design basis loss of coolant accidents; and the prevention of fission product releases, which are based on hypothetical, non-mechanistic source terms during an LWR accident. LWR-based safety requirements, such as the focus of containment on the fission product retention function, need special interpretation or adaptation before they can be applied to advanced reactor designs.

For non-LWR designs additional ‘containment’ performance functions should not be imposed without due consideration of realistic event scenarios, such as the presumption of significant core failure or early or late fission product releases for a particular reactor design. Through such an approach, unnecessary or counterproductive features will not creep into the designs or discourage designers from using inherent and passive safety features that provide significant safety improvements in new reactor designs. Advanced reactor designs may have different inherent damage states that can only be examined in the context of reactor-specific and event sequence-specific mechanistic source terms.

Performance Criteria Options

The new regulatory framework proposed by the NRC staff at the July 27, 2004 public workshop reflects an approach for judging the frequencies and consequences of event sequences and event sequence families. Use of mechanistic source terms will dictate for a given event sequence, the margin to unacceptable public health and safety consequences and the uncertainties therein. In the NRC’s proposed framework, part of the designer’s decision considerations for safety is providing sufficient safety margin so as to reduce the probability of a large fission product release from design bases accidents or other events. If, with due regard to uncertainties, it is determined that a traditional containment would provide minimal or no additional protection of public health and safety, then a design without the traditional LWR containment structure should be acceptable.

Five performance criteria options were presented (Slide 24). Performance criteria options should only address functional performance requirements rather than technology-specific requirements. They should be top level regulatory criteria that a licensee can use to design reactors and be the basis for demonstrating that plant meets the design and safety requirements. The functional performance requirements for a reactor building must be framed in terms of the applicable licensing DBEs.

In establishing a new regulatory framework for licensing new and advanced reactors, the NRC should not impose conditions of equipment failure or non-mechanistic events that yield unnecessary plant features that would never be called upon or that could be counterproductive to more realistic accident mitigation or management. The use of risk-informed insights for each design type will assist in understanding the level of risk and should be considered before imposition of additional features for any reactor design. For these reasons, Option 1, *Dose Criteria are Met*, is the only appropriate option for consideration.

The two performance criteria resulting from the staff's analysis which are presented in Slide 50 are based on those developed for LWR technology and may not be appropriate for non-LWR reactor designs. They should be revised to reflect the direction given in the SRM on SECY-03-0047, *Policy Issues Related to Licensing Non-Light-water Designs*, dated June 26, 2003. NEI suggests that the containment functional objective be stated as follows:

“Provide additional capability (i.e. defense-in-depth) to perform appropriate functions that reduce exposures to the public to acceptable levels, should normal fuel and primary pressure boundaries not perform as expected.”