

**NEI Comments on Division of High-Level Waste Repository Safety
(HLWRS) - Draft Interim Staff Guidance (ISG)-01,
Review Methodology for Seismically Initiated Event Sequences,
71 Federal Register 29369, May, 22, 2006**

**Industry Basis for Recommending That NRC Reconsider
Draft HLWRS-ISG-1**

The nuclear industry recommends that NRC reconsider issuing Draft HLWRS-ISG-1 and instead, more appropriately, address seismically initiated event sequences in the Yucca Mountain Review Plan. This is based on process and technical concerns in the following five areas:

1. Use of Interim Staff Guidance (ISG) as a Regulatory Tool

As a general matter, we encourage NRC to limit use of ISGs and other forms of generic communication to clarifications of regulatory review guidance that do not involve new technical issues and/or compel licensees or prospective licensees to take actions beyond those required by regulation. Other, more appropriate regulatory tools, such as rulemaking, that receive broader NRC regulatory, technical, and policy review are available to address such matters. The ISG process does not have the same rigor or level of management attention as regulatory processes that are designed to promulgate requirements. ISGs issued at the NRC Staff (Staff) level have the potential for creating consequences that are not intended by the NRC Commission (Commission) and that may be problematic in practical application as is the case with this proposed ISG.

2. Application of the Interim Staff Guidance Precedent to Yucca Mountain

ISGs were originally intended by NRC's Spent Fuel Project Office (SFPO) as a response to an emerging issue that would guide staff actions and ensure consistent reviews of ongoing licensed activities by multiple licensees and certificate holders. These documents were labeled as "interim," because they were only intended to be in place until the regulations and/or standard review plan could be revised.

This rationale does not extend to Yucca Mountain, where there is only one potential licensee and no ongoing licensed activities. Based on DOE's public statements, a license application is more than a year away and NRC's review will not begin until after this application is submitted. In addition, in the case of Yucca Mountain, there is no potential for any emerging issue to affect the Staff's review in any way that requires "interim" guidance to be issued

until the issue can be more directly addressed in the Yucca Mountain Review Plan or 10 CFR Part 63.

Also, in the case of Yucca Mountain, there is no emerging issue. There has been no event, occurrence, discovery, or scientific advance that would cause NRC to need to change its Yucca Mountain review guidance in this area. The only change is the Staff's declaration that they expect DOE to use a specific methodology to demonstrate compliance with the regulation. Our concerns regarding the expectation of a specific methodology and with the specific methodology put forth in this ISG are discussed below in areas 4 and 5. However, the specification of a particular methodology is inconsistent with the performance-based nature of 10 CFR Part 63. Draft HLWRS-ISG-1 represents an evolution in regulatory expectation that is being imposed without the due process that should be associated with a change in the regulation, if at all.

3. Safety-Focus

The proposed ISG would have the unintended consequence of imposing more stringent seismic design requirements on the Yucca Mountain surface facilities than what is currently required for power reactors. NRC has offered no public health and safety protection rationale for doing this and, in doing so, has ignored Section 63.102(f) of the regulations promulgated by the Commission. That section is presented in its entirety below.

(f) *Preclosure safety analysis.* Section 63.111 includes performance objectives for the geologic repository operations area for the period before permanent closure and decontamination or permanent closure, decontamination, and dismantlement of surface facilities. The preclosure safety analysis is a systematic examination of the site; the design; and the potential hazards, initiating events and their resulting event sequences and potential radiological exposures to workers and the public. Initiating events are to be considered for inclusion in the preclosure safety analysis for determining event sequences only if they are reasonable (i.e., based on the characteristics of the geologic setting and the human environment, and consistent with precedents adopted for nuclear facilities with comparable or higher risks to workers and the public). The analysis identifies structures, systems, and components important to safety.

NRC has a long and successful history of instituting requirements that ensure the seismic safety of facilities that it regulates, including nuclear power stations. Postulated accident sequences with fuel handling operations at Yucca Mountain would present inherently less risk than those associated with reactor operations. The safety of nuclear power stations from a seismic design perspective is not in question by NRC. With this in mind, the NRC Yucca Mountain Repository regulations recognize that safety is adequately ensured at higher risk facilities than what will exist at Yucca Mountain. For example, fuel handling, the primary operation at a repository, is among the least risk significant nuclear activities that occur at nuclear power stations.

Thus 10 CFR 63.102(f) states, “Initiating events are to be considered for inclusion in the preclosure safety analysis for determining event sequences only if they are reasonable (i.e., based on the characteristics of the geologic setting and the human environment, and consistent with precedents adopted for nuclear facilities with comparable or higher risks to workers and the public). The analysis identifies structures, systems, and components important to safety.”

The language is clear as promulgated by the Commission. As applied to seismic initiating events, such events should only be considered to the extent that “. . . they are reasonable (i.e., based on the characteristics of the geologic setting and the human environment, and consistent with precedents adopted for nuclear facilities with comparable or higher risks to workers and the public).” It is unreasonable to impose consideration of lower probability seismic events at a repository than is required for operating power reactors based on the wording of 10 CFR Part 63 taken in its entirety. That is exactly what the proposed ISG would do if implemented.

Section 63.102(f) of 10 CFR Part 63, as applied to pre-closure seismic initiating events allows for the sole consideration of events with the same probability used in nuclear power reactor licenses as adequate to protect public health and safety at a repository. Designing a repository to lower probability seismic initiating events is not required, nor is there a requirement to make structures, systems, and components of a repository important to safety if their purpose is to prevent or mitigate such lower probability seismic event initiators. Any Staff guidance should, at a minimum, recognize that fact.

To assure that its actions are appropriately safety-focused, the Staff should answer the following questions before making decisions regarding issuance of guidance regarding seismically initiated event sequences.

- Is it really the Staff’s intention to require the repository seismic design to be significantly more stringent than the requirements for power reactors?
- Is the Commission, who specifically included 63.102(f) in the repository regulations, aware that the Staff position on seismic repository design would result in greater seismic safety margin than required for power reactors?
- What is the purpose of Section 63.102(f) and how is it accounted for in Draft HLWRS-ISG-1?

Based on industry’s considerable experience with the design of nuclear facilities capable of safely withstanding seismic events, a thorough

consideration of these questions would support the withdrawal of Draft HLWRS-ISG-1.

4. Bias Against Other Methodologies

In guiding the Staff to review a specific methodology for compliance with this regulation, NRC places a much higher burden on the applicant (in this case DOE) to support the use of any other methodology. Once this ISG is issued, Staff will prepare to consider the specific methodology described therein and be less receptive to other methodologies. Yet DOE, in a public technical exchange held June 7, 2006, and in its comments on Draft HLWRS-ISG-1, dated June 30, 2006, has already declared its intent to use a methodology different from that described in Draft HLWRS-ISG-1. If the Yucca Mountain Review Plan was deemed to be adequate to guide the Staff's review when it was issued just three years ago giving DOE the flexibility to propose the specific method to be used in this area and nothing has fundamentally changed in that time, why should NRC not allow DOE to propose a methodology and review it as originally planned?

Again, Interim Staff Guidance was originally conceived to address emerging issues potentially affecting ongoing licensed activities. In this case, NRC is acting preemptively in front of not only the conduct of any such activities, but ahead of even an application proposing how the activities will be conducted. With the application more than a year away, and an already existing need to revise the Yucca Mountain Review Plan during that time (to address the coming revision to EPA's Yucca Mountain Radiation Protection Standard, 40 CFR Part 197), there is no need for NRC to get ahead of the applicant with "interim" guidance at the present time. Rather than reducing flexibility ahead of the application, NRC should first give DOE the opportunity to propose an acceptable method for meeting the regulation before issuing any additional guidance. This approach would certainly allow for a more independent review on NRC's part as compared to, with the ISG ahead of the application, a situation where NRC is both telling DOE how to demonstrate compliance and then determining if compliance was demonstrated in the manner NRC proposed.

Not only should DOE be allowed flexibility to determine how to comply with the regulation, the specific methodology proposed by NRC is problematic from a technical standpoint. Our technical concerns with the methodology proposed in Draft HLWRS-ISG-1 are described below in area 5.

5. Lack of Precedent and Scientific Support for Draft HLWRS-ISG-1

Lack of precedent for the Methodology Described in the ISG

Applying technical analysis to very low probability events such as seismic events with a probability of less than one in ten thousand per year with the precision necessary to establish design bases is unprecedented. In general, techniques that would likely be applied tend to be overly conservative without much knowledge of the uncertainty associated with assumptions. For instance, establishing ground motion levels for events with extremely low annual probabilities could be done by extending higher probability curves of ground motion versus probability (assuming such an extension was valid). However, there is currently no technical basis and no empirical data supporting this approach. While this analysis can be performed as a bounding calculation, it becomes problematic when the outputs of the extrapolated ground motions would be inputs to design of Structures, Systems, and Components (SSCs). The result would likely be either stringent design criteria making the facility extremely (possibly prohibitively) complex and expensive with no commensurate benefit to safety margin; or a design on paper that could not be implemented in the field.

Lack of scientific support for the methodology described in Draft HLWRS-ISG-1

The evaluation of consequences of seismic events that would be assumed to occur is likely beyond the state of the art. This makes the demonstration of how particular SSCs would respond after a beyond design basis seismic event occurs problematic. Statements such as in lines 310-312 of Appendix B of the Draft ISG might be unsupportable when extended to limitless possibilities such as would exist in a beyond design basis event. For instance, while the statement that the fragility of different systems and components is dependent on the spectral acceleration of the seismic event is accurate, the follow-on statement that the fragility of the separate systems are independent of each other may not be accurate. A never ending series of questions without meaningful answers will then arise such as: Could there not be overlap in the spectral fragility casting uncertainty into the independence of the curves? How much uncertainty? How can the uncertainty be quantified? To even get to the point of system fragilities requires some presumptions that the systems are not irrevocably damaged by interactions with other systems, safety and non-safety. The licensee will be asked to prove what won't occur (with reasonable assurance). In a nutshell, quantifying the probability of beyond design basis events and their effect on an SSC specific basis and defending the estimates without being ultraconservative is extremely difficult and represents an exercise that adds no value to public health and safety protection. This has been recognized in power reactor regulations, which do not require such quantification, and in Section 63.102(f) of the repository regulations which allows the same approach applied to power reactors to be applied to Yucca Mountain.