(7)

Standards Committee

555 North Kensington Avenue
La Grange Park, Illinois
60526 USA

Tel: +1 708 579 8269
Fax: +1 708 352 6464
Email: standards@ans.org
www.ans.org

PR 50 and 53
(71FR26267)

October 5, 2006

DOCKETED
USNRC

October 5, 2006 (1:21pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Secretary,
US Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTN: Rulemaking and Adjudications Staff

American Nuclear Society (ANS) Responses to Published Questions on the Advance Notice of Proposed Rulemaking (ANPR) on Proposed 10 CFR Part 53 (RIN 3150-AH81): Approaches to Risk-Informed and Performance-Based Requirements for Nuclear Power Reactors

On September 13, 2006, the Nuclear Facilities Standards Committee (NFSC) of the ANS submitted its general comments to the subject ANPR. The attached responses to the NRC questions published in the *Federal Register/Vol. 71, No. 86, pp. 26267-26275,* representing the views of two NFSC Subcommittees, ANS-22 (Nuclear Power System Level Design) and ANS-28 (Gas Cooled Reactor Standards) are being offered to provide more detail on the NFSC positions. It should be noted that although the attached responses emphasize different aspects of the proposed rulemaking, there is a general consensus on some significant aspects of the ANPR contents.

The ANS-22 Subcommittee is currently revising existing design standards for light water reactors, while the ANS-28 Subcommittee is developing new design standards for modular helium cooled reactors. Approximately two years ago, NFSC made a decision, supported by the ANS Standards Board, that any new standard, or a revision of an existing standard, wherever possible, would be developed as a performance-based and risk-informed standard. Moreover, wherever possible, the design criteria developed in that standard would be technology neutral.

At this time, four voluntary consensus standards are being developed by the appropriate Working Groups, each following the aforementioned NFSC guidance:

- ANS 53.1: *Safety Criteria for the Design of Modular Helium-Cooled Reactor Plants* (New);
- ANS 51.1: *Safety Criteria for the Design of Pressurized Water Reactors* (Revision);
- ANS 52.1: *Safety Criteria for the Design of Boiling Water Reactors* (Revision); and,
- ANS 58.14: *Safety and Pressure Classification Criteria for Light Water Reactor Structures, Systems, and Components* (Revision).

Thank you again for this opportunity to provide our comments to this important rulemaking. ANS stands ready to direct its large contingent of standards volunteers towards the development of

Template = SECY-067

SECY-02

standards that will support the existing fleet and the future generation of nuclear power generation facilities.

Sincerely,

Carl A. Mazzola

Carl Mazzola, Chairman
ANS NFSC

Attachment: Responses developed from ANS-22 and ANS-28 Subcommittees

C: Dr. N. Prasad Kadambi, Chairman ANS Standards Board
Donald J. Spellman, Vice-Chairman ANS Standards Board
James F. Mallay, Co-Chair NRMCC
Raymond R. Weidler, Co-Chair NRMCC
Harry A. Bradley, ANS Executive Director
Kenneth Balkey, Vice President ASME Nuclear Board of Codes & Standards
Richard Black, DOE Standards Executive
Dr. Jennifer Uhle, NRC Standards Executive

ANPR Question	ANS-22	ANS-28
Comment period expires December 29, 2006		
A. Plan		
1. Is the proposed plan to make a risk-informed and performance-based alternative to 10 CFR Part 50 reasonable? Is there a better approach than to create an entire new 10 CFR Part 53 to achieve a risk-informed and performance-based regulatory framework for nuclear power reactors? If yes, please describe the better approach?	It is reasonable to make a risk-informed and performance-based alternative to 10CFR50 as long as it remains optional. However, it could be beneficial if a risk-informed and performance-based alternative method could be applied to supplemented grade SSCs while applying the deterministic approach to safety related SSCs. The supplemented grade SSCs are those SSCs that are not safety-related but which have a special regulatory requirement such as SBO or ATWS.	Subcommittee ANS-28 embraces the risk-informed, performance-based, "technology-neutral " (really, technology specific, without Light Water Reactors prejudice) license framework, while acknowledging the challenges this poses. While a substantial licensing framework supports traditional deterministic Light Water Reactor (LWR) industry, new technologies lack technology-neutral guidance. The committee feels the risk-informed approach will allow new technologies to be considered on merit, rather than by comparison with LWR technology. We don't seek to consider how new rules would apply to LWRs, but they shouldn't inappropriately encumber Modular Helium-cooled Reactor (MHR) design technology. We're not calling for a "technology-neutral" level playing field so much as a bias-free one. We don't think inappropriate, legacy constraints set on MHR or any other technology is in the country's long-term interest.
2. Are the objectives, as articulated above in the proposed plan section, understandable and achievable? If not, why not? Should there be additional objectives? If so, please describe the additional objectives and explain the reasons for including them.	They are reasonable. An additional objective would be to establish regulatory design criteria that require minimal interpretation. A lot of design time is spent trying to predict what regulators would consider as acceptable and then changing the design when the guess was wrong.	Based on our general discussions, objectives are reasonable. The challenge will be to build a new foundation. NRC should identify the timeframe for the initiative to be completed. Untimely action will diminish the potential value.
3. Would the approach described above in the proposed plan section accomplish the objectives? If not, why not and what changes to the approach would allow for accomplishing the objectives?	no comment	no comment
4. Would existing licensees be interested in using risk-informed and performance-based alternative regulations to 10 CFR Part 50 as their licensing basis? If not, why not? If so, please discuss the main reasons for doing so.	no comment	no comment

ANPR Question	ANS-22	ANS-28
5. Should the alternative regulations be technology-neutral (*i.e.*, applicable to all reactor technologies, e.g., light water reactor or gas cooled reactor), or be technology-specific? Please discuss the reasons for your answer. If technology-specific, which technologies should receive priority for development of alternative regulations?	It would be preferable to prepare industrial standards for specific technologies in order to make the standards as specific and objective as possible. Light Water Reactor (LWR) designs will probably continue using the deterministic design approach since it is well established. The gas cooled reactor design has less design guidance so it should probably receive priority.	ANS-28's scope is to develop the high-level safety standard for MHRs. Developing this standard, general discussions included the challenge of developing and reviewing new technology in an LWR framework. The subcommittee feels strongly that new regulations should be unbiased, appropriately technology-specific. Without technology-specfic guidance, traditional LWR assumptions and thinking could pose great barriers to the MHR -- or any other new nuclear technology's commercial entrance. Technology specific guidelines for LWRs (PWRS & BWRs), Gas Reactors, Liquid Metal Reactors (LMR), and Fast Reactors (FR) are needed because there are significant differences in specific designs and technologies that makes a "one-fits-all" approach not feasible. LMR and FRs can be left until later.
6. When would alternative regulations and supporting documents need to be in place to be of most benefit? Is it premature to initiate rulemaking for non-LWR technologies? If so, when should such an effort be undertaken? Could supporting guidance be developed later than the alternative regulations, *e.g.* phased in during plant licensing and construction?	Industrial standards will be prepared based on the Alternate Regulations and supporting documents. Therefore, the industrial standards cannot precede them, however, they could be produced in parallel as a collaborative effort. The collaborative approach would be preferred since it would address issues and concerns of both the regulators and the industry. LWR sections should be developed ASAP in order to be applied to Gen III+ and Gen IV. The primary advantage of doing it this way is to allow NRC to endorse these design standards as they are developed along with the rulemaking and not make the same mistake as was made with ANS-51.1, 52.1 and 58.14. These standards are all under revision at ANS to be written performance-based/risk-informed.	Companies are more likely to explore new designs if they have greater assurance their designs will be considered on merit. New reactor technology interest is growing in response to global needs. The sooner a technology-neutral, licensing framework can be developed, the better to meeting these needs. However, poorly constructed rules will not provide the sustainable long-term framework needed. Gas Cooled Reactors (GCRs) standards should be developed in harmony with fundamental design principles. ANS has developed ANS-53.1, "Safety Criteria for the Design of Modular Gas Reactors," a new standard nearing completion, as performance-based and risk-informed. Remaining supporting GCR standards for detailed designs will follow the baseline ANS-53.1 format. Liquid Metal and Fast Reactor (LMR and FR) standards can be left for later. Those designs are not close to commercial application, unlike the MHR/GCR. ANS, ASME, IEEE, and others should develop or revise necessary supporting standards in parallel with rulemaking so rules can endorse (or at least proceed considering) standard methods. Given the lead time for rulemaking and standards development/amendment, it is not premature to develop new regulatory approaches for new technologies. LWR technology carries no sense of urgency. The existing framework and 50.69 provide a viable means to implement risk-informed LWR regulation. New technology rulemaking has not been adopted by any of the current wave of Gen III+ plants. Based on 50.69 repsonse, new LWR regulation is not likely to be worth any effort by the LWR community. It has no perceived value.

ANPR Question	ANS-22	ANS-28
7. The NRC encourages active stakeholder participation through development of proposed supporting documents, standards, and guidance. In such a process, the proposed documents, standards, and guidance would be submitted to and reviewed by NRC staff, and the NRC staff could endorse them, if appropriate. Is there any interest by stakeholders to develop proposed supporting documents, standards, or guidance? If so, please identify your organization and the specific documents, standards, or guidance you are interested in taking the lead to develop?	Yes - The American Nuclear Society is interested in developing applicable standards. In general, the ANS would want to prepare new standards for topics already addressed by existing ANS standards. An example would be the standard for classification of Systems, Structures and Components. Other standards would be those that provide design criteria for various mechanical systems. ANS should take the lead to develop all the "safety criteria for the design" type of standards for PWRs, BWRs, GCRs and later LMRs. These are the baseline documents for rolling down the top level requirements to the design criteria and component classifications. System design standards, operational standards including analysis, siting standards, decommissioning standards for NPPs, fuel cycle standards, and waste management standards should come primarily from ANS with support from other SDOs such as IEEE, ASME, AIChE and others. This division of responsibilities should be directed by ANSI and Federal Standards Executives at DOE and NRC to avoid duplication and overlap.	Starting in August 2004, using NRC risk-informed regulatory guidance, other professional organizations' (ASME) consensus input, Subcommittee ANS-28, began drafting a new Modular Helium-cooled Reactor standard -- ANS-53.1, "Nuclear Safety Criteria for the Design of Modular Helium-Cooled Reactor Plants." Though nominally for a Modular Helium Reactor, its risk-informed, performance-based, technology-neutral safety licensing basis guidance is quite general. Our draft standard provides a risk-informed, performance-based development template for any new reactor technology's design. This framework could easily apply to and support other new technologies. We will develop supporting technical standards for several new classes of MHRs, following this standard's completion. NEI, INPO, and EPRI as well as any other vested participants should help develop ANS standards by sitting on the development committee(s).
B. Integration of Safety, Security, and Emergency Preparedness		
8. In developing the requirements for this alternative regulatory framework, how should safety, security, and emergency preparedness be integrated? Does the overall approach described in the technology-neutral framework clearly express the appropriate integration of safety, security, and preparedness? If not, how could it better do so?	Because of the restrictions on divulging security information, it may be impractical to integrate them.	[Security has been discussed, but has not been a primary focus] The overall approach described in the technology neutral framework expresses appropriate integration of safety, security, and preparedness. The same safety considerations should apply to security in the new licensing framework. Security risks should be based on intrinsic technology characteristics, not traditional practices or LWR technology assumptions. Where designs have low intrinsic risks, security requirements should reflect that. The regulations should be separate; the risks can be discused and managed with PRA.
9. What specific principles, concepts, features or performance standards for security would best achieve an integrated safety and security approach? How should they be expressed? How should they be measured?	no comment	Similar considerations apply for security, with the added qualification that vulnerability generates safeguards requirements. For vulnerable designs, sensitive vulnerability information needs to be protected. Where design lacks credible source term, for example, disseminating that information to the public could enhance that design's plant security. Potential security threats could be motivated to look elsewhere to find targets. Obviously, the converse is also disadvantageous to the industry as a whole. Knowing which plant designs are susceptible invites focus on those designs. Presenting plant hazard information to the public at large makes riskier targets more visible. Does the public really need to know risks in today's world? Must risk be presented analytically? Traditionally the public had a right to know (observation). Historically, low threat combined with similar LWR plants risk meant comparative risk was not a consideration. All plants were in

ANPR Question	ANS-22	ANS-28
		the same general risk category. Today it could be diffferent. The goal should be to not encumber intrinsically safer desgins with inappropirate source term responses or arbirtary requirements not related to risk.
10. The NRC is considering rulemaking to require that safety and security be integrated so as to allow an easier and more thorough understanding of the effects that changes in one area would have on the other and to ensure that changes with unacceptable impacts are not implemented. How can the safety-security interface be better integrated in design and operational requirements?	no comment	no comment
11. Should security requirements be risk-informed? Why or why not? If so, what specific security requirements or analysis types would most benefit from the use of Probabilistic Risk Assessment (PRA) and how?	It may be difficult to define security since they can include sabotage, terrorism, etc. which can be politically motivated and unpredictable.	Although our focus has not been security, those risks can be analyzed much like others. In principle, security requirements should be risk-informed. This could stimulate more secure design development. Risk-informing methods add a process step, and more complexity. Goals must be known. Risk informing security should not impede timely rulemaking. Security poses problematic considerations that warrant industry wide discussion.
12. Should emergency preparedness requirements be risk-informed? Why or why not? How should emergency preparedness requirements be modified to be better integrated with safety and security?	no comment	no comment
C. Level of Safety		
13. Which of the options in SECY–05– 0130 with respect to level of safety should be pursued and why? Are there alternative options? If so, please discuss the alternative options and their benefits.	Industrial standards should specify the minimal acceptable acceptance criteria and which avoid subjectivity. This philosophy is consistent with the use of Quantitative Health Objectives.	The subcommittee has used Quantitative Health Objectives (QHOs) as the analysis starting point for draft standard 53.1. The transition from QHOs to the surrogate measures that assure the QHOs has been discussed but is currently work in progress. Surrogate measures for the MHR provide more direct measures of safety performance.
14. Should the staff pursue developing subsidiary risk objectives? Why or why not? Are there other uses of subsidiary risk objectives that are not specified above? If so, what are they?	no comment	ANS-28 has not explicitly considered alternative subsidiary risk objectives. Our efforts to date have used the QHOs as the starting point for design. We would like to point out that the subsidiary risk objectives of 10(-05) and 10(-06) /plant year are intrinsically LWR based, based upon major fuel damage and release, respectively. Subsidiary risk objectives, if pursued, should be pursued in the spirit of the technology-neutral framework embodied by the rest of the proposed rule framework.

ANPR Question	ANS-22	ANS-28
15. Are the subsidiary risk objectives specified above reasonable surrogates for the QHOs for all reactor designs?	no comment	The subsidiary risk objective specified above are not reasonable surrogates for the Triso-coated fuel particles of the MHR design, since these particles have no sudden phase transformation, discontinuous "cliff edge" effects, like metal-clad LWR fuels. Similarly, fission product release mechanisms that could bypass intrinsic design barriers are not known. Thus, the subsidiary risk objectives identified above are not reasonable surrogates for MHR designs.
16. Should the latent fatality QHO be met by preventive measures alone without credit for mitigating measures, or is this too restrictive?	no comment	The latent fatality QHO requires release of fission products at the exclusion area boundary in amounts sufficient to require emergency planning evacuation consideration. Again, this reflects the historical release mechanisms like those analyzed for LWR accidents. ANS-28 notes that meeting the latent fatality QHO without mitigating measures is a noble goal, but that other means may also be reasonable and adequate to reach the desired end state. ANS-28 has no position comment. Perhaps without realizing the difficulties this position presents for other technologies, yes, we reach risk goals. Benefits from a technology should validate improved methods for achieving compliance, based on risk.
17. Are there other subsidiary risk objectives applicable to all reactor designs that should be considered? What are they and what would be their basis?	no comment	no comment
18. Should a mitigation goal be associated with the early fatality QHO or should it be set without credit for preventive measures (i.e., assuming major fuel damage has occurred)?	no comment	Without identifying source terms and release mechanisms, fuel damage means little. A technology-neutral framework would assure that unreasonable LWR fuel failure mechansims don't transfer to other designs, and won't ignore intrinsic characteristics of new designs. Where designs can meet QHOs without mitigating measures, none should be required. There should be no default or baseline measures imposed that don't demonstrably contribute to the technolgy-specfic risk case.
19. Should other factors be considered in accident mitigation besides early fatalities, such as latent fatalities, late containment failure, land contamination, and property damage? If so, what should be the acceptance criteria and why?	no comment	Technology-neutral framework excludes certain accident mitigation considerations like "late containment failure." Any acceptance criteria should be technology-neutral, which will exclude some of those traditionally used.
20. Would a level 3 PRA analysis (*i.e.*, one that includes calculation of offsite health and economic effects) still be needed if subsidiary risk objectives can be developed? For a specific technology, can practical subsidiary risk objectives be developed without the insights provided by level 3 PRAs?	no comment	no comment

ANPR Question	ANS-22	ANS-28
D. Integrated Risk		
21. Which of the options in SECY–05– 0130 with respect to integrated risk should be pursued and why? Are there alternative options? If so, what are they?	For a multi-unit site, it would be easier to design each unit if it can be treated independently. Therefore, integrated risk should only be considered if there is any potential interaction among the units.	ANS-28 has implicitly adopted the integrated risk measures of the QHOs, proposed option (2). Discussions have also identified difficulties presented with this option. Based upon the technical materials that support the MHR safety case, option (3), developing other risk objectives for the acceptable level of safety, would most clearly develop the MHR's technical safety case.
22. Should the integrated risk from multiple reactors be considered? Why or why not?	see question 21	ANS-28 discussed integrated sites' risk consequences from the perspective of QHOs curve imposed limits. While it seems evident that multiple-unit site risks should accumulate from a risk-informed perspective, current guidance is confusing. ACRS comments define integrated risk questions; addressing those should provide clear, integrated risk regulatory guidance. To the degree risk from multiple unit sites can be accumulated with simple guidance, guidance should be simple. License one facility at a time. Where conservatisms increase the nominal risk, without providing credit for greater mitigation and control intrinsic with large sites (more staff, better support, more knowledge experience base, more services...) that is not desired and should be avoided.
23. If integrated risk should be considered, should the risk meet a minimum threshold specified in the regulations? Why or why not?	yes - Specifying a minimum threshold will facilitate design.	no comment
E. ACRS Views on Level of Safety and Integrated Risk		
24. Should the views raised in the ACRS letter and by various members of the Committee be factored into the resolution of the issues of level of safety and integrated risk? Why or why not?	no comment	Views expressed by the ACRS should be factored into safety and integrated risk resolution. Their views capture common questions over advanced reactor licensing. For example, the ACRS questions the relevance of certain metrics like LERF, CDF, and even the integrated QHOs limits as they stand today. Their concern expresses the fear that adopting specific metrics closes the door to other metrics that could be more relevant for advanced reactors. MHR tecnology focuses on fission product barrier protection. LERF and CDF are not relevant to MHR technolgy; other metrics including real-time, circulating fission product inventory are better. These metrics are technology dependent. The ACRS points out the regulatory dilemma posed by surrogate metrics; their use over time ascribes more validity to the metric than can ever be scientifically demonstrated. Adopting any single metric forces safety case presentation directed towards that metric, while another metric may more clearly present the same safety case. Ideally, technology-neutral licensing would not exclude consideration of better metrics yet unforseen. The ACRS also captures

ANPR Question	ANS-22	ANS-28
		concerns voiced in ANS-28 meetings over modular plant design interpretation at individual sites. Integration of multiple unit site measures should neither restrict their use, nor create undue restrictions based upon conservative risk accumulations from individual modules.
F. Containment Functional Performance Standards		
25. How should containment be defined and what are its safety functions? Are the safety functions different for different designs? If so, how?	The same general containment function should apply to different building designs. However, the methods for accomplishing the containment function, including associated system and structural designs and their performance requirements can vary for different building designs,	"Containment" is LWR technology. Containment should be functionally defined. Where alternatives can provide the same functions as traditional LWR Containment, e.g., defense-in-depth, multiple fission product barriers, technology-neutral alternatives should be treated equivalently. Containment provides defense-in-depth. Where equivalent functions can't be provided -- such as exterior missile protection, functions should be considered separately, based on their need for and contribution to the safety case.
26. Should the containment functional performance standards be design and technology specific? Why or why not?	see question 25	High-level containment, functional-performance standards should be technology neutral. Where containment alternatives can provide the same functions, e.g., fission product retention, defense-in-depth, multiple barriers, etc., alternatives should be considered on a technology-neutral basis. While containment precedent is based on defense-in-depth for LWR metal-clad fuel, at the highest level, "containment" requirement should be technology neutral.
27. What approach should be taken to develop technology-neutral containment performance standards that would be applicable to all reactor designs and technologies? Should containment performance be defined in terms of the integrated performance capability of all mechanistic barriers to radiological release or in terms of the performance capability of a means of limiting or controlling radiological releases separate from the fuel and reactor pressure boundary barriers?	no comment	General technology-neutral functions and principles apply. Defense-in-depth with multiple fission product barriers embodied by containment can be provided alternatively as multiple fission product barriers around coated fuel particles at the fission product barrier itself. Flexible functional interpretation will lead to improved designs. Containment should provide integrated performance capability. Explicit redundancy level and design margin identification would provide, albeit deterministically, an alternative to abstract requirements for many indeterminate defense-in-depth layers. Containment performance definition as indicated presents bias against Triso ceramic fuel performance capabilities.

ANPR Question	ANS-22	ANS-28
28. What plant physical security functions should be associated with containment and what should be the related functional performance standards?	no comment	Required containment security functions should consider containment preservation with credible threat scenarios. Within a risk-informed perspective, defense-in-depth should consider appropriate levels of depth based on event likelihood. Where containment is considered a second theft barrier against fuel diversion, etc, the (non) compromising quality of the fuel should be considered considering radiation, chemical and isotopic content merit as well as physical separation concentration fesibility. Pure unirradiated U235 is more valuable than dirty low-level U325, which in turn is worth more than highly irradiated high level waste U235, etc. Fuel made of impenetrable particles hard to extract in new fuel, has much less value than fuel in metal clad containers, which are more easily removed to access the fuel, etc. These fuel characteristics should be considered incidentally adding containment functions "because it's there," and available to take credit against. These incidentals could severely hinder non-containment fuel, without fairly allowing other factors into functional requirements definitions.
29.How should PRA information and insights be combined with traditional deterministic approaches and defense-in-depth in establishing the proposed containment functional performance requirements and criteria for controlling radiological releases?	no comment	no comment
30. How should the rare events in the range 10¥4 to 10¥7 per year be considered in developing the containment functional performance requirements and criteria? Should events less than 10¥7 per year in frequency be considered in developing the containment functional performance requirements and criteria?	no comment	no comment
G. Technology-Neutral Framework		

ANPR Question	ANS-22	ANS-28
31. Is the overall top-down organization of the framework, as illustrated in Figure 2–6 a suitable approach to organize the approach for licensing new reactors? Does it meet the objectives and principles of Chapter 1? Can you describe a better way to organize a new licensing process?	no comment	(Figure 2-6 not available in SECY-05-006 from ADAMS) The SECY lists nine framework items: 1. Integrated risk 2. Containment functional performance requirements and criteria 3. Level of safety 4. Definition of defense-in-depth 5. Use of a probabilistic approach to establish the licensing basis 6. Use of scenario-specific source terms for licensing decisions 7. Possible modifications of emergency preparedness requirements 8. Physical protection 9. Selective implementation This approach appears suitable, though importance order may be viewed differently. Specifically, items 2, 3 and 4 should clarify issues that currently pose barriers to new reactor design licensing. Developing clear positions on specific requirements for containment, level of safety, and defense-in-depth would assist those working with inexact or ad hoc specifications guidance in these areas today. The ANPR lists five bullets: Safety, security and emergency... Defense-in-depth and treated.... Licensing Basis Events .... Safety Classification of Structures... PRA Technical Acceptability... Together these constitute suitable top down criteria structure for licensing new reactors. With the exceptions of bullets one, "security and emergency preparedness" and five, "PRA technical acceptability," ANS-28 has discussed these areas exhaustively and factored them into their considerations.
32. Do you agree that the framework should now be applied to a specific reactor design? If not, why not? Which reactor design concept would you recommend?	no comment	(Not clear based on available documents)
33. The unified safety concept used in the framework is meant to derive regulations from the Safety Goals and other safety principles (*e.g.*, defense-in-depth). Does this approach result in the proper integration of reactor regulations and staff processes and programs such that regulatory coherence is achieved? If not, why not?	no comment	Figure 2-6 not available; not ANS-28 focus/no comment]

ANPR Question	ANS-22	ANS-28
34. The framework is proposing an approach for the technical basis for an alternative risk-informed and performance-based 10 CFR Part 50. The scope of 10 CFR Part 50 includes sources of radioactive material from reactor and spent fuel pool operations. Similarly, the framework is intended to apply to this same scope. Is it clear that the framework is intended to apply to all of these sources? If not, how should the framework be revised to make this intention clear?	no comment	Figure 2-6 not available; not ANS-28 focus/no comment]
35. What role should the following factors play in integrating emergency preparedness requirements (as contained in 10 CFR 50.47) in the overall framework for future plants: • The range of accidents that should be considered? • The extent of defense-in-depth? • Operating experience? • Federal, state, and local authority input and acceptance? • Public acceptance? • Security-related events?	no comment	no comment
36. What should the emergency preparedness requirements for future plants be? Should they be technology-specific or generic regardless of the reactor type?	no comment	Emergency preparedness for future plants should be technology-specific, dependent on their design-associated accident source terms. Requiring common levels of emergency preparedness planning ignoring design would eliminate one value of intrinsically safer designs could provide. In principle, new reactors should benefit from superior designs.
37. Is the approach used in the framework for how defense-in-depth treats uncertainties well described and reasonable? If not, how should it be improved?	no comment	Not able to review/couldn't locate text
38. Are the defense-in-depth principles discussed in the framework clearly stated? If not, how could they be better stated? Are additional principles needed? If so, what would they be? Are one or more of the stated principles unnecessary? If so, which principles are unnecessary and why are they unnecessary?	no comment	Not able to review/couldn't locate text

ANPR Question	ANS-22	ANS-28
39. The framework emphasizes that sufficient margins are an essential part of defense-in-depth measures. The framework also provides some quantitative margin guidance with respect to LBEs in Chapter 6. Should the framework provide more quantitative guidance on margins in general in a technology-neutral way? What would be the nature of this guidance?	no comment	Not able to review/couldn't locate text
40. The framework stresses that all of the Protective Strategies must be included in the design of a new reactor but it does not discuss the relative emphasis placed on each strategy compared to the others. Are there any conditions under which any of these protective strategies would not be necessary? Should the framework contain guidelines as to the relative importance of each strategy to the whole defense-in-depth application?	no comment	Not able to review/couldn't locate text
41. Are the protective strategies well enough defined in terms of the challenges they defend against? If not, why not? Are there challenges not protected by these five protective strategies? If so, what would they be?	no comment	no comment
42. Is the approach to and the basis for the selection LBEs reasonable? If not, why not? Is the cut-off for the rare event frequency at 1E–7 per year acceptable? If not, why not? Should the cut-off be extended to a lower frequency?	no comment	Yes, this is reasonable.
43. Is the approach used to select and to safety classify structures, systems, and components reasonable? If not, what would be a better approach?	no comment	Yes, this is reasonable.
44. Is the approach and basis to the construction of the proposed frequency-consequence (F–C) curve reasonable? If not, why not?	no comment	We have discussed the F-C curve in detail and the approach and basis have not been critiqued on technical merit. This curve is embedded in our draft standard. Implicitly, then, it is reasonable.
45. Are the deterministic criteria proposed for the LBEs in the various frequency categories reasonable from the standpoint of assuring an adequate safety margin? In particular, are the deterministic dose criteria for the LBEs in the infrequent and rare categories reasonable? If not, why not?	no comment	no comment

ANPR Question	ANS-22	ANS-28
46. Is it reasonable to use a 95% confidence value for the mechanistic source term for both the PRA sequences and the sequences designated as LBEs to provide margin for uncertainty? If not, why not? Is it reasonable to use a conservative approach for dispersion to calculate doses? If not, why not?	Yes, but it should allow justification of other values.	no comment
47. The approach proposed in the framework does not predefine a set of LBEs to be addressed in the design. The LBEs are plant specific and identified and selected from the risk-significant events based on the plant-specific PRA. Because the plant design and operation may change over time, the risk-significant events may change over time. The licensee would be required to periodically reassess the risk of the plant and, as a result, the LBEs may change. This reassessment could be performed under a process similar to the process under 10 CFR 50.59. Is this approach reasonable? If not, why not?	no comment	no comment
48. The framework provides guidance for a technically acceptable full-scope PRA. Is the scope and level of detail reasonable? If not, why not? Should it be expanded and if so, in what way?	no comment	ANS-28 discussion has implicitly assumed that full-scope PRA is required for new designs. Therefore, this is reasonable.
49. Because a PRA (including the supporting analyses) will be used in the licensing process, should it be subject to a 10 CFR Part 50 Appendix B approach to quality assurance? If not, why not?	no comment	no comment
50. Is this process clear, understandable, and adequate? If not, why not? What should be done differently?	no comment	no comment
51. Is the use of logic diagrams to identify the topics that need to be addressed in the requirements reasonable? If not, what should be used?	no comment	no comment
52. Is the list of topics identified for the requirements adequate? Is the list complete? If not, what should be changed (added, deleted, modified) and why?	no comment	no comment

ANPR Question	ANS-22	ANS-28
53. A completeness check was made on the topics for which requirements need to be developed for the new 10 CFR Part 53 (identified in Chapter 8) by comparing them to 10 CFR Part 50, NEI 02–02, and the International Atomic Energy Agency (IAEA) safety standards for design and operation. Are there other completeness checks that should be made? If so, what should they be?	no comment	no comment
54. The results of the completeness check comparison are provided in Appendix G. The comparison identified a number of areas that are not addressed by the topics but that are covered in the IAEA standards. Should these areas be included in the framework? If so, why should they be included? If not, why not?	no comment	While it would be ideal to compare standards, few are fluent enough with the IAEA approach to do this comparison quickly. Lacking experts familiar with the IAEA standards, we welcome vender input.
H. Defense-in-Depth		
55. Would development of a better description of defense-in-depth be of any benefit to current operating plants, near-term designs, or future designs? Why or why not? If so, please discuss any specific benefits.	no comment	ANS-28 has spent a considerable effort further describing defense-in-depth. Various defense-in-depth requirements have been proposed. All have sought to quantify this otherwise indefinite design objective. A better description of this principle's requirements would be helpful, on the basis of committee effort expended. Failing to reevaluate and define defense-in-depth, while problematic for licensed reactors, is more difficult for new technology where no precedents exist. Then the designers must suggest defense-in-depth levels and let reviewers decide acceptability.
56. If the NRC undertakes developing a better description of defense-in-depth, would it be more effective and efficient to incorporate it into the Commission's Policy Statement on PRA or should it be provided in a separate policy statement? Why?	no comment	Not discussed - no position
57. RG 1.174 assumes that adequate defense-in-depth exists and provides guidance for ensuring it is not significantly degraded by a change to the licensing basis. Should RG 1.174 be revised to include a better description of defense-in-depth? Why or why not? If so, would a change to RG 1.174 be sufficient instead of a policy statement? Why or why not?	no comment	A policy statement would better establish the level of importance attached to defense-in-depth. Details could be amplified in a revision to RG 1.174. By itself, RG revision is inadequate. Efforts to futher specify and delineate the meaning of defense-in-depth in concrete terms will benefit its use.

ANPR Question	ANS-22	ANS-28
58. How should defense-in-depth be addressed for new plants?	no comment	Ideally, defense-in-depth is specified in unambiguous terms that would give designers exact guidance on levels and types of depth required. It seems fairly simple to state the principle, and then specify what that means in concrete terms for use by the designer.
59. Should development of a better description of defense-in-depth (whether as a new policy statement, a revision to the PRA policy statement, or as an update to RG 1.174) be completed on the same schedule as 10 CFR Part 53? Why or why not?	no comment	Defense-in-depth goes hand in hand with Part 53 rulemaking. Although separate, their joint resolution would provided clearer guidance. This can only improve results.
I. Single Failure Criterion		Not discussed - no position
60. Are the proposed options reasonable? If not, why not?	The options should be "options." A designer should be able to select the option that is most effective.	no comment
61. Are there other options for risk-informing the SFC? If so, please discuss these options.	no comment	no comment
62. Which option, if any, should be considered?	no comment	no comment
63. Should changes to the SFC in 10 CFR Part 50 be pursued separate from or as a part of the effort to create a new 10 CFR Part 53? Why or why not?	no comment	no comment
J. Continue Individual Rulemakings to Risk-Inform 10 CFR Part 50		
64. Should the NRC continue with the ongoing current rulemaking efforts and not undertake any effort to risk-inform other regulations in 10 CFR Part 50, or should the NRC undertake new risk-informed rulemaking on a case-by-case priority basis? Why?	The NRC should undertake new risk-informed rulemaking only on a case-by-case bases and only as an alternative approach. The rulemaking should be for areas where the deterministic approach results in overly restrictive design requirements.	Leaving the old Part 50 basis seems acceptable if there is concurrance that LWR technology exhibits an acceptable level of safety. Why reinvent the wheel if industry accepts it, and no safety benefit can be foreseen?
65. If the NRC were to undertake new risk-informed rulemakings, which regulations would be the most beneficial to revise? What would be the anticipated safety benefits?	no comment	no comment

ANPR Question	ANS-22	ANS-28
66. In addition to revising specific regulations, are there any particular regulations that do not need to be revised, but whose associated regulatory guidance documents, could be revised to be more risk-informed and performance-based? What are the safety benefits associated with revising these guides? Which ones in particular are stakeholders interested in having revised and why?	no comment	While this was not specifically discussed, there were enough discussions of risk-informed aspects of the current licensing basis that the risk-informed and performance-based approach for 10CFR50 would be helpful. The existing framework is so imbued with LWR philosophy and assumptions that developing a policy statement and framework for achieving risk-informed and performance-based regulation is probably the best way to expeditiously give credence to other innovative approaches. The safety benefit is opening the door for innovative and safer designs that might otherwise be more expensive formulated under the traditional framework. Specific regulations that specify "how," to achieve goals, which leave out the "what" or "why" are biased towards the existing status quo LWR framework intrinsically. Requirements for "containment" are one example of policy burdensome to MHR designs where "containment" is effectively shrunk down to the fuel particle coating. The first physical barrier for radionuclide containment is shrunk down to particle level where we now have billions of individual containments. The second barrier is the primary system pressure boundary which contributes some and the third barrier is the reactor building which also contributes to radionuclides containment after the initial puff of helium is released. Furthermore, MHR is designed around protecting the first barrier. This means unless we have bad fuel which would be readily evident, chances of a scenario that takes a large portion of the fuel beyond its possible failure point is next to zero.
67. If additional regulations and/or associated regulatory guidance documents were to be revised, when should the NRC initiate these efforts, e.g., immediately or after having started implementation of current risk-informed 10 CFR Part 50 regulations?	no comment	The scope of this effort requires a staged approach. A continuous effort to risk inform existing regulations based on risk-value to the industry and public should address regulations by priority

Terms
MHR Modular Helium Reactor
ACRS: Advisory Committee on Reactor Safety
QHO: Quantitative Health Objective
LWR: light-water reactor

From: "Pat Schroeder" <PSchroeder@ans.org>
To: <cag@nrc.gov>, <SECY@nrc.gov>
Date: Thu, Oct 5, 2006 12:09 PM
Subject: Complete -- ANS Responses to ANPR Questions on RIN 3150-AH81

My apologies ... complete attachment provided.

>>> Pat Schroeder 10/05/06 10:55AM >>>
To Whom It May Concern,

Please find attached responses to the NRC questions published in the Federal Register/Vol. 71, No. 86, pp. 26267-26275.

Thank you for this opportunity.

Regards,
Pat

Patricia Schroeder
Standards Administrator
American Nuclear Society
555 North Kensington Avenue
LaGrange Park, Illinois
60526 USA

Tel: 708/579-8269
Fax: 708/352-6464
E-mail: pschroeder@ans.org

CC: "Blanca Hinojosa" <BHinojosa@ans.org>, "Harry Bradley" <hbradley@ans.org>, "Mary Beth Gardner" <mgardner@ans.org>, <jamesmallay@aol.com>, <Richard.Black@eh.doe.gov>, <jxu1@nrc.gov>, <NPK@nrc.gov>, <SpellmanDJ@ornl.gov>, <rrweidler@prodigy.net>, <carl.mazzola@shawgrp.com>, <balkeykr@westinghouse.com>

Mail Envelope Properties (45252E32.146 : 11 : 37190)

Subject: Complete -- ANS Responses to ANPR Questions on RIN 3150-AH81
Creation Date Thu, Oct 5, 2006 12:04 PM
From: "Pat Schroeder" <PSchroeder@ans.org>

Created By: PSchroeder@ans.org

Recipients
nrc.gov
OWGWPO02.HQGWDO01
CAG (Carol Gallagher)

nrc.gov
TWGWPO04.HQGWDO01
JXU1 CC (Jennifer Uhle)

nrc.gov
OWGWPO04.HQGWDO01
NPK CC (N P Kadambi)

nrc.gov
TWGWPO02.HQGWDO01
SECY (SECY)

westinghouse.com
balkeykr CC

shawgrp.com
carl.mazzola CC

prodigy.net
rrweidler CC

ornl.gov
SpellmanDJ CC

eh.doe.gov
Richard.Black CC

aol.com
jamesmallay CC

ans.org

mgardner CC (Mary Beth Gardner)
hbradley CC (Harry Bradley)
BHinojosa CC (Blanca Hinojosa)

Post Office	Route
OWGWPO02.HQGWDO01	nrc.gov
TWGWPO04.HQGWDO01	nrc.gov
OWGWPO04.HQGWDO01	nrc.gov
TWGWPO02.HQGWDO01	nrc.gov
	westinghouse.com
	shawgrp.com
	prodigy.net
	ornl.gov
	eh.doe.gov
	aol.com
	ans.org

Files	Size	Date & Time
MESSAGE	486	Thursday, October 5, 2006 12:04 PM
NRC Letter & Q Responses FINAL 10-5-06.pdf	73646	
Mime.822	103114	

Options

Expiration Date:	None
Priority:	Standard
ReplyRequested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

Junk Mail Handling Evaluation Results
Message is eligible for Junk Mail handling
This message was not classified as Junk Mail

Junk Mail settings when this message was delivered
Junk Mail handling disabled by User
Junk Mail handling disabled by Administrator
Junk List is not enabled
Junk Mail using personal address books is not enabled
Block List is not enabled