

## NAC International Comments on Draft NUREG-1536, Revision 1A

Line	Topic	Comment	Recommended Improvement/Correction
N/A	General	The Draft NUREG-1536 does not appear to reflect NRC's position on risk based regulations. It appears to be too prescriptive in areas that have little to no impact on safety.	Reconsider detailed prescription of requirements that are covered by other regulations, measurements and controls, e.g., shielding design, related computer verification, measurements required during loading operations, measurements on loaded casks for site operations to manage site boundary dose. Technical Specification material should be limited to system operational limits that the licensee must meet and not repeat regulatory requirements or include material property and test requirements addressed by Quality Assurance requirements. Technical specifications should not be used as a control on the licensee use of 72.48 revision.
1914-1917	Confinement Boundary	“Nevertheless, for assessment purposes and to demonstrate ... the DSS should be evaluated for effects of a confinement boundary failure.” This is not duplicated in confinement SRP discussion. Evaluation of the effect of a confinement boundary failure is not a standard evaluation set for current licensed systems (ISG-5).	Nonmechanistic failure should not be a system analysis requirement. This imposed analysis is beyond regulation requirements.
3106	Definition of Acceptable Guidance	Imposes excessive conservatism for seismic evaluations.	RG 1.60 should be replaced by NUREG/CR-6728 and also NUREG/CR-6865.
3139-3140	Confinement	“Confinement casks” is poor terminology.	It should read: “for the confinement boundary of the cask.”

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3153	Basket Evaluation	In the previous paragraph, Subsection NB is used to define stress qualification for the confinement boundary, which is a pressure retaining boundary. In this paragraph, it does not clearly state that the basket is a nonpressure-retaining boundary and that the applicant should use Subsection NG.	Need to state that Subsection NG is acceptable or else the reader is left to believe that Subsection NB applies to nonpressure boundary baskets. It should confirm that Appendix F is applicable for use with Subsection NG.
3168	Restricts Analyses to Using Linear Properties	Includes excessive conservatism that is not consistent physical testing.	It should state that Subsection NB and Subsection NG permit the use of Appendix F, which does permit the use of inelastic properties for components that serve as the pressure boundary or also non-pressure boundary applications, such as baskets. It should also state that strain base criteria can be employed for energy limited accident conditions, provided the applicant provides such basis for its use.
3171	Restricts Analyses to Using Static Properties	In many applications for drop conditions, it should be acceptable to strain rate sensitive properties. Appendix F permits its use.	Need to include “strain rate properties, which need the appropriate references.”
4302	Annotation of Input Files	Too subjective	It is important to be able to use the applicant’s files. It is not necessary to understand all aspects of the input files. Some of these files come from Journal files or Log files which are generated by the program. It is not feasible to add comments to these files. Open-ended statements such as adding “annotation” lead to overstatement by the reviewer for the need of such documentation.

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4313	Annotation of the Load Steps	This would lead to excessive documentation in the computer solutions.	4311-4315 should be removed. It is the responsibility of the applicant's QA program to ensure that the analyses are performed correctly.
4332	Sensitivity Study on Mesh Type	Lack of clarity	"Mesh type" should be removed. It is not clear.
4335-4336	Mesh Study	Not required when stress linearization is being used for primary loading. Such detailed studies should be restricted to fatigue evaluations at stress discontinuities	Remove these lines. Too subjective, allowing the reviewer to specify detailed mesh studies for any part of the model he so desires.
4349	Including Plots of the Results	Generates extra data to be included in the SAR, while it is not needed.	Remove "plots" from line 4349.
4680	Exclusion of Natural Convection Internal to the Canister	Too restrictive for convection designs. It states: "...should be limited to...the external surface..." This is an unacceptable statement that will be taken by the reviewer that internal convection cannot be used without some excessive burden of proof provided by the applicant.	Remove line 4680. There is sufficient test data to confirm that convection internal to the canister is acceptable.
4687	Convection	What does "robust" mean? This allows the reviewer to apply his personal definition of "robustness" to the applicant's analyses.	Remove "robust" from line 4687.

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5185-5187	Confinement Monitoring Capability	Welded closure seal. "However, the lack of a closure monitoring system has typically been coupled with a periodic surveillance program that would enable the licensee to take timely and appropriate corrective actions ..." Dry cask storage systems have been approved without a closure weld seal monitoring system, as within the storage cask, surveillance of the closure weld is not feasible.	Temperature monitoring and/or visual surveillance of the air cooling vents is a standard part of concrete cask (welded canister) licensing.
5426	Nuclides with Potential for Release	Table 5-2, Release Fractions. "...should not be used for spent fuel described as damaged." Based on NUREG/CR-6497, damaged fuel would not have a driving force to release fines from the matrix. What is the postulated issue here? Is there data available to NRC that indicates a safety concern?	Provide additional guidance and describe what factors are suggested for damaged fuel.
5799-5801	Radiation Source Definition	"radionuclide content, and estimated radiation source strength in Becquerels, .... should be described...." New requirement.	Provide clarification as to what the basis of this request is, as radiation source strength in Ci or Bq is not clearly related to gamma/neutron source strength (e.g. beta emitters).
5809-5810	Radiation Source Definition (Gamma Sources)	"characteristics for each gamma-ray source type should be provided, including isotopic composition, and photon yields" Is a tabulation of spent fuel isotopics requested here? If so, to what purpose?	Typically, inputs into depletion analysis are provided, but not isotopics of depleted materials. Clarify requirement if a tabulation of spent fuel isotopics is requested and describe purpose.

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5813-5814	Radiation Source Definition (Gamma Sources)	Within gamma source description, "describe the extent to which radioactivity may be induced by interactions involving neutrons originating in the stored materials" If this implies n-gamma reactions, then the current SRP version is clearer.	If activation is to be considered for decommissioning, that should be clarified.
5868-5870	Shielding Analyses (Computer Codes)	"The applicant should defend any simplifications and assumptions by showing that the approach used will result in conservative (bounding) estimates."	Clarify if results need to be bounding or "provide reasonable assurance" as stated in Section 6.4, Line 5723: "Reasonable assurance that the proposed design fulfills the acceptance criteria ..."
5873-5874	Shielding Analyses (Computer Codes)	"...SAR should numerically specify source term uncertainties for high burnup fuels" in combination with "...validation data is relatively limited for burnup above 45 GWd/MTU." High burnup fuel is licensed and in storage. No indication that substantial dose effects occurred. If limited data is available it leaves an open ended question as to how to specify uncertainties. Conservative assumption and desired design margins are not defined, leaving it up to each reviewer when, and how much, in uncertainties to apply.	Provide correlation why maximum fuel assembly heat load is related to uncertainties. Low heat capacity/minimal shield system may be affected by low fuel assembly heat load and vice versa.
6003-6004	Radiation Source Definition (Initial Enrichment)	"Applicant and the staff should not attempt to establish specific source terms as operating control and limits for cask use." If that is the case, why does the SRP focus in the Section 6.4.2 on curie content and isotopic description of the spent fuel?	For Cobalt-60 dominated hardware sources, a source term may be more appropriate than other limits (e.g., mass, exposure, cool time).

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6149-6150	Shielding Model Specification (Configuration of the Shielding and Source)	<p>"...homogenization should not be used in neutron dose calculation when significant neutron multiplication can result from moderated neutrons..."</p> <p>While not changed from current SRP statement, it should be noted that standard practice is to homogenize the rod lattice in shielding calculations (not necessarily homogenizing basket structure into the fuel region).</p>	Provide additional guidance and/or justification why the standard practice of homogenizing the rod lattice in shielding calculations should not be used.
6221-6222	Shielding Analyses (Computer Codes)	<p>"The reviewer should be aware that often adjoint calculations are performed by the applicant ... importance functions..."</p> <p>Review staff should recognize that importance functions may also be produced with Monte Carlo, point-kernel and transport codes.</p>	Include importance functions produced with Monte Carlo, point-kernel and transport codes.

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6246-6248	Shielding Analyses (Computer Codes)	<p>"The applicant should use the latest released computer code version that is valid for the particular computational platform used to perform the analysis."</p> <p>This item in particular has been discussed with NRC staff as a significant issue. Licensed code for same type of application should not require code version change unless safety issue has been identified. Continual use of different code version within an application is difficult to reconcile and potentially leads to unnecessary confusion.</p> <p>Typical new release code versions tend to contain a certain amount of bugs that get resolved through user feedback to code originator.</p>	<p>Could be interpreted that a newer code provides more "accurate" result; but as previous version was found to be acceptable for system approval, there should be no requirement for change. The goal per draft SRP Section 6.4 is to provide reasonable assurance that system will meet limits.</p>
6302-6309	Shielding Analyses (Computer Codes)	<p>"by verifying that the following information has been provided in the SAR ... The computer code solutions to a series of test problems ..."</p> <p>Draft SRP does not contain the previous SRP statement "that these solutions may be referenced, and need not be submitted in the SAR". This change would add a substantial amount of information to the SAR without any safety benefit, as the referenced documents, per current SRP, should be public information and/or have been previously submitted to NRC.</p>	<p>Adopt current SRP verbiage and add: "These solutions may be referenced but need not be submitted in the SAR."</p>

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7697	Methodology to Evaluation Flaw Size	For stainless steel casks and welding, this is too limiting. NAC uses the J-integral method to evaluate flaw size which limits the size of a single weld pass.	In order to be consistent with 7682, it should explicitly state that the applicant can use J integral methodology based incorporating plasticity for ductile weld materials such as stainless steel.
9131-9232	Fuel Temperature Range Limits	This could be interpreted as the limit in any one cycle of fuel temperature is limited to 65°C	It needs to explicitly state that the 65°C range can be exceeded, but for less or equal to 10 cycles.
10418-10433	Charpy Test Requirements	Use of carbon steel less than 5/8 inch thickness.	NRC's position/guidance should be stated. Clarification should include ASME Code concurrence that fracture testing is not required for material with wall thicknesses of less than 5/8 inch.
11007	Exposures at or Beyond the Controlled Area Boundary (Normal Conditions)	Focus added on "additional engineering features and distance from array." As only hypothetical array and single cask are evaluated, it is not clear when features would be required to show compliance with regulations and should be included in the conditions of cask use. Specific distance and shielding options and inclusion of such limitations in the CoC do not seem to be consistent with the 72.212 evaluation that a site would do to establish compliance with the requirements.	Further guidance is required.
12537	Consolidated References	Imposes excessive conservatism for seismic evaluations	RG 1.60 should be replaced by NUREG/CR-6728 and also NUREG/CR-6865.