ENCLOSURE 1

NUCLEAR ENERGY INSTITUTE (NEI)
SPECIFIC COMMENTS ON DRAFT INTERIM STAFF GUIDANCE 23, "APPLICATION OF ASTM STANDARD PRACTICE C1671-07 WHEN PERFORMING TECHNICAL REVIEWS OF SPENT FUEL STORAGE AND TRANSPORTATION PACKAGING LICENSING APPLICATIONS"

NO.	ISG-23 Line No.	COMMENT
1	General	The ISG contains several clarifications and additional guidance that do not pertain to content, or applicants' use of the ASTM standard. These clarification and additional guidance should already be in the revision to NUREG-1536. Alternatively, the scope of the ISG could be broadened beyond applicability to just the ASTM standard in order to include these items. Specific examples are cited in the comments below.
2	35-38	It is not clear why an SFST ISG would address long-term use of neutron absorbers (e.g., a year or more) in spent fuel pools. The standard is not intended for wet storage.
3	40-48	A neutron absorber supplier change may be simply the result of a company sale to a new entity. This change may result in no change in the location, equipment, process, and personnel involved in the manufacture of the material. Similarly, a manufacturing facility may be relocated but continue applying identical processes, process control and equipment. There should not be an automatic assumption that anything beyond the control of key processes should be examined. The purpose of the key process specification is to outline the steps required to produce a consistent material compatible with that produced for the qualification program. Please clarify.
4	46	If NRC staff considers the guidance "insufficient" it would be helpful if the staff provided guidance on what is considered sufficient with respect to this part of the ASTM standard.
5	58	Specifying that the accelerated testing should be "longer" than the anticipated service life is vague and should be clarified.
6	59-61	Including the service life of the neutron absorbing materials in the CoC and/or Technical Specifications (TS) is not appropriate. Including this information in the SAR, subject to initial NRC review and approval and 72.48 review after that for future changes is sufficient.

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7	68	Please confirm the statement that clad neutron absorbers with porosity between 1 and 3% have experienced blistering, or withdraw these numbers. EPRI report 1009696, Boral Behavior Under Simulated Cask Vacuum Drying found that Boral with porosity between 1-3% exhibited blisters. However, the porosity for these test coupons was determined by the difference in weight of the coupons before and after wetting, indication that this is interconnected (open) porosity at the edge of the sheets rather than total porosity. NRC Generic Safety Issue 196 addressed Boral degradation and concluded that no new guidance or requirements for licensees were necessary. It is recommended that the ISG be modified to discuss Generic Safety Issue 196 and its resolution.
8	70	Please clarify how blistering can have an effect on retrievability. There a numerous casks already loaded and in-service with clad-type neutron absorbers (e.g., Boral).
9	74	The ultimate demonstration of Boron-10 presence and uniformity per specification is acceptance testing with the associated statistical treatment. The qualification testing merely demonstrates that there will be sufficient uniformity (or enough excess Boron-10) to minimize the risk of failing acceptance testing. For acceptance testing, the certificate holder must develop an adequate sampling rate, and must sample production at this rate in either a systematic or probabilistic fashion. Removing coupons "contiguous to each plate" is irrelevant because plate sizes can vary significantly from one basket design to another, thus resulting in large variation in the sampling rate per unit surface area.
10	80-98	The amount of "credit" taken for Boron-10 in the application is not addressed in the ASTM standard. Thus, this clarification is not germane to the purpose of the ISG and should be deleted. This topic appears to be adequately addressed in the recent proposed revision to NUREG-1536.
11	84	If the Boron-10 credit discussion remains in this ISG, including the amount of Boron-10 credit used in the criticality analysis in the TS is not appropriate. Including this information in the SAR is sufficient.

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12	95-96	The statement that alternate means of Boron-10 areal density inspection must be periodically calibrated against neutron attenuation requires a technical basis. There is a practical limitation, because there are few neutron attenuation facilities available to perform this work, and if they were to become unavailable, production of neutron absorbers would come to a stop unless there was an alternative available. The purpose of benchmarking as conceived by the ASTM working group was not to "calibrate" the alternate method, but to see if there was a bias that needs to be factored in when using the alternate method. It is interesting to note that one regulatory authority (BAM) uses chemical and spectrometric analysis to verify the neutron attenuation results.
13	93-99	No guidance is provided as to the application of the terms "partial substitution," "periodic sampling," and "proper sample size." This may be interpreted in varying degrees by individual reviewers/applicants and result in individual negotiations with NRC from application to application. Please clarify or refer to an acceptable standard for these terms.
14	94	The text discusses partial substitution for attenuation testing with other methods, presumably wet chemistry testing. Does this mean that a CoC holder can use wet chemistry testing as the primary acceptance test and neutron attenuation testing as a verification test with a smaller sample size? An example of a partial substitution for attenuation tests should be provided for clarity.
15	99-100	Editorial: Insert a blank line between these two lines.
16	100-104	A requirement for neutron attenuation testing on 75%-credit Boron-10 material represents a double penalty on the material. In the case of Boral, the reduced (75% credit) historically has been traced to streaming within the neutron absorber core material due to a larger particulate B_4C (compared to MMC with a finer particulate B_4C content). Neutron attenuation testing with a collimated thermal neutron beam (standard test procedure for neutron attenuation testing) directly measures the streaming phenomena, resulting in lower measured Boron-10 content than an equivalent homogenous absorber (e.g. ZrB_2). Applying the 75% credit on top of this reduces the credited absorber content a second time, therefore accounting for neutron streaming twice.

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17	112-117	The statement regarding neutron absorber standards requires a technical basis. Whether homogeneous absorbers or heterogeneous absorbers are used, there is always an approximation of the condition that is modeled in the criticality calculations. If a chemically homogenous sheet of ZrB_2, TiB_2, B_4C, etc., is used, the standard is generally paired with a sheet of aluminum to account for the scattering effect of the matrix alloy. But this separation of the absorber and the scatterer into two separate sheets is artificial. Heterogeneous absorbers do not represent the homogenous mixture in a computer model for criticality analysis, but they better represent the overall material distribution, and with a sufficiently fine dispersion of the boron-containing particles, the behavior with respect to a neutron beam is indistinguishable from a homogeneous material. This is precisely what the ASTM standard requires. Calibration traceable to a national standard or to a physical constant (e.g., a monoenergetic neutron cross section) would in any event be required by any certificate holder's QA program.
18	112-117	The text precludes the use of "boron carbide reinforced aluminum matrix composites" as the calibration standard for neutron absorption. It is suggested that the ISG recommend that if heterogeneous neutron absorbing particles are used, then the applicant should justify the necessary controls (e.g., particle sizes, and calibration controls are in place to effectively eliminate the possibility of self-shielding and neutron streaming.) These controls should be defined in the Safety Analysis Report, but not part of the technical specifications. Additionally, the staff's independent and extremely conservative criticality study shows "no significant difference in k_{eff}" with exaggerated heterogeneities properties for the neutron absorbing material of a transport cask. Thus, the staff's own study supports that boron carbide is acceptable for use in neutron attenuation standards.
19	124-125	This additional guidance is unnecessary for clarifying the use of an ASTM standard by a CoC holder and should be deleted or clarified. The NRC's input on, and acceptance of the use of alternative testing methods occurs either via the review of license applications or by inspection.

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20	164-182	Industry agrees that visual inspections are generally required, that they will generally look for more than just surface finish as cited in the ASTM standard, and that the visual inspections must be suitable for the specific materials and application. However, industry disagrees with the significance that the review guidance is placing on edge cracking. The ISG clarification fails to explain the consequences of cracks based on their magnitude. A small tight crack would not have sufficient surface area to affect criticality safety and if the absorber is used without structural credit; the notch effect is unimportant.
21	164-182	The cited section of the ASTM standard refers to "properties" to be verified, not the techniques to be used to perform the verifications, which is the subject of the clarification. The suggested additional guidance does not pertain to the information in this section of the standard and should be deleted.
22	184-187	"Actions to be taken if thickness is outside the permissible limits" is beyond the scope of the ASTM standard. These actions are handled case-specifically in the applicant's corrective action program. This additional guidance should be deleted.
23	191-192	Including "discussion" of deviations in the physical dimensions of the neutron absorber in the CoC or TS is not appropriate. Including this information on the drawings is sufficient without incorporating the drawings by reference into the CoC or TS.
24	200-209	Industry does not agree that the Part 72 Technical Specifications are an appropriate place for the acceptance testing and key process control details. At the most, only the neutron absorber characteristic essential to criticality safety, i.e., the minimum ^{10}B areal density, and major material characteristics such as limits of composition should be included in the TS. That is, the TS should state what must be achieved, not how to achieve it.
25	215-218	This additional guidance is beyond the scope of the ASTM standard and should be deleted. Safety classification of components such as neutron absorbing materials is governed by the applicant's QA program.