

**Responses to Public Comments on Draft Regulatory Guide DG-3053,  
“Nuclear Criticality Safety Standards for Nuclear Materials Outside Reactor Cores”  
Proposed Revision 3 of Regulatory Guide 3.71**

On August 24, 2017, the U.S. Nuclear Regulatory Commission (NRC) published a notice in the *Federal Register* (82 FR 40173) announcing that Draft Regulatory Guide DG-3053 (proposed Revision 3 of Regulatory Guide 3.71) was available for public comment. The comment period closed on October 23, 2017 and the NRC received six comment submissions. The comments have been edited for clarity. The following table documents the public comments and NRC staff’s responses.

The NRC received comments from the following:

<p>Mr. Lon Paulson &lt;Lon.Paulson@ge.com&gt; GE-Hitachi/Global Nuclear Fuel – Americas 3901 Castle Hayne Road, K26 Wilmington, NC 28404 Dated: August 23, 2017</p> <p>ADAMS Accession No.: ML17352A513</p>	<p>Mr. Daniel Cronin &lt;dcronin@ufl.edu&gt; University of Florida Training Reactor 202 Nuclear Science Building P.O. Box 118300 Gainesville, FL 32611-8300 Dated: August 24, 2017</p> <p>ADAMS Accession No.: ML17242A021</p>	<p>Mr. Ronald Lavera &lt;Ronald.LaVera@nrc.gov&gt; U.S. Nuclear Regulatory Commission Mail Stop O-7D21 Washington, DC 20555 Dated: August 30, 2017</p> <p>ADAMS Accession No.: ML18071A045</p>
<p>Mr. David Erickson &lt;david.erickson@srs.gov&gt; Savannah River Site 707-C, Rm 228 Aiken, SC 29808 Dated: September 27, 2017</p> <p>ADAMS Accession No.: ML17276A315</p>	<p>Ms. Patricia Schroeder &lt;pschroeder@ans.org&gt; American Nuclear Society 555 N. Kensington Ave. La Grange Park, IL 60561 Dated: October 11, 2017</p> <p>ADAMS Accession No.: ML17290A355</p>	<p>Mr. Nima Ashkeboussi &lt;nxa@nei.org&gt; Nuclear Energy Institute 1201 F Street, NW, Suite 1100 Washington, DC 20004 Dated: October 23, 2017</p> <p>ADAMS Accession No.: ML17304A064</p>

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1	Lon Paulson, GE-Hitachi/Global Nuclear Fuel – Americas	The following citations are incorrect: Section C.1 of RG 3.71: a. ANS-8.12 should be reaffirmed (R) 2016. b. ANS-8.14 should be R2016. c. ANS-8.20 should be R2015. d. ANS-8.22 should be R2016. e. ANS-8.26 should be R2016. Section C.2 of RG 3.71: f. ANS-8.17 should be R2014.	The NRC staff agrees with the comment and the references have been updated accordingly.
2	Lon Paulson, GE-Hitachi/Global Nuclear Fuel – Americas	The clarification regarding Section 4.1 of ANSI/ANS-8.24-2007 is unnecessary and unwarranted. There is no need for annual reverification. The computer code system is verified prior to first use; the clarification might emphasize the importance of verification prior to first use to confirm proper functionality of the code system.	The NRC staff disagrees with the comment. Section 5.4.3.1.7.1(B)(3) of NUREG-1520 states that in addition to initial verification, licensees should periodically re-verify calculational methods. This is appropriate to ensure that inadvertent changes have not been made to either the hardware or software that would invalidate the results of the validation. No change will be made for this comment. Note: ANSI/ANS-8.24-2007 has been superseded by ANSI/ANS-8.24-2017 which was issued in December 2017 and the Regulatory Guide (RG) has been updated to reflect the 2017 version.
3	Daniel Cronin, University of Florida Training Reactor	The last sentence in the Applicability section should be shortened to read: “This revision is not intended for use by nuclear reactor licensees.” The rest of the sentence is vague and likely to cause confusion. This is needed to be consistent with the statement under “Reason for Revision” addressing the applicability to reactor facilities licensed under 10 CFR Part 50.	The NRC staff agrees with the comment. The Applicability Section has been modified.
4	Ronald Lavera, NRC	The proposed draft guide should address the following issue: Under the 1979 MOU with DOT, NRC regulations do not contain any requirements for Storage in Transit. Once fuel is delivered to the reactor site, it is no longer in transit, even if it has not yet been placed in the new fuel racks. There is some operating experience indicating	The comment is beyond the scope of this RG and no change will be made to the RG.

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		that some reactor sites have received multiple shipments of new fuel without placing them in approved new fuel racks. 10 CFR Part 71 does not consider criticality controls during Storage in Transit; hence, there are no criticality controls applied when multiple shipments are staged on-site awaiting placement in the new fuel racks.	
5	David Erickson, Savannah River Site	It is not appropriate for NRC to claim that ANS-8.1-2014 “contains an error.” The value for the plutonium nitrate concentration single parameter limit has been there since 1981 and has a sufficient basis. If the NRC has a different basis, it can state the value it prefers to use, with an applicable reference to support. The value presented is not to be used for normal conditions, but only as a bounding value for credible abnormal conditions after accounting for uncertainty.	The NRC staff agrees in part with the comment. However, the staff has determined that the 7.3 g/L plutonium nitrate concentration limit in Table 1 of ANS-8.1-2014 warrants clarification, in that the modeling of plutonium nitrate with 100 wt% <sup>239</sup> Pu at this concentration would produce a k-eff value above 0.98. The standard states that the limit is applicable to a mixture of isotopes, but no minimum <sup>240</sup> Pu content is specified. The staff notes that in practice there will always be some <sup>240</sup> Pu present, as it is not possible to attain 100% <sup>239</sup> Pu. The exception has been removed and replaced with an appropriate clarification.
6	Patricia Schroeder, American Nuclear Society	ANS is an American National Standards Institute (ANSI) Accredited Standards Developer. Standards approved by ANSI are permitted to include the “ANSI” acronym in their designation. ANSI does not approve any of our committees or working groups, so “ANSI” should not be used in their names. Suggested changes correct the use of the acronym, update the name of the ANS consensus committee responsible for approving NCS standards, and update reaffirmation dates for ANS standards.	The NRC staff agrees with the comment. The RG will be revised so the “ANSI” designation will not be included in the discussion of committees or working groups. It will only be included in the names of standards approved by ANSI.
7	Patricia Schroeder, American Nuclear Society	Reaffirmation is in process for two additional standards—ANS-8.3-1997 (R2012) and ANS-8.5-1996 (R2012). ANSI approved of these reaffirmations is expected by the end of this month or early next month.	The NRC staff agrees with the comment. The references have been updated accordingly in the final RG.
8	Nuclear Energy Institute	Two of the standards (ANS-8.10 and -8.23) are endorsed with added exceptions. These appear to be imposing	The NRC staff disagrees with the comment. In the case of ANSI/ANS-8.10-2015 (issued after the 2010 revision

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		<p>new or different staff positions. This is compounded with changes made to NUREG-1520, Rev. 2, specifically Section 5.4.3.1.1. We would also refer to NEI's comment letter on Rev. 2 of NUREG-1520.</p>	<p>of Regulatory Guide 3.71), the NRC staff is providing clarification, and not taking additional exceptions to this standard. The clarifications point out that NRC does not require licensees to accept the more conservative approach as described in the standards to meet the regulations. Specifically, this clarification is describing that the standard may be applied if the specified conditions are met in individual areas, rather than for the entire facility as stated in the standard. In addition, the dose limits in 10 CFR 70.61 are higher, and therefore less restrictive, than those in ANSI/ANS-8.10-2015. In both cases, a licensee could acceptably commit to follow the standard.</p> <p>With regard to ANSI/ANS-8.23-2007 (R2012), the NRC staff is also providing clarification to point out that compliance with the standard does not require compliance with ANSI N13.3-1969 (R1981), which is now obsolete. As with ANSI/ANS-8.10, a licensee could acceptably commit to follow the standard in full.</p> <p>The staff previously reviewed NEI's letter on Rev. 2 of NUREG-1520, dated November 3, 2014, and subsequently addressed all public comments on NUREG-1520 as appropriate. Section 5.4.3.1.1 of NUREG-1520 was revised to refer to "the most current revision of the standards that have been endorsed by the NRC in the version of RG-3.71 in effect when the license application was submitted." This ensures consistency between NUREG-1520 and the RG as it is updated to reflect the most recent industry standards.</p>
9	Nuclear Energy Institute	<p>The last paragraph of Section D states: "If an existing licensee voluntarily seeks a license amendment or change...then the staff may request that the licensee</p>	<p>The NRC staff agrees with the comment. The comment is correct that if a request is unrelated to the topics of this</p>

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		<p>either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting....” It would be helpful to gain additional context from NRC staff as to what level of justification would be required. Additionally, it is the industry’s understanding that, pursuant to the NRC’s current position regarding “forward-fitting” that the application of Rev. 3 would fall outside the definition of backfitting only where it (1) relates to a licensee’s voluntary request, and (2) is an essential consideration in the NRC staff’s determination of the acceptability of the licensee’s voluntary request. It is our understanding that unrelated licensing actions or amendments should not garner new commitments regarding the new referenced standards in Rev 3, nor should they garner subsequent RAIs related to criticality safety, as discussed in the September 26, 2017 public meeting.</p>	<p>RG, then the applicant will not be asked to address this RG.</p> <p>If an existing licensee’s voluntary request involves a regulatory issue directly relevant to this RG and is an essential consideration in the staff’s determination, then the level of justification required to demonstrate that an alternative to this RG complies with the underlying regulatory requirements will vary based on the nature and safety significance of the alternative and based on the degree of difference from the standards endorsed by this RG.</p> <p>As the comment notes, applicants would only be asked to follow this RG or justify an alternative when two factors are met: (1) the NRC staff’s consideration of the request involves a regulatory issue directly relevant to this regulatory guide, and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff’s determination of the acceptability of the licensee’s request. Similar language was included in Revision 2. No changes were made as a result of this comment.</p>
10	Nuclear Energy Institute	<p>The last sentence on page 11 states: “This is not considered backfitting as defined in 10 CFR 70.76 or 10 CFR 72.62.” This notes that license amendments or changes would not constitute a backfit, but is silent on license renewal. This leaves considerable uncertainty as to NRC’s expectations during license renewal. An attempt to endorse a particular standard’s current version may be problematic during a Part 70 license renewal given that several decades may pass between renewals. This places an unnecessary burden on a licensee to perform a gap analysis, demonstrate or justify</p>	<p>The NRC staff agrees that Section D, Implementation, does not specifically address implementation in license renewals under 10 CFR 70.73. Requests for license renewal under 10 CFR 70.73 are voluntary requests for new approvals from the NRC and, therefore, subject to the language referenced in the comment, stating:</p> <p><i>“If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff’s consideration of the request involves a regulatory issue directly relevant to this regulatory guide and (2) the</i></p>

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		<p>exceptions to revised standards, or potentially make significant licensed program upgrades.</p>	<p><i>specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 70.76 or 10 CFR 72.62."</i></p> <p>The NRC staff does not agree that requesting applicants for license renewals to address this RG imposes an unnecessary burden. This RG addresses standards for preventing nuclear criticality, a key feature of safely handling special nuclear material. The NRC staff does not deem it an unnecessary burden at the time of license renewal to ask licensees to adopt up-to-date standards for such a significant safety issue or to justify how they will otherwise comply with the underlying NRC regulations in order to permit licensed activities for an additional ten to twenty years. No changes were made as a result of this comment.</p>
11	Nuclear Energy Institute	<p>The applicability of the draft guide is also proposed to be expanded to include 10 CFR Part 71. This could impart unintended burdens on certificate holders when renewal is pursued, without a clear regulatory basis, articulated benefit, or safety concern. This appears to be imposing a staff position that is either new or different from a previous staff position. In addition, the requirements of 10 CFR 71.55 and RG 7.9 have not changed and there is no equivalent "Use of Industry Standard" statement (similar to Section 5.4.3.1.1 in NUREG-1520, Rev. 2) for Part 71 fissile package reviews. Therefore, it is unclear</p>	<p>The NRC staff disagrees with this comment. Compliance with an RG is not required and compliance with the standards in this RG is voluntary. The RG provides one method of demonstrating compliance with the underlying NRC regulations. Other methods may also be acceptable. Additionally, backfit and issue finality considerations do not apply to licensees and applicants under 10 CFR Part 71. See response to Comment 9. No changes were made as a result of this comment.</p>

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		how NRC plans to expand the applicability of the draft guide to Part 71 reviews.	
12	Nuclear Energy Institute	The draft guide endorses and harmonizes both ANS and ISO standards. This is misplaced as an NRC goal; consideration should be given to removal of the ISO standard. Should ISO standards remain, the draft guide should address the acceptability of a licensee using a combination of both standards. For example, a licensee could apply all ANS standards except ANS-8.3, and alternatively apply ISO 7753. Otherwise without further clarification, endorsing two different standards for criticality accident alarm systems could cause confusion as to which takes precedent.	The NRC staff agrees in part with the comment and a statement has been added in Section C of the RG to clarify that either ANSI/ANS8.3 or ISO 7753 may be used as an acceptable method to meet the regulations.
13	Nuclear Energy Institute	As stated in the FRN, “the proposed revision would provide methods that are acceptable to the NRC staff.” The draft guide incorporates several “shall statements,” understood to denote requirements of the standard, if and only if the licensee commits to that particular standard. Alternately, if the standard is not accepted by the licensee, and the licensee chooses an alternate method, “shall” statements would not apply.	The staff agrees, and alternatives may be used. See also the response to Comment 9. No changes were made as a result of this comment.
14	Nuclear Energy Institute	As noted during the September 26, 2017 public meeting, ANS standards are continually being revised and reaffirmed approximately every 5 years. However, this is problematic in that the effective dates of issuance are frequently changing and endorsing the current versions of the 18 standards is not practical. For example, several standards listed in Section c.1 are already outdated and have the following errors: i. ANS-8.12 should be R2016 ii. ANS-8.14 should be R2016 iii. ANS-8.17 should be R2014 iv. ANS-8.20 should be R2015	The NRC staff agrees in part with the comment. The staff disagrees with the statement that endorsing the current version of the 18 standards is not practical. The NRC currently has a policy of reviewing RGs every 10 years. It is the policy of NRC to endorse, to the extent practical and consistent with regulations, the most recent version of industry consensus standards. Standards are constantly being reviewed and revised, and current practice is to keep up with them on at least a ten-year review cycle.

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		<p>v. ANS-8.22 should be R2016                      vi. ANS-8.26 should be R2016                      We also recommend a minimum of 5 years between revisions, in recognition of the Cumulative Effects of Regulation.</p>	<p>The reaffirmation dates of the standards have been updated. The staff notes that reaffirmation does not change the content of the standard, so would not be a reason (by itself) to revise the RG.</p>
15	Nuclear Energy Institute	<p>Section c.2.b, paragraph 2, states “Section 4.2.2 of the standard states that a criticality alarm system is not required in areas where personnel would be subject to an excessive radiation dose.” This is an error. It should state “...where personnel would <b>not</b> be subject to an excessive radiation dose.”</p>	<p>The NRC staff agrees with the comment. The text has been corrected.</p>
16	Nuclear Energy Institute	<p>The ANS-8.3 exceptions added the sentence: “A clarification is that 10 CFR 70.24 requires placement of detectors in areas where threshold quantities of special nuclear material are present, but that audible or visual alarms may be located in areas where immediate evacuation is determined to be necessary based on the potential for an excessive dose.” ANS-8.3 defines an excessive radiation dose as a combined neutron and gamma dose of at least 12 rad in free air. 10 CFR 70.62(a)(1) requires a monitoring system capable of detecting an absorbed dose in soft tissue of 20 rad of combined neutron and gamma dose at an unshielded distance of 2 m within 1 minute. The added sentence is not clear and appears to change the regulatory requirements from detecting 20 rads within 1 minute to a system capable of detecting 12 rad.</p>	<p>The NRC staff disagrees with the comment. The criticality alarm system (CAAS) consists of multiple components, including detectors and annunciators. A CAAS must be deployed wherever the threshold quantities listed in 10 CFR 70.24 are exceeded. The placement of <u>detectors</u> is in accordance with the dose thresholds indicated [70.24(a), is the applicable regulation, vs. 70.62(a)(1)]. The placement of <u>annunciators</u> (e.g., horns) is based on wherever evacuation is deemed necessary, which may be based on the potential for an excessive radiation dose. The clarification was developed to distinguish the placement of detectors vs. annunciators. No changes were made as a result of this comment.</p>
17	Nuclear Energy Institute	<p>The exceptions of Section c.2.c (ANS-8.10) are not clear and appear misaligned with the regulatory definitions in 10 CFR 70.61(c). ANS-8.10 states shielding and confinement should be applied such that the total effective dose to individuals outside the shielded and confined area will not exceed 10 rem and the total</p>	<p>The NRC staff agrees in part with the comment. The language was modified in this RG to state that the licensee may use the more restrictive limits in ANS-8.10 if it so chooses, or use the less restrictive limits from 10 CFR 70.61.</p>



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		<p>effective dose to individuals outside the restricted area will not exceed 0.5 rem. The draft guide states that the dose limits in ANS-8.10 are more conservative than the performance requirements in 10 CFR 70.61 and are applicable. As currently written, the draft guide appears to lower the regulatory definition of an intermediate consequence event in 10 CFR 70.61(c) and NUREG-1520.</p>	<p>Also, we do not lower the regulatory definition of an intermediate consequence event in 10 CFR 70.61(c) and NUREG-1520. The NRC staff accepts the use of less restrictive values from the regulations in meeting the intent of the standard.</p>
18	Nuclear Energy Institute	<p>The exceptions of Section c.2.d (ANS-8.17) adds that “licensees and applicants may perform a misload analysis, along with additional administrative loading procedures to reduce the likelihood of a misload, in lieu of a quantitative measurement.” Section 4.10 of ANS-8.17 allows both physical measurements and appropriate analysis and verification to determine appropriate fuel burnup credit. NRC currently accepts analytical methods to determine burnup credit in criticality analyses per NUREG/CR-6801, NUREG/CR-7109, and NEI 12-16, Rev. 1. The draft guide endorsement of this standard does not provide the flexibility to use currently acceptable practices to use a burnup analysis method and appears to be narrowly focused on loading spent fuel casks.</p>	<p>The NRC staff disagrees with the comment. The NRC staff’s position is that assignment of fuel burnup is to be based on physical measurements to confirm reactor records. In lieu of this, licensees may perform a misload analysis, and include additional loading procedures which reduce the probability of misloads. The use of analytical methods that take credit for burnup (e.g., depletion and reactivity calculations) is a separate issue. This approach is consistent with current NRC staff positions in ISG-8, Rev. 3. No changes were made as a result of these comments.</p>
19	Nuclear Energy Institute	<p>Section c.2.f (ANS-8.24) states that there should be provision for periodic (e.g., annual) reverification of computer codes. It is not clear why annual reverification is required if there are no changes to the computer code system. There is no added value to annual verification when software hasn’t changed, and appears to be imposing a new regulatory staff position. Currently, the computer code system is verified prior to use on each production workstation used to perform transport calculations.</p>	<p>See response to Comment 2. No changes were made as a result of this comment.</p>