

Stakeholder Comment Disposition Table

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1	General	The timelines, activities, and impacts associated with increasing burnup and enrichment are different. The appendix sometimes discusses both topics and other times is only referring to one of the two, however, it is not perfectly clear at all times.	Please consider partitioning the various sections into burnup and enrichment portions of the appendix to more clearly identify the information relevant to each topic.	The impacts of high burnup and increased enrichment are different (i.e., different technical concerns), and the schedules slightly different, but the activities for addressing the impacts are largely, if not entirely, the same because of leveraging resources to perform high burnup and enrichment tasks in parallel with ATF. Those areas where there are differences in schedule or activity are delineated in the various tables present in the project plan. And the differences in the technical issues are discussed in the opening paragraphs in each section. Therefore, the decision was made not to partition the project plan. However, many areas of the project plan were updated with revised wording to clearly indicate, when appropriate, which of the two technologies is being discussed.	Various portions of text within the entire HBU+IE project plan were revised to clearly indicate which of the two technologies (burnup or enrichment) are being discussed in those instances where both were not being addressed.
2	General	In numerous places it references UF6 as the only enriched product used to fabricate UO2.	Please revise the text to be more generic as there are possibilities to use other precursor forms that are not UF6.	Agree.	Revised to identify UF6 or other potential precursor forms that are enriched above the current limit (5 weight percent U-235).

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3	General	The draft appendix discusses changes to the standard 'pellet/clad' fuel system. In a fuel system where uranium is the minority component, a uranium enrichment could be above 5% while the ratio of U235 to all atoms by volume may not be above 5%. Therefore the effective enrichment would be less than 5% despite the ratio of U235 atoms to U atoms being above 5%.	Please add text to indicate that this appendix is only applicable for current UO2 fuel or clarify how to treat all fuel types.	5% weight enrichment is generally understood to be the amount of the uranium-235 isotope present relative to the amount of all other uranium isotopes.	Approach outlined in the project plan does not change depending on the fuel type. No changes made.
4	General	The appendix to the NRC Project Plan is prepared as Appendix A, however the NRC Project Plan Version 1.0 (ML18261A414) already contains an Appendix A "NRC Plans to Develop Analysis Capability." Having two appendices with the same letter creates an error likely situation.	Please revise the burnup and enrichment appendix or the current project plan appendix to be a different letter.	Discussed during public meeting, the HBU+IE project plan will appear as Appendix A in the ATF project plan. The existing Appendix A in the ATF project plan will become Appendix B.	ATF project plan document to be updated with modified appendix lettering
5	General	Where is table A.5? The appendix appears to skip this table.	Please revise text for consistency.	Tables A.1 through A.6 now labeled consistently	Text revised for consistency

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6	General, Line 25, Lines 228-292	<p>The text indicates NRC staff will participate in a coordinated PIRT on in-reactor performance of fuels with increased enrichment. Please provide more information on the timing, scope, and intent of this activity. Additional information such as the information presented during the Public Meeting on September 12th would be helpful.</p> <p>The text indicates that the PIRT would only be for increased enrichment. Is burnup excluded intentionally? Would these activities be NRR focused or more cross-cutting across multiple parts of NRC?</p> <p>The text indicates NRC staff will participate in a PIRT for transportation packages for unirradiated fuel transportation for material with higher burnup and enrichment. Please provide more information on the timing, scope, and intent of this activity.</p> <p>Please explain higher burnup unirradiated material.</p>	Please explain NRC's intentions regarding a PIRT for increased burnup and enrichment efforts.	<p>Within the scope of the In-Reactor performance, a HBU PIRT is not being developed (but a literature search is being performed). An IE PIRT is being developed. Clarified the scope of Section A.2.2.2 to include uranium feed material and unirradiated fuel. Revised to eliminate references to higher burnup and clarified the scope of the PIRTs will include criticality safety and materials properties/performance.</p>	<p>Additional discussion within Section A.1.4 has been provided to clarify the In-Reactor intent of an IE PIRT and a HBU literature search. Delineation is also made between HBU for conventional fuel designs and ATF designs. Clarified the scope of Section A.2.2.2 to include uranium feed material and unirradiated fuel. Revised to eliminate references to higher burnup and clarified the scope of the PIRTs will include criticality safety and materials properties/performance.</p>

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7	Line 24	Please spell out PIRT as this is the first occurrence (Phenomena Identification & Ranking Table)	Please revise text as indicated	PIRT spelled out	Text revised as indicated.
8	Lines 46-50	The Appendix states that “the staff does not anticipate identification of gaps or deficiencies in these regulations” with respect to Part 71 and 72. However, lines 243- 244 discuss new transportation packages, modification of current packages, or exemptions from 10 CFR 71.55(g), especially subpart (g)(4) and its limit of 5.0 w/o. The latter statements appear to be contradictory with respect to gaps in Part 71.	Please ensure text is consistent with intent.	The latter is not contradictory in that a gap in the regulations for Parts 71 or 72 would not provide the staff with a regulatory tool for review and approval of a proposed transport package or storage cask design. If holders of a transport package certificate of compliance for UF6 are able to demonstrate that the package is subcritical with optimum moderation, then an exemption is not needed, and the package design will meet Part 71 in its entirety.	No changes needed.

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9	Lines 112-113	While updating the regulatory framework is important to ensure regulatory certainty, why would such changes that could include rulemaking, need to be made before either higher enrichments or burnups can be licensed? This text appears to indicate that the common regulatory practice of using exemptions first would not be acceptable. Additionally, it is inconsistent with the exemption pathway discussed in lines 180-182 and the discussion in lines 227-230.	Please revise text to remove indication that regulatory framework changes are anticipated to be complete before licensing can be approved.	The intent of the word "generic" was to attempt to capture the standard, predictable licensing process used for widespread adoption of methods and technology. Clarification has been provided to indicate the NRC staff anticipates regulatory changes will be needed before a predictable licensing approach outside the use of exemptions can be implemented.	Text revised to meet original intent.

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10	Lines 118-123	Two sentences appear to be inter-mixed and need to be corrected. We believe the sentences are supposed to read as follows: While higher burnups and increased enrichments may impact the way compliance with regulatory requirements is demonstrated, the actual principal design and performance requirements provided by the GDC remain applicable. The degree to which existing regulations and guidance need revision or new regulatory requirements and guidance need to be established, depends on the level of departure from existing burnup and enrichment limits.	Please revise text.	Two sentences are indeed intermixed. The paragraph was revised by moving the intermixed sentence to the beginning of the paragraph, which was its originally intended location.	Text revised to meet original intent
11	Tables A.1 and A.2	Tables A.1 and A.2 do not appear to be in alignment. Industry believes that 10 CFR 51 and NUREG-1555 should have similar impacts. However 10 CFR 51 is noted as being impacted by both higher burnup and enrichment but NUREG-1555 is only noted as impacted by higher enrichment.	Please review regulatory impact tables for consistency.	NUREG-1555 in Table A.2 has been updated to reflect the same impact as 10 CFR 51 in Table A.1	Text revised for consistency

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12	Lines 141-159	Industry performs a review of whether a LAR qualifies for a categorical exclusion from the National Environmental Policy Act (NEPA) as part of the standard LAR review process and NRC reviews that assessment during the approval of that LAR. As such, the text discussing whether NRC staff needs to reconsider the justification for the continued applicability of the existing Generic Environmental Impact Statement is unnecessary.	Please remove Section A.1.1 as it's redundant.	Section A.1.1 was not removed. Instead it was updated to be clearer about the NRC staff's intended course of action, should it become necessary: streamlining NRC staff reviews of categorical exclusions and/or environmental impacts that do not meet the exclusion.	Text updated to be clearer.
13	Line 170	The reference to ADAMS Accession Number ML18100A045 is incorrect. That was the draft LTA letter from the NRC to NEI which was posted on 5-31-18. The final LTA letter should be cited, ADAMS Accession Number ML18323A169 dated 6-24-19.	Please revise text.	Agreed	Text updated with applicable ML#.

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14	Lines 171-173	The text states that for LTAs using increased enrichments and higher burnups, the guidance in the LTA letter may not be applicable. The guidance in the LTA letter should be applicable to all LTAs programs. The determination of whether a 50.59 or LAR is required is made by applying the guidance on a case-by-case basis depending on the scope of the LTA campaign and the licensing basis of the reactor.	Please revise the text to simply state that LTA programs for higher burnup and increased enrichment may require LARs and remove the text indicating that the LTA program may fall outside the guidance. The determination of whether a LAR or 50.59 is appropriate is made by applying the guidance in the LTA letter to the specifics of the LTA campaign and the reactor licensing basis.	Agreed	Text updated to be clearer.

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15	Lines 241 – 244	The design of new UF6 packaging must continue to interface with the existing plant equipment process (receipt, storage, heating, discharge, cleaning, etc).	Please add text to indicate that as part of the consideration of new package designs, there should be a consideration for how a new packages would interface with existing facility equipment.	The package designer should work with licensees to ensure that any new or modified package design will interface with existing facility equipment.	No changes needed.
16	Lines 235-244	The Appendix contains two citations of 10 CFR 71.55(g) and one citation of 49 CFR 173.420 (line 322). There is no mention of 49 CFR 173.417 which sets a 5.0 w/o U235 enrichment limit for transport within 30-inch cylinders. Given the regulatory infrastructure changes discussed in lines 235-244 of the Appendix, the need to revise DOT's 49 CFR 173.417 should be captured in some fashion in this Appendix.	Please add mention of 49 CFR 173.417 in the appendix.	Section A2.2.4.1 was revised to state that "DOT regulations in 49 CFR 173.417 which provide requirements for shipment of UF6 heels without a protective overpack also limit the enrichment of 30B and 30C cylinders to 5 weight percent."	Revised text as stated.

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17	Table A.4	Why does table A.4 not have an opinion on NUREGs 1536, 1567 or 1927?	Please provide the NRC opinion of these fuel cycle NUREGs in table A.4.	NUREG-2215 is being finalized, which consolidated both the guidance in NUREG-1567 and NUREG-1536, Revision 1. The staff expects that the document will be publicly-available prior to any need to store ATF with high burnup and high enrichment. NUREG-2215 will be the review guidance used for the initial period of storage, up to 40 years. The renewals of storage facilities will be addressed in a future revision to this plan, which will include reference to the proper revision of NUREG-1927. At this point, that reference is not warranted.	No edits are warranted.
18	Line 256	"safety related- issues" should be "safety-related issues"	Please revise text as indicated		Text revised as indicated.
19	Lines 266, 272, 321, 329	Please use subscripts consistently throughout the appendix.	Please revise text for consistency.	All instances of U235 or superscript 235U have been updated with "uranium-235" (to maintain consistency with the ATF project plan), UF6 now uses subscript 6, and UO2 now uses subscript 2.	Text revised throughout document.

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20	Lines 328 to 338	The International Handbook of Evaluated Criticality Safety Benchmark Experiments contain approximately 30 LWR benchmark cases between 5 and 10 w/o U-235 with the majority near 7 w/o. Pooling these benchmark experiments with the larger population of experiments below 5 w/o does present a challenge but general issue exists in all benchmark studies as discussed in DSS-ISG-2010-01 (ML110620086).	Please revise the last bullet (lines 336 and 337) to the following: "increase the one-sided k-effective tolerance factor to account for uncertainties in criticality code performance due to the number of applicable critical experiments for benchmarking."	Agree.	Text revised as indicated.

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21	Lines 332-337	Are each of the activities noted are potential methods for applicants to overcome the NRC's stated lack of criticality benchmark data? Or is the intent that a combination of the denoted activities would be needed? Given the predictive nature of first principle codes now available, has the NRC staff reviewed how these advanced codes could resolve the issue?	Please clarify text.	The NRC staff is not aware of any higher fidelity computer codes which have been demonstrated to have increased predictive capability compared to the previously approved methods. Insufficient representative test data may prevent adequate validation of higher fidelity codes and result in an inability to assess the code's uncertainty. While NRC staff is aware that many new codes are able to model detailed physical processes that were previously unable to be modeled, the staff has not reviewed and is not aware of the justification which demonstrates the credibility of these higher fidelity models in areas where data is unavailable.	Text revised to indicate an "either/or" set of options (or combination thereof).

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<p>22</p>	<p>Lines 353-355</p>	<p>The text indicates that there is a need for experimental confirmation for whether an unknown age-related phenomena impact the spent fuel during storage and transport after storage. Why would this be the case?</p>	<p>Please remove this text. There is no reason an experimental confirmation for something that isn't known to exist is needed.</p>	<p>The NRC has historically expected that experimental confirmation be obtained and assessed, which confirms that the spent fuel performs as expected. The experimental confirmatory basis that low-burnup fuel [≤ 45 gigawatt days per metric ton of uranium (GWd/MTU)] remains in its analyzed configuration during the period of extended operation was provided in NUREG/CR-6745, "Dry Cask Storage Characterization Project—Phase 1; CASTOR V/21 Cask Opening and Examination" (Bare and Torgerson, 2001), and NUREG/CR-6831, "Examination of Spent PWR Fuel Rods after 15 Years in Dry Storage" (Einziger et al., 2003). This research demonstrated that low-burnup fuel cladding and other cask internals had no deleterious effects after 15 years of storage and confirmed the basis for the guidance on creep deformation and radial hydride reorientation in NRC's review guidance. The research results in NUREG/CR-6745 and NUREG/CR-6831 support a determination that degradation of low-burnup</p>	<p>Revised the text to refer to "unanalyzed" instead of "unknown" age-related phenomena, and provide perspective on NRC's basis for the expectation.</p>
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				<p>fuel cladding and assembly hardware should not result in changes to the approved design bases during the first period of extended operation, provided that the cask/canister internal environment is maintained. The U.S. Department of Energy (DOE) is funding a similar program for high burnup fuel [>45 gigawatt days per metric ton of uranium (GWd/MTU)] at the North Anna independent spent fuel storage installation to gather similar experimental confirmatory data to support the technical basis for storage during the first period of extended operation (EPRI, 2014). Therefore, the cited discussion is consistent with NRC's expectation that experimental data be obtained to confirm that unanalyzed age-related phenomena is not operable during the dry storage and subsequent transport of spent ATF of higher burnup and higher enrichment.</p>	
23	Line 372	"Near -term" should be "near-term"	Please revise text as indicated		Text revised as indicated.
24	Line 374	Please revise text to "...only one fuel cycle facility has shared plans..."	Please revise text as indicated		Revised to delete "however".

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25	Line 394	Please revise "unrainum" to "uranium"	Please revise text as indicated		Text revised as indicated.
26	Lines 423 – 424	The text indicates that near-term increases in burnup and enrichment limits are expected to be only marginally greater than current limits. Is the 5 – 8 wt% range considered as “marginally greater than current limits”; or is a stepwise approach between 5 – 8% being envisioned? What burnup values are considered to be marginal increases?	Please clarify text.	Text clarified to indicate range of consideration for impacts	Text clarified.