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Green & Jan Burkhardt

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Draft Letter to the Nuclear Energy Institute Regarding the Clarification of Regulatory Paths for Lead Test Assemblies

Comment On: NRC-2018-0109-0002

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Submitter Information

Name: Anonymous Anonymous

General Comment

See attached file(s)

Attachments

LTA Letter Comments

COMMENTS ON DRAFT LTA LETTER TO NEI (NRC-2018-0109)

As written, the letter suggests that there are no substantial requirements for LTAs. The letter indicates the requirements in 50.46 are not applicable to LTAs. The letter indicates that LTAs can be placed in the reactor without prior NRC approval if the licensee has adopted STS Section 4.2.1, provided the existing analysis is bounding. Several of the new positions taken in this letter would require rulemaking, license amendments, or license exemptions to implement. The consequences of the NRC positions taken in the letter are not well thought out, and the positions taken in one part of the letter are inconsistent with statements made in other parts of the letter (e.g., the NRC interpretation of the STS LTA provision eliminates the need for 50.59 evaluations to be conducted for LTAs, but the letter provides guidance on the application of the 50.59 criteria to LTAs). Therefore, the letter should not be issued and the appropriate regulatory processes should be used instead. The comments that follow should be considered no matter what regulatory process is used.

The letter should explain how an analysis for low-enriched, uranium-oxide fuel with zirconium-alloy cladding can bound LTAs made with high-enriched uranium, other uranium compounds, uranium metal alloys, non-zirconium-alloy cladding, or no cladding. In addition, the ACRS should be provided an opportunity to review this letter.

The letter should provide a comparison of the new interpretations and guidance to existing NRC guidance, such as the guidance in SRP Section 4.2, "Fuel System Design."

The letter indicates that it does not consider certain other regulatory and other TS provisions. However, the letter indicates that the plain language reading of the STS LTA provision and the regulations in 50.46 and 50.59 leads is inconsistent with the current NRC interpretation. In addition, the letter indicates that licensees have been unnecessarily been requesting amendments and exemptions for LTAs. Therefore, the letter should identify all requirements that apply to LTAs, since we cannot rely on the plain language reading of requirements or past precedents to make this determination. This information should be provided for licensees that have the STS LTA provisions and for those that do not.

The first paragraph of the draft letter states: "As it gains more experience with these regulatory approaches, the NRC staff will continue to engage with stakeholders to determine whether further guidance is necessary." It is unclear how the NRC can lack experience with regulations that have been around for decades (50.46 was issued in 1974, the last major revision to 50.59 was in 1999). The industry has been designing and testing fuel since before reactors were built. The only thing that is new is the NRC's position that licensee's may no longer need prior NRC approval to use LTAs. The letter should clearly explain the history and what has changed to cause the NRC to change its position. In addition, if the NRC staff truly lack regulatory experience on these issues, it would actually benefit the NRC and industry if the NRC staff were to gain experience through the review of license amendment and exemption requests to use LTAs. This may improve the efficiency in reviewing future topical reports and license amendment requests to transition to new fuel based on the LTA designs.

In the second paragraph of the draft letter, it states: "Other licensees conducted LTA campaigns under 10 CFR 50.59 without prior NRC approval." This statement is either misleading or the NRC staff is not enforcing its regulations under 50.59. If a licensee's TS were amended to include the STS LTA provision (or similar) and a COLR methodology that permits use of LTAs, then it has received prior NRC approval to use LTAs. If the licensee is using LTAs without

either of these items, it is likely in violation of 50.59. The NRC should clarify what is intended by this statement.

In the second paragraph of the draft letter, it states (emphasis added): "This letter is intended to clarify the NRC's current interpretation of when prior NRC approval is needed for LTA campaigns." This suggests that there has been a change in staff position. The letter provides a new interpretation of 50.59 and 50.46, which should go through rulemaking. This letter should be reviewed for potential backfit and issue finality issues by the CRGR. In addition, since STS Section 4.2.1 can only be adopted by plant-specific amendments, the NRC must apply the interpretation of this TS at the time the amendments were approved. Neither the staff nor the licensee can re-interpret a TS without a license amendment. The letter should explain and justify why it is providing "interpretations" of NRC regulations and plant-specific TSs, rather than providing guidance on how to implement those regulations and TSs.

The third paragraph of the draft letter should discuss issues or unexpected performance with LTAs. Right now it gives a one sided view that LTAs only improve safety. If a licensee uses this guidance and experiences a failure of an LTA or an LTA adversely affects other fuel in the reactor, then it could have a significant impact on other licensees that use LTAs.

Page 2 of the draft letter states: "Under either path, the licensee is responsible for assessing its ability to irradiate LTAs in accordance with its license and must comply with its license and the NRC's regulations. By doing so, the NRC expects that the loading of LTAs will be done safely." However, the letter provides the following new NRC interpretation: (1) 50.46 is not applicable to LTAs; (2) the STS LTA provision does not limit the design of LTAs; and (3) approved methods to evaluate LTAs are not required. Based on this, it appears there are no significant requirements on the use of LTAs. The NRC should explain how it reached a conclusion that it expects loading of LTAs will be done safely with very limited requirements. In addition, the NRC should explain why its conclusion is only an "expectation" regarding the loading of LTAs. This appears to be a lesser standard than a reasonable assurance of adequate protection of public health and safety. In addition, the NRC should also explain why its conclusion is limited to just loading of LTAs and does not apply to LTA irradiation during reactor operation or removal from the reactor core.

Guidance on STS LTA provisions

Rather than try to re-interpret STS Section 4.2.1, the NRC and industry should work with the TSTF to develop a revision to STS Section 4.2.1 that more clearly specifies the requirements for use of LTAs. This would provide more regulatory stability going forward with LTAs. Given that NRC staff do not appear to internally agree on the positions stated in the letter, the development of a TSTF Traveler could avoid inspection and enforcement issues for licensees that try to use the letter to justify using LTAs under 50.59.

Based on past precedent, the guidance on STS Section 4.2.1 appears to provide licensees with greater operating authority, which can only be done through a license amendment. Specifically, the letter states how it "interprets" plant-specific TS similar to the STS LTA provision. By interpreting an existing TS provision, the NRC is altering the terms of the license without a license amendment. The NRC staff should provide a review of past precedents, including a review of approved LARs to adopt the STS LTA provision, approved LARs for specific LTA use, and approved exemptions to 50.46. The review should explain how the draft letter is consistent with past precedents and identify those areas where it is not consistent. The review should

identify which licensees can use the guidance on STS Section 4.2.1 and which licensees cannot, based on their licensing basis.

Since the STS LTA provision was added to plant-specific TS by license amendment, the NRC should provide a summary of how these license amendments characterized this provision and how the NRC reached a conclusion that regulatory requirements would continue to be met. The NRC should identify what regulations and guidance were considered when this provision was added. Since the letter takes the position that the STS LTA provision does not limit the design of an LTA, the NRC should identify how the safety evaluations for the addition of the STS LTA provision that the following requirements would continue to be met:

1. Each category in 50.36(c), since LTAs may need additional TS requirements.
2. Existing COLR requirements, safety limits, and TS fuel limits (e.g., LHGR).
3. Existing source term analysis.
4. Defense-in-depth, since the interpretation in the draft letter would permit LTAs without cladding.
5. 10 CFR 50.44, 50.46, and Appendix K
6. GDC 10, 12, 15, and 35.
7. Existing reactor water chemistry analysis.

A review of some of the amendments to add the STS LTA provision indicates that licensees requested the provision without significant justification, and that the NRC staff approved these amendments without a basis that went beyond noting that it was consistent with the STS. It appears that the NRC staff did not consider relevant guidance (e.g., SRP Section 4.2, "Fuel System Design) to approve the STS LTA provision. This suggests that at the time the amendments to add the STS LTA provision were approved, the NRC staff did not interpret the STS LTA provision or the 50.46 regulations in the same manner as described in the draft letter. It is more likely that, at the time when the STS LTA provisions were approved, the NRC staff understood that the LTA provision would not allow significantly different designs from existing designs (i.e., LTAs would use zircaloy or ZIRLO cladding with uranium oxide fuel, and have other similarities). In other words, an LTA may not have completed representative testing, but it would have otherwise been designed consistent with the other requirements in STS Section 4.2.1 (i.e., the other sentences apply).

The letter claims that only the first and last sentence of the STS LTA provision applies to LTAs. In addition, the letter claims that 50.46 does not apply to LTAs. This leads to the conclusion that when the NRC approved amendments to adopt the STS LTA provision it authorized the licensee to use any LTA design in the reactor core, with the only limitations being the number of LTAs and the placement of LTAs in nonlimiting locations. If this new NRC position is correct, then a 50.59 evaluation for an LTA is never required for a licensee that has the STS LTA provision, since the amendment was already approved by the NRC. In addition, the NRC cannot impose restrictions or limitation on the use of LTAs, such as requiring them to conform to methods, that were not explicitly identified with the license amendment requires or required with the approved STS LTA provision.

The discussion in the draft letter on STS LTA provisions is inconsistent with the plain language reading of STS Section 4.2.1. The discussion states that LTAs are fuel assemblies. The letter then argues that because LTAs are fuel assemblies, the first sentence of STS Section 4.2.1 is applicable to LTAs. The letter then argues that the fourth sentence, which specifies requirements for "fuel assemblies," does not apply to LTAs. Thus, implying that LTAs are not

fuel assemblies. The letter states that the fourth sentence applies only to batch loading, but provides no bases for this interpretation nor an explanation of what is meant by "batch loading."

The letter is silent on the second sentence in STS Section 4.2.1 which specifies the requirements for "each assembly." Past licensing precedent suggests that this sentence is applicable to LTAs (e.g., see Braidwood LAR dated 9/16/06 at ADAMS ML062700248). The NRC should explain its position regarding this sentence and LTAs. If it is the NRC's position that the second sentence does not apply to LTAs, the NRC should explain why an LTA is not an assembly and why past precedents are not applicable.

The regulations in 10 CFR 50.36 specify the requirements for the content of TS. Paragraph 50.36(c)(4) states: "Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety. . . ." STS Section 4.2.1 is intended to satisfy this requirement. By definition, an LTA is considered an alteration or modification to the fuel design. The draft letter should explain why new cladding, no cladding, new uranium compounds, new fuel geometries, and other LTA design differences would not have a significant effect on safety, given that the draft letter indicates the only limitation on LTAs is that they are "placed in nonlimiting core regions."

The letter provides guidance on how to interpret "limited number" of LTAs and "nonlimiting core regions." The letter should explain how this is consistent with the current licensing bases for the plants that have the STS LTA provisions. The NRC should explain how these terms were addressed with the STS LTA provisions were originally approved through license amendments. This guidance should be reviewed by the CRGR to determine if it is imposing new requirements on licensees.

The letter indicates that 50.46 does not apply to LTAs. From this position, it follows that the codes and methods used to demonstrate compliance with 50.46 are not required to be used for LTAs. The letter should explain what criteria, codes, and methods are actually required for LTAs, and what is the regulatory bases for these requirements.

The STS LTA provision allows a limited number of LTAs to be placed in nonlimiting core regions. The letter provides guidance on how to demonstrate that core regions are nonlimiting for the LTA using NRC-approved codes and methods. Specifically, the letter states that the licensee is expected to demonstrate that limits are still relevant to LTAs and that LTAs are not the most limiting assemblies. However, if 50.46 is not required for LTAs, the licensee would only need to evaluate its normal reactor fuel and the limits would not apply to LTAs. Thus, based on the logic in the letter, a licensee would only have to identify the nonlimiting core regions for the normal reactor fuel. The licensee could then place the LTAs in these regions, without demonstrating that the LTAs are not limiting. The letter should explain the regulatory basis for stating that the licensee would be expected to demonstrate that limits are still relevant to LTAs and that LTAs are not the most limiting assemblies.

The second paragraph on page 3 of the draft letter states that "The NRC staff expects. . . ." The letter should clarify if this "expectation" is just a recommended practice or if it is actually intended to provide guidance for a regulatory requirement.

Guidance on Approved Methods

On page 5 of the draft letter, it states: "The NRC staff's position is that approved methods should be used wherever possible. . . ." This suggests that the use of approved methods is not a requirement. The NRC should clarify this statement. The paragraph goes on to cite an AREVA report for Browns Ferry as justification. In that report, AREVA cites an NRC-approved topical report it uses for new fuel design. Thus, it appears that AREVA used an NRC-approved method for LTAs which would describe the process for analyzing new fuel designs when they are not within the scope of existing NRC-approved codes and methods. The NRC should clarify if an NRC-approved method for developing new fuel designs is required, or if a licensee can just choose to apply NRC-approved codes and methods to LTAs that are not within the scope of the code or method.

Guidance on Regulatory Paths

The letter identifies two regulatory paths. For regulatory path 2 it states that "the staff has not attempted to provide more specific guidance for this regulatory path." Does this mean that the guidance in the letter for 50.59 and 50.46 is not applicable to regulatory path 2? If this is the case, then the letter should provide further explanation for this position. The letter should also explain why the NRC staff believes there are only two possible options.

If only the first and last sentence of the STS LTA provision apply to LTAs, then the last sentence is the only real limitation on the use of LTAs in the TS. This is because the draft letter argues that 50.46 does not apply to LTAs. Therefore, licensees that have a TS similar to the STA LTA provision, but without the last sentence, have no limitations on the use of LTAs provided the total number of fuel assemblies in the reactor is not exceeded. The NRC should clarify what are the requirements for licensees that fall under regulatory path 2, since the guidance provided in the letter indicates suggests there are no requirements in this situation other than 50.59.

Guidance on 50.59

The NRC approved the adoption of the STS Section 4.2.1 through plant-specific amendments. The draft letter suggests that STS Section 4.2.1 provides licensees with significant flexibility to use LTAs. Since the STS LTA provision does not limit the design of an LTA, this leads to the conclusion that a 50.59 evaluation would not be required because, by authorizing the STS LTA provision, the NRC already authorized all LTA designs. The letter should explain why a 50.59 evaluation would be required for the licensee to use a TS provision that was already approved by the NRC.

The draft letter makes some generic conclusions regarding certain criteria in 50.59. The letter should provide a technical justification that these conclusions are bounding for all reactor designs, core loadings, and other plant conditions that may be affected by the use of LTAs.

In the 50.59 guidance section of the letter it states: "If a licensee's TS contains a provision allowing for use of LTAs, and if the LTA irradiation campaign satisfies the TS, then a change to that TS is not required (item (i) above)." It is unclear what is meant by "that TS." The licensee must determine if any TSs must be revised, and it may not be sufficient just to focus on a single TS when determining if a license amendment is needed. In addition, it is possible that an LTA may require a new TS provision to comply with 10 CFR 50.36.

Per 10 CFR 50.59(c)(2)(vii), a change requires a license amendment if it “[results] in a design basis limit for a fission product barrier as described in the FSAR (as updated) being exceeded or altered.” The cladding for an LTA is a fission product barrier. If the LTA uses a different material for cladding than previously described in the UFSAR, then new design basis limits applicable to the LTA should be established. This suggests that for new cladding material an amendment would be needed, which is consistent with the plain language reading of the second sentence in STS Section 4.2.1.

The second paragraph on page 7 incorrectly implies that the 50.59 evaluation can be done after LTAs are inserted in the core. For example, one sentence starts with: “If the LTA campaign demonstrates”

Guidance on 50.46 exemptions

The 50.46 discussion should provide a detailed bases for the NRC positions. The letter should discuss existing guidance, past rulemaking, and specific experience with reactor licensing and exemptions.

On page 3 of SECY-16-0033, it states:

Additionally, on March 14, 2000, as amended on April 12, 2000, the Nuclear Energy Institute (NEI) submitted a PRM (ADAMS Accession No. ML010880245), docketed as PRM-50-71 (65 FR 34599, dated May 31, 2000), requesting that the NRC amend its regulations in 10 CFR 50.44 and 50.46 to expand the applicability of these regulations beyond the two zirconium-based fuel claddings identified in the regulations (zircaloy and ZIRLO™). The petition noted that these two regulations apply only to zircaloy and ZIRLO™, but that reactor fuel vendors had developed new cladding materials other than the two acknowledged by the regulations, and that in order for licensees to use these new materials under the existing regulations, licensees had to request NRC approval of exemptions from 10 CFR 50.44³ and 50.46.

So for at least the last 18 years, the industry has believed exemptions from 50.46 were required for licensees to use new cladding materials. On page 6 of the SECY, it states that the 50.46c rulemaking addresses the NEI PRM and would eliminate the need for a licensee to seek an exemption to use alloys other than zircaloy or ZIRLO™. This provides evidence that the NRC position taken in the draft letter re-interprets 50.46, which would require rulemaking. If the NRC decides to maintain its position in the draft letter that exemptions from 50.46 are not needed, then the NRC should correct its SECY to explain why the NEI PRM was not needed and why it took 18 years to for the staff to come to this conclusion.

In the discussion of 50.46 exemptions it states:

In the past, some licensees have requested exemptions to expand the applicability of 50.46 to other zirconium alloys. The NRC staff has granted these exemptions. However, because the acceptance criteria of 10 CFR 50.46 still apply while LTAs are utilized, preparation and approval of an exemption request is not necessary for an LTA campaign. Moreover, the staff does not see a substantial safety benefit associated with processing exemptions expanding the applicability of 10 CFR 50.46 to other zirconium-based claddings.

Exemptions only remove regulatory requirements, they do not expand regulatory requirements. The statement suggests that the NRC staff processed exemption requests, but did not actually exempt the licensee from any requirements. The NRC staff should explain why past reviews have not determined the exemption was not necessary.

The quoted text above focuses on "other zirconium alloys." The draft letter should explain the staff's position regarding non-zirconium alloys as well. Does 50.46 not apply to any LTAs? Would the licensee have to consider the potential impacts of LTA failures on the other fuel within the core?

The last sentence of the quoted text above from the draft letter is unclear. Does batch-loading of zirconium-alloy cladding not listed in 50.46 require an exemption? Just because there is not a substantial safety benefit does not mean that an exemption is not required.

Section 50.46 applies to power reactors fueled with uranium oxide pellets in cylindrical zircaloy or ZIRLO cladding. Licensees with this fuel must continue to comply with 50.46 when they add LTAs to the reactor, but the rule makes no mention of other fuel types being excluded from the 50.46 requirements when they are also in the core. Although particular criteria within 50.46 may not be appropriate for new fuel designs, that does not mean these criteria are not requirements on those new fuel designs. The appropriate regulatory method for dealing with these situations is to request an exemption under 50.12.

The draft letter should explain how LTAs can be excluded from 50.46 requirements, while at the same time the acceptance criteria of 50.46 still applies when LTAs are used. The draft letter implies that some requirements apply and some do not, but it is not clear. The letter should explain if the ECCS analysis need to include the LTAs, can the ECCS analysis be limited to just the fuel with uranium oxide pellets in cylindrical zircaloy or ZIRLO cladding, or can the ECCS analysis assume the LTA is the same as the other fuel in the core.

The draft letter notes that the 2200 °F fuel clad temperature limit and the maximum local oxidation limit "may not be applicable" for non-zirconium-based cladding. Does this mean there are also situations when these limits would be applicable? Although these limits may not be appropriate for non-zirconium-based cladding, that does not mean they are not required. It is not clear why the letter focuses on these criteria alone. The letter should also discuss the criteria for maximum hydrogen generation, coolable geometry, and long-term cooling. Either all of the criteria in 50.46(b) apply to LTAs, or none of them do.

Draft Letter Conclusions

The letter appears to give up most, if not all, regulatory oversight of LTAs if licensees have the STS LTA provision. The letter indicates that there are a number of requirements that do not apply to LTAs, that amendments and exemptions are generally not required to use LTAs, and that 50.59 evaluations are not needed. The conclusion to the letter states: "It is important to note that regardless of the path, NRC oversight is maintained (e.g., ROP inspection sampling includes review of licensees' 10 CFR 50.59 evaluations)." This statement should be explained in more detail, given that the NRC licensing staff is no longer need to approve amendments or exemptions for LTAs and there are no significant requirements for an inspector to enforce related to LTAs. The NRC should also explain how inspection of 50.59 evaluation provides oversight of LTAs, when the letter indicates that 50.59 evaluations are not required for LTAs.

The conclusion states: "Throughout LTA campaigns, safety remains the primary focus of the NRC." Given the positions taken in the letter, the NRC would not have any role in LTA campaigns. The NRC should explain what it means by this statement.