



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 18, 2016

Dr. Kelly A. Jordan, Director
University of Florida
University of Florida Training Reactor
106 UFTR Building
Gainesville FL 32611-6400

SUBJECT: UNIVERSITY OF FLORIDA – REQUEST FOR ADDITIONAL INFORMATION
REGARDING LICENSE RENEWAL FOR THE UNIVERSITY OF FLORIDA
TRAINING REACTOR (TAC NO. ME1586)

Dear Dr. Jordan:

The U.S. Nuclear Regulatory Commission (NRC) is continuing its review of your request for renewal of Amended Facility Operating License No. R-56 for the University of Florida Training Reactor which you submitted on July 18, 2002 (available on the NRC's public Web site at www.nrc.gov under Agencywide Documents Access and Management System (ADAMS) Accession No. ML022130185), as supplemented. During our review of your renewal request, questions have arisen for which we require additional information and clarification. We request that you provide responses to the enclosed request for additional information within 30 days from the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.30(b), "Oath or affirmation," you must execute your response in a signed original document under oath or affirmation. Your response must be submitted in accordance with 10 CFR 50.4, "Written communications." Information included in your response that is considered sensitive or proprietary, that you seek to have withheld from the public, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to security should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements." Following receipt of the additional information, we will continue our review of your renewal request.

K. Jordan

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If you have any questions about this review, or need additional time to respond to this request, please contact me at (301) 415-3724, or by electronic mail at Duane.Hardesty@nrc.gov.

Sincerely,

/RA/

Duane A. Hardesty, Senior Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-83

Enclosure:
As stated

cc: See next page

University of Florida

Docket No. 50-83

cc:

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Tallahassee, FL 32301

State Planning and Development Clearinghouse
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202 Nuclear Science Building
Gainesville, FL 32611-8300

K. Jordan

-2-

If you have any questions about this review, or need additional time to respond to this request, please contact me at (301) 415-3724, or by electronic mail at Duane.Hardesty@nrc.gov.

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As stated

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ADAMS Accession No.: ML15336A796 * concurrence via email NRR-088

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DATE	7/12/16	7/12/16	7/18/16	7/18/16

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OFFICE OF NUCLEAR REACTOR REGULATION
REQUEST FOR ADDITIONAL INFORMATION
REGARDING LICENSE RENEWAL FOR THE
UNIVERSITY OF FLORIDA TRAINING REACTOR
LICENSE NO. R-56; DOCKET NO. 50-83

The U.S. Nuclear Regulatory Commission (NRC) is continuing its review of your application for renewal of Facility Operating License No. R-56 for the University of Florida Training Reactor (UFTR) that you submitted on July 18, 2002, as supplemented. During our review of your renewal request, questions have arisen for which we require additional information and clarification. These questions are in reference to the most recent proposed UFTR technical specifications (TSs), as provided on August 13, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13252A141). Please provide responses to the following request for additional information (RAI) no later within 30 days from the date of this letter.

TSs are fundamental criteria necessary to demonstrate facility safety and are required by Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36 for each license authorizing operation of a production or utilization facility of a type described in 10 CFR 50.21. TSs are derived from the analyses and evaluation included in the safety analysis report and submitted pursuant to 10 CFR 50.34. TSs for nuclear reactors will include items in the following categories: safety limits (SL), limiting safety system settings (LSSS), limiting conditions for operation (LCO), surveillance requirements (SR), design features (DF), and administrative controls. The NRC guidance for TSs is provided in NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," Appendix 14.1, "Format and Content of Technical Specifications for Non-Power Reactors". This guidance, and recent additional guidance under which this review is being conducted (SECY 08-161) rely significantly on ANSI/ANS-15.1-2007, "The Development of Technical Specifications for Research Reactors." The NRC staff takes the position that the statements in these documents provide acceptable guidance to licensees and, unless acceptable alternatives are justified by the licensee, should be utilized whenever appropriate.

1. TSs are fundamental criteria necessary to demonstrate facility safety and are required by 10 CFR 50.36 for each license authorizing operation of a production or utilization facility of a type described in 10 CFR 50.21. TSs are derived from the analyses and evaluation included in the safety analysis report and submitted pursuant to 10 CFR 50.34. Due to the importance to overall facility safety of a uniform interpretation by both the licensee and regulator of terms and phrases used in TSs, definitions shall be included where necessary to ensure that the technical specification criteria necessary for compliance with regulatory requirements is uniformly understood by the licensee and regulator. The following questions pertain to Section 1, Introduction, Definitions and Surveillance Intervals of the proposed UFTR TSs. Provide a response that addresses each issue identified, propose a suitable alternative in your response, or explain why one is not needed.

Enclosure

- a. Section 1.0, Introduction, states "...requirements to which the licensee must adhere." Replace the term "licensee" with a specific reference to the UFTR licensee to which these TSs apply that identifies the person or organization holding the UFTR license or explain why this is not needed.
- b. The term "channel" is used throughout the UFTR TSs, however, it is not defined. Provide a suitable definition for "channel" for the purposes of the UFTR TSs that is consistent with the ANSI/ANS-15.1-2007 definition of this term, justify an alternative definition, or explain why one is not needed.
- c. The UFTR TSs include a facility-specific definition for "CORE ALTERATION," that states "[s]uspension of core alterations shall not preclude completion of movement of a component to a safe position." Being that "CORE ALTERATION," is defined in the UFTR TS to be movement of any reactor fuel assemblies, etc. the statements in the definition appear contradictory. Further, the definition for Core Alteration references "component," which is not defined in the UFTR TS. Provide a revised definition for CORE ALTERATION that fully explains the intended meaning of the term as used in the UFTR TS and that does not use undefined terms.
- d. The UFTR TS definition for "MOVABLE EXPERIMENT," states "where it is intended that all or part of the experiment may be moved into or adjoining the core or into and out of the core while the reactor is critical." As 'critical' has a very narrow definition, and would not appear to be an intended limitation for movement of a moveable experiment, consider revising the definition to be consistent with the guidance in ANSI/ANS 15.1-2007, defined in terms of Table 1.1-1, or explain the definition as written.
- e. The UFTR TSs include a definition for "SECURED EXPERIMENT." This term is not used in the UFTR TSs, remove this definition or justify why it is necessary for inclusion in the UFTR TSs.
- f. The UFTS TS definition for "SHUTDOWN MARGIN," (SDM), states "...instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition..." The ANSI/ANS-15.1-2007, guidance defines SDM in terms of the minimum shutdown reactivity necessary to provide confidence the reactor can be made subcritical "from any permissible operating conditionwithout further operator action." Explain how the UFTR TS definition of SDM meets the intent of the ANSI/ANS-15.1-2007, definition (i.e., "instantaneous" vs. "minimum," "present condition" vs. "any permissible condition, without regard for operator action," and other provisions that are important to the determination of SDM, such as temperatures, xenon reactivity, effect of experiment reactivity, etc.) or modify the definition to be consistent with the guidance in NUREG-1537, Part 1, Appendix 14.1 and ANSI/ANS-15.1-2007.
- g. The UFTR TS for "Shutdown," (MODE 3) for the "MODES OF OPERATION," stated in Table 1.1-1, does not consider the conditions cited in ANSI/ANS 15 1 2007, such as including consideration of the reactivity worth of all installed experiments that have a positive effect on core reactivity. Revise the Table or provide a definition that

- meets the intent of the guidance for reactor shutdown in ANSI/ANS-15-1 2007, or justify why a revised definition is not necessary.
- h. "Secured" is a defined mode (MODE 4) in the UFTR TS for the "MODES OF OPERATION" stated in Table 1.1-1. The UFTR TS definition does not address conditions cited in the guidance of ANSI/ANS-15-1-2007, such as including either the sufficiency of moderator or fissile material or that all scrammable blades are fully inserted, console switch position is off, maintenance is not being performed as detailed, and no experiments are being moved. Revise the Table or provide a definition that meets the intent of the guidance for reactor secured in ANSI/ANS- 15.1-2007, or justify why a revised definition is not necessary.
 - i. The UFTR TSs do not define the term "reference core condition," which is recommended for use to clarify the conditions under which the SHUTDOWN MARGIN and excess reactivity are evaluated and used to support UFTR TS 3.1. Include a definition consistent with NUREG-1537, Part 1, Appendix 14.1, and incorporate in terms of the modes defined in UFTR TS Table 1.1-1, or justify why a definition is not necessary.
 - j. The UFTR TSs do not define the term "Reactivity Worth of an Experiment," which is used to clarify the conditions under which the SHUTDOWN MARGIN is evaluated. Provide a definition that meets the intent of NUREG-1537, Part 1, Appendix 14.1, or justify why a definition is not necessary.
 - k. The UFTR TSs do not include a definition for "Secured Shutdown," per the guidance of NUREG-1537, Part 1, Appendix 14.1. Secured shutdown is achieved when the reactor meets the requirements of the definition of "Reactor Secured," and the facility administrative requirements for leaving the facility with no licensed reactor operators present. Revise Table 1.1-1 or provide a definition in the UFTR TSs that meets the intent of the guidance for secured shutdown or justify why a definition is not necessary.
 - l. The UFTR TSs do not establish any criteria or parameters that characterize when fuel is acceptable for use nor define fuel damage as referenced in the UFTR TSs (e.g., UFTR TS 3.9.2). The guidance in NUREG-1537, Part 1, Appendix 14.1 includes consideration of damage (out of tolerance dimensional changes or indications of cladding failure as indicated by the presence of detectable amounts of fission products), deterioration (such as erosion, corrosion, blistering, observed defects, etc.), oxide buildup, and fission density. Provide a definition for acceptable fuel integrity consistent with the guidance in NUREG-1537, Part 1, Appendix 14.1, and supports UFTR TS 3.9.2.1, on damaged fuel or justify why it is not needed.
 - m. Table 1.1-1 and the UFTR TS definition for "Mode," references a "key condition," for each of the modes of operation. Modify the table header for Table 1.1-1 and the definition for Mode to indicate that the key condition referenced is for the console key or justify why a specific reference to the console key is not required.

- n. A combination of core reactivity condition, power level, key condition, and concrete block shielding are listed in Table 1.1-1 of the UFTR TSs for each of the UFTR Modes of Operation. The LSSS in UFTR TS 2.2, provides a safety system setting for low reactor coolant flow that is not a condition for and is inconsistent with the modes defined by Table 1.1-1. Modify the UFTR TSs to ensure consistency between Table 1.1-1 and Table 2.2-1 or justify why a change is not needed.
 - o. The NRC staff finds the definitions given in ANSI/ANS-15.1-2007, generally acceptable and the guidance in NUREG-1537, Part 1, Appendix 14.1, states that those definitions applicable to a particular facility should be included verbatim. The UFTR TSs make use of a number of terms that are not defined in the TSs. Update the UFTR TSs to incorporate, the following ANSI/ANS-15.1-2007, definitions, as modified by NUREG-1537, Part 1, Appendix 14.1, where applicable:
 - i. operator, licensed operator, senior reactor operator, and facility operators;
 - ii. license, licensee, and licensed;
 - iii. unscheduled shutdowns
 - p. UFTR TS 1.2, establishes the surveillance intervals for each surveillance requirement or audit. The specified frequency for "Daily," is stated to be "Daily - interval not to exceed 36 hours." ANSI/ANS-15.1-2007, recommends a maximum interval for daily surveillances of (i) during the calendar day; (ii) within a shift, and, (iii) prior to the first reactor startup of the day. Modify the UFTR "Daily," surveillance interval to be consistent with the guidance of ANSI/ANS-15.1-2007, or provide an analysis to justify the 36 hour interval.
2. Safety limits, limiting safety system settings, and limiting control settings are defined in 10 CFR 50.36(c). Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. The following questions pertain to Section 2.0, Safety limits and Limiting Control Settings of the proposed UFTR TSs. Provide a response that addresses each issue identified, or propose a suitable alternative in your response.
- a. UFTR TS 2.1 and UFTR TS 2.2 provide an applicability statement referencing the "Modes of Operation," listed in Table 1.1-1 of the UFTR TSs. The ANSI/ANS-15.1-2007, guidance states the applicability information should be "a statement that indicates which components are involved and when they are involved." Reference to Modes from Table 1.1-1 provides the "when," but does not provide the "which." Modify the Applicability statement for UFTR TS 2.1, and TS 2.2, to indicate the components to which the specification applies or justify why this information is not needed.
 - b. UFTR TS 2.1, "Fuel Temperature Safety Limit." Revise UFTR TS 2.1, by removing the phrase "Fuel Temperature," to be consistent with the term "Safety Limit," as formally referenced in 10 CFR 50.36(c)(1).

- c. UFTR TS 2.1, states that the SL is applicable in MODE 1. However, 10 CFR 50.36(c)(i)(A), states that the SL for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. Such limits apply under all operating modes and conditions. Revise UFTR TS 2.1, to be consistent with the regulations.
 - d. UFTR TS 2.2 is titled "Limiting Control Settings." The regulation in 10 CFR 50.36, provide that the accepted term is "Limiting Safety System Settings," for nuclear reactors (limiting control settings apply only to fuel reprocessing plants). Revise UFTR TS 2.2, including the title for Table 2.2-1 and the header in UFTR TS 2.0, to be consistent with 10 CFR 50.36(c)(1)(ii)(A) by renaming "Limiting Control Settings" to "Limiting Safety System Settings."
 - e. The objective for UFTR TS 2.2, is stated to be "[t]o ensure automatic action terminates the off-normal situation." The regulations in 10 CFR 50.36(c)(ii)(A) states "automatic protective action will correct the abnormal situation before a safety limit is exceeded." Modify the objective for UFTR TS 2.2, to be consistent with 10 CFR 50.36.
 - f. UFTR TS 2.2, states that the Limiting Control Settings (which, per the regulations, should be LSSS for a nuclear reactor) is applicable in MODE 1. However, 10 CFR 50.36(c)(ii)(A) states that the LSSS pertains to "settings for automatic protective devices related to those variables having significant safety functions." The settings in the revised Table 1.1-1 are such settings and thus the LSSS is applicable during operation (i.e., to both MODES 1 and 2 as referenced in Table 1.1-1). Revise UFTR TS 2.2, to be consistent with 10 CFR 50.36.
 - g. The current approved UFTR TS contain 12 LSSS specifications. The proposed UFTR TS 2.2 has three specifications. Revise UFTR TS 2.2 to include any missing specifications and provide an analysis justifying those that are removed or justify why this information is not needed.
3. A limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of the criteria provided in 10 CFR 50.36(c)(2)(ii). Regulation 10 CFR 50.36 also requires the inclusion of surveillance requirements that prescribe the frequency and scope of the surveillance necessary to demonstrate the required performance. The following questions pertain to Section 3, "Limiting Conditions for Operation and Surveillance Requirements" of the proposed UFTR TSs. Provide a response that addresses each issue identified, or propose a suitable alternative in your response.
- a. The UFTR TS utilize MODES to define when LCOs are applicable. The UFTR TS are not clear regarding what conditions are required for entry into or exit from any given MODE. The NRC staff position is that entry into or exit from a MODE requires that the conditions of that MODE be satisfied prior to the MODE change. Revise UFTR TS 3.0.1, to provide conditions for each MODE that must be satisfied prior to the MODE change or justify why specific conditions are not needed.

- b. UFTR TS 3.0.1, proposes that the action time for an LCO not being met is “within 15 minutes of discovery.” There is no basis provided for the acceptability or determination of the 15 minute time limit. The NRC staff position is that unless justified otherwise, action times for non-compliance with LCOs require corrective action to be taken immediately or “without delay and in a controlled manner.” Similarly, since action times other than IMMEDIATELY have not been justified by the licensee, the statement: “Where corrective measures are completed that permit operation in accordance with the LCO, completion of the actions required by LCO 3.0.1 is not required,” is also not justified. Revise UFTR TS 3.0.1, and the associated Basis to specify corrective action must be taken immediately, to include an acceptable definition for IMMEDIATELY consistent with NRC staff position, or provide a safety analysis report (SAR) justification for the 15 minutes of discovery of failure to meet the LCO.

- c. The Applicability, Objective, and Specifications for UFTR TS 3.0.2 make reference to “the applicable system, structure, or component (SSC).” The guidance in ANSI/ANS 15-1-2007, states “[l]imiting conditions for operations (LCOs) are those administratively established constraints on equipment and operational characteristics that shall be adhered to during operation of the facility.” Further, throughout the 10 CFR regulations, SSCs are referenced as being either safety- and security-related SSCs or as a risk-informed safety class, neither of which appear to apply to UFTR TS 3.0.2. Provide a response that addresses each issue identified for TS 3.0.2, or propose a suitable alternative in your response
 - i. UFTR TS 3.0.2, “SSC,” is not adequately inclusive of properties and functional capabilities, such as stated in UFTR TSs 3.1, UFTR TS 3.7.2, and UFTR TS 3.8. The surveillance requirement applicability (as defined in UFTR TS 3.0.1) is applicable to all items cited by your LCOs. Use another term, consistent with the regulations and the guidance of ANSI/ANS-15.1-2007, or provide an acceptable definition for “SSC,” in Section 1.1 of the UFTR TS.

 - ii. UFTR TS 3.0.2, Specification (1), states “[s]urveillances do not have to be performed on inoperable equipment or variables outside specified limits.” The UFTR TS deferral or exception for performance of surveillances is too vague. Provide a response that addresses each issue identified for TS 3.0.2, Specification (1), or propose a suitable alternative in your response
 - (1) The guidance in ANSI/ANS-15.1-2007, states that “[f]or each surveillance requirement (SR), it should be specified if the surveillance activity can or cannot be deferred during reactor shutdown.” It should also be specified for those that can be deferred, which must be performed prior to reactor operations. Revise the UFTR TS to specifically indicate which SR can be deferred and which must be performed prior to reactor operations, consistent with the ANSI/ANS-15.1-2007, guidance.

- (2) The term “variables,” is not defined in the UFTR TS. Revise UFTR TS 3.0.2, Specification (1), to use defined terms or provide a definition for “variables” in the UFTR TSs.
- iii. UFTR TS 3.0.2, Specification (3), states “[a]ppropriate surveillance testing on any Technical Specification required SSC shall be conducted after replacement, repair, or modification before the SSC is considered OPERABLE except as provided in UFTR TS 3.0.2 (2).” The guidance in ANSI/ANS-15.1-2007, states that any item, equipment, or condition that is controlled by an LCO shall be evaluated using the applicable SR after replacement, repair, or modification before placing such equipment in service. There is no acceptable exception to performing the TS required SR before placing such equipment in service. Modify UFTR TS 3.0.2, Specification (3), to eliminate the exception allowed in UFTR TS 3.0.2, Specification (2), or provide a safety analysis justifying why and when such an exception would be needed and acceptable.
- d. UFTR TS 3.1, is stated to be applicable to MODES 1 and 2. The guidance in NUREG-1537, Part 1, Section 4.5.3 states the applicant should present information on “[the amount of negative reactivity that must be available by control rod action to ensure that the reactor can be shut down safely from any operating condition and maintained in a safe shutdown state.” Accordingly, the applicable MODES for UFTR SDM should be MODES 1 through 5. Revise the applicability of UFTR TS 3.1, to be all modes (i.e., Modes 1 through 5) consistent with the Table 1.1-1 definition of MODES.
- e. UFTR TS 3.1, is applicable to reactor core reactivity parameters. Section 3.1, of ANSI/ANS-15.1-2007, NUREG-1537, Part 1, Section 4.5, and Appendix 14.1, Section 3.1, provide guidance for TS related to reactivity parameters, core configuration, fuel burnup limits, and fuel inspections. Respond to the following considering this guidance as related to UFTR TS 3.1.
- i. The applicability of UFTR TS 3.1 is stated to be Modes 1 and 2. Per NRC guidance, the conditions for these reactor core reactivity parameters apply at all times (i.e., UFTR Modes 1 to 5). Modify the applicability statement of UFTR TS 3.1, to include all modes and indicate the components to which the specification applies or justify why this information is not needed.
- ii. The basis for UFTR TS 3.1, is not consistent with the basis provided for SDM in ANSI/ANS-15.1-2007, in that it does not include that the reactor will remain subcritical without further operator action. Modify the basis statement of UFTR TS 3.1, to be consistent with the guidance or justify why this information is not needed.
- iii. NUREG-1537, Appendix 14.1, Section 1.2.2, TS that use the SAR as a basis should explicitly reference the SAR section. In addition, any other sources used to support the TS should be explicitly referenced. Add a SAR reference

for the accident analyses reference in the basis for UFTR TS 3.1, or justify why this information is not needed.

- iv. The UFTR SR for UFTR TS 3.1 includes a footnote indicating reactivity parameters [i.e., SDM and excess reactivity] be verified within limits following changes in core configuration. Core configuration should be controlled by an LCO using the guidance in NUREG 1537, Part 1, Section 4 and Appendix 14.1, Section 3.1. Revise UFTR TS 3.1, specification and associated SR to add an LCO for Core Configuration or explain why these are not required.
- f. The guidance in NUREG-1537, Part 1, Appendix 14.1, Section 3.2, recommends using control rod operability and maximum insertion rate LCOs/SRs that are not included in the UFTR TS. Revise UFTR TS 3.2.1, to include the following LCOs and SRs or explain why these are not required:
 - i. an LCO and corresponding SRs to specify the minimum number and type of operable control and safety rods and reference the applicable analysis in the UFTR SAR supporting these TS in the bases for the TS.
 - ii. an LCO and corresponding SRs to specify the maximum rates of adding positive reactivity and reference the applicable analysis in the UFTR SAR supporting these TS in the bases. The specification should explicitly state if gang or multiple blade withdrawal is allowed.
- g. NUREG-1537, Part 1, Sections 4.5.3 and Appendix 14.1, Section 3.2, item (2) provide guidance concerning acceptable reactivity addition rates, including inadvertent addition of ramp reactivity at the maximum rate for the most conservative power, rod position, and reactor conditions to demonstrate acceptability. Revise UFTR TS 3.2.1, or add another TS to address ramp reactivity and also ensure that the SR frequency includes considerations for performing this SR after changes to the core configuration.
- h. The guidance in NUREG-1537, Part 1, Appendix 14.1, Section 3.2, item (4) states “[a] table should specify all required scram channels and setpoints, the minimum number of channels, [and] other functions performed by the channel.” Revise UFTR TS 3.2.2 including the Bases to address the following issues or justify why they are not required:
 - i. Revise UFTR TS 3.2.2, including the Basis, to specify the number of channels available and required for the MODES specified;
 - ii. Revise UFTR TS 3.2.2, including the Basis, to include the “Allowable Condition or Value” for both Mode 1 and Mode 2 for scrams 1 through 4 identified in Table 3.2.2-1;
 - iii. UFTR Table 3.2.2-1 does not include information pertaining to full trip vs. blade trip described in Section 7 of the UFTR SAR. Revise UFTR TS 3.2.2,

including the Basis, to include the type of reactor trip for each "Function," identified in Table 3.2.2-1.

- iv. UFTR Table 3.2.2-1 does not list all UFTR reactor trips listed in SAR Section 7.3.1, "Trip Circuits." Add all UFTR reactor trips to UFTR Table 3.2.2-1 or justify why they are not needed.
- v. UFTR SR 3.2.2.1 is redundant to UFTR SR 3.2.2.2 except for "Frequency." Verify that both SRs are intended to be for CHANNEL TEST or modify TS SR 3.2.2.1 if it should refer to a CHANNEL CHECK instead.
- i. The guidance in NUREG-1537, Part 1, Appendix 14.1, Section 3.2, item (5), states "interlocks that inhibit or prevent control rod withdrawal or reactor startup should be specified by a table." UFTR SAR, Sections 7.1.3.1.1, 7.1.3.1.2, 7.2.2.2, and 9.1.2 all describe the importance of interlocks to UFTR. Revise UFTR TS 3.2, to provide LCOs/SRs for all interlocks described in the SAR or explain why they do not need to be in the TS.
- j. The guidance in NUREG-1537, Appendix 14.1, Section 3.3, item (5), states that the TS "should provide for prompt detection of fission products escaping from the fuel barrier." Modify the UFTR TS to clearly provide an LCO and associated SR to provide for prompt detection of possible fission products escaping from the fuel barrier or justify why these are not needed.
- k. UFTR TS 3.4, establishes the requirement that the automatic actuation of the evacuation alarm requires two simultaneous area radiation monitors (ARMs) to alarm high. UFTR SAR Section 11.1.4.1, summarizes the existence of ARMs, but does not provide any information on the location or total number of ARMs. The guidance in NUREG-1537, Part 1, Appendix 14.1, Section 3.7.1, item (3) states alarm and automatic action setpoints should be specified to ensure that personnel exposures and potential doses remain well below limits of 10 CFR Part 20, and are consistent with the facility ALARA (as low as is reasonably achievable) program. Explain and revise the UFTR SAR, TS 3.4, or both, as needed, to address the following concerns:
 - i. Explain how many ARM channels are available to perform this function, where they are located, their alarm setpoint, and the basis for that setpoint.
 - ii. The evacuation alarm interlock is credited in the Basis for UFTR TS 3.4, as a function "designed to alert the staff and occupants of a radiological emergency." Add a SAR reference for the analyses supporting this LCO in the basis for UFTR TS 3.4, or justify why they are not needed.
- l. UFTR TS 3.5, states "[t]he core vent and stack dilution systems shall be operating and maintaining REACTOR CELL pressure negative with respect to the surrounding environment." The guidance in ANSI/ANS-15.1-2007, Section 4, states, in part, that the "surveillance specification requirement will prescribe the frequency and scope of surveillance to demonstrate [LCO] performance."

- i. With regard to the scope of SR 3.5 identify what equipment provides indication of acceptable reactor cell pressure to demonstrate LCO performance.
 - ii. Explain how “negative,” pressure is measured and quantified and identify the operating pressure, flow rates, and any associated setpoints for the reactor cell and any other systems associated with reactor cell ventilation system.
 - iii. Add a SAR reference for the analyses supporting this LCO in the basis for UFTR TS 3.5, or justify why they are not needed.
- m. NUREG-1537, Part 1, Section 3.7, states that the radiation monitoring system and effluent LCOs/SRs should be stated in the TS. Explain and revise the SAR and UFTR TS 3.7.1, or both, as needed, to address the following concerns:
 - i. The guidance in NUREG-1537, Part 1, Appendix 14.1, Section 3.7.1, item (3), states “[a]larm and automatic action setpoints should be specified to ensure that personnel exposures and potential doses remain well below limits of 10 CFR Part 20, and are consistent with the facility ALARA program.” Revise UFTR Table 3.7.1-1 in UFTR TS 3.7.1, to provide the allowable levels or alarm setpoints for the radiation monitoring system, provide a reference with this information, or justify why these are not needed.
 - ii. The number of monitoring systems required for operability is indicated in Table 3.7.1-1, but the number typically in service and where they are located is unclear in the TS and is not elaborated in the SAR, Table 11-4. Revise UFTR Table 3.7.1-1 in UFTR TS 3.7.1, or the SAR to provide this information, or justify why these are not needed.
 - iii. ANSI/ANS-15.1-2007, recommends that radiation monitoring systems have an LCO for operability including, where possible, source checks. Add an LCO and SR or SAR reference for the analyses in the basis for UFTR TS 3.7, or justify why they are not needed.
- n. NUREG-1537, Part 1, Section 3.7 states that the radiation monitoring system and effluent LCOs/SRs should be stated in the TSs. Explain and revise the SAR, and UFTR TS 3.7.2, or both, as needed, to address the following concerns:
 - i. The objective of UFTR TS 3.7.2, states Ar-41 emissions will remain below applicable limits. The Specification portion of the TS should state the complete specification and need to reference the Basis. Modify UFTR TS 3.7.2 to clearly indicate the referenced applicable limits for Argon-41 emissions.
 - ii. The Basis statement should provide reference to the SAR analyses that demonstrates the UFTR method adequately controls Argon-41 generation to

within regulatory limits. Modify UFTR TS 3.7.2, Basis, to indicate the SAR reference or explain why it is not required.

- o. The guidance in ANSI/ANS-15.1-2007, states, in part, that “a specific [LCO] will establish the minimum performance level, and a companion [SR] will prescribe the frequency and scope of surveillance to demonstrate such performance.” In the case of experiments, ANSI/ANS-15.1-2007, Section 4.8, alternately states, in part, that “specific surveillance activities [for experiments] shall be established during the review and approval process as specified [under Administrative controls].” Modify UFTR TSs 3.8.1, UFTR TS 3.8.2, and UFTR TS 3.8.3 to add specific surveillances for the limitations on experiments, provide a reference to the administrative controls providing surveillance, or justify why a SR is not required.
- p. The guidance in ANSI/ANS-15.1-2007, Section 1.2.2, states that “[t]he basis is a statement that provides the background or reason for the choice of specification or references a particular portion of the Safety Analysis Report.” Modify the basis statement for UFTR TS 3.8.1, UFTR TS 3.8.2, and UFTR TS 3.8.3 to reference the corresponding SAR accident analyses or justify why this information is not required.
- q. NUREG-1537, Part 1, Appendix 14.1, Section 3.8.2, states that potentially corrosive materials shall be doubly encapsulated. UFTR TS 3.8.2(2), states that known “corrosive materials in quantities greater than trace amounts shall be doubly encapsulated.” Revise UFTR TS 3.8.2, Specification (2), to incorporate the stated guidance, define and justify by analysis the acceptability of “quantities greater than trace amounts,” or explain why these revisions are not required.
- r. UFTR TS 3.8.3, uses the term “credible,” failure with regard to limiting the quantity and type of fissile material in any experiment. This term does not provide sufficient limits on the occurrence or consequence for failure of an experiment. Revise UFTR TS 3.8.3, to delete the word “credible,” from the UFTR TS Objective, UFTR TS 3.8.3, Specifications (1) and (2) or provide a definition for “credible,” including a SAR reference to the analysis in the basis.
- s. The guidance in NUREG 1537, Part 1, establishes the principal objective of the shield design to ensure that the projected radiation dose rates and accumulated doses in occupied areas do not exceed the limits of 10 CFR Part 20, and the guidelines of the facility ALARA program. UFTR TS 3.9.1, establishes the requirement for the shield tank water level, but the basis statement does not establish dose limit constraints for “adequate radiation shielding.” Revise UFTR TS 3.9.1, basis to identify that the specified shield tank level offers reasonable assurance that the shield tank can successfully prevent exceeding the limits of 10 CFR Part 20, and the guidelines of the UFTR ALARA program, including a SAR reference to the analysis.
- t. NUREG 1537, Part 1, Appendix 14.1, provides guidance on the periodic visual inspection of the fuel. This specification should be clear and explicit for detecting deterioration, including the intervals and methods of fuel inspection. UFTR TS 3.9.2, provides for a visual inspection on a 10-year periodic basis. However, it is not clear

from the sample size of 8 in-core reactor fuel assemblies how the entire core will be inspected in the required frequency. Update UFTR TS 3.9.2, to provide a basis reference that establishes the 10 year interval with a sample size of 8 in-core fuel assemblies is adequate to detect cladding deterioration that results from erosion, corrosion, or other damage.

4. Regulation 10 CFR 50.36 (c)(4) requires the inclusion of those design features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered elsewhere in the specifications. The following questions pertain to Section 5, Design Features (DF) of the proposed UFTR TS. Provide a response that addresses each issue identified, or propose a suitable alternative in your response.
 - a. The guidance in ANSI/ANS-15.1-2007, Section 5.1, states, in part, that the site and facility description should include “[a] general description of the site and of the facility including location and exclusion or restricted areas.” Revise UFTR TS 5.0, “Design Features,” to include information to characterize the area and clearly discuss the area that is under the reactor license or justify why this information is not required.
 - b. The guidance in ANSI/ANS-15.1-2007, states, in part, that “[i]f not included elsewhere in the technical specifications, features of the reactor room, such as ventilation system minimum free air volume, height of effluent release, etc., that are important to radiological safety and monitoring [should] be presented also. Revise UFTR TS 5.1, “Reactor Cell,” DFs to include the free volume of the Reactor Cell and the ventilation system operational parameters (e.g., volumetric exhaust rate) that are not supplied elsewhere or justify why this information is not required.
 - c. NUREG-1537, Part 1, Appendix 14.1, Section 3.1 item (6)(c), “Materials Testing Reactor (MTR)-Type Fuel,” states, in part, that to prevent fuel swelling there should be burnup limitations on the fuel specified for materials testing reactor (MTR)-type fuel. UFTR TS 5.3.2, does not include such a DF limiting fuel burnup. Revise UFTR TS 5.3.2, to provide a limit on uranium-235 burnup or fission density consistent with the SAR, which accounts for all relevant thermal-hydraulic and metallurgical considerations or justify why this information is not required.
5. The following questions pertain to Section 6, Administrative Controls (AC) of the proposed UFTR TS. Regulation 10 CFR 50.36 (c)(5) states “[a]dministrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner.” Provide a response that addresses each issue identified, or propose a suitable alternative in your response
 - a. UFTR TS 6.1.1, “Structure,” references Figure 6-1, UFTR Organizational Chart. The proposed figure identifies the responsible Level 1 individuals as the “VP. Business Affairs,” and the “Dean, College of Engineering.” The current UFTR organizational chart lists the Level 1 (Figure 6.1) as the “UF President, Dean, College of

Engineering, Chairman, Nuclear & Radiological Engineering Department.” Modify Figure 6-1 to be consistent with the prior approved Level 1 individuals or provide a detailed explanation of how the Level 1 individuals identified in proposed Figure 6-1 will be responsible for the reactor facility’s licenses, charter, and site administration.

- b. UFTR TS 6.1.3, staffing has duplicate numbering for (1), (2), and (3). Revise UFTR TS 6.1.3, to eliminate duplicate numbering, such that each TS can be uniquely identified.
- c. UFTR TS 6.1.3(1) uses the term “licensed operator,” but does not define what constitutes a “licensed operator.” ANSI/ANS-15.1-2007, includes a definition for “licensed,” and “operator,” neither of which appropriately apply to the UFTR use of the term “licensed operator.” Modify UFTR TS 6.1.3(1), and add the definition in Section 1.1 to incorporate the use of “reactor operator,” from ANSI/ANS-15.1-2007, or provide a facility-specific definition for “licensed operator.”
- d. For “a designated second person,” under Section 6.1.3, “Staffing,” in ANSI/ANS-15.1- 2007, the guidance states “[u]nexpected absence for as long as 2 hours to accommodate a personal emergency may be acceptable provided immediate action is taken to obtain a replacement.” UFTR TS 6.1.3(2), states unexpected absence is acceptable, but does not constrain the acceptability to an emergency situation. Modify UFTR TS 6.1.3(2), to be consistent with the guidance or explain why it is not necessary.
- e. ANSI/ANS-15.1-2007, Section 6.1.3(c)(iii) provides guidance for parameters defining “reasonable time,” (e.g., 30 minutes or within a 15-mile radius). The UFTR TS 6.1.3(3)c., also uses the term “reasonable time,” but does not define the term. Revise UFTR TS 6.1.3, to incorporate the cited guidance, define “reasonable time,” or explain why this information is not required.
- f. The guidance in ANSI/ANS-15.1-2007, Section 6.1.3(3)(a), states, in part, that (a) initial startup and approach to power requires the presence at the facility of the senior reactor operator. Revise UFTR TS 6.1.3, to incorporate the cited guidance or explain why this information is not required.
- g. UFTR TS 6.1.4, references the American National Standard, ANSI/ANS-15.4-2007, for selection and training of personnel. However, the UFTR requalification plan references, ANSI/ANS-15.4-1988. Revise TS 6.1.4 to be consistent with the requalification plan, reference the requalification plan, or explain why the references are, and need to be, different. Additionally, the NRC staff noted that ANSI/ANS-15.4 has been recently revised (ANSI/ANS-15.4-2016) and consideration should be given to referencing the latest version.
- h. The term “SSC important to safety” is used in UFTR TS 6.2.3(3), however, it is not defined. Provide a suitable definition for “SSC important to safety,” for the purposes of the UFTR TS, justify an alternative definition, or explain why one is not needed.

- i. The UFTR TS 6.3, states “Radiation Control Officer shall be responsible for implementation of the radiation protection program,” but does not state the recommended provision from ANSI/ANS-15.1-2007, Section 6.3, that this individual shall report to Level 1 or Level 2. Figure 6-1 in the UFTR TS shows the reporting responsibility for the Radiation Control Officer, but does not show the recommended provision from ANSI/ANS-15.1-2007, Section 6.3, that this individual shall report to Level 1 or Level 2. Revise UFTR TS 6.3, and Figure 6-1 to incorporate the cited guidance or explain why this change is not required.
 - j. The last paragraph of UFTR TS 6.4, “Procedures,” discusses changes to or temporary deviations from the procedures listed in (1) through (8). In part, the proposed TS states, (i) substantive changes will only be made only after review by the RSRs and approval by the Facility Director, (ii) minor modifications to procedures may be made by the Reactor Manager but must be approved by the Facility Director within 14 days. Explain how these allowable changes are performed, such that they are consistent with and meet the requirements of the regulations under 10 CFR 50.59, “Changes, tests and experiments,” or modify UFTR TS 6.4, to specify approval of changes must be documented by conducting a 50.59 evaluation.
6. The requirements for TS Bases are established in 10 CFR 50.36(a)(1), which states, in part, that “[a] summary statement of the bases or reasons for such specification, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications.” ANSI/ANS-15.1-2007, states that the bases are statements that provide the background or reason for the choice of TS, or references a particular portion of the SAR that does. Provide a response that addresses each issue identified, or propose a suitable alternative in your response.
- a. The Basis for UFTR TS 3.1, states what the SHUTDOWN MARGIN and EXCESS REACTIVITY specifications represent, not why they are acceptable. It does not cite the restrictions imposed by the limiting core configuration nor the analysis that demonstrates the acceptability of that limiting core configuration in terms of the safety limits and NRC guidance or regulations. Revise the UFTR TS 3.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting these LCOs.
 - b. The Basis for UFTR TS 3.2.1, does not restate or reference the SAR analysis that demonstrates the acceptability of the control blade drop time specified consistent with NUREG-1537, Part 1, Section 4.5.3. Revise the UFTR TS 3.2.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
 - c. The Basis for UFTR TS 3.2.3, does not restate or reference the SAR analysis that demonstrates the acceptability of the measuring channel information stated in Table 3.2.3-1. The Basis also does not address interlocks and their important attributes that are discussed in several places in the SAR. Revise the UFTR TS 3.2.3, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.

- d. The Basis for UFTR TS 3.3.1, states why maintaining core water level is important, not why the value cited is acceptable. It does not cite the portions of the SAR that demonstrates the acceptability of the LCO in terms of the safety limits or relevant NRC guidance or regulations. Revise UFTR TS 3.3.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- e. The Basis for UFTR TS 3.3.2, states the purpose of the water level sensor, not why the value cited is acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits or relevant NRC guidance or regulations. Revise UFTR TS 3.3.2, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- f. The Basis for UFTR TS 3.3.3, states the purpose of the specifications, not why the values cited are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise the UFTR TS 3.3.3, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- g. The Basis for UFTR TS 3.4, states the purpose of the specifications, not why the actions and restrictions cited are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.4, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- h. The Basis for UFTR TS 3.5, states the importance of the specifications, not what the accepted operational parameters are and why they are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits or relevant NRC guidance or regulations. Revise the UFTR TS 3.5, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- i. The Basis for UFTR TS 3.7.1, states what the specifications accomplish, not what the accepted setpoints are and why they are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits or relevant NRC guidance or regulations. Revise UFTR TS 3.7.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- j. The Basis for UFTR TS 3.7.2, states the applicable regulations and invokes administrative requirements to satisfy them - not the methodology employed, how it is translated into operating limitations, and why they are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.7.2, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.

- k. The Basis for TS 3.8.1, states the importance of the establishing the reactivity worths, but not why the stated values are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.8.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- l. The Basis for UFTR TS 3.8.2, states the importance of the establishing the reactivity worths, but not why the stated values are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.8.2, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- m. The Basis for TS 3.8.3 states the importance of the establishing the experiment limits on fissile material and credible failure, but not the criteria that are applicable to the limitations or why they are acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.8.3, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- n. The Basis for UFTR TS 3.9.1, states the importance of the ensuring adequate shielding, but not why the value cited is acceptable. It does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.9.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- o. The Basis for UFTR TS 3.9.2, states that it is important to operate with undamaged fuel because it ensures that the accident analysis is then bounding. The staff does not understand the assertion. It also states that limiting access as stated preserves the assumptions regarding fission product inventory. The staff does not understand this assertion. The Basis does not cite the portions of the SAR submitted that demonstrates the acceptability of the LCO in terms of the safety limits and NRC guidance or regulations. Revise UFTR TS 3.9.1, Basis, so that it summarizes or restates the analysis or reasoning presented in the SAR supporting this LCO.
- p. The regulation in 10 CFR 50.36(a)(1), requires that DFs shall have bases. The UFTR TS do not provide bases for the DFs. Revise the UFTR TS to provide acceptable bases for all UFTR DFs.