August 3, 2016

Dr. Cameron Goodwin, Director
Rhode Island Nuclear Science Center
Rhode Island Atomic Energy Commission
16 Reactor Road
Naragansett, RI 02882-1165

SUBJECT: RHODE ISLAND ATOMIC ENERGY COMMISSION – REQUEST FOR ADDITIONAL INFORMATION FOR THE RHODE ISLAND NUCLEAR SCIENCE CENTER REACTOR LICENSE RENEWAL TECHNICAL SPECIFICATIONS (TAC NO. ME1598)

Dear Dr. Goodwin:

The U.S. Nuclear Regulatory Commission (NRC) is continuing its review of your application for renewal of Facility Operating License No. R-95 for the Rhode Island Nuclear Science Center (RINSC) reactor by letter dated May 3, 2004, as supplemented. During our review, questions have arisen for which additional information is needed. The following requests for additional information (RAIs) are related to the Technical Specifications (TSs) provided by RINSC by letter dated February 26, 2016.

We request that you provide responses to this RAI within 30 days from the date of this letter. If 30 days is insufficient time for you to develop your responses, we request that you identify a timeline for providing the responses, including a schedule for updates.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.30(b), "Oath or affirmation," your response must be executed 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 evaluation of your renewal request.

If you have any questions regarding this review, please contact me at (301) 415-3936, or by electronic mail at Patrick.Boyle@nrc.gov.

Sincerely,

/RA/

Patrick G. Boyle, Nuclear Engineer
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-193
License No. R-95

Enclosure:
As stated

cc: See next page

cc:

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

If you have any questions regarding this review, please contact me at (301) 415-3936, or by electronic mail at Patrick.Boyle@nrc.gov.

Sincerely,

/RA/

Patrick G. Boyle, Nuclear Engineer
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Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-193
License No. R-95

Enclosure:
As stated

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ADAMS Accession No.: **ML16196A416** *concurrence via e-mail NRR-088

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

REGARDING THE RENEWAL OF

THE RHODE ISLAND NUCLEAR SCIENCE CENTER RESEARCH REACTOR

LICENSE NO. R-95; DOCKET NO. 50-193

The U.S. Nuclear Regulatory Commission (NRC) is continuing the review of your application for renewal of Facility Operating License No. R-95 for the Rhode Island Nuclear Science Center (RINSC) reactor by letter dated May 3, 2004 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML041270519), as supplemented. (A redacted version of the safety analysis report (SAR) is available on the NRC's public Web site at www.nrc.gov under ADAMS Accession No. ML14038A386).

During our review, questions have arisen for which additional information is needed. The following requests for additional information (RAIs) are related to the Technical Specifications (TSs) provided by RINSC by letter dated February 26, 2016, (ADAMS Accession No. ML16062A380). We request that you provide responses to this RAI within 30 days from the date of this letter. If 30 days is insufficient time for you to develop your responses, we request that you identify a timetable for providing the responses including a schedule for updates.

TSs are fundamental criteria necessary to demonstrate facility safety and are required by Title 10 of the *Code of Federal Regulations* (10 CFR), 50.36, "Technical specifications," for each license authorizing operation of a production or utilization facility of a type described in 10 CFR 50.21, "Class 104 licenses; for medical therapy and research and development facilities." TSs are derived from the analyses and evaluation included in the safety analysis report and submitted pursuant to 10 CFR 50.34, "Contents of applications; technical information." 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 (DFs), 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, "Standard Format and Content of Technical Specification. This guidance relies significantly on American National Standards Institute/American Nuclear Society (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. The proposed TSs do not include an introduction section.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, "Technical Specifications," states, in part, that "The applicant should be able to state conclusively that the technical specifications were prepared following an accepted format, that normal operation of the reactor within the limits of the technical specifications will not result in offsite radiation

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exposure in excess of 10 CFR Part 20 guidelines, and that the technical specifications limit the likelihood and consequences of malfunctions." Licensees should also be able to state that "The technical specifications are neither derived nor justified in this chapter [14] of the SAR. They are determined by the analyses that appear in the other chapters of the SAR."

These understandings do not appear to be stated in the proposed RINSC TSs. Provide an introduction to the TSs that addresses these issues, or state your justification for a suitable alternative.

2. Proposed TS 1.0, "Definitions," includes the following items identified by the NRC staff:

   a. Proposed TS 1.6, "Control Rod," states, "A control rod is a device fabricated from neutron absorbing material, that is used to establish neutron flux changes and to compensate for routine reactivity losses." Proposed TS 1.32, "Regulating Rod or Regulating Blade," states, "The regulating rod is a control rod of low reactivity worth used primarily to maintain an intended power level. It is not required to have a scram capability, and may be controlled manually or by servo controller." Proposed TS 1.41, "Shim Safety Rod or Shim Safety Blade," states, "A shim safety rod is a control rod of high reactivity worth used primarily to make course adjustments to power level, and to provide a means for very fast reactor shutdown by having a scram capability." The NRC staff finds these definitions lack specific information on the neutron absorbing and cladding materials for the regulating and shim control rods.

      The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 1.2.2, "Format," states that any information used to support the TSs should be explicitly referenced.

      Provide a revised TSs 1.6, 1.32, and 1.41, as applicable, to include the neutron absorbing and cladding materials, or justify why no change is needed.

   b. Proposed TS 1.13, "Explosive Material," states, in part, that "Explosive material is any solid or liquid which is either: [...]." The NRC staff finds that the proposed definition appears to be limited to material in a solid or liquid physical form, and notes that other types of materials, such as gases and metastable materials, can also have explosive potential, and seeks additional clarification in order to avoid potential confusion.

      The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 1.2.2, "Format," states that any information used to support the TSs should be explicitly referenced.

      Provide a revised TS 1.13 to indicate that the explosive materials "used" at the RINSC are limited to solid and liquid forms, propose a revised TS 1.13 definition that includes other forms used at RINSC, or justify why no change is needed.

   c. Proposed TS 1.28, "Reactor Secured," defines conditions under which the RINSC reactor shall be considered secured, and includes proposed TS 1.28.3.1, which states that "The reactor is shutdown." TS 1.29, "Reactor Shutdown," provides a reactivity

condition (0.75%Δk/k) for shutdown. However, the NRC staff finds that the criteria for the physical location of the control rods (e.g. "fully inserted") appears to be missing.

ANSI/ANS-15.1-2007, Section 1.3, for "reactor secured," item (2) (a), provides guidance that "the minimum number of neutron absorbing control devices is fully inserted or other safety devices are in shutdown position, as required by technical specifications."

Provide a revised TS 1.28.3.1 to describe the physical location (e.g., all control rods fully inserted) for the neutron absorbing control devices, or justify why no change is needed.

d. The NRC staff finds that proposed TS 1.43, "Shutdown Margin," may not be consistent with the guidance provided in ANSI/ANS-15.1-2007, as it is lacking descriptions regarding "any permissible operating condition," and "will remain subcritical without further operator action."

   ANSI/ANS-15.1-2007, Section 1.3, "shutdown margin" includes reference to "any permissible operating condition," and "will remain subcritical without further operator action."

   Provide a revised TS 1.43 to include the definition provided in ANSI/ANS-15.1-2007, or justify why no change is needed.

3. Proposed TSs in Section 4.0, "Surveillance Requirements," have the following items identified by the NRC staff:

   a. The NRC staff finds that proposed TS 4.2.3 and TS 4.2.4, which use the term "verified to be operable […]," is not defined in the TSs and does not clearly indicate the method used to determine the operability of the channels (i.e., channel check, channel test, and/or channel calibration).

      The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 4, "Surveillance Requirements," states "the surveillance-related specifications should clearly identify…the [surveillance] method…."

      Provide a revised TS 4.2.3 and TS 4.2.4 to describe the surveillance method, or justify why no change is needed.

   b. The NRC staff finds that proposed TS 4.2.5 is not clear as it does not state the surveillance test method used (i.e., a channel check, channel test, and/or channel calibration).

      The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 4, "Surveillance Requirements," states "the surveillance-related specifications should clearly identify…the [surveillance] method…."

      Provide a revised TS 4.2.5 to describe the surveillance method, or justify why no change is needed.

c. The NRC staff finds that proposed TS 4.2.6 does not clearly state that a “channel” calibration is required, as defined in the proposed TSs, and this could cause potential confusion.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 4, “Surveillance Requirements,” states “the surveillance-related specifications should clearly identify…the [surveillance] method….”

   Provide a revised TS 4.2.6 to clearly describe the surveillance method, or justify why no change is needed.

d. The NRC staff finds that proposed TS 4.4.2.1 and TS 4.4.2.2 use the term “…functional test…,” which is not defined in the TSs, and use of the defined term “operable” could avoid potential confusion.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 4, “Surveillance Requirements,” states “the surveillance-related specifications should clearly identify…the [surveillance] method….”

   Provide a definition for “functional” in the proposed TSs. Provide a revised TSs 4.4.2.1 and 4.4.2.2 to use a term are already defined in the proposed TSs (e.g., operable), or justify why no change is needed.

e. The NRC staff finds that the specification in proposed TS 4.5.1, states “…in operation…,” which is not clearly defined in TS (e.g., “operable,” and “operating,” are defined terms in theTSs), and could cause confusion. In addition, proposed TS 4.5.1 appears to contain a typographical error as to whether the colon (“:”) in the proposed TS should be a period (“.”).

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 1.2.2, “Format,” states that any information used to support the TSs should be explicitly referenced.

   Provide a definition for “in operation” in the proposed TSs, revise TS 4.5.1 to use terms defined in the proposed TSs (e.g., operable or operating), or justify why no change is needed.

f. The NRC staff finds that proposed TS 4.6.2, states “… functional test…,” which is not clearly defined in the TSs (e.g., “operable” is defined) and could cause confusion.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 1.2.2, “Format,” states that any information used to support the TSs should be explicitly referenced.

   Provide a definition for “functional” in the proposed TSs, revise TS 4.6.2 to use a defined term (e.g., operable), or justify why no changes are needed.

g. The NRC staff finds that proposed TS 4.7.1.2 and TS 4.7.2.1, state "…calibrated annually…," and the TSs would be more consistent with the guidance provided in ANSI/ANS-15.1-2007, to use the term "channel calibration."

   ANSI/ANS-15.1-2007, Section 1.3, provides guidance for use of the definition of "channel calibration."
   Revise TS 4.7.1.2 and TS 4.7.2.1 to use "channel calibration," or justify why no change is needed.

4. The requirements for LCO and SR TSs are established in 10 CFR 50.36(c)(2), "Limiting conditions for operation," and 10 CFR 50.36(c)(3), "Surveillance requirements," respectively. The cited regulations state that LCOs are required to have a companion SR to provide assurance that the LCO will be met. Additionally, NUREG-1537, Part 1, Chapter 14, Appendix 14.1, and ANSI/ANS-15.1-2007 provide guidance regarding TSs, including LCOs and SRs.

   a. Some proposed RINSC LCOs do not appear to have a corresponding SR, as noted below.

      i. Proposed TS 3.1.1.1.4, states: "The reactor shall be subcritical by at least 3.0 %Δk/k during fuel loading changes."

         Provide an appropriate corresponding SR, or justify why no such SR should be required.

      ii. Proposed TS 3.1.2.1, states "All core grid positions shall contain fuel elements, baskets, reflector elements, or experimental facilities during operations at power levels in excess of 0.1 MW in the forced convection cooling mode."

         Provide an appropriate corresponding SR, or justify why no such SR should be required.

      iii. Proposed TS 3.1.2.2, states "The pool gate shall be in its storage location during operations at power levels in excess of 0.1 MW in the forced convection cooling mode."

         Provide an appropriate corresponding SR, or justify why no such SR should be required.

      iv. Proposed TS 3.2.1.2, states "The reactivity insertion rates of individual shim safety and regulating rods does not exceed 0.02%Δk/k per second." Proposed TS 4.2.2, states "All shim safety reactivity insertion rates shall be measured […]." Proposed TS 4.2.2 would impose a SR for reactivity insertion rates for individual shim safety rods, but would not impose a SR for reactivity insertion rates for regulating rods.

         Provide a revised TS 4.2.2 such that it would impose a SR for reactivity insertion rate for regulating rods, or justify why no such SR should be required.

v. Proposed TS 3.5.2.4, states “The Emergency Filter System Exhaust Absolute Filter shall be certified by the manufacturer to have a minimum efficiency of 99.97% for removing 0.3 micron diameter particulates.”

   Provide an appropriate corresponding SR, which clarifies the interval at which this certification is performed, and if it is only performed once prior to initial filter installation, also clarifies the interval at which the filter is replaced; or, justify why no such SR should be required.

   Provide a SR that ensures that the manufacturer’s certified state minimum efficiency remains effective throughout the surveillance interval or, justify why no change is needed

vi. Proposed TS 3.6.2.1 provides requirements that the Emergency Blower (TS 3.6.2.1.1) and Dilution Blower (TS 3.6.2.1.2) shall be connected to an emergency power source. Proposed TS 4.6.1, states “A quarterly operability test shall be performed in order to verify that the emergency power system starts in the event of a facility power outage.” Proposed TS 4.6.2, states “A functional test of the emergency power system under load shall be performed: […].” The NRC staff is not clear how proposed TSs 4.6.1 and 4.6.2 verify that the emergency blower and dilution blower are connected to the emergency power source.

   Propose a revised TSs 4.6.1 and 4.6.2 such that they indicate that operation of the Emergency Blower and Dilution Blower demonstrate that emergency power is connected, or justify why no change is needed.

vii. Proposed TS 3.7.1.1.2, states “If the detector described in specification 3.7.1.1.1 fails during operation, a suitable alternative gaseous or particulate air monitor may be used, or an hourly grab sample analysis may be made in lieu of having a functioning monitor.” Proposed TSs 4.7.1.1.3, 4.7.1.1.4, 4.7.1.2.3, and 4.7.1.2.4 impose SRs on the gaseous effluent air monitor and the particulate air monitor. The NRC staff is not clear if the SRs required by TSs 4.7.1.1.3, 4.7.1.1.4, 4.7.1.2.3, and 4.7.1.2.4 are intended to extend to the alternative monitor that would be allowed by proposed TS 3.7.1.1.2.

   Provide a revised TSs 4.7.1.1.3, 4.7.1.1.4, 4.7.1.2.3, and 4.7.1.2.4 to clearly delineate if they extend to the alternate monitor, propose a SR for TS 3.7.1.1.2, or justify why no changes are needed.

viii. Proposed TS 3.7.1.1.4, states “If the detector described in specification 3.7.1.1.3 fails, a suitable gamma sensitive alternative meter with alarming capability may be placed at the top of the bridge in lieu of the normal detector.” Proposed TS 4.7.1.1.2 and TS 4.7.1.2.2 impose SRs on the pool top area radiation monitor. However, the NRC staff is not clear if the SRs imposed TSs 4.7.1.1.2 and 4.7.1.2.2 are intended to extend to the alternative meter.

Provide a revised TS 4.7.1.1.2 and TS 4.7.1.2.2 to include the alternative meter, propose another SR for the alternative meter in TS 3.7.1.1.4, or justify why no changes are needed.

ix. Proposed TS 3.7.1.1.5, states "Passive radiation monitors provided by a certified vendor shall be used to provide area radiation monitoring inside confinement when the reactor is in operation, and during fuel handling operations."
Proposed TSs 4.7.1.1.1 and 4.7.1.2.1 would impose SRs on the experimental level area radiation monitor.

Clarify whether proposed TSs 4.7.1.1.1 and 4.7.1.2.1 are intended to provide SRs for the radiation monitor required by proposed TS 3.7.1.1.5. If so, revise TS 3.7.1.1.5 and/or TSs 4.7.1.1.1 and 4.7.1.2.1 to clarify that this is the case; if not, provide an appropriate corresponding SR for TS 3.7.1.1.5; or, justify why no such SR should be required.

x. Proposed TS 3.7.1.1.6, states, "Passive radiation monitors provided by a certified vendor shall be used to provide environmental radiation monitoring when the reactor is in operation, and during fuel handling operations."

Provide an appropriate corresponding SR, or justify why no such SR should be required.

xi. Proposed TS 3.7.1.2.4, states "Alarm set points may be adjusted higher with the approval of the Director or one of the Assistant Directors." This TS does not have a corresponding SR.

Provide an appropriate corresponding SR, or justify why no such SR should be required.

xii. The specification in proposed TS 3.7.2.1, states "The annual total effective dose equivalent to the individual member of the public likely to receive the highest dose from air effluents will be calculated using a generally-accepted computer program."

Provide an appropriate corresponding SR (i.e., requiring that this calculation be performed, and compliance with 10 CFR Part 20, "Standards for Protection Against Radiation," limits determined, at a specific interval), or justify why no such SR should be required.

xiii. Proposed TS 3.9.3, "Experimental Facilities," would impose requirements on experimental facility configuration during reactor operation and within 4.5 hours following reactor shutdown. Although ANSI/ANS-15.1-2007 states that specific surveillance activities for experiments are typically not part of the TSs, the LCOs in proposed TS 3.9.3 relate to permanently installed experimental facilities (beam ports) at the RINSC, rather than specific experiments. Therefore, the LCOs in proposed TS 3.9.3 should have corresponding SRs.

Provide appropriate corresponding SRs for TS 3.9.3 (including TSs 3.9.3.1.1, 3.9.3.1.2, 3.9.3.1.3, 3.9.3.1.4, 3.9.3.2.1, 3.9.3.2.2.1, and 3.9.3.2.2.2), or justify why no such SRs should be required.

b. The NRC staff finds the following proposed TS SRs do not appear to have a corresponding LCO:

   i. Proposed TS 4.1.1.2.2, states "The reactivity worth of the shim safety rods shall be determined: […]."

      Identify the intended corresponding existing LCO, provide an appropriate LCO, or justify why no such LCO should be required.

   ii. Proposed TS 4.2.5.7.1 would impose a SR for the bridge manual scram.

      Identify the intended corresponding existing LCO, provide an appropriate LCO, or justify why no such LCO should be required.

   iii. The specification in proposed TS 4.3.1.3, states "The primary coolant level shall be verified to be greater than or equal to the Limiting Safety System Setting value prior to the initial start-up each day that the reactor is started up from the shutdown condition." Proposed TS 2.2.1.2 would impose a LSSS for the coolant level, but the proposed RINSC TSs do not appear to contain an LCO for primary coolant level (additionally, the guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.3, Subsection (3), states that pool water level should be an LCO).

      Provide an appropriate corresponding LCO, or justify why no such LCO should be required.

   iv. Proposed TS 4.3.1.4, states "The components of the primary coolant system shall be inspected annually."

      Provide an appropriate corresponding LCO, or justify why no such LCO should be required.

   v. Proposed TS 4.3.2.2, states "The components of the secondary coolant system shall be inspected annually."

      Provide an appropriate corresponding LCO, or justify why no such LCO should be required.

   vi. Proposed TS 4.6.3, states "The fuel tank levels for the emergency generator shall be verified to be at least 50% full on a monthly basis." Provide an appropriate corresponding LCO, or justify why no such LCO should be required.

vii. The specification in proposed TS 4.7.2.1, states “The monitoring equipment used to measure the radioactive concentrations in the waste retention tanks shall be calibrated annually.”

Provide an appropriate corresponding LCO, or justify why no such LCO should be required.

viii. Proposed TS 4.9.1.2. would impose SRs (TSs 4.9.1.2.1., 4.9.1.2.2., and 4.9.1.2.3.) requiring that the beryllium reflectors be periodically inspected and functionally fit into the core grid box.

Provide an appropriate corresponding LCOs for TSs 4.9.1.2.1., 4.9.1.2.2., and 4.9.1.2.3., or justify why no such LCOs should be required.

5. Proposed TS 3.1.1.3.1 and TS 3.1.1.3.2 provide an exception for the reactivity worth of an experiment that states “except when the operation of the reactor is for the purpose of measuring experiment reactivity worth by doing criticality studies.” The guidance provided in ANSI/ANS-15.1-2007, Section 1.2.1, “Purpose,” states, in part, that “Specific limitations and equipment requirements for safe reactor operation and for dealing with abnormal situation, typically derived from the Safety Analysis Report [...].”

   a. The NRC staff finds that TS 3.1.1.3.1 and TS 3.1.1.3.2 would allow experiments an unlimited reactivity, and this condition not supported by the SAR.

      Provide a revised TSs 3.1.1.3.1 and 3.1.1.3.2 to remove the exception when the reactor is operated for the purpose of measuring experiment reactivity, or justify why no change is needed.

   b. The NRC staff thinks that proposed TS 3.1.1.3.1.1 appears to contain a typographical error where “0.6%Δk.k” should be “0.6%Δk/k.”

      Propose a revised TS 3.1.1.3.1.1 to change “0.6%Δk.k” to “0.6%Δk/k,” or justify why no change is needed.

6. The NRC staff finds some of the LCOs appear to be action statements that provide allowable deviations from other LCOs, but a completion time for the action statements is not clear. ANSI/ANS-15.1-2007, states that deviations from LCOs may be allowed under specified conditions, such as action statements.

   a. Proposed TS 3.7.1.1.2, states “If the detector described in specification 3.7.1.1.1 fails during operation, a suitable alternative gaseous or particulate air monitor may be used, or an hourly grab sample analysis may be made in lieu of having a functioning monitor.” However, no completion time is provided for use of the alternative method.

      Provide a revised TS 3.7.1.1.2 to include a completion time or, justify why no changes are needed.

b. Proposed TS 3.7.1.1.4, states “If the detector described in specification 3.7.1.1.3 fails, a suitable gamma sensitive alternative meter with alarming capability may be placed at the top of the bridge in lieu of the normal detector. However, no completion time is provided for use of the alternative meter.

   Provide a revised TS 3.7.1.1.4 to include a completion time, or justify no change is needed.

c. Proposed TS 3.9.3.2.1, states “If there is no need to open a beam port within 4.5 hours after reactor shutdown, then the 1.25 square inch area opening to confinement shall be maintained until that time period has passed.” The NRC staff is not clear whether the opening must be reduced to a 1.25 square inch area before “there is no need to open a beam port,” or within a certain timeframe after “there is no need to open a beam port.”

   Provide a revised TS 3.9.3.2.1 to include a completion time for reducing the opening size or eliminate the conditional logic, or justify why no changes are needed.

d. Proposed TS 3.9.3.2.2 provides requirements on to open a beam port. However, the NRC staff is not clear whether the actions specified in proposed TS 3.9.3.2.2.1 and TS 3.9.3.2.2.2 must be performed before “there is a need to open a beam port,” or within a certain timeframe after “there is a need to open a beam port.”

   Provide a revised TS 3.9.3.2.2 to provide a completion time for performing the actions specified in proposed TS 3.9.3.2.2.1 and TS 3.9.3.2.2.2, or justify why no change is needed.

7. The proposed TSs do not appear to include any limitations related to the fuel burnup.

   ANSI/ANS-15.1-2007, Section 5.3, “Reactor core and fuel,” states “[...] limitations on fuel burnup shall be included as appropriate [...].” NUREG-1313, “Safety Evaluation Report Related to the Evaluation of Low-Enriched Uranium Silicide-Aluminum Dispersion Fuel for Use in Non-Power Reactors,” Section 3.3, “Irradiation Behavior,” states that the fuel has been tested to “[...] burnups of up to 98 percent of the uranium-235 [...].”

   Provide a proposed TSs limiting fuel burnup, or justify why these TSs are not required.

8. Proposed TS 3.2.1.1, states “All shim safety blades are capable of being fully inserted into the reactor core within 1 second from the time that a scram condition is initiated.” However, the number of the control rods is not specified.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2, Subsection (1), states that licensees’ LCOs should specify the number and type of control rods that must be operable.

   Provide a revised TSs that specifies the minimum number of shim safety rods that shall be operable, or justify why this is not required.

9. Proposed TS 3.2.1.2, states “The reactivity insertion rates of individual shim safety and regulating rods does not exceed 0.02%Δk/k per second.” The accident analyses provided in the RINSC SAR, as supplemented, are based on a maximum ramp reactivity insertion rate of 0.02%Δk/k per second. Additionally, the RINSC SAR states that only one safety blade can be moved out of the core at a time. However, the NRC staff finds that while proposed TS 3.2.1.2 would limit the reactivity addition rate from withdrawal of an individual shim safety or regulating rod to the rate that in analyzed in the SAR, as supplemented, it would not limit the total reactivity addition rate to 0.02%Δk/k per second because it does not specify that only one safety blade or regulating rod can be withdrawn from the core at a time.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2, Subsection (2), states “The acceptable rates [of reactivity insertion] should be based on the SAR, including inadvertent addition of ramp reactivity at the maximum rate for the most conservative power, rod position, and reactor conditions.”

   Provide a revised TS 3.2.1.2 such that it limits the total reactivity addition rate from withdrawal of control rods (not the reactivity addition rate from withdrawal of an individual safety blade or regulating rod) to the rate analyzed in the SAR, or justify why no change is needed.

10. Proposed TS 3.2.1.3, states “The instrumentation shown in Table 3.1 is operable and capable of providing its intended function.” Table 3.1, “Instrumentation Required for Reactor Operation,” provides a list of protection channels and describes the function as a scram or an interlock preventing rod motion. The information provided in the proposed TS 3.2.1.3, Table 3.1, includes a column for functional description of the scrams and interlocks that are listed. However, the NRC staff finds that while the functional descriptions describe whether each item is a scram channel or interlock, the table does not appear to provide information regarding other functions that the scram channels may have, such as displays and alarms. In addition, TS 3.2.1.3, Table 3.1, does not appear to list other channels that do not have a scram function, but which are required for operation.

    The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2, Subsection (4), states that licensees’ LCOs “should specify all required scram channels and setpoints, the minimum number of channels, other functions performed by the channel [...].” The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2, Subsection (8), states “Technical specifications for non-power reactors should have redundant and accurate power level monitors that cover the range from subcritical source multiplication to above full power level. Not all monitors are required to include scram capability […].” The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2, Subsection (8), also states “Specifications in this section should cover the entire channel, including readout meters and recorders and the protective functions they perform, such as to prevent an LSSS from being exceeded.”

    Provide a revised TS 3.2.1.3, Table 3.1, to list the all of the instrumentation channels (with or without scram capability) required for reactor operations, including whether the channels have readout indications, trending capability, and alarms; provide other proposed TSs that cover this information; or, justify why no changes are needed.

11. Proposed TS 3.2.1.3, Table 3.1, lists two servo control interlocks: "No regulating rod automatic servo if Regulating rod not full out," and "No regulating rod automatic servo if period is less than 30 seconds." The SAR states that interlocks prevent initiation of the regulating rod automatic servo if the regulating rod is not full out or the reactor period is less than 30 seconds. However, the NRC staff finds that while the two servo control interlocks in are listed and described in proposed TS 3.2.1.3, Table 3.1, it is not clear from the proposed TS that the interlocks only prevent initiation of the regulating rod automatic servo, and do not prevent continued operation of the regulating rod automatic servo once it has already been initiated

    The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.2 Subsection (5), states "Required interlocks that inhibit or prevent control rod withdrawal or reactor startup should be specified by a table […]. Interlocks should be specific to the facility and should be based on the SAR."

    Provide a revised TS 3.2.1.3, Table 3.1, to clarify the interlock, or justify why no change is needed.

12. The NRC staff finds that the proposed TSs do not appear to provide any LCO for equipment needed to respond to a loss of coolant accident or for detection of the loss of pool water or heat exchanger integrity.

    The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.3, Subsection (4), states that licensees should establish LCOs for systems that would lead to the detection of leakage or loss of coolant.

    Provide a proposed LCOs for detection of leakage or loss of coolant, or justify why no changes are needed.

13. Proposed TS 3.7.1.2.4, states, "Alarm set points may be adjusted higher with the approval of the Director or one of the Assistant Directors." The NRC staff finds that TS 3.7.1.2.4 appears to allow a change to a radiation system monitoring alarm without a formal review process. Furthermore, the TS would also allow the Director or one of the Assistant Directors to change a value specified in an LCO without NRC review, as provided in 10 CFR 50.59, "Changes, tests, and experiments," which require, in part, that changes to a licensee facility or facility procedures may only be made without an NRC-approved license amendment if they do not involve changes to TSs.

    Provide a revised TS 3.7.1.2.4 such that it would not allow other TSs to be changed without NRC approval, or justify why no other changes are needed.

14. Proposed TS 4.4.2.2 describes the functional test of the emergency operating mode confinement system that would be required by proposed TS 4.4.2.1, and proposed TS 4.5.2.2 describes the operability test of the emergency operating mode ventilation system that would be required by proposed TS 4.5.2.1.

NUREG-1537, Part 1, Chapter 14, Appendix 14.1, and ANSI/ANS-15.1-2007 provide guidance for SRs. The proposed SR TSs 4.4.2.2 and 4.5.2.2 appear to be inconsistent with the construct for SRs, since they appear to detail the procedure that would be used to meet another SR, rather than specifying the SR and an associated interval.

Provide a revised TSs 4.4.2.2 and 4.5.2.2 (and the related subsection TS) to make them consistent with the construct for SRs, or justify why the proposed TSs should remain as written.

15. The proposed TSs 5.1, "Site and Facility Description," 5.2, "Reactor Coolant System Description," and 5.3, "Reactor Fuel and Core Description," each include a description section discussing DFs.

    The requirements for TSs for DFs are established in 10 CFR 50.36(c)(4), "Design features." Additionally, NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 5, and ANSI/ANS-15.1-2007 provide guidance regarding DF TSs. Specifically, ANSI/ANS 15.1 2007 states that the DFs TSs should include a general description of the site and facility, information about the design of the reactor coolant system, a description of the reactor core and fuel and the licensed area.

    a. The NRC staff finds that TSs 5.1, 5.2, and 5.3 provide information in the "Description" section, which is not consistent with the TS format as provided in the guidance in ANSI/ANS-15.1-2007

       Provide a revised TSs 5.1, 5.2, and 5.3 to follow the format of ANSI/ANS-15.-2007, or justify why no change is needed.

    b. The NRC staff finds that TS 5.1 does not appear to include a description of the area that is considered to be under the reactor facility license (Part 50).

    c. Provide a revised TS 5.1 to include a description of the licensed area (in the "Specifications" section), or justify why no change is needed.

16. The proposed TS 5.4, "Fissionable Material Storage Description," provides requirements for fissionable material storage at the RINSC facility. The "Description" portion of proposed TS 5.4 discusses the storage of irradiated fuel. However, the NRC staff finds that while the "Description" portion of proposed TS 5.4 discusses irradiated fuel storage, including the arrays in which such fuel is stored, this information does not appear to be included in the "Specifications" portion of proposed TS 5.4. In addition, cooling of irradiated fuel that is in storage (i.e., how the stored irradiated fuel is cooled) does not appear to be addressed in either the "Description" or "Specifications" portions of proposed TS 5.4

    The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 5, states that TSs for DFs should include descriptions of fuel storage facilities.

    Provide a revised TS 5.4 to include the requirements for the storage and cooling of irradiated fuel (in the "Specifications" section), or justify why no change is needed.

17. The specification in proposed TS 4.3.1.3, states “The primary coolant level shall be verified to be greater than or equal to the Limiting Safety System Setting value prior to the initial start-up each day that the reactor is started up from the shutdown condition.” The basis for TS 4.3.1.3 includes the statement that a float switch monitors the pool level 24 hours per day and 7 days per week and provides a monitored alarm. The basis for TS 4.3.1.3 also discusses the pool autofill feature and the associated equipment. In addition, your previous response to RAI-5.1 (see ADAMS Accession No. ML16202A008) stated that this equipment is used to maintain pool water minimum levels during operation or while in reactor shutdown condition.

    The regulations in 10 CFR 50.36(c)(2) require that LCOs be established for the “lowest functional capability or performance levels of equipment required for safe operation of the facility.” As such, the NRC staff finds that maintaining the water level provides shielding that would otherwise potentially expose occupational workers or the public. As such, the NRC staff considers this equipment should be controlled in the TS.

    Provide a revised TS 4.3.1.3, or justify why no change is needed.

18. The proposed TS 2.2.2, “Limiting Safety System Settings for Forced Convection Mode of Operation,” includes the specifications for thermal power, coolant height, and bulk pool temperature.

    The requirements for LSSS TSs are established in 10 CFR 50.36(c)(1)(ii). Additionally, NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 2.2, and ANSI/ANS-15.1-2007 provide guidance regarding LSSS TSs. Specifically, NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 2.2, states that LSSS TSs should be set to ensure that SLs will not be exceeded, and the LSSS TSs should be based on analysis in the SAR. The 2010 steady state thermal-hydraulic analysis for forced-convective flow in the RINSC reactor (performed by Argonne National Laboratory, ADAMS Accession No. ML16062A376) demonstrates acceptable thermal-hydraulic results given the following assumed steady-state conditions: 125°Fahrenheit primary coolant inlet temperature; 2.4 megawatts thermal (MWt) power; 1580 gallons per minute (gpm) coolant flow rate; and, 23 ft 6.5 in of water above the core. The analysis also states that thermal power level has a measurement uncertainty of +/- 0.2 MWt, and flow rate has a measurement uncertainty of +/- 60 gpm. Proposed TS 2.2.2.1, states “The limiting safety system setting for reactor thermal power shall be 2.3 MW.” Proposed TS 2.2.2.4, states “The limiting safety system setting for the primary coolant flow rate shall be 1560 gpm.” Given the assumed conditions (thermal power and flow rate) for the steady-state thermal hydraulic analysis, and given the measurement uncertainty in those parameters, the LSSSs in proposed TSs 2.2.2.1 and 2.2.2.4 do not appear to be sufficiently conservative.

    Provide a revised TSs 2.2.2.1 and 2.2.2.4 such that the LSSSs are sufficiently conservative, or justify why no such changes are not required.

19. The proposed TS 3.7.1.1, “Required Radiation Monitoring Systems,” describes the radiation monitors that must be operable during reactor operation, during fuel or experiment handling, or when work is being performed on the core. Proposed TS 3.7.1.2, “Radiation Monitoring System Alarm Set Points,” provides the alarm set points for the required radiation monitors.

a. Proposed TS 3.7.1.1.1, states “A minimum of one radiation monitor that is capable of warning personnel of high radiation levels in the confinement gaseous or particulate effluent shall be operating whenever: […].” Proposed TS 3.7.1.1.2, states “If the detector described in specification 3.7.1.1.1 fails during operation, a suitable alternative gaseous or particulate air monitor may be used, or an hourly grab sample analysis may be made in lieu of having a functioning monitor.”

   The NRC staff is not clear if the “one radiation monitor” and the “alternative […] monitor” described in proposed TSs 3.7.1.1.1 and 3.7.1.1.2, respectively, would detect both gaseous and particulate radioactive effluents.

   The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.7.1, Subsection (1), states that radiation monitors should be specified for both radioactive gas and those radioactive particulates that might be airborne in the reactor room.

   Provide a revised TSs 3.7.1.1.1 and 3.7.1.1.2 to clarify that the monitors described in the proposed TSs would detect both gaseous and particulate radioactive effluents, or justify why no change is required.

b. The guidance provided in NUREG-1537, Part 1, Chapter 14, Appendix 14.1, Section 3.7.1, Subsection (1), states that TSs “should list the required radiation monitors, the function each performs […], the approximate location of each, the type of radiation detected, and the alarm or automatic action setting, as analyzed in the SAR.” Proposed TS 3.7.1.1.1, states “A minimum of one radiation monitor that is capable of warning personnel of high radiation levels in the confinement gaseous or particulate effluent shall be operating whenever: […].” Proposed TS 3.7.1.1.3, states “A minimum of one gamma sensitive radiation monitor that is capable of warning personnel of high radiation levels shall be over the pool whenever: […].”

   i. Proposed TS 3.7.1.1.1 does not appear to indicate all functions performed by the effluent monitor (i.e., whether it alarms locally, in the control room, or both, and whether it gives a readout locally and/or in the control room), the approximate location of the effluent monitor, or the type(s) of radiation detected by the effluent monitor. Your previous response to RAI-7.4 (ADAMS Accession No. ML16202A008) provided some of this information, but proposed TS 3.7.1.1.1 does not include the information.

      Provide a revised TS 3.7.1.1.1 to include this information, or justify why no such revisions are required.

   ii. Proposed TS 3.7.1.1.3 does not appear to indicate all functions performed by the pool top monitor (i.e., whether it alarms locally, in the control room, or both, and whether it gives a readout locally and/or in the control room). Your previous response to RAI-7.4 (see ADAMS Accession No. ML16202A008) provided this information, but proposed TS 3.7.1.1.3 does not include the information.

Provide a revised TS 3.7.1.1.3 to include this information, or justify why no such revisions are required.

iii. Proposed TS 3.7.1.2.3, states “The area radiation monitors shall alarm when radiation levels are 2 times normal levels, or greater.” It is not clear which of the monitors required by proposed TS 3.7.1.1 that proposed TS 3.7.1.2.3 is referring to.

Clarify which of the monitor(s) in proposed TS 3.7.1.1 the proposed TS 3.7.1.2.3 is referring to, and either provide a revised TS 3.7.1.2.3 to include this clarification, or justify why the proposed TS 3.7.1.2.3 should remain as written.

20. The specification in proposed TS 4.4.1, states “The conditions required to achieve normal operating mode confinement that are specified in section 3.4.3.1 shall be verified to be met prior to the each day of reactor start-up.”

The NRC staff finds that TS 4.4.1 appears to contain an extraneous “the.”

Provide a revised TS 4.4.1 to remove the extraneous “the,” or justify why no change is needed.