



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
4301 JONES BRIDGE ROAD, BUILDING 42
BETHESDA, MARYLAND 20889-5648
www.usuhs.edu/afrrri



September 17, 2021

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Dear Mohammed Shams,

The Armed Forces Radiobiology Research Institute (AFRRI) TRIGA is currently in a shutdown state pending the review and approval of the license amendment request for the upgrade to the digital instrumentation and control system (EPID L-2020-NFA-0012). In addition, after nearly two decades of service, the only licensed [senior] reactor operator retired in April 2021. Consequently, the facility has neither the capability nor the required personnel to conduct portions of the operating test for an operator licensing exam. Therefore, an exemption to the regulations is required.

The Code of Federal Regulations, Title 10, Part 55.31(a)(5) states that to apply for an operator or senior operator license the applicant shall provide evidence that the applicant, as a trainee, has successfully manipulated the controls of either the facility for which a license is sought or a Plant Reference Simulator (PRS) that meets the requirements of 10 CFR Part 55.46(c). At a minimum, five significant control manipulations must be performed that affect reactivity or power level. 10 CFR Part 50 also requires an operator or senior operator licensed pursuant to Part 55 of this chapter to be present at the controls at all times during the operation of the facility and manipulation of the controls.

Title 10, Part 55.45(b) also requires that operator or senior operator license applicant pass an operating test which will be administered during a plant walkthrough and in either of the following:

- (1) A simulation facility that the Commission has approved for use after application has been made by the facility licensee under §55.46(b);
- (2) A plant-referenced simulator (§55.46(c)); or
- (3) The plant, if approved for use in the administration of the operating test by the Commission under §55.46(b).

Since the AFRRI TRIGA reactor has neither senior licensed operators to monitor manipulations nor a PRS that meets the requirement of 10 CFR Part 55.46(c), AFRRI requests the following exemptions:

(1) An exemption from the requirement in 10 CFR Part 55.31(a)(5) that the applicant for a AFRRI operator license use a PRS or the facility to provide evidence of having successfully manipulated the controls of the facility. In lieu of that requirement, AFRRI requests that the NRC (Commission) accept evidence that the applicant, as a trainee has successfully manipulated the controls at Idaho National Laboratory NRAD TRIGA reactor.

(2) Also due to the same unavailability of licensed operators or a PRS, AFRRI requests an exemption from the requirement in 10 CFR Part 55.45(b) that the operating test be administered at the AFRRI TRIGA and that portions of the operating test that require a senior licensed operator and/or an operating facility be conducted at the NRAD TRIGA.

Both of these requests are made based on 10 CFR Part 55.11, stating that the Commission may, upon application by an interested person, or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 55 as it determines are: (1) authorized by law; (2) will not endanger life or property; and (3) are otherwise in the public interest. The remainder of this request will provide justification, precedence and gap analysis to show that the exemption meets the above requirements.

(1) Authorized by law

Precedence: On 31 March 2016, the Commission demonstrated precedence for granting exemptions to provide evidence that the applicant as a trainee has successfully manipulated the controls at a similar facility to which the desired trainee is being certified. The commission deemed such a request as authorized by law when it granted Vogtle Electric Generating Plant Units 3 and 4 an exemption from the requirement in 10 CFR Part 55.31(a)(5) that operator license applicants must provide evidence that the applicant, as a trainee, has successfully manipulated the controls of either the facility for which a license is sought or a PRS that meets the requirements of 10 CFR Part 55.46(c).

The AFRRI exemption request is similar to the Vogtle exemption request due to the fact that both facilities require exemptions to the Commission's regulations that require:

1. To apply for an operator or senior operator license the applicant shall provide evidence that the applicant, as a trainee, has successfully manipulated the controls of either the facility for which a license is sought or a Plant Reference Simulator (PRS) that meets the requirements of 10 CFR Part 55.46(c).
2. A portion of the operating test, which is part of the operator licensing examination, to be administered in a different facility.

Justification: In the exemption issuance document, Docket Nos. 52-025 and 52-026; NRC-2008-0252, the Commission stated that

”Exemptions are authorized by law where they are not expressly prohibited by statute or regulation. A proposed exemption is implicitly “authorized by law” if all of the conditions listed therein are met (i.e., will not endanger life or property and is otherwise in the public interest) and no other provision prohibits, or otherwise restricts, its application. As discussed in this section of the evaluation, no provisions in law restrict or prohibit an exemption to the requirements concerning control manipulations; the “endanger” and “public interest” factors are addressed later in this evaluation.”

In accordance with 10 CFR Part 55.45(a), the operating test, to the extent applicable, requires the applicant to demonstrate an understanding of and the ability to perform the actions necessary to accomplish a representative sample from among the 13 items listed in Table 1 below. Hence a proposed exemption should be lawful if the applicant can demonstrate the requirements as would be conducted at the plant, a simulator or a PRS. After conducting analysis of research reactors with the similar capabilities, AFRRI has identified Idaho National Laboratory NRAD TRIGA reactor as the only other reactor with a digital instrumentation and control console, reactor control rod drive mechanisms and fuel assemblies similar to the AFRRI TRIGA, that with administrative controls can simulate the 13 required tasks listed in Table 1 below without endangering life or property and is otherwise in the public interest and hence makes the exemption legal.

Conducting required manipulations and operator testing on the NRAD TRIGA in lieu of the AFRRI TRIGA will not endanger life or property because:

1. Both sites instrumentation and controls were recently built and installed by the same original equipment manufacturer (OEM).
2. Both reactors have similar response in all modes except for the AFRRI square wave and pulse modes.
3. Both reactors have similar fuel, cooling systems, and both have only water reflection, hence control rod manipulations will have a similar response.
4. The OEM designed and installed control system with a similar look and feel to both facilities, with most of the hardware and software using identical parts (e.g. the control rod UP and DOWN buttons, the primary operator screen graphics indicating control rod position and reactor power, etc.).
5. Both INL and AFRRI have specialized interlock control systems for the protection of personnel and equipment. AFRRI has the Facility Interlock System, which can prevent reactor operation if interlocks are not satisfied, while INL has an interlock on its reactor room access door which can prevent reactor operation if the door is not shut.

6. Both use TRIGA fuel, therefore the safety limit condition, which is maximum fuel temperature, for both reactors is that same.

7. Neither reactor has a graphite reflector, which is common at many other TRIGA sites, making the system response similar to steady state and transient conditions.

Table 1 – Required Tasks to be Performed during an Operational Exam

10 CFR Part 55.45(a) Task	Facility for Operations Test and Manipulation
(1) Perform pre-startup procedures for the facility, including operating of those controls associated with plant equipment that could affect reactivity.	Similarity 1,3,4 above allow for completion at NRAD TRIGA, but could be performed at AFRRI
(2) Manipulate the console controls as required to operate the facility between shutdown and designated power levels.	Similarity 1,2,3,4,5,6,7 above allow for completion at NRAD
(3) Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.	Similarity 1,4,5 above allow for completion at NRAD TRIGA, but could be performed at AFRRI
(4) Identify the instrumentation systems and the significance of facility instrument readings.	Similarity 1,3,4 above allow for completion at NRAD TRIGA, but could be performed at AFRRI
(5) Observe and safely control the operating behavior characteristics of the facility.	Similarity 1,2,3,4,5,6,7 above allow for completion at NRAD
(6) Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.	Similarity 1,2,3,4,6,7 above allow for completion at NRAD
(7) Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems, and identify the relations of the proper operation of these systems to the operation of the facility.	Performed at AFRRI

(8) Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.	Performed at AFRRI
(9) Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.	Performed at AFRRI
(10) Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.	Performed at AFRRI
(11) Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.	Performed at AFRRI
(12) Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.	Performed at AFRRI
(13) Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.	Performed at AFRRI

AFRRI has evaluated the operations of the Idaho National Laboratory NRAD Reactor and found that it provides adequate conditions for applicants to demonstrate an understanding

and the ability to perform the actions necessary to accomplish a representative sample from among the 13 items prescribed in 10 CFR Part 55.45. The operating tests can be performed without changing any factors that could affect safety to either the personnel or equipment at AFRRI or INL. Further, the conditions under which the applicants are licensed will be as similar as achievable due to the fact that the INL facility is the only facility with a similar console to that of the AFRRI TRIGA. In this regard, the INL NRAD reactor would also be the most appropriate facility to conduct the AFRRI trainee operational examinations.

Gap Mitigation: The major differences between the NRAD TRIGA and the AFRRI TRIGA are:

1. AFRRI is a pulsing reactor with a transient control rod and three standard control rods. INL is not a pulsing reactor and only has three standard control rods. However, the standard control rods are identical at the two sites. AFRRI will implement administrative control through official guidance and continuous training program. Level 1 licensee will maintain authority to grant any operator permission to conduct pulsing until pulsing training has been completed as part of the continuous NRC approved requalification training program.
2. The nuclear instrument cluster (NI) at NRAD TRIGA consists of one NLW1000 and three NMP1000 power range monitors while the NI cluster at AFRRI consists of one each of NLW1000, NMP1000, NP1000, NPP1000, and NFT1000 power range monitors. These modules are for monitoring power via temperature and neutron flux in the reactor. AFRRI has contracted with the OEM to provide training on site for all nuclear instruments and as part of operator training.
3. Part of the scram logic at NRAD TRIGA includes the NMP hi-power scrams in a two-out-of-three logic. The scram logic at AFRRI is one-of-one i.e. any one instrument can scram the reactor. AFRRI's scram procedures will not change depending on which power monitoring instrument is activated, hence any manipulation with scram at NRAD TRIGA will translate directly to the AFRRI reactor.

(2) Will not endanger life or property

The Idaho National Laboratory has been operational under the DoE since 1977. The facility safety analysis and design specifications meet or exceed the requirements of 10 CFR Part 52.157 (Contents of applications; technical information in final safety analysis report). AFRRI trainees will be under instruction of DoE qualified Reactor Operators and Reactor Supervisors for all training and operational licensing manipulations.

(3) Otherwise in the public interest

The AFRRI TRIGA reactor is the only Department of Defense (DoD) research reactor regulated by the NRC for developing countermeasures and solutions to problems arising from combat operations in a post nuclear detonation environment. AFRRI TRIGA has been shut down for over five years as a result of reactor console upgrade and unfortunately in that time has lost

all qualified reactor operators. The continued shutdown or inability to operate of the AFRRI facility degrades DoD force posture and is a threat to national security. Timely return of the AFRRI TRIGA Reactor to service is critical to national defense, and the requested exemption offers the most straightforward path to achieve that goal. These exemptions will permit AFRRI to operate the reactor and bring us into compliance with the staffing and surveillance requirements of the Reactor Technical Specifications.

The AFRRI TRIGA has been nonoperational for over five years. The performances of certain maintenance and surveillance activities require licensed operators. Hence, it is in the public's best interest for this exemption to be approved to facilitate the proper maintenance of critical systems.

Exemption request:

AFRRI is requesting that the Commission evaluate the Idaho National Laboratory NRAD Reactor as a suitable option for trainees to successfully complete the required reactivity manipulations prior to application for a reactor operator license [10 CFR Part 55.31(a)(5)], and then to conduct the operational examinations at NRAD in partial fulfillment of the licensing examination requirements for the AFRRI TRIGA Reactor [10 CFR Part 55.45].

AFRRI requests the Commission issuance of exemption no later than 31 October 2021 in order for AFRRI to meet contractual deadlines associated with training.

Point of contact for this letter is LTC Omololu Makinde at omololu.makinde@usuhs.edu.

I declare under penalty of perjury that the foregoing is true and correct. Executed on:

Date

Mohammad Naeem, MD, FCCP, FACR
Colonel, Medical Corps, US Army
Director AFRRI