



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

February 3, 2020

Dr. David M. Slaughter, President
and Reactor Administrator
Aerotest Operations Inc.
3455 Fostoria Way
San Ramon, CA 94583

SUBJECT: AEROTEST OPERATIONS, INC. – REPORT ON THE REGULATORY AUDIT
CONDUCTED DECEMBER 11, 2019, RE: LICENSE AMENDMENT REQUEST
FOR POSSESSION-ONLY STATUS OF THE AEROTEST RADIOGRAPHY AND
RESEARCH REACTOR (EPID NO. L-2019-LLA-0065)

Dear Dr. Slaughter:

By letter dated March 21, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19084A051), as supplemented by letter dated June 28, 2019 (ADAMS Accession No. ML19184A112), Aerotest Operations, Inc., applied for a license amendment of Facility Operating License No. R-98 for the Aerotest Radiography and Research Reactor (ARRR). The requested licensing action would amend the facility operating license to a possession-only license in support of your decision to permanently cease operation of the ARRR.

Enclosed is a report on the regulatory audit conducted by staff of the U.S. Nuclear Regulatory Commission (NRC) on December 11, 2019, in connection with its review of the application. The audit report does not make any licensing conclusions or findings, but it is part of the administrative record of the NRC staff's review of the application and may provide information supporting the NRC staff's safety evaluation. The audit followed the plan provided by letter dated October 31, 2019 (ADAMS Accession No. ML19255F932), unless otherwise noted in the enclosed report.

If you have any questions regarding the NRC staff's audit, please contact me at 301-415-0893, or by electronic mail at Geoffrey.Wertz@nrc.gov.

Sincerely,

/RA Greg Casto Acting for/

Geoffrey A. Wertz, Project Manager
Non-Power Production and Utilization Facility
Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Docket No. 50-228
License No. R-98

Enclosure:
As stated

Aerotest Operations, Inc.

Docket No. 50-228

cc:

California Energy Commission
1516 Ninth Street, MS-34
Sacramento, CA 95814

Radiologic Health Branch
P.O. Box 997414, MS 7610
Sacramento, CA 95899-7414

Test, Research and Training
Reactor Newsletter
Attention: Ms. Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

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RESEARCH REACTOR (EPID NO. L-2019-LLA-0065) DATED:

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OFFICE OF NUCLEAR REACTOR REGULATION

REGULATORY AUDIT REPORT

REGARDING THE LICENSE AMENDMENT FOR A POSSESSION-ONLY FACILITY LICENSE

FACILITY LICENSE NO. R-98

AEROTEST OPERATIONS, INC

AEROTEST RADIOGRAPHY AND RESEACH REACTOR

DOCKET NO. 50-228

Location: Aerotest Operations, Inc., San Ramon, California

Date: December 11, 2019

Audit Team Members: Geoffrey Wertz (Audit Leader and Technical Reviewer)
Elizabeth Reed (Technical Reviewer)

Licensee Representatives: Dr. David M. Slaughter, President and Reactor Administrator,
Aerotest Operations, Inc.
Ms. Toni Richey, Radiation Safety Officer
Ms. Melinda Krahenbuhl, Radiation Safety Committee Member
(Reed College Facility Director)
Mr. Malcolm McCarthy, Consultant
Mr. Mitch Wilkinson, Facility Manager

Background

By letter dated March 21, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19084A051), as supplemented by letter dated June 28, 2019 (ADAMS Accession No. ML19184A112), Aerotest Operations, Inc., applied for a license amendment of Facility Operating License No. R-98 for the Aerotest Radiography and Research Reactor (ARRR). The requested licensing action would amend the facility operating license to a possession-only license in support of your decision to permanently cease operation of the ARRR.

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Enclosure

Regulatory Bases for the Audit

The purpose of this audit is to determine if the licensee's proposed license amendment request (LAR) to permanently cease reactor facility operations and obtain a possession-only license and associated technical specifications (TSs) meets regulatory requirements and addresses applicable guidance provided in NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors Format and Content," and NUREG-1537, Part 2, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors Standard Review Plan and Acceptance Criteria," Chapter 17, "Decommissioning and Possession-Only License Amendments," Section 17.2, "Possession-Only License Amendments," (ADAMS Accession Nos.: ML042430055 and ML042430048, respectively).

Audit Activities

The following activities were performed during this audit:

1. Entrance Meeting

The NRC staff discussed the goals and objectives of the audit at the entrance meeting, which focused on gaining a better understanding of the storage locations of the NRC Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," licensed materials (TRIGA fuel elements and the Americium-Beryllium startup neutron source) and the proposed changes to the physical security plan (PSP) needed to support a possession-only NRC 10 CFR Part 50 license. The NRC staff stated that an audit report would be issued summarizing the results of the on-site review, as stated in the October 31, 2019, audit letter. Further, the NRC staff indicated that the information gained from the audit review would assist the staff to better focus any requests for additional information (RAIs) needed to support the review.

2. Facility Tour

The licensee provided the NRC staff with a comprehensive facility tour. The NRC staff observed the fuel and source storage locations, the facility boundary and the numerous dedicated work areas and office spaces.

3. Review of the Audit Questions

The NRC staff reviewed the information requested in the attachment to the NRC audit letter dated October 31, 2019 (ADAMS Accession No. ML19255F932). The licensee's responses are summarized below:

NUREG-1537, Part 1, Section 17.2, "Possession-Only License Amendment"

1. The guidance in NUREG-1537, Part 1, Section 17.2.1, states to provide a commitment date to submit the applications for authorization to decommission and for license termination. Do you plan to submit the applications for authorization to decommission and license transfer? Do you have a planned date or time frame?

Licensee response: ARRR staff indicated that they planned to submit an application for authorization to decommission and for license termination within the required 2-year time period (i.e., prior to December 5, 2020, as stated in NRC staff letter dated July 30, 2019 (ADAMS Accession No. ML19193A077)).

2. For a possession-only license, the phrase “in connection with the operation of the reactor,” is currently stated in License Condition (LC) 2.B.(2). Since the application is for a possession-only license, is this phrase consistent? Do you plan to remove it?

Licensee response: ARRR staff indicated that they planned to request the change.

3. LC 2.C.(3) refers to an outdated regulation (10 CFR 2.790(d)). Do you plan to request to change the LC reference to the current regulation, which is 10 CFR 2.390, “Public inspections, exemptions, requests for withholding”?

Licensee response: ARRR staff indicated that they planned to request the change.

4. The LAR states that, “There is no conflict with the new direction and authority concerning the existing SAR (*Aerogel-General Nucleonics Industrial Reactor - Hazards Summary report, AN-1193, September 1964*); thus, changes are not needed or proposed” (ADAMS Accession No. ML19192A162). The NRC staff is not clear as to the applicability of the current Aerotest safety analysis to provide a basis for the proposed TSs, and to provide analyses that demonstrate that the facility can be possessed in a way that protects the health and safety of workers, the public and the environment. More specifically, the NRC staff has the following questions:

- 4.1 Can you provide a description of the proposed fuel storage location, and any proposed limits to the movement of the fuel or its storage locations?

Licensee response: ARRR staff showed the NRC staff the location of the irradiated fuel elements which were stored in the reactor pool in racks located on the pool floor and along the pool wall. NRC staff noted that some fuel elements were also encapsulated inside canisters. The licensee indicated that those fuel elements had been damaged during previous reactor operation. The NRC staff plans to further evaluate these containers.

- 4.2 Can you provide a list or a description of the conditions necessary to maintain the fuel in a safe condition?

Licensee response: ARRR staff considered water quality to be the most important consideration for long term fuel storage. The licensee also indicated that in its letter dated August 14, 2019, which provided a final version (all edits removed) of the proposed TSs (ADAMS Accession No. ML19231A127), that the following conditions would be monitored to maintain the fuel.

- Proposed TS 4.1 provides a requirement that the minimum depth of water above the top of the core structure to be 16 feet and the maximum bulk water temperature to be 130 degrees Fahrenheit and the minimum 40 degrees Fahrenheit.
- Proposed TS 4.2 provides for a limit on the conductivity of the primary coolant of 5 micromhos per centimeter.
- Proposed TS 7.3 provides a requirement that a fission product water monitor be attached to the process water cleanup system and provide high radiation level alarms, from a range of 0.1 to 100 milliroentgen per hour.

- Proposed TS 7.7 provides a requirement for process instrumentation with readout in the control room to provide continuous indication of pool water temperature and conductivity. Alarms to indicate low water flow and low pool water (level).

4.3 Can you provide the results of any safety reviews done to ensure that the possession-only fuel remains in a safe condition?

Licensee response: ARRR staff indicated that the available safety review information was in the safety analysis report (*Aerojet-General Nucleonics Industrial Reactor - Hazards Summary report*, AN-1193, September 1964). The licensee added that the fuel has not been used (irradiated) for 8 to 10 years and planned to consider evaluating the reduction (from decay) in the fission product inventory as a means to simplify the safety review.

4.4 Can you provide a description of any accident scenarios associated with the possession-only fuel in long term storage?

Licensee response: ARRR staff indicated that they considered the fuel handling accident to be the only credible source of radioactive release since the decay period (8 to 10 years) since the fuel was last used (irradiated). As such, the license may consider performing an evaluation to determine a more accurate source term. The licensee indicated that the decay length would most likely allow the fuel to be placed into dry storage. The licensee indicated that the reactor was last operated in calendar year 2010. Furthermore, the licensee identified numerous failed fuel elements and have placed those in specially designed canisters to help prevent any radioactive release.

5. Can you provide the possession-only versions of the Aerotest Operations PSP and emergency preparedness/planning (EP)?

Licensee response: ARRR staff indicated that they would provide updated versions of the PSP and EP.

6. The guidance in NUREG-1537, Part 1, Section 17.2.1.5, states that the licensee should provide a plan for making operational or procedural changes under the possession-only license since 10 CFR 50.59, "Changes, tests and experiments," applies to operating reactors only. Can you provide a plan for making operational or procedural changes under the possession-only license?

Licensee response: ARRR staff indicated that they plan to develop a modified process.

Operator/Certified Fuel Handler Retraining Program

7. The proposed TS 11.3 states, "The fuel handling tool shall remain in a lock cabinet under the cognizance of the Fuel Handling Supervisor [FHS] when not authorized for use." What are the roles and responsibilities of the FHS?

Licensee response: The roles and responsibilities of the FHS are described in the ARRR CHF Training/Requalification Program (enclosure 4).

8. The proposed TS 11.4 states, "Transfer of irradiated fuel in the reactor tanks shall be conducted by a minimum staff of two, a Certified Fuel Handler (CFH) and an additional

person trained in radiation safety.” Provide a CFH eligibility to include the certification and training requirements.

Licensee response: The CHF eligibility certification and training requirements are described in the ARRR CHF Training/Requalification Program (enclosure 4).

9. Provide a plan on how to meet the training program covering fuel-handling operations. The program should include instructions of the following areas:
 - 9.1. Health physics fundamentals and the principles of reactor theory and thermodynamics.
 - 9.2. Design features of fuel-handling and storage activities and conditions, including facility systems and equipment associated with fuel-handling operations, pertinent instrumentation, and control systems.
 - 9.3. Systems to control or mitigate an accident in which the fuel is damaged.
 - 9.4. Administrative, operational, surveillance, emergency, and radiation control, security, and safety procedures concerning fuel handling and storage.

Licensee response: The fuel handling operations training program is described in the ARRR CHF Training/Requalification Program (enclosure 4).

10. The proposed TS 11.5 states, “Not more than one fuel element shall be allowed in the facility which is not in storage.” Please verify that all fuel elements are currently in storage.

Licensee response: ARRR staff indicated that all fuel elements were in storage in racks with a $k_{eff} < 0.8$.

Security Plan

11. How does the PSP comply with the regulations in 10 CFR 73.21, 10 CFR 73.22, and 10 CFR 73.23 as applicable for Safeguards Information; in 10 CFR 73.57 for background checks; in 10 CFR 73.67 for the protection of special nuclear material; and, in 10 CFR 73.71 for Event Notification?

Licensee response: ARRR staff indicated that they will update the security plan to adequately reflect compliance to these regulations and will submit the updated plan.

12. How does the PSP comply with the requirements in the following NRC Orders: EA-06-203 and EA-07-074?

Licensee response: ARRR staff has submitted fingerprints and a request letter for a reviewing official. This will put them in compliance with these orders.

13. The current PSP, Section IV, lists compensatory measures (CMs), but does not discuss their implementation. In order for the NRC staff to close-out the NRC confirmatory action letter, the CM implementation plan needs to be written into the PSP. Can you provide a PSP incorporating the CMs?

Licensee response: ARRR staff intends to incorporate the CMs into the PSP and submit an updated plan.

14. The current PSP does not provide a reference as to the type of material (low-enriched uranium, irradiated/fresh fuel, etc.) that is used at the facility, the quantity of material, and the storage location(s). Can you provide a PSP which provides the type of material that is used at the facility, the quantity of material, and the storage location(s)?

Licensee response: ARRR staff indicated that they will include the details of the type and quantity of the special nuclear material that is in the facility.

Emergency Plan

15. By letter dated June 28, 2019, Aerotest stated that the EP, as well as other site documents, have been updated to reflect the shutdown status, and would be implemented and submitted to the NRC upon approval of their requested changes to the license and TSs. The NRC staff finds that it would be beneficial to the licensee to have the EP reviewed by the NRC prior to implementation; however, it is the licensee's decision to make the changes following the 10 CFR 50.54(q) "Emergency plans," process. The NRC staff wants to ensure that the licensee understands that any changes to the EP made by the licensee in accordance with 10 CFR 50.54(q) will be subject to future NRC inspection.

Licensee response: ARRR staff plans to revise the EP in accordance with the requirements in 10 CFR 50.54(q).

Requests for Additional Information

The audit team discussed the need for RAIs to capture the information on the docket consistent with the requirements in 10 CFR 50.9, "Completeness and accuracy of information," and 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit." An RAI letter will be forthcoming.

Exit Briefing

On December 11, 2019, the audit team held an exit briefing with the licensee representatives listed above. No disagreements were noted by the licensee on during the audit summary.

Deviations from the Audit Plan

No deviations from the audit plan were noted.