January 7, 2013

Ms. Sandra Warren, General Manager
Aerotest Operations, Inc.
3455 Fostoria Way
San Ramon, CA 94583

SUBJECT: AEROTEST OPERATIONS, INC. – NRC NON-ROUTINE INSPECTION REPORT NO. 50-228/2012-206

Dear Ms. Warren:

From December 10 to 13, 2012, the U.S. Nuclear Regulatory Commission (NRC or the Commission) completed an inspection at your Aerotest Radiography and Research Reactor facility (Inspection Report No. 50-228/2012-206). The enclosed report documents the inspection results, which were discussed on December 13, 2012, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (301) 466-4495 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/
Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-228/2012-206
cc w/encl: See next page

cc w/encl:

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

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

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DATE	12/16/2012	12/26/2012	1/7/2013

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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No:	50-228
License No:	R-98
Report No:	50-228/2012-206
Licensee:	Aerotest Operations, Inc.
Facility:	Aerotest Radiography and Research Reactor
Location:	3455 Fostoria Way San Ramon, CA 94583
Dates:	December 10–13, 2012
Inspector:	Craig Bassett
Approved by:	Gregory T. Bowman, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Aerotest Operations, Inc.
Aerotest Radiography and Research Reactor
Report No: 50-228/2012-206

The primary focus of this non-routine, announced inspection was the onsite review and observation of Aerotest Operations, Inc. (the licensee's) fuel handling and containerization activities. The inspection included review of selected aspects of the licensee's safety program, including: (1) organizational structure and staffing, (2) review and audit functions, (3) procedures, (4) radiation protection, and (5) conformance to security plan requirements. The licensee's program was acceptably directed toward the protection of public health and safety and was in compliance with U.S. Nuclear Regulatory Commission requirements.

Fuel Handling and Containerization

- Adequate preparations were made for damaged fuel to be placed into canisters.
- A testing station was developed by the licensee's contractor, which allowed the containerization work to be completed underwater, saving a great deal of personnel dose.
- All the damaged fuel elements were placed in canisters and then transferred to storage in a fuel rack in a timely manner without incident.

Organizational Structure and Staffing

- The licensee's organization and staffing met the requirements specified in the Technical Specifications.

Review and Audit Functions

- The Reactor Safeguards Committee conducted reviews and audits in compliance with the requirements specified in the Technical Specifications.

Procedures

- Facility procedural review, revision, and control satisfied Technical Specifications requirements.

Radiation Protection

- Surveys during work evolutions were completed and documented acceptably to permit evaluation of the radiological conditions present in the facility.
- Notices and postings at the facility met regulatory requirements.
- Personnel dosimetry was being worn and doses were within the regulatory limits.

- Radiation monitoring equipment was maintained and calibrated as required.

- Training was provided covering the topics outlined in Title 10 of the *Code of Federal Regulations* Section 19.12, as required.

Conformance to the Security Plan Requirements

- Security facilities, equipment, and procedures satisfied security plan requirements.

REPORT DETAILS

Summary of Plant Status

Aerotest Operations, Inc. (AO or the licensee) ceased operation of their TRIGA conversion research and test reactor on October 15, 2010. Prior to that time, the reactor had been operated for neutron radiography, to complete surveillance requirements, and for reactor operator training. During this inspection the reactor remained shut down and all the fuel was in storage racks which were located along the wall or at the bottom of the reactor pool. Fuel elements with cracked cladding were placed in canisters.

1. Background Information

In December 2011 the licensee began an inspection of all their fuel elements in an effort to comply with their commitment to the U.S. Nuclear Regulatory Commission (NRC) to inspect all the fuel elements every 5 years. After removing all the elements that they could, the licensee found that there were 27 aluminum clad fuel elements and 11 graphite elements that were stuck in place and could not be removed through core upper grid plate (none of the stainless steel clad elements were found to be stuck). The licensee then used their underwater video camera to conduct an inspection of those fuel elements. The licensee found that, of those elements that remained in the core, four had signs of cracks in the cladding. Previously, in 2007, a fifth aluminum clad fuel element had been removed from service and placed in a storage rack due to cracked cladding.

On January 9, 2012, the licensee notified the NRC of the cracked fuel elements. The licensee submitted a letter documenting the problem the same day. From January 17–18, 2012, the NRC completed an inspection at the Aerotest Radiography and Research Reactor (ARRR) (see NRC Inspection Report No. 50-228/2012-201).

The licensee subsequently made the decision to remove the stuck fuel elements from the core and they hired a contractor, Secured Transportation Services (STS), to assist in the project. STS developed a project plan proposal for removing all the elements and submitted it to the licensee. The proposal was found to be acceptable and preparations for the actual removal work began. The contractor developed reactor work instructions (RWIs) for the project to ensure that all those who worked on the project understood their respective roles. When all the elements had been removed from the core, it was the intention of the licensee to place the fuel elements with cracked cladding in specially designed and fabricated canisters. Before beginning removal of the fuel with damaged cladding, the licensee anticipated that four to five more elements would be found with cracks in the cladding, in addition to the ones already noted. Therefore, a total of ten canisters were ordered and fabricated and a storage rack was designed and fabricated to hold up to twelve canisters in the reactor pool.

During the period of July 16–26, 2012, licensee and contractor personnel were able to remove all the stuck fuel elements from the core and conduct an initial examination of the elements. The licensee then proceeded to examine all the remaining aluminum clad elements and all of the stainless steel clad elements that were stored in the pool. Initially, two elements with cracked cladding were placed into the specially designed

canisters (i.e., “canned”) and placed in the new storage rack. However, after examining all the fuel elements, the licensee determined that there were substantially more fuel elements with cladding problems than had originally been anticipated. The licensee then contracted to have more canisters and a larger storage rack fabricated. At that point the fuel element work was stopped and all the elements were placed in appropriate storage. This was done because the STS personnel had other commitments and could not return until a later date to assist in the canning of the rest of the fuel elements with damaged cladding. During the period when the stuck fuel was being removed from the core, the NRC completed a non-routine inspection at the ARRR (see NRC Inspection Report No. 50-228/2012-204).

On August 10, 2012, the licensee submitted a letter to the NRC documenting the fact that the inspection of the fuel elements at the facility indicated that there were a total of 22 fuel elements with cracks in the cladding. Also, further review of the video documentation of the entire inventory of elements was scheduled to be conducted during the week of September 10, 2012. The NRC conducted another non-routine inspection during that period to review the actual status of the fuel elements (see NRC Inspection Report No. 50-228/2012-205). Plans were made to have STS personnel return to the ARRR facility on December 10, 2012, to complete the containerization process.

During this inspection, the inspector observed as the remaining fuel elements with cladding degradation were placed in the canisters. A lid was then installed on each canister and it was sealed, drained, and then backfilled with helium gas. Finally, the canisters were positioned in a new storage rack at the bottom of the reactor pool.

2. Organizational Structure and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001)

The inspector reviewed the following regarding the licensee’s organization and staffing to ensure that the requirements of Technical Specification (TS) Section 10.0 and TS 12.1 were met:

- Management and staff responsibilities
- Staffing for safe maintenance of the reactor facility
- Aerotest Operations, Inc. organizational structure
- Annual Summary of Changes, Tests, and Experiments at ARRR for the period from July 1, 2010, through June 30, 2011, issued July 28, 2011
- Annual Summary of Changes, Tests, and Experiments at ARRR for the period from July 1, 2011, through June 30, 2012, issued July 31, 2012

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities at the facility had not changed since the previous routine NRC inspection in June 2012 (NRC Inspection Report No. 50-228/2012-202). The inspector noted that the General Manager was the local official in charge of day-to-day operations at the facility. The Reactor Supervisor/Reactor Operations Manager retained direct control over, and overall responsibility for,

management of the reactor as specified in the TS. The General Manager and the Reactor Supervisor reported to the President, Aerotest Operations, Inc.

Through review of records and discussions with licensee personnel, the inspector determined that staffing at the facility had been reduced because the reactor was no longer in operation. During the fuel containerization work, staffing was sufficient for the tasks performed and was augmented by two contractor personnel to facilitate timely completion of the project.

c. Conclusion

The licensee's organization and staffing met the requirements specified in the TS. During the containerization project, licensee staff was augmented by two contractor personnel and staffing was sufficient for the tasks performed.

2. Review and Audit Functions

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in the requirements of TS 12.1.3 were being completed:

- Reactor Safeguards Committee (RSC) meeting minutes for the most recent meetings held on November 22, 2011, July 11, 2012, and November 6, 2012
- TS-defined duties of the RSC, including the review and audit functions
- Section I of the ARRR Procedures Manual, "Administrative Procedures," Procedure Change Notice (PCN) No. 2, RSC approval dated June 28, 1990, and last reviewed May 16, 2011

b. Observations and Findings

Review and Audit Functions

The inspector reviewed the RSC meeting minutes from November 2011 through the present. The minutes showed that the RSC met annually as required and considered the types of topics outlined by the TS. An additional meeting had been held in July to discuss the fuel containerization project. The inspector determined that the review functions required by the TS were being completed by the RSC. Through records review the inspector noted that the RSC membership satisfied the TS requirements and RSC charter stipulations.

The inspector noted that the chairman of the RSC had completed an annual unannounced audit of various aspects of the reactor facility operations and programs as stipulated in the TS. The most recent audit was completed on August 20, 2012. The audits, as well as the resulting findings, were appropriate and the licensee's response and corrective actions, if needed, were acceptable.

c. Conclusion

Audits and reviews were being conducted acceptably by the RSC in accordance with the requirements specified in the TS.

3. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the requirements of TS Section 12 were met concerning written procedures:

- Procedure approval sheets
- PCN forms
- Section I of the ARRR Procedures Manual, "Administrative Procedures," PCN No. 2, RSC approval dated June 28, 1990, and last reviewed May 16, 2011, which detailed the process used to review, revise, and approve all facility procedures
- Section IV of the ARRR Procedures Manual, "Critical Assembly and Power Calibration Procedures," PCN No. 9, RSC approval dated November 6, 2012
- AO RWI No. 101, "Aerotest – Canister Handling, Loading, Drying, and Conditioning," Rev. 1, dated November 28, 2012

b. Observations and Findings

The inspector verified that procedures had been developed and were available for fuel handling operations and were being implemented at the facility as required. Procedures were being reviewed biennially and revised as needed. The last review had been completed on May 16, 2011. Procedure approval sheets were maintained and PCN forms were completed as required when changes were made. The inspector also noted that, when procedures were revised, the revisions were presented to the RSC for review and approval. The last procedure revision was reviewed and approved by the RSC during the most recent meeting of the committee on November 6, 2012.

During a previous inspection, it was noted that the contractor who had been hired to help with the damaged fuel containerization had also written various RWIs for the project. These instructions were not considered facility procedures, and thus were not required to be reviewed and approved by the RSC. Nevertheless, the inspector verified that the instructions had been reviewed by the RSC chairman and that he did not have any concerns about their use at the facility. The inspector reviewed AO RWI No. 101, "Aerotest – Canister Handling, Loading, Drying, and Conditioning." It was noted that this instruction had been revised and changed by the contractor because they had developed a different method for "canning" the fuel. The newly revised instruction had been reviewed and approved by the facility General Manager.

c. Conclusion

Facility procedural review, revision, and control satisfied TS requirements.

4. Fuel Handling and Containerization Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify that fuel handling was being conducted as required by TS 5.1.1, TS Section 11, and by procedure:

- Current fuel element storage location map
- Various current records and data sheets related to fuel movement
- Listing of the cracked fuel elements, including the location of each
- Schematics of the canister draining, drying, and inert gas fill rig/setup
- Fuel inspection and examination records, including video of fuel inspections
- Detailed drawings of the base ring and testing station to be used during the fuel element "canning"/containerization process
- AO RWI No. 101, "Aerotest – Canister Handling, Loading, Drying, and Conditioning," Rev. 1, dated November 28, 2012
- AO RWI No. 102, "Aerotest – Fuel Handling Procedure," Rev. 0, dated June 25, 2012
- Project Plan Aero-PP-01, "Aerotest Operations Fuel Removal, Inspection, and Canning," Rev. 0, dated June 25, 2012

In addition, as noted above, the inspector observed the planning, discussions, and actions of licensee and contractor personnel as the remaining fuel elements with damaged cladding were sealed in canisters and the canisters positioned in the new storage rack in the reactor pool.

b. Observations and Findings

(1) Preparations for Fuel Containerization

As discussed above, after the licensee found that numerous fuel elements had cracks or other problems with their cladding, the licensee decided to place them all in canisters to provide for safe storage. STS originally designed and fabricated enough specialized canisters for eight regular and two instrumented fuel elements. Two regular elements had been placed in the canisters in July (see NRC Inspection Report No. 50-228/2012-204). Because of the number of damaged fuel elements found, STS was asked to fabricate more canisters and return to help with the containerization process. More canisters were subsequently fabricated, a new storage rack was completed, and the containerization or "canning" operation for the remainder of the elements with cracked cladding

occurred during the week of December 10, 2012. As noted above, STS contractor personnel were on site to assist the licensee.

In order to provide the maximum shielding possible for those performing the "canning" work, the licensee and contractor personnel developed a testing station to be used in the containerization process. The testing station allowed work to be performed on a canister loaded with fuel (i.e., attaching the lid to the canister with bolts and then sealing, backfilling, and testing the sealed container) under four feet of water. During the previous "canning" operation in July, once a canister was loaded with an element, it had to be brought to the surface of the pool so the lid could be installed. One person would then have to hold the canister and lid while another person tightened the bolts in the lid with a torque wrench. This resulted in a moderate dose to both individuals involved. The new design for a canister and lid working area using water as shielding resulted in significant dose reduction.

(2) Use of the Testing Station/Canister Loading and Testing Apparatus

With the testing station securely installed, the licensee then fastened an underwater camera in place to record the operations that would take place below the surface. After loading an element in a submerged canister, the container was then raised to within approximately three and one half feet of the pool surface and lowered into place in the testing station. The lid, with extension fill and drain tubes attached to the vent and drain valves, was then lowered onto the canister and the lid bolts were tightened with a torque wrench to the appropriate predetermined value by using an extension with a hex head attached. With the lid installed, the extension fill and drain tubes were attached to the vacuum and pressurization system. It was then possible to drain/dewater the canister using pressurized gas, draw a vacuum on the canister with a vacuum pump, and then backfill it with helium gas. Once this was completed and verified, the canister and enclosed fuel element were removed from the testing station, weighed, and placed in a designated storage location in the new storage rack.

The inspector observed as each of the elements with damaged cladding was placed into a canister and the canister was closed, dried, tested, and backfilled with the cover gas. The canisters were then placed into pre-designated locations in the new storage rack on the reactor pool floor.

c. Conclusion

Adequate preparations were made for the damaged fuel to be placed into canisters. A testing station was developed by the contractor, which allowed the containerization work to be completed underwater, resulting in a reduction in dose to workers. All the damaged fuel elements were placed in canisters and then transferred to storage in a fuel rack without incident.

3. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 and the requirements in TS 6.2, TS Section 7.0, and TS 12.1.2:

- Special Work Permits (SWPs) 2012-01 through 2012-03
- Radiological signs and posting at the entrances to controlled or restricted areas
- Calibration records for the electronic dosimeters provided by the contractor
- Radiation protection surveillance and survey data for the defueling project
- Section VI of the ARRR Procedures Manual, "Radiological Safety Procedures," PCN No. 3, RSC approval dated April 29, 1996
- Section VIII of the ARRR Procedures Manual, "Maintenance Procedures," PCN No. 2, RSC approval dated January 14, 1993
- "ALARA [As Low as Reasonably Achievable] and Radiation Protection Program for Aerotest Operations, Inc.," updated August 14, 2004

The inspector also observed the use of dosimetry and radiation monitoring equipment during the inspection.

b. Observations and Findings

(1) Surveys

Appropriate radiation surveys were conducted during all phases of the containerization project. The survey results indicated that fuel "canning" activities were being conducted in accordance with applicable procedures. The results of the surveys were documented on the applicable forms and continually evaluated as required. Surveys in the area where people were working directly on the "canning" activities (i.e., at pool side) indicated a general area radiation level of less than one millirem per hour during all aspects of the operation (i.e., lifting the loaded canisters into position on the testing station and working on the draining and conditioning of the canisters).

The inspector noted that licensee and contractor personnel were using the appropriate monitoring equipment during the various work evolutions. Those directly involved in the "canning" monitored themselves after handling the "canning" equipment or items that might have been contaminated.

(2) Postings and Notices

During tours of the facility, the inspector observed that caution signs, postings, and controls in the restricted or controlled areas were acceptable for hazards involving radiation, high radiation, and contamination, and were posted as required by 10 CFR Part 20, Subpart J. Radiological signs were typically posted at the entrances to controlled areas.

Copies of current notices to workers were posted in various areas in the facility including the hallway in the reactor bay outside the control room. Other postings also characterized the industrial hygiene hazards that were present in the areas. The inspector noted that the copies of NRC Form 3, "Notice to Employees," posted at the facility as required by 10 CFR 19.11, were the current version.

(3) Dosimetry

The inspector determined that the licensee used thermoluminescent dosimeters (TLDs) for whole body monitoring of beta and gamma radiation exposure (with an additional component to measure neutron radiation). The licensee also used TLD finger rings for extremity monitoring. The dosimetry was supplied and processed by Radiation Detection Company, a company that was a National Voluntary Laboratory Accreditation Program accredited vendor. The licensee also issued dosimeters and finger rings to contractor personnel to be used for the job and issued pocket ion chambers each day to track daily exposure.

STS also provided electronic dosimeters for everyone to use during the project. Similar to the pocket ion chambers issued by the licensee, the electronic dosimeters were also used to track daily exposure. During the entire project, the highest dose received by any one individual was approximately 5 millirem.

(4) Radiation Monitoring Equipment

During the inspection the inspector determined that licensee survey meters were appropriately calibrated. The inspector noted that the calibration of portable instruments was being verified quarterly as required by procedure.

(5) Training

During a previous inspection, the inspector verified that the training given to contractor personnel, including training on radiation protection practices, satisfied NRC requirements. Contractor personnel did not require any further training for the work performed during this period. The inspector had also received training concerning the SWP issued for the fuel element inspection and "canning" project. The training provided

satisfied the requirements and covered the topics outlined in 10 CFR 19.12.

(7) Radiation Work Permit Program

SWPs were required to be prepared for special operations typically performed by non-Aerotest maintenance and other support personnel who were required to work in radiation areas. The inspector noted that SWPs had been written and issued for the contractor personnel, as well as for the inspector. The SWPs had been prepared and implemented in accordance with the requirements specified in the licensee's radiological safety procedures. The controls and safety precautions specified were appropriate for the work conducted under the SWP.

c. Conclusion

The inspector determined that the radiation protection and ALARA programs, as implemented by the licensee, satisfied regulatory requirements because: (1) surveys and associated checks were completed and documented acceptably to permit evaluation of the radiation hazards present, (2) postings met regulatory requirements, (3) personnel dosimetry was being worn as required, (4) radiation survey and monitoring equipment were being maintained and calibrated as required, and (5) radiation protection training had been conducted relative to the fuel element containerization work that was done.

4. Conformance to Security Plan Requirements

a. Inspection Scope (IPs 81401, 81402, 81431, 81810)

The inspector reviewed the following to verify that fuel containerization activities were conducted in compliance with TS 3.2 and the licensee's NRC-approved physical security plan (PSP), "Aerotest Radiography and Research Reactor Security Plan," last revised January 7, 2005:

- Access controls currently in effect
- Alarm checklist forms for 2012
- Emergency detection devices and physical barriers
- "Emergency Plan for the Aerotest Radiography and Research Reactor," last revised January 14, 2005, and last reviewed May 16, 2011
- Section III of the ARRR Procedures Manual, "General Emergency Procedures," PCN No. 4, RSC approval dated January 28, 2005
- Section V of the ARRR Procedures Manual, "Security Procedures," PCN No. 3, RSC approval dated February 11, 2005

b. Observations and Findings

The inspector previously conducted an inspection of the PSP in June 2012 (see NRC transmittal letter for Inspection Report No. 50-228/2012-203). During that

inspection the inspector verified that the licensee was maintaining adequate security and control over the facility.

During this inspection the inspector verified that the physical protection system remained in place and was as stipulated in the PSP. The system was being maintained and tested as required by procedure. The inspector verified that the required control continued to be maintained over access to the facility, the reactor pool, and over fuel handling equipment.

c. Conclusion

Security facilities, equipment, and procedures satisfied PSP requirements.

5. Follow-up on Previously Identified Issues

a. Inspection Scope

The inspector reviewed the licensee's actions taken in response to previously identified items in various NRC inspection reports, including four previously opened inspector follow-up items (IFIs).

b. Observation and Findings

(1) IFI 50-228/2012-201-02 - Follow-up on the issue of cracks in the fuel elements.

During a previous inspection, various factors that may have led to the fuel elements developing cracks in the cladding were reviewed. These included reviews of operations, maintenance, and surveillance records, and fuel element history records. At that time the licensee was unable to conclusively determine a probable cause for the cracks in the fuel. The NRC indicated that this issue would continue to be reviewed, to include a review of the videos produced by the licensee of the cracks and the condition of the stuck fuel elements.

The inspector continued to evaluate IFI 50-228/2012-201-02 during this inspection. Previous inspections had been conducted to review this issue, including inspections in July and September 2012 which involved observing the removal of the stuck fuel elements from the core and reviewing the videos of those elements. It was noted that the licensee had committed to conduct a root cause analysis of the problem and IFI 50-228/2012-205-01 was opened to follow the completion of that analysis. Because of the prior inspections that had been completed and the commitment by the licensee to conduct a thorough analysis, IFI 50-228/2012-201-02 is closed. Review of the licensee's causal analysis will be tracked under IFI 50-228/2012-205-01.

(2) IFI 50-228/2012-204-01 - Review the licensee's actions to ensure that all the cracked fuel elements are placed in canisters.

As noted above, during this inspection all the elements with cracked or damaged cladding were successfully placed in canisters and no issues of significance were identified. As such, IFI 50-228/2012-204-01 is closed.

(3) IFI 50-228/2012-204-03 - Review the licensee's 10 CFR 50.59 evaluation and review of the proposed new mechanism for attaching the upper grid plate to support structure.

During a previous inspection, the process of removing the stuck fuel elements from the core was reviewed. One of the obstacles encountered by the licensee was raising the upper grid plate to allow the elements to be removed from underneath. When the licensee tried to loosen the four bolts holding the upper grid plate to the core support structure, three bolts would not turn. Eventually the three bolts snapped off in place, while the fourth bolt was loosened and unscrewed about two inches. In order to reattach the upper grid plate to the core support structure in the future, several methods were discussed. STS contractor personnel indicated that they could develop a clamping mechanism that could be used instead of the bolts. This would eliminate the necessity of redrilling the upper grid plate and drilling and tapping the core support structure. Because this would be a change to the current structure, the licensee was aware that they would need to perform a 10 CFR 50.59 evaluation and review of the proposed new attachment mechanism.

During this inspection the inspector reviewed this issue. It was noted that STS had developed a clamping device for the upper grid plate and that they were in the process of conducting and documenting a 10 CFR 50.59 evaluation to determine if NRC approval would be required prior to installation. Therefore, this issue remains open.

(4) IFI 50-228/2012-205-01 - Review the licensee's actions to complete a root cause or fault tree analysis concerning the fuel element cracked cladding problem.

During a previous inspection, the licensee indicated that they were planning to conduct a root cause or fault tree analysis concerning what might have caused the cladding of the various fuel elements to crack.

During this inspection the inspector reviewed this issue. It was noted that the licensee had made the decision to postpone completion of a root cause analysis of the cladding degradation until after all the elements with damaged cladding were placed in canisters and stored properly. Since this activity was only just completed during this inspection, this issue remains open.

c. Conclusion

Four inspector follow-up items were reviewed and two were closed.

6. Exit Interview

The inspection scope and results were summarized on December 13, 2012, with members of licensee management. The inspector described the areas inspected and discussed the inspection findings. Proprietary information was reviewed during the inspection; however, no material is included in this report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

C. Bauman	Research and Development Manager
A. Meren	Reactor Supervisor and Reactor Operations Manager
T. Richey	Neutron Radiography Manager
S. Warren	General Manager and Radiological Safety Officer
M. Wilkinson	Quality Assurance Manager

Other Personnel

R. Boyd	Vice President, Secured Transportation Services
B. Williams	President, Secured Transportation Services

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
IP 81401	Plans, Procedures, and Reviews
IP 81402	Reports of Safeguards Events
IP 81431	Fixed Site Physical Protection of Special Nuclear Material of Low Strategic Significance
IP 81810	Protection of Safeguards Information

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-228/2012-201-02	IFI	Follow-up on the issue of cracks in the fuel elements.
50-228/2012-204-01	IFI	Review the licensee's actions to ensure that all the cracked fuel elements are placed in canisters.

Discussed

50-228/2012-201-01	URI	Operating the reactor with possible defective fuel was identified as a potential TS violation.
50-228/2012-204-02	URI	Review the issue of fuel verification at the Aerotest facility.
50-228/2012-204-03	IFI	Review the licensee's 10 CFR 50.59 evaluation and review of the proposed new mechanism for attaching the upper grid plate to support structure.
50-228/2012-205-01	IFI	Review the licensee's actions to complete a Root Cause or fault tree analysis concerning the fuel element cracked cladding problem.

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Documents Access and Management System
ALARA	As Low as Reasonably Achievable
AO	Aerotest Operations
ARRR	Aerotest Radiography and Research Reactor
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
PCN	Procedure Change Notice
PSP	Physical Security Plan
RSC	Reactor Safeguards Committee
RWI	Reactor Work Instruction
STS	Secured Transportation Services
SWP	Special Work Permit
TLD	Thermoluminescent Dosimeter
TS	Technical Specification