



INSPECTOR NOTES COVER SHEET

Licensee/Certificate Holder (name and address)	Massachusetts Institute of Technology (MIT) Nuclear Reactor Laboratory (NRL) 138 Albany Street Cambridge, MA 02139
Licensee/Certificate Holder contact	Edward Lau
Docket No.	71-0164
Inspection Report No.	71-0164/2014-201
Inspection Date(s)	July 1, 7 and 8, 2014
Inspection Location(s)	Cambridge, MA
Inspectors/Observers	Robert Temps Earl Love
Summary of Findings and Actions	The NRC determined that corrective actions described in a February 21, 2014, letter from MIT NRL were implemented adequately. MIT NRL's revised operating procedures for use of the BEA Research Reactor package were determined to be in conformance with the Safety Analysis Report's Chapter 7 package operations requirements. Package loading and leak testing activities were observed and determined to be conducted in accordance with the revised procedures. Overall, no significant safety concerns were identified as a result of the inspection.
Lead Inspector Signature/Date	Robert Temps  For Rob Temps 15 Aug 2014
Inspector Notes Approval Acting Branch Chief Signature/Date	Stephen Koenick  15 Aug 2014

Inspection Background

On January 24, 2014, the NRC Division of Spent Fuel Storage and Transportation (SFST) issued a letter (ref. ML14016A317) to MIT Nuclear Reactor Laboratory (NRL) that identified an apparent violation of NRC regulations identified during the conduct of an NRC Office of Investigations (OI) investigation conducted in 2012 and 2013. MIT NRL responded to the apparent violation by letter dated February 21, 2014 (ref. ML14069A091). In that letter, MIT NRL described the reason for the apparent violation, contributing factors, and corrective actions taken as well as those planned. The NRC responded by letter dated May 15, 2014 (ref. ML14127A030). The letter contained a Notice of Violation (NOV) that cited MIT NRL with two Severity Level IV Violations

The MIT NRL holds NRC Quality Assurance Program (QAP) Approval 71-0164.

Inspection Purpose

The purpose of the inspection was to:

- Verify and assess the adequacy of corrective actions taken by MIT in their response letter dated February 21, 2014.
- Verify that MIT NRL's revised procedures for operation of the BEA Research Reactor (BRR) package (cask) fully conformed to Chapter 7 of the BRR Safety Analysis Report (SAR) regarding package operations.
- Observe fuel loading and pre-shipment activities for a planned shipment of fuel to an off-site location.

Review of MIT NRL Corrective Actions

As noted above, the NRC issued an NOV to MIT NRL in a letter dated May 15, 2014. A response was not required based on the information provided to the NRC in MIT NRL's February 21, 2014 letter. The two violations cited involved:

1. A non-compliance with a condition in NRC Certificate of Compliance (CoC) No. 9341 in that the package did not conform to the CoC drawing. Specifically, for a shipment made in December 2011, MIT NRL improperly substituted an O-ring of a type that was not specified in the CoC-referenced drawing.
2. MIT NRL did not prepare the package for shipment in accordance with Chapter 7 of the application (SAR) as required by Condition 6(a) of the package CoC.

The team determined that MIT NRL's corrective action system was appropriately implemented in addressing the two examples cited in the NOV. Corrective actions included:

- Employee safety culture training with particular focus on procedure compliance and accountability.

- Revision to the BRR package SAR Chapter 7, Section 7.1 for package loading and pre-shipment drying and leak test activities.
- Revision to MIT procedures PM 3.3.4.1, "Fuel Shipping Supervisory Checklist" and PM 3.3.4.4, "Fuel Shipping – Dry & Leak Test" to address availability of BRR package documents and replacement/spare parts, and to align with leak testing steps listed in the revised SAR, respectively (discussed further in the following Section).

Overall, the team verified through review of records and observations that the corrective actions described in MIT NRL's response to the NOV were adequately implemented.

Review of MIT NRL's BRR Package Operation Procedures

As noted above, the NRC identified (during the OI investigation) that the operating procedures that MIT NRL had developed for package loading and leak testing activities were not in compliance with the BRR SAR Chapter 7.0--specifically, Section 7.1 of the SAR, "Procedures for Loading the Package." The BRR CoC Condition 6(a) requires that the package be prepared and operated in accordance with the SAR Chapter 7 requirements.

The team reviewed MIT NRL's revised procedures for package loading and leak testing. These activities were addressed through several MIT NRL procedures. The team reviewed the procedures against the BRR SAR Section 7.1 requirements and determined that overall, the newly revised MIT NRL procedures complied with the SAR. One exception was noted with regard to the procedure for leak testing the package in that the transition from SAR Section 7.1 to the SAR Sections 8.2.2.2, 8.2.2.3 and 8.2.2.4, that accomplish the three required leak tests, was not in verbatim compliance with the SAR sequencing. The team's observation was discussed with MIT NRL personnel during the inspection. MIT NRL explained their reason for the misinterpretation of the test sequencing and the procedure was subsequently revised. The team reviewed the revised procedure and determined that it was in full compliance with the SAR requirements.

Package Loading Observations

On July 7, 2014, the team observed cask vacuum drying and helium leak testing of a loaded BRR shipping cask that was being prepared for off-site shipment. The team verified that procedure PM 3.3.4.4, "BRR Cask Vacuum Dry and Leak Test" had been revised (based on an observation discussed in the previous section) and that it now contained all steps in verbatim compliance with the BRR SAR, Revision 7, dated March 2014, section 7.1.2.1 "Wet Loading" and applicable sections of 8.2.2 "Maintenance/Periodic Leak Rate Tests."

Prior to the inspection, certain procedural sequences such as cask loading, replacement of the main containment O-ring seal, installation of the cask closure lid, and cask drying had been completed by MIT NRL personnel. During the inspection, the team observed additional activities such as replacement of drain, vent and test port sealing washers that were supplied by the package CoC holder (Areva Federal Services LLC) and procured under their NRC-approved QAP. Correct part numbers (NAS1523C-10N and 6N) of new (unused) sealing washers were installed on their respective port plugs. The team observed that visual examinations for damage and contamination of each sealing surface were performed, with no deficiencies noted. The team observed the performance of cask vacuum drying and verified that the SAR requirement of pressure maintained less than 3 torr for a minimum 30 minutes was met. The team also observed the helium leak testing process and verified that the leak testing met the acceptance

leak rate criteria of less than or equal to 1.0×10^{-7} reference cubic centimeters per second air as required by procedure PM 3.3.4.4 and the SAR. Measuring and test equipment used to perform vacuum drying and leakage tests (i.e., pressure gauges, helium leak standard, torque wrenches) were controlled and calibrated. In addition, the leak test was adequately performed by a U.S. Department of Energy Idaho National Laboratory examiner. The team reviewed the examiners Level III certificate and noted acceptable qualifications to ASNT-TC-1A. Overall, no significant safety concerns were identified with MIT NRL's loading and operation of the BRR package for the off-site shipment.



SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. CERTIFICATE/QUALITY ASSURANCE PROGRAM (QAP) HOLDER MIT Nuclear Reactor Laboratory 138 Albany Street Cambridge, MA 02139		2. NRC REGIONAL OFFICE Headquarters U. S. Nuclear Regulatory Commission Mail Stop 3WEN 14C-28 Washington, DC 20555-0001	
REPORT NUMBER(S) 71-0164 2014-201			
3. CERTIFICATE/QAP DOCKET NUMBER(S) QAP 71-0164	4. INSPECTION LOCATION Cambridge, MA	5. DATE(S) OF INSPECTION July 1, 7, and 8, 2014	

CERTIFICATE/QUALITY ASSURANCE PROGRAM HOLDER:

The inspection was an examination of the activities conducted under your QAP as they relate to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your QAP Approval and/or Certificate(s) of Compliance. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows:

- ☒ 1. Based on the inspection findings, no violations were identified.
- ☐ 2. Previous violation(s) closed.
- ☐ 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, to exercise discretion, were satisfied.

_____ Non-cited violation(s) was/were discussed involving the following requirement(s) and Corrective Action(s):

- ☐ 4. During this inspection, certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited in accordance with NRC Enforcement Policy. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11.
(Violations and Corrective Actions)

Statement of Corrective Actions

I hereby state that, within 30 days, the actions described by me to the Inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

TITLE	PRINTED NAME	SIGNATURE	DATE
CERTIFICATE/QAP REPRESENTATIVE	Edward Lau		07/17/2014
NRC INSPECTOR	Robert Temp		7/17/14
BRANCH CHIEF	Stephen Koenick		7/22/14