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

May 27, 2015

Dr. Thomas H. Newton, Jr.
Director of Reactor Operations
Massachusetts Institute of Technology
MITNRL-NW 12
138 Albany Street
Cambridge, MA 02139

SUBJECT: MASSACHUSETTS INSTITUTE OF TECHNOLOGY – PLAN FOR AUDIT RELATED TO APPLICABILITY OF FUKUSHIMA LESSONS LEARNED TO RESEARCH AND TEST REACTORS

Dear Dr. Newton:

The purpose of this letter is to provide you the details of an audit that the U.S. Nuclear Regulatory Commission (NRC) is conducting of your facility to support its evaluation of applicability of Fukushima lessons learned to research and test reactors. The NRC staff's preliminary assessment for your facility, as well as other research and test reactors, is discussed in a paper dated March 2, 2015, "Draft White Paper Applicability of Fukushima Lessons Learned to Facilities other than Operating Power Reactors." The draft white paper can be found in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15042A367.

As discussed in the draft white paper, the NRC staff recognizes that the Massachusetts Institute of Technology (MIT) research reactor is a tank type reactor. Because of its low power, natural convection flow of reactor coolant is sufficient to remove decay heat from the reactor and prevent bulk boiling, even in the event of a loss of all electrical power and active decay heat removal systems. Therefore, there is not a near-term need to replenish the water around the reactor fuel lost by evaporation. However, the staff is reviewing the MIT reactor's ability to address scenarios where extreme external events could possibly result in loss of coolant inventory that could cause inadequate decay heat removal and fuel damage.

The enclosure to this document provides the detail of the NRC staff's plan to audit your facility. At this time the NRC staff does not envision the need to visit your facility, but may request documents from you to support the audit. The NRC staff plans to document the result of its audit in an audit report and subsequent staff assessment.

Should you have any questions concerning this audit, please contact Mr. Patrick Boyle at (301) 415-3936 or by electronic mail at Patrick.Boyle@nrc.gov.

Sincerely,

Alexander Adams, Jr., Chief
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No.: 50-020

License No.: R-37

Enclosure:
Audit Plan for Massachusetts Institute
of Technology Research Reactor
Associated with Evaluation of Applicability
of Fukushima Lessons Learned

cc: See next page

cc:

City Manager
City Hall
Cambridge, MA 02139

Department of Environmental Protection
One Winter Street
Boston, MA 02108

Mr. Robert Gallagher, Acting Director
Radiation Control Program
Department of Public Health
Schrafft Center, Suite 1M2A
529 Main Street
Charlestown, MA 02129

Nuclear Preparedness Manager
Massachusetts Emergency Management Agency
400 Worcester Road
Framingham, MA 01702-5399

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

Audit Plan for Massachusetts Institute of Technology Research Reactor Associated with Evaluation of Applicability of Fukushima Lessons Learned

BACKGROUND AND AUDIT BASIS

This audit plan was developed in accordance with U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195) to support the NRC staff's assessment of applicability of Fukushima lessons learned to the 6 Megawatt thermal (MW_t) Massachusetts Institute of Technology research reactor (MITR)

The staff identified the need for additional information for three high-power research and test reactors (RTRs) (including the MITR) in a preliminary assessment dated March 2, 2015, "Draft White Paper Applicability of Fukushima Lessons Learned to Facilities other than Operating Power Reactors." The draft white paper can be found in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15042A367. In accordance with LIC-111, one of the reasons for performing an audit is to, "establish an understanding of potential concerns to inform future regulatory actions or decisions, such as generic communications."

As discussed in the draft white paper, for the three reactors (including the MITR), NRC staff will perform additional assessments regarding the reactors' capabilities to prevent or mitigate loss of coolant accidents (LOCAs) as a result of beyond-design-basis natural phenomena (e.g., seismic events). For these RTRs, the early loss of reactor coolant can result in failure of the fuel cladding and subsequent radiological release unless reactor coolant makeup can be provided from installed facility equipment or from portable external sources.

The MITR is a tank type reactor. Because of its low power, natural convection flow of reactor coolant is sufficient to remove decay heat from this reactor and prevent bulk boiling, even in the event of a loss of all electrical power and active decay heat removal systems. Therefore, there is no near-term need to replenish the water around the reactor fuel lost by evaporation. However, if the initiating external event also causes (or occurs concurrently with) the failure of the core tank, then the resulting loss of coolant inventory could result in inadequate decay heat removal and fuel damage.

AUDIT SCOPE

The audit scope for the MITR is to collect additional information regarding the seismic capabilities of the reactor to assess the level of margin inherent in the design to withstand a beyond design basis earthquake and to preclude a seismically-induced LOCA from a beyond-design-basis earthquake. The staff will also collect additional information regarding the capabilities of this reactor to prevent or mitigate LOCAs as a result of other beyond-design-basis natural phenomena (e.g., tornado born missiles).

Enclosure

NRC AUDIT TEAM

Title	Team Member
Team Lead	John Adams
Japan Lessons-Learned Division (JLD) Project Manager	Joe Sebrosky
Seismic Technical Support	Yong Li
Structural Technical Support	Amitava Ghosh
JLD Mitigating Strategies Technical Support (as required)	On Yee
RTR Technical Support	Michael Balazik
RTR Project Manager	Patrick Boyle

LOGISTICS

For the MITR, the staff believes that a desk audit of calculations, licensing material regarding the design of the reactor, and drawings will be able to address the staff information needs.

DELIVERABLES

An audit report or summary will be issued by December 31, 2015, to document the results of the audit. The staff intends to use the audit report to support a safety assessment for the three RTRs by first quarter calendar year 2016.

INFORMATION NEEDS

Seismic Review

For MITR, the RTR staff will work with the licensee to obtain applicable licensee seismic calculations. Once the NRR RTR staff obtains these calculations they will be provided to the NRR seismic and structural reviewer. Once the review of these calculations is completed, these calculations will be either destroyed or returned to the licensee. Additional information needs maybe identified based on the review of these calculations.

Structural Review

The NRR RTR staff will obtain the necessary drawings and information to allow the NRR structural staff and JLD mitigating strategies staff to determine if other natural hazards (e.g., tornado born missile) have the capability to cause a LOCA and if so the staff will assess the mitigation capabilities that the MITR might be able to employ.

References

MITR Safety Analysis Report

Should you have any questions concerning this audit, please contact Mr. Patrick Boyle at (301) 415-3936 or by electronic mail at Patrick.Boyle@nrc.gov.

Sincerely,

/RA/

Alexander Adams, Jr., Chief
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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