



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-8392

September 14, 2016

Mr. Scott W. Moore
Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

License No. SNM-362
Docket # 70-398
TAC No. L32643

Subject: Licensee Event Report Number 52185, "Irradiator Safety Equipment Failure"

Dear Mr. Moore,

The attached report addresses the requirements in 10 CFR 30.50 pursuant to NIST's twenty-four hour event notification to the NRC Operations Center on August 16, 2016. The twenty-four hour event notification report was initially submitted under 10 CFR 70.50 (b) (2). Upon discussions with NRC Region I, NIST has determined that 10 CFR 30.50 (b) (2) is the correct reporting requirement section to follow as the licensed material in the irradiator is byproduct material and not special nuclear material. NIST also provided courtesy notifications to NRC Region I and the SNM-362 Project Manager at NRC Headquarters on August 16, 2016. During the courtesy notifications, corrective actions taken and planned were discussed.

The event was an irradiator safety equipment failure, which prevented the equipment operator from shutting down the radiation beam upon conclusion of instrument calibrations. As detailed further in the attached report, the event did not involve any significant occupational dose or exposure to any individual in excess of the limits in 10 CFR 20.1301 – Dose Limits for Individual Members of the Public.

The attached report provides (1) a description of the event, including the probable cause and the manufacturer and model number of the equipment that failed or malfunctioned; (2) the exact location of the event; (3) a description of the isotopes, quantities, chemical and physical form of the licensed material; (4) the date and time of the event; (5) the corrective actions taken or planned and the results of any evaluations or assessments; and (6) the extent of exposure to individuals to radiation or to radioactive materials without identification of individuals by name.

Thank you for your attention to this letter and report. If you have further questions about this report, please contact the NIST Radiation Safety Officer, Mr. Thomas O'Brien, at 301-975-5800 or thomas.obrien@nist.gov.

Sincerely,

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cc: D. H. Dorman, Regional Administrator, NRC Region I
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A.K. Thompson, NIST IRSC Chairman
T.J. O'Brien, NIST Radiation Safety Officer

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Licensee Event Report – Safety Equipment Failure

As required by 10 CFR 30.50 –“Reporting requirements”, this written report is submitted as the follow-up to the August 16, 2016 twenty-four hour telephone notification of an irradiator safety equipment failure (Event # 52185). The notification was made by the NIST Gaithersburg Radiation Safety Officer, Mr. Thomas J. O’Brien, for license SNM-362. This report addresses the six categories required for events under paragraph (b) in 10 CFR 30.50.

(1) Description of the event, including the probable cause and the manufacturer and model number of the equipment that failed or malfunctioned:

On the afternoon of August 15, 2016, a member of the radiation safety office was performing routine survey instrument calibrations using a NIST-owned J.L. Shepherd and Associates irradiator. The unit is a Model 81-12Q calibrator. At the end of an instrument calibration the technician noticed that the indicated radiation level on the survey instrument (seen via closed-circuit video camera system) was not receding after pressing the source-return button on the control panel of the irradiator. Further visual checks were made by observing the warning light still flashing and noticing the source-up indicators on the control panel. The technician immediately recognized the unusual situation and proceeded to make a phone call to the supervisor to seek assistance.



Model 81-12Q

Members of the radiation safety management team visited the area a few minutes later to evaluate the situation and consulted with the manufacturer. It was determined that a manufacturer repair was needed.

Authorized J.L. Shepherd personnel visited NIST Gaithersburg on August 17, 2016 and performed an emergency service to repair the irradiator. The field service engineer identified failure of a 1-inch negator spring as the probable cause of the event. The negator spring, upon failure, obstructed the return path for the sources into the shield. Given the position of the obstruction, the sources became stuck at the 6 Ci position.

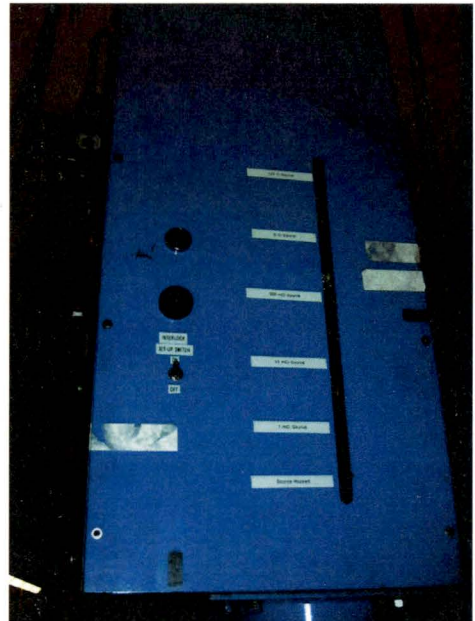
(2) The exact location of the event:

The irradiator is located at the portable instrument calibration facility in building 245 of the NIST Gaithersburg, Maryland campus.

(3) The isotopes, quantities, and chemical and physical form of the licensed material involved:

The Model 81-12Q irradiator has five Cs-137 sources with a total activity of 131.316 Ci (as of 10/27/1994-original activity). The sources' physical form is solid. These are JLS&A Type 6810 special form sealed sources and the chemical form for the cesium inside the encapsulation is cesium chloride. The five sources have the following quantities:

- 125 Ci (as of 10/27/1994)
- 6 Ci (as of 10/27/1994)
- 0.3 Ci (as of 10/27/1994)
- 0.015 Ci (as of 10/27/1994)
- 0.001 Ci (as of 10/27/1994)



Source Position Indicator 1

(4) Date and time of the event:

Approximately 16:15 (EDT) on August 15, 2016.

(5) Corrective actions taken or planned and the results of any evaluations or assessments:

Corrective actions taken:

- Access to the calibration facility was limited until the unit was repaired on 8/17/2016.
- Area surveys were conducted to confirm that radiation levels were normal for the 6Ci source-up condition and limited to the instrument calibration area.
- Manufacturer-provided beam stopper was installed the morning of 8/16/2016 until the manufacturer performed the repair service on 8/17/2016.
- An emergency repair service was performed by the manufacturer on 8/17/2016. An NRC Form 241 was provided by the manufacturer authorizing the non-routine maintenance activities.

- The field service engineer replaced the failed negator spring causing the event and performed checks to ensure proper operation of the unit prior to resuming operations with the irradiator.
- A one-time contract for a full-scope preventative maintenance service of the irradiator was scheduled for October 2016.

Corrective actions planned:

- NIST plans to have the manufacturer perform routine preventative maintenance service of the irradiator.

Results of any evaluations or assessments:

- The irradiator was evaluated by radiation safety personnel the afternoon of 8/15/2016 and it was determined that manufacturer repair was needed and that no exposure to personnel as a result of the event had taken place.
- J.L. Shepherd field service engineer evaluated the irradiator on 8/17/2016 and it was determined that the probable cause of failure was a damaged negator spring obstructing the path for the sources to return to the fully-shielded position.
- The field service engineer, upon replacement of the negator springs, evaluated the unit for proper operation and determined that the unit was in a fully-functional state.
- Radiation safety personnel performed an independent verification of the irradiator operation and re-surveyed the area. Radiation safety determined that the unit was in good operating condition. A leak test was performed prior to resuming calibration activities.

(6) The extent of exposure of individuals to radiation or to radioactive materials without identification by name.

- No exposure of individuals occurred as a result of this event.

Please direct any questions to the Radiation Safety Officer, Mr. Thomas J. O'Brien, at 301-975-5801.