

EXECUTIVE SUMMARY

Integrity Testlab, Inc.
NRC Inspection Report No. 03036177/2011003

The inspector conducted a reactive inspection to review the circumstances surrounding a dosimetry result that was greater than the allowable 5 rem total effective dose equivalent. The inspection involved an on-site inspection on August 26, 2011, and a review of the licensee's event report dated September 21, 2011, and supplemental report dated October 17, 2011.

The licensee determined that the exposure was due to a dosimeter that was inadvertently exposed after it became detached from an assistant radiographer's clothing during radiographic operations. The licensee interviewed the individual, confirmed the event details through interviews with the individual's coworker (radiographer), reenacted the event, and calculated that the dosimetry result was reasonable given the details.

The inspector independently reviewed the event report, daily radiation surveys, training records, and dosimetry records; interviewed management, the assistant radiographer and the radiographer; and reproduced the licensee's calculations. The inspector concluded that the licensee's investigation was accurate. The inspector further concluded that the dosimetry result was due to an accidental exposure to a dosimeter, and not to the assistant radiographer.

No violations of NRC requirements were identified.

REPORT DETAILS

1.0 Program Overview

The Nuclear Regulatory Commission (NRC) License No. 07-30791-01 authorizes Integrity Testlab, Inc. (licensee) to conduct radiographic operations at temporary job sites where the NRC maintains jurisdiction and to store licensed materials for this purpose at its facility located in New Castle, Delaware. The license authorizes the possession and use of radiographic devices (cameras), containing sealed sources of Iridium-192 (Ir-192) and Selenium-75 (Se-75). The licensee conducts radiographic operations daily at temporary jobsites.

The Radiation Safety Officer (RSO) is responsible for establishing programs and procedures applicable to the radiation safety program. The RSO also oversees the implementation of the radiation safety program including maintaining records and reports, ensuring adequate radiographer training, and overseeing the storage, maintenance, and dispatch of radiography equipment. The RSO reports directly to the president of the company.

The licensee employs 9 radiographers and 18 assistants, who report to the RSO. The radiographers are responsible for implementing the licensee's operating and emergency procedures.

2.0 Dosimeter Overexposure Event Summary and Inspection Activities

a. Inspection Scope

This inspection was performed in accordance with Inspection Procedure 87103, Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing. The Focus Elements addressed were 05.01 through 05.14. Prior to the onsite portion of the inspection, the inspector reviewed the Event Notification Report Number 47197. The inspector performed an onsite inspection on August 26, 2011, which included a review of dosimetry records, Radiation Survey Reports, Operating and Emergency Procedures, personnel training records, and an August 26, 2011, memo from the RSO to all licensee personnel regarding the event. The inspector reviewed the licensee's final written report, dated September 21, 2011 (ML11269A013), and supplemental report dated October 17, 2011 (ML113040065). The licensee's final written report will not be made publicly available as it contains personal privacy information.

b. Observations and Findings

Site Inspection

During the on-site inspection, the licensee provided a detailed account of the events. The inspector interviewed the RSO, the company president, the radiographer, and the assistant radiographer, and determined that their statements provided a consistent description of the event.

The event was reported to have occurred on July 29, 2011, when a radiographer and assistant radiographer (crew) were radiographing welds on seven, 14-inch pieces of carbon steel metal pipe at a warehouse near Baltimore, Maryland. Following a sequence

of five radiographic exposures, the assistant radiographer noticed his optically stimulated luminescence (OSL) dosimeter lying on a wooden pallet supporting the pipe they had just radiographed. The assistant radiographer speculated that his dosimeter became detached from his shirt pocket during the equipment setup, and that it had been exposed during the last five exposures. During the course of the day, the crew did not experience any unusual dose rate alarms on their alarming ratemeter, unusual dose rates with their dose rate instrument, or unusual pocket ion chamber readings. The radiographer and the assistant compared readings from their pocket ion chambers and each had received 0.040 rem for the day. The assistant radiographer attempted to notify the RSO by telephone, but was unable to reach him. No further radiography was performed that day.

On the following Tuesday, August 2, 2011, the assistant radiographer notified the RSO of the incident in person. The RSO instructed the assistant to write a statement describing what had happened and discussed the cause of the incident and how to prevent his dosimeter from becoming detached while working. The RSO exchanged the assistant's OSL dosimeter with a new OSL dosimeter for the month of August. The RSO then sent the dosimeter to the dosimetry provider (Landauer, Inc.) along with all of the company badges as part of the monthly routine badge processing.

On August 25, 2011, the dosimetry processor notified the licensee that the assistant radiographers July dosimeter reading was 9.587 rem. The RSO immediately notified the NRC Headquarters Operations Officer by telephone.

The licensee assigned the assistant radiographer to non-radiation worker duties until the RSO could complete his review of the incident. The RSO informed all employees of the incident and provided training regarding the importance of firmly attaching dosimetry.

A dose reconstruction was conducted by the RSO, including a mock radiography site intended to replicate the conditions under which the dosimeter was exposed. The licensee reconstructed the dose exposure scenario in order to estimate the time and distance between the radiography source and the dosimeter for multiple locations along the path of the source within the guide tube, while at the guide stop, and while shielded within the camera.

In addition to the dose reconstruction, the licensee assessed the individual's dose for the monitoring period and assigned the assessed dose to the individual's permanent dose record.

The licensee submitted a written report to NRC on September 21, 2011, and a supplemental report on October 17, 2011, in accordance with 10 CFR 20.2203.

Written Report

The inspector reviewed the licensee's written report and identified no concerns. The inspector reviewed the dose calculation and found that it agreed with the assumptions and the description of the event. The inspector reviewed the licensee's corrective actions and considered them to be appropriate.

Dosimeter Dose Assessment

The licensee's dose calculations were based on multiple event specific assumptions for time, distance, and shielding. The dose calculation involved two constants, the gamma constant for Ir-192 and the Half Value Layer (HVL) for steel.

The inspector independently verified the licensee's assumptions and dose calculations to the dosimeter. The licensee reported a result of 9.329 rem, which was consistent with the inspector's calculation. While minor discrepancies were noted in the licensee's calculations, the inspector concluded that the licensee's assumptions and calculation methodology were reasonable.

The inspector also noted that the licensee did not use a collimator, although there appeared to be no technical reason not to use one. A collimator is a device commonly used to reduce personnel exposure to radiation and focus the radiation beam on the material being radiographed. The inspector noted that this issue did not appear to be programmatic in nature and was determined not to be a violation of NRC requirements.

Root Cause and Contributing Factors

The licensee determined that the root cause of the event was individual human error. The assistant radiographer did not take the necessary precautions to prevent the loss or detachment of his dosimeter. The assistant radiographer stated that he attached his dosimeter to the breast pocket of his shirt and did not identify that the dosimeter had become unattached and fallen to the floor.

The inspector noted that the licensee could have conducted a more comprehensive review regarding the underlying reason(s) why the error occurred and what corrective actions could be taken to address them.

Corrective Actions

The licensee implemented two immediate corrective actions. Both were completed prior to the on-site inspection. The corrective actions were: (1) retrain the assistant radiographer on the proper use and control of dosimeters, and (2) inform the radiography staff of the event.

The licensee completed training of all radiographers on staff regarding dosimeter use on September 9, 2011.

c. Conclusions

No violations of NRC requirements were identified.

3.0 Exit Meeting

The inspector discussed the conclusions described in this report with licensee management during an exit meeting conducted by telephone on October 31, 2011.

PARTIAL LIST OF PERSONS CONTACTED**Licensee**

#* Stacey Spike, President, Integrity Testlab, Inc.
 #* William Batting, Radiation Safety Officer, Integrity Testlab, Inc.
 Radiographer, Integrity Testlab, Inc.
 Assistant Radiographer, Integrity Testlab, Inc.

in attendance at entrance meeting

* in attendance at exit meeting

Maryland Department of the Environment

Raymond E. Manley, Chief, Radioactive Material Licensing & Compliance Division
 Alan Jacobson, Health Physicist Supervisor, Radioactive Materials Inspections. Section

INSPECTION PROCEDURES USED

IP 87103

LIST OF DOCUMENTS REVIEWED

- Integrity Testlab Industrial Radiographic Operating and Emergency Procedure, RSP-310, Revision 1 dated January 28, 2003.
- NMED Item Number 110432
- Event Notification Number 47197
- Radiation Dosimetry Reports for time period 01/01/2011 – 07/31/2011
- Email from William Batting to Integrity Testlab Personnel; RE: Over Exposed Film Badge by ITL's Assistant Radiographer, dated Friday, August 26, 2011 7:07 AM.
- Fax to Stacey Spike from Landauer, Inc., dated August 25, 2011 9:19 AM
- Training record for Assistant Radiographer, dated June 22, 2009, signed by William Batting
- (13) Radiation Survey Reports dated July and August, 2011.
- Assistant Radiographer memo to William Batting dated August 2, 2011 (written statement of events).
- Integrity Testlab written report in accordance with 10 CFR 20.2203 dated September 21, 2011. (ML11269A013)
- Integrity Testlab supplemental written report in accordance with 10 CFR 20.2203 dated October 17, 2011. (ML113040065)

LIST OF ACRONYMS USED

rem (roentgen equivalent man): a special unit of radiation dose expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor.

OSL (optically stimulated luminescence) dosimeter: OSL is a methodology that can be employed in personnel dosimetry to determine the dose of record.