



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

November 6, 2014

Mr. Bryce Feighner, P.E., Chief
State of Michigan
Department of Natural Resources & Environment
Radiological Protection Section
P.O. Box 30241
Lansing, MI 48909-7741

**SUBJECT: NRC ROUTINE INSPECTION REPORT NO. 03007188/2014001(DNMS) –
STATE OF MICHIGAN**

Dear Mr. Feighner:

On September 23-24, 2014, an inspector from the U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection at your Lansing, Michigan office, with continued in-office review through October 29, 2014. The purpose of the inspection was to review activities performed under your NRC license to ensure that activities were being performed in accordance with NRC requirements. The in-office review included a review of your radiation safety surveys and evaluations. A final exit meeting was held between Ms. Deborah A. Piskura of my staff and Mr. Ken Yale of your staff by telephone on October 29, 2014, to discuss the inspection findings.

During this inspection, the NRC staff examined activities conducted under your license related to public health and safety. Additionally, the staff examined your compliance with the Commission's rules and regulations as well as the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Within the scope of this inspection, no violations of NRC requirements were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure, will be made available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at <http://www.nrc.gov/reading-rm/adams.html>.

B. Feighner

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Please feel free to contact Ms. Piskura of my staff if you have any questions regarding this inspection. Ms. Piskura can be reached at 630-829-9867.

Sincerely,

/RA/

Aaron T. McCraw, Chief
Materials Inspection Branch
Division of Nuclear Materials Safety

Docket No. 030-07188
License No. 21-05199-02

Enclosure:
IR 03007188/2014001(DNMS)

cc w/encl: Ken Yale, Radiological Protection Section Chief
David Asselin, Physicist

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**U.S. Nuclear Regulatory Commission
Region III**

Docket No.: 030-07188

License No.: 21-05199-02

Report No.: 03007188/2014001(DNMS)

Licensee: State of Michigan
Department of Natural Resources & Environment
Environmental Resource Management Division
Radiological Protection Section

Locations Inspected: 815 Filley Street
Lansing, Michigan

Constitution Hall
525 West Allegan Street
Lansing, Michigan

Inspection Dates: September 23-24, 2014, with continued
in-office review through October 29, 2014

Inspector: Deborah A. Piskura, Health Physicist
Materials Inspection Branch

Approved By: Aaron T. McCraw, Chief
Materials Inspection Branch
Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

State of Michigan NRC Inspection Report 03007188/2014001(DNMS)

On September 23-24, 2014, with continued in-office review through October 29, 2014, a U.S. Nuclear Regulatory Commission (NRC) inspector conducted a routine inspection of the State of Michigan's (the licensee's) radiation safety program with focus on personnel monitoring and radiation exposure rates in restricted and unrestricted areas. The inspection included observations of a waste disposal operation through the Off-Site Source Recovery Project funded by the Department of Energy's (DOE) Los Alamos National Laboratory (LANL).

The inspector determined that the licensee implemented appropriate controls to monitor and secure its licensed sources stored within its facility. The inspector conducted independent radiation surveys and verified that radiation exposures to licensee staff were below the regulatory occupational dose limits.

No violations of NRC requirements were identified during this inspection.

REPORT DETAILS

1.0 Program Overview and Inspection History

The licensee is authorized by NRC License No. 21-05199-02 to possess numerous sealed sources and calibration sources, including a Gulf Nuclear americium-241:beryllium (Am:Be) neutron well logging source, and a vintage Soil Test, Inc. portable moisture/density gauge. The licensee possessed “exempt” quantities of material for civil defense equipment, environmental samples, and “orphaned” sources. The licensee stored its licensed material inside two dedicated rooms with the walls constructed of varying thickness of concrete block. The licensee designated seven individuals as authorized users of its radioactive material; these individuals were specifically listed by name on the NRC license. The licensee staff accessed the storage room occasionally to perform source inventories and leak tests. The licensee also possessed a cesium-137 calibration unit, maintained in an adjacent room, which the licensee used occasionally for calibration of its personnel dosimeters and radiation survey instrumentation. The daily operations were managed by a dedicated full-time radiation safety officer (RSO).

One violation of NRC requirements was identified during the last inspection on September 1, 2010. The violation concerned the failure to complete an evaluation of a former facility occupied by the licensee for release for unrestricted use prior to releasing the facility for such use, as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 30.36(b)(2). No violations of NRC requirements were identified during the previous inspection on September 14, 2005.

2 Independent Measurements and Dose Assessment

2.1 Inspection Scope

The inspector reviewed the use and storage of the licensee’s sealed sources to determine if the materials were stored in a manner consistent with the requirements of 10 CFR 20.1101(b) to maintain radiation exposures to licensee personnel as low as reasonably achievable. The inspector toured the source storage facilities, interviewed select licensee personnel, and performed independent radiation surveys. The inspector observed source transfer operations of the licensee’s Am:Be well logging source and the vintage portable gauge as part of the Off-Site Source Recovery Project funded by the Department of Energy’s (DOE) Los Alamos National Laboratory.

2.2 Observations and Findings

The licensee provided a written assessment of the exposure rates around the Am:Be source within the storage room at specified distances and configurations. The licensee conducted radiation surveys on August 7, 2014, using a ThermoScientific NRD 9 with RemBall and a side window Geiger Muller survey instrument. The licensee’s assessment included a comparison of exposure rates between the Am:Be source activity in the licensee’s possession and a hypothetical source activity (much greater than the source activity in the licensee’s possession) that would result in potential adverse health effects. The licensee’s Radiological Protection staff conducted its assessment through calculations and radiation measurements. The staff removed the

source from the shielding container and placed it on the storage room floor to recreate working conditions for staff that may maneuver the source. The licensee obtained integrated radiation measurements at a distance of approximately three feet from the Am:Be source for 11.5 minutes, and measured 640 microRoentgens.

The licensee requested a dose assessment from the DOE's Radiological Assistance Program (RAP) for personnel potentially exposed to the Am:Be source.

On August 8, 2014, representatives from the DOE's RAP team performed surveys around the licensee's Am:Be source. The surveys were performed to mimic specific working conditions licensee staff could encounter while handling the Am:Be source in preparing the source for transfer for disposal. Based on the team's survey results, the RAP representatives determined the probability of any personnel overexposure was unlikely and no further dose assessment was provided to the licensee. The inspector reviewed the RAP team's report dated August 8, 2014, and noted that the survey results reported by the DOE RAP team correlated with the expected radiation levels listed in the Sealed Source and Device Registry for this specific model and activity of Am:Be source.

On September 24, 2014, the inspector observed personnel from LANL perform packaging and surveys of select sources including the Am:Be well logging source and the vintage portable gauge. While the LANL personnel performed these operations, licensee staff maintained constant surveillance of the sources. The LANL personnel performed surveys of the Am:Be source with results similar to those by the licensee and the DOE RAP team.

The inspector independently evaluated the radiation dose to licensee personnel who work in the vicinity of the sources within the storage room. The inspector focused the dose assessment to the potential exposures from the Am:Be well logging source. The assessment included independent radiation measurements using a Canberra UltraRadic survey meter, NRC Tag No. 33535G, calibration date January 2, 2014. The inspector performed direct radiation measurements in and around the licensee's storage room. The inspector determined that the highest levels were measured in the central area of the source storage room housing numerous sealed sources. The following summarized the survey results:

- Background radiation in the general area was 10-15 microRoentgens per hour;
- 500-1000 microRoentgens per hour at the center of the source storage room;
- 500 microRoentgens per hour at contact on the Am:Be source container shield;
- 360-370 microRoentgens per hour at 2 feet from the Am:Be source; and,
- 120-130 microRoentgens per hour at 3 feet from the Am:Be source.

The inspector determined that radiation levels in the unrestricted areas outside the source storage room, the calibration room, the warehouse area, and exterior of the building were indistinguishable from background. Based on the estimated time that an individual would likely spend around the source in preparing it for transfer, about 10 minutes, at a distance of two to three feet, the inspector estimated the maximum dose to an individual working with the Am:Be source was approximately 20 to 60 microrem.

2.3 Conclusions

The inspector concluded that the radiation levels in the licensee's facility complied with the Part 20 limits. The inspector determined that the manner in which sources was used and stored were based on sound radiation protection principles to achieve occupational doses that were as low as reasonably achievable. The inspector calculated that occupational radiation doses to any licensee personnel who worked in the vicinity of the Am:Be well logging source during preparations for source transfer were within the dose limits of 10 CFR 20.1201. No violations of NRC requirements were identified.

3 **Personnel Monitoring**

3.1 Inspection Scope

The inspector reviewed aspects of the licensee's program for controlling and monitoring radiation dose from external sources. The inspection included tours of the source storage facilities, interviews with select licensee personnel, and review of personnel dosimetry reports.

3.2 Observations and Findings

The licensee implemented a program for monitoring external occupational dose in accordance with the provisions in 10 CFR 20.1502. The licensee provided whole body optically stimulated luminescence (OSL) dosimetry to seven individuals within the radiological branch who routinely handle radioactive sources; the OSD devices were exchanged for vendor analysis on a quarterly basis. The inspector reviewed vendor processing reports for 2011 through year-to-date 2014 for licensee staff. The maximum annual occupational whole body dose was reported as 5 millirem for 2011. All other doses were reported as "minimal" for the years 2012 through year-to-date 2014. Licensee management confirmed licensee staff had not experienced any overexposures or doses in excess of the regulatory limits.

The licensee implemented a program for informing its staff of declared pregnant worker policies and procedures for monitoring and recording fetal dose, as required by 10 CFR 20.1208 and 20.2006. Declared pregnant workers were provided separate fetal dose monitors; the licensee tracked and monitored the fetal doses individually.

3.3 Conclusions

The licensee's program for controlling and monitoring external occupational dose was adequate and satisfied regulatory requirements. All personnel doses were reported below the regulatory limits. No violations of NRC requirements were identified.

4 **Other Areas Inspected**

4.1 Inspection Scope

The inspector reviewed other aspects of the licensee's radiation protection program, which included the security of licensed material, audits of the radiation protection program, training, survey instrument calibration, physical inventory and leak testing of

sealed sources, labeling of containers, and postings. The inspector interviewed selected individuals, toured the licensee's facilities, examined the licensee's containers and reviewed selected records.

4.2 Observations and Findings

The licensee stored its radioactive material in a dedicated and secured storage facility. The storage areas were key-controlled with access granted only to the authorized individuals listed on the NRC license. The storage rooms were constructed with solid concrete blocks providing adequate shielding for licensee staff working in the adjacent areas, as well as members of the public.

The licensee's RSO performed an audit of the radiation safety program for the calendar year 2013; no violations of regulatory requirements were identified. The licensee documented its audit findings in a report dated January 29, 2014, and provided a copy of the results to licensee management.

The inspector determined that the licensee provided annual training to all staff working with or in the vicinity of licensed material. The last training session was provided on July 11, 2013. Through interviews, the inspector determined that the licensee staff understood exposure control and security requirements for licensed material.

The inspector examined the sealed sources in the licensee's possession. The inspector noted that each source container had a clearly visible label identifying the radionuclides and source activities. The licensee performed inventories and leak tests of the sealed sources and documented the results. The inspector noted that all sealed sources could be accounted for and none had been identified as leaking.

The inspector observed that the licensee posted a copy of NRC Form 3. The inspector also observed that the areas where licensed material was used and stored were appropriately posted with "CAUTION-RADIOACTIVE MATERIALS" signs.

4.3 Conclusions

Based on record reviews, interviews with personnel, and the observations described above, the inspector determined that no violations of NRC requirements were identified.

5 Exit Meeting Summary

On September 24, 2014, the inspector conducted an onsite exit meeting with the licensee representatives. The inspector discussed the activities reviewed and the inspection findings. The licensee did not identify any information reviewed during the inspection and proposed for inclusion in the inspection report as proprietary in nature. A final exit meeting was conducted via telephone on October 29, 2014.

Attachment: List of Personnel Contacted
Inspection Procedures Used

LIST OF PERSONNEL CONTACTED

State of Michigan Department of Environmental Quality

David Asselin, Physicist
Bryce Feighner, P.E., Chief
Michael J. McCarty, Lab Scientist
Ken Yale, Radiological Protection Section Chief

Los Alamos National Laboratory, Off Site Source Recovery Project

Frank G. Cocina, Jr., Beta/Gamma Source Recovery Coordinator
Rick Day, Team Leader
Frank Williams, Radiation Control Technician
Ioana Witkowski, Acceptable Knowledge Expert

Department of Energy, Radiological Assistance Program

Christine Van Horn
George Mosho, CEM, CHMM, Health Physicist

LIST OF INSPECTION PROCEDURES USED

IP 87123, "Well Logging Programs"
IP 87126, "Industrial/Academic/Research Programs"