IEMA
Illinois Emergency Management Agency
Division of Nuclear Safety

Pat Quinn, Governor
Andrew Velasquez III, Director
Joseph G. Klinger, Assistant Director

April 17, 2009

Dear Industrial Gauge Manufacturers, Distributors and Service Providers:

Enclosed for your information is the U.S. Nuclear Regulatory Commission's (NRC) Information Notice 2009-05, "CONTAMINATION EVENTS RESULTING FROM DAMAGE TO SEALED RADIOACTIVE SOURCES DURING GAUGE DISMANTLEMENT AND NON-ROUTINE MAINTENANCE OPERATIONS." This notice serves as a reminder of the importance for licensees to exercise caution when performing licensed activities that involve the handling or removal of sealed radioactive sources in gauges or devices. Prior to the start of any such activity, licensees should review specific information about the gauge, source holder and/or device. This includes, as appropriate, information available in the sealed source and device registry or other information from the manufacturer or vendor. In the absence of such information, licensees should themselves develop, document, and implement appropriate procedures.

Initial and routine training programs should also emphasize maintenance operations. This training should address emergency procedures to be taken if operations do not go as planned, including use of instrumentation to assess radiation levels and contamination.

We appreciate your attention to this matter. If you have any questions, please feel free to contact myself or Daren Perrero of my staff at (217) 785-9947.

Sincerely,

Charles G. Vinson, Head
Radioactive Materials Section

Enclosure

EMAP Accredited

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF FEDERAL AND STATE MATERIALS
AND ENVIRONMENTAL MANAGEMENT PROGRAMS
WASHINGTON, D.C. 20555

February 3, 2009

NRC INFORMATION NOTICE 2009-05 CONTAMINATION EVENTS RESULTING FROM DAMAGE TO SEALED RADIOACTIVE SOURCES DURING GAUGE DISMANTLEMENT AND NON-ROUTINE MAINTENANCE OPERATIONS

ADDRESSEES

All U.S. Nuclear Regulatory Commission (NRC) materials licensees. All Agreement State Radiation Control Program Directors and State Liaison Officers.

PURPOSE

The U.S. Nuclear Regulatory Commission is issuing this Information Notice (IN) to alert addressees of recently reported events that occurred during gauge dismantlement or non-routine maintenance operations that involved the handling or removal of sealed radioactive sources. During these events, sealed radioactive sources were damaged or ruptured, leading to both facility and personnel contamination. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar incidents. However, the suggestions contained in this information notice are not new NRC requirements; therefore, no specific action, or written response is required. The NRC is providing this IN to the Agreement States for their information and for distribution to their licensees as appropriate.

DESCRIPTION OF CIRCUMSTANCES

In the last three years, NRC has received five event reports, three of them recently, involving gauge dismantlement/disassembly or non-routine maintenance operations of devices that involved the handling or removal of sealed radioactive sources. Four of these events occurred while personnel were attempting to remove a source holder from a gauge or removing a source from its source holder for the purposes of source disposal. One of the events involved non-routine maintenance of a calibration device. The specific circumstances of these events are discussed below.

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Event 1

An NRC service provider licensee was dismantling gauges for the purpose of source removal and consolidation for disposal. A licensee employee attempted to dismantle a frame-type beta gauge containing an approximately 2.29 GBq (62 mCi) strontium-90/yttrium-90 source. The gauge was over 20 years old and had been in storage at the licensee's facility for over 5 years. The employee performing the dismantlement had not previously worked with the particular type of gauge or radioactive source. The employee removed the source holder from the gauge and then attempted to remove the radioactive source from its source holder. The strontium-90/ yttrium-90 source, designed to emit beta particles, had a 0.076 mm (0.003 inch) stainless steel window. A leak test performed prior to dismantlement did not reveal the presence of removable contamination. In an attempt to remove the radioactive source from its holder, the employee physically impacted the source window with a screwdriver and also impacted the source holder containing the source onto an unyielding metal surface. Following these actions, an in-process leak test revealed the presence of large amounts of removable contamination.

As a result of the damage to the source, the employee performing the dismantlement activities had considerable external contamination, including on the hands, face, and clothing. During on-scene personnel decontamination activities, it was found that the employee also received an intake of strontium-90, as evidenced by the detection of radiation inside the nostrils. Three other licensee employees were externally contaminated to a lesser extent. The employees decontaminated themselves prior to leaving the licensee's facility. The employee performing the dismantlement was taken to a local health care facility for medical evaluation as a precautionary measure and provided several days of urine and fecal samples for bioassay analysis. The other three employees provided urine samples for bioassay analysis. The dose assessment for the employee performing the dismantlement revealed a total effective dose equivalent of 14.4 mSv (1.44 rem). The radiation doses to the other three employees were considerably lower. The licensee's facility was extensively contaminated and strontium-90/ yttrium-90 was found to be dispersed widely throughout the interior of the licensee's facility, considerably beyond the area where the disassembly had been performed or where contaminated individuals had walked within the facility. Decontamination activities were performed by an appropriately licensed contractor and were completed three months after the event.

Event 2

During disassembly operations at the facilities of an Agreement State gauge manufacturer and distributor licensee, an employee attempted to remove a radioactive source from its source housing for the purpose of disposal. The industrial density/level fixed-type gauge had originally been manufactured by the licensee over 30 years prior and at the time of the incident contained an 11.1 GBq (300 mCi) cesium-137 sealed source. The source was damaged or breached as a result of an employee's attempt to remove it from the gauge housing using a saw. Prior to commencing the dismantlement activities, the employee was unaware that the gauge internals had been custom-configured. Therefore, when the gauge was cut open with the saw, the sealed radioactive source was not in the area where the employee expected, and as a result, the radioactive source itself was damaged by the saw.

As a result of the damage to the source, cesium-137 was dispersed throughout the licensee's source disposal room, contaminating the area with microspheres. Emergency procedures were activated by the licensee, and no contamination was detected on the floor outside the source disposal room. The employee that damaged the source exhibited contamination on one hand and one leg; a second employee exhibited contamination on both hands and clothing. The employees were decontaminated onsite and sent for medical evaluation as a precautionary measure. The two employees provided urine samples for bioassay analysis and also underwent lung counting. Calculated doses for the two employees were less than 50 uSv (5 mrem). Decontamination activities were performed by an appropriately licensed contractor and were completed two months after the event.

Event 3

During disassembly operations at an Agreement State gauge manufacturer and distributor licensee, radioactive sources in two different continuous level fixed-type gauges were breached on the same day, resulting in personnel and facility contamination. In the first incident, a 0.41 GBq (11 mCi) cesium-137 sealed source in a gauge was breached when an employee cut into the source with a band saw. In the second incident, a 0.96 GBq (26 mCi) cesium-137 sealed source in a gauge was breached when the same employee, using a drill, broke the drill bit when it became stuck in the source capsule. In both cases, the employee that was dismantling the gauges did not have a clear understanding of the location of the sources within the gauges.

Radioactive contamination was detected on the employee, throughout the source handling area, and in other portions of the licensee's restricted area, including the gauge manufacturing area. The employee involved in the incidents was decontaminated onsite although some contamination remained on the fingertips. The employee was sent for medical evaluation as a precautionary measure. Contamination on the employee's hands, arms, hair, and clothing was estimated to be 0.37 GBq (10 mCi). Urine samples from the employee were collected for bioassay analysis. Whole body counting of the employee was also performed. Calculations indicated a committed effective dose equivalent (CEDE) to the employee ranging from 21.3 to 19.4 uSv (2.13 to 1.94 mrem). The licensee's facility was decontaminated by an appropriately licensed contractor.

Event 4

An employee of an Agreement State manufacturer and distributor licensee attempted to remove an approximately 12 GBq (325 mCi) cesium-137 sealed source from the source housing of a density/level fixed-type gauge. At the time of the event, the gauge was approximately 19 years old. Previous attempts had been made to remove the source from the gauge but were unsuccessful. The employee then attempted to gain access to the source by drilling next to where the source was believed to be located. However, the drill nicked and damaged the radioactive source.

As a result of the damage to the source, radioactive material was dispersed in the licensee's facility, contaminating the immediate work area. The licensee estimated that less than 0.37 MBq (10 uCi) of cesium-137 was dispersed, contaminating various surfaces, including the

drill press, work bench, and floor. The licensee's facility was decontaminated. The highest radiation dose to an individual was calculated by the licensee to be 10.9 mSv (1.09 rem).

Event 5

An employee of Agreement State instrument calibration service provider attempted to modify or perform non-routine maintenance on a piece of calibration equipment that contained a radioactive source. At the time of the incident, the calibration device contained a 1.85 GBq (50 mCi) cesium-137 sealed source. The device had previously been designed and built by the licensee for their own use. The employee used a grinder to grind what was believed to be a metal spacer inside of the calibration device. When contamination was detected by another employee in the vicinity of the work area, the employees recognized that the piece of metal that had been ground actually contained a radioactive source.

As a result, the licensee's machine shop became contaminated. Also, due to the tracking of radioactive contamination by personnel, some other areas of the licensee's facility became slightly contaminated. The licensee performed some decontamination activities themselves and retained the services of an appropriately licensed contractor to complete the decontamination activities. The licensee identified four individuals that might have been exposed to the contamination event. All four individuals underwent whole body counting. Three individuals were estimated to have received less than 0.1 mSv (10 mrem) CEDE. The fourth individual, who performed the grinding of the source, is estimated to have received 2.99 mSv (29.2 mrem) CEDE.

DISCUSSION

The events described above each occurred during gauge dismantlement or non-routine maintenance operations that involved the handling or removal of sealed radioactive sources. In each event, radiation sources were damaged or breached, resulting in both radioactive contamination of individuals and licensee facilities. In each event, radioactive contamination was confined within the licensee's facility, with no detectable release of radioactive material into the public domain. However, some licensee facilities were contaminated significantly, leading to long periods of time of facility closure and in most cases, necessitating decontamination services provided by a contractor. Also, in each case, licensee personnel were contaminated, often with both external radioactive contamination and some level of intake of radioactive material. Some employees with a suspected intake of radioactive material were sent for medical evaluation as a precautionary measure. Additionally, special dose analysis and assessment methods were necessary in some cases, including urine and fecal bioassay and/or lung or whole body counting.

Common causal factors have been identified in the events described above that may have contributed to the damage to the radioactive sources, the subsequent release of radioactive material, and the resultant contamination of licensee facilities and personnel. The common causal factors have been identified as follows:

1. Dismantling/disassembling gauges or performing non-routine maintenance of devices based on intuition rather than reviewing the information contained in the sealed source and device registry (SS&DR) safety analysis or other information available from the source or device manufacturer or vendor.

2. For an unfamiliar radioactive source or device, or in the absence of specific information about the configuration of the radioactive sources within the gauges or devices, licensees did not develop, document, and implement their own procedures to perform the dismantlement or non-routine maintenance activities.

3. For the incidents that involved dismantlement or disassembly of gauges, the aged and potentially deteriorated condition of the gauges and/or radioactive sources at the time of dismantlement/disassembly was not taken into consideration by licensee personnel that were handling the sources or devices.

This IN serves as a reminder of the importance for licensees to exercise caution when performing licensed activities that involve the handling or removal of sealed radioactive sources in gauges or devices. Prior to the start of any such activity, licensees should review specific information about the gauge, source holder, and/or device. This includes, as appropriate, information available in the SS&DR or other information from the manufacturer or vendor. In the absence of such information, licensees should themselves develop, document, and implement appropriate procedures, as well as train personnel on the procedures.

When developing procedures, licensees should consider conducting dismantlement/ disassembly and other non-routine maintenance activities in a deliberate, stepwise manner, including conducting routine monitoring for radioactive contamination to promptly detect potential problems. Additionally, procedures should take into consideration actions that might be necessary to mitigate the consequences of radioactive source damage/rupture incidents. The availability of appropriate radiation detection equipment would assist personnel in determining the scope and extent of radiological contamination; which would, in part, help determine the necessary level of response.

Regarding training, licensees might remain mindful that a successful training program should thoroughly familiarize employees with actions to take to limit the spread of contamination within licensee facilities and actions to take to successfully decontaminate personnel. Licensees should consider having appropriate supplies available in the event that the decontamination of personnel is necessary. Furthermore, a successful training program would help employees recognize actions that may be necessary to prevent the spread of radioactive contamination into the public domain. Finally, licensee employees should be trained to recognize conditions under which it might be necessary to seek external assistance, or notify as appropriate, NRC or other appropriate regulatory agencies.

CONTACTS

This IN requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate regional office.

/RA/

Robert Lewis, Director
Division of Materials Safety
and State Agreements
Office of Federal and State Materials
and Environmental Programs

Technical Contacts: Lymari Sepulveda; FSME
(301) 415-5619
E-mail: Lymari.Sepulveda@nrc.gov

Janine F. Katanic, Ph.D., CHP; FSME
(817) 860-8151
E-mail: Janine.Katanic@nrc.gov

Enclosure: List of Recently Issued
FSME/NMSS Generic
Communications

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Enclosure: List of Recently Issued
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ML090370785

OFFICE	DMSSA/ASPB	DMSSA/LB	DMSSA/ASPB
NAME	JFKatanic: sxg6	LSepulveda	ADWhite
DATE	01/08/09	01/09/09	01/09/09
OFFICE	DMSSA/LB	DMSSA/RMSB	DMSSA
NAME	PRathbun	AMcIntosh	RLewis
DATE	02/03/09	02/03/09	03/03/09

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List of Recently Issued Office of Federal and State Material and Environmental Management Programs Generic Communications

Date	GC No.	Subject	Addressees
05/13/08	RIS-2008-10	Notice Regarding Forthcoming Federal Firearms Background Checks	All U.S. Nuclear Regulatory Commission licensees, certificate holders, and applicants for a license or certificate of compliance who use armed security personnel as part of their physical protection system and security organization. All Radiation Control Program Directors and State Liaison Officers.
06/16/08	RIS-2008-13	Status And Plans for Implementation of NRC Regulatory Authority for Certain Naturally Occurring and Accelerator-Produced Radioactive Material	All U.S. Nuclear Regulatory Commission materials licensees, Radiation Control Program Directors, State Liaison Officers, and the NRC's Advisory Committee on the Medical Uses of Isotopes
07/18/08	RIS-2008-17	Voluntary Security Enhancements for Self-Contained Irradiators Containing Cesium Chloride Sources	All U.S. Nuclear Regulatory Commission Materials Licensees Authorized to Possess Self-Contained Irradiators Containing Cesium Chloride (CsCl) ; all Agreement State Radiation Control Program Directors and State Liaison Officers; all members of the Advisory Committee on the Medical Uses of Isotopes.
10/03/08	RIS-2008-23	The Global Threat Reduction Initiative (GTRI) Domestic Threat Reduction Program & Federally Funded Voluntary Security Enhancements For High-Risk Radiological Material	All U.S. Nuclear Regulatory Commission Materials Licensees authorized to possess Category 1 or Category 2 quantities of radioactive materials. All Agreement State Radiation Control Program Directors and State Liaison Officers. Members of the Advisory Committee on the Medical Uses of Isotopes
10/03/08	RIS-2008-24	Security Responsibilities Of Service Providers and Client Licensees	All U.S. Nuclear Regulatory Commission licensees that hire service providers to install, service, repair, maintain, relocate, exchange, or transport radioactive materials in quantities of concern, service provider licensees, Agreement State Radiation Control Program Directors, and State Liaison Officers
12/22/08	RIS-2008-10, Suppl. 1	Notice Regarding Forthcoming Federal Firearms Background Checks	All U.S. Nuclear Regulatory Commission licensees, certificate holders, and applicants for a license or certificate of compliance who use armed security personnel as part of their physical protection system and security organization. All Radiation Control Program Directors and State Liaison Officers

Note: This list contains the six most recently issued generic communications, issued by the Office of Federal and State Materials and Environmental Management Programs (FSME). A full listing of all generic communications may be viewed at the NRC public website at the following address: http://www.nrc.gov/reading-rm/doc-collections/gen-comm/index.html