

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
WASHINGTON, D.C. 20555

November 22, 1988

NRC INFORMATION NOTICE NO. 88-90: UNAUTHORIZED REMOVAL OF INDUSTRIAL  
NUCLEAR GAUGES

Addressees:

All Nuclear Regulatory Commission (NRC) licensees authorized to possess, use, manufacture, or distribute industrial nuclear gauges.

Purpose:

This notice is provided to alert recipients to a potentially significant problem involving nuclear gauges. It is expected that recipients will review this notice for applicability to their facilities, distribute it to responsible radiation staff or authorized users, as appropriate, and consider actions to preclude a similar problem from occurring at their facilities. Primarily, this notice concerns the unauthorized removal of gauges, especially those which are damaged and might be leaking radioactive material, and failure to perform radiological surveys. This notice also serves as a reminder to licensees that they need to maintain awareness of their license conditions and realize the limits of their emergency response capabilities when faced with a potentially serious radiological incident. However, suggestions contained in this notice do not constitute any new NRC requirements, and no written response is required.

Description of Circumstances:

Recently, an NRC industrial licensee who was authorized to use four cesium-137 gauges in manufacturing steel components reported to NRC that 25 tons of molten steel spilled on and around the gauges during a manufacturing incident. As the steel cooled and hardened, the four gauges' shutters were stuck in the open "beam-on" position. The gauges were embedded in the spilled steel, and initial surveys showed low radiation levels due to the shielding effect of the spilled steel. However, the licensee failed to evaluate the gauges and surrounding spilled steel for radioactive contamination. The licensee contacted its Radiation Safety Officer (RSO) by telephone and, before his arrival at the site, had used torches to cut away the steel embedding the gauges. After two of the gauges were removed, the RSO notified NRC of the incident. NRC instructed the RSO to perform a leak test for radioactive contamination on the gauges. This test resulted in readings up to 45 milliroentgens per hour on the surface of the smears, which indicated significant leakage of radioactive material. The sealed radiation sources and shielding material inside one or more of the gauges had melted because of the molten steel (approximately 3000°F).

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As a result, 15 licensee workers received minor external radioactive contamination, confined mostly to their clothing. Multiple areas onsite were significantly contaminated. An immediate emergency response effort by NRC, the Department of Energy, and State agencies identified and controlled the spread of contamination so that no offsite contamination occurred. No personnel radiation exposures in excess of NRC limits were reported. The licensee lost approximately two weeks of production while a licensed contractor performed onsite decontamination and waste disposal preparation activities.

Discussion:

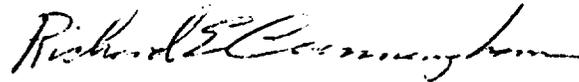
Licensees authorized to possess and use sealed sources in industrial nuclear gauges should be aware of their responsibilities to maintain compliance with their license conditions and applicable NRC regulations (particularly 10 CFR Section 20.105(b) and 10 CFR Section 20.201). In this case, the licensee was permitted, under a license condition, to relocate the gauges from their mounted locations only after the shutters had been closed and locked. However, the licensee was not permitted to relocate the gauges with damaged shutters. The licensee failed to make such surveys as were necessary to assure radiation levels specified in 10 CFR Section 20.105(b) were not exceeded while the slag, protective shielding, and steel support brackets were being cut away. The licensee also failed to initiate leak-test surveys of the gauges to determine whether radiation source integrity had been breached and whether contamination of personnel and the environment existed.

Whenever a gauge containing radioactive material is involved in an incident or damaged, the RSO and other knowledgeable personnel, such as any radiation safety consultants, should be notified immediately. The licensee should not perform any work that may spread radioactive contamination, in the area of the gauge, until the gauge is checked for leaks. If the incident could result in a significant or uncontrolled spread of contamination, or cause or threaten to cause the situations described in 10 CFR Section 20.403, NRC should be notified immediately at (202) 951-0550 (twenty-four hours per day).

In June 1984, NRC reminded all licensees authorized to use fixed gauges that problems might occur with gauges located in high temperature or corrosive environments. (See Attachment 1.) Licensees should examine the environment in which their gauges are installed to ensure that the gauges are protected against possible adverse situations such as excessive heat or corrosive materials.

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No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the appropriate NRC regional office or this office.



Richard E. Cunningham, Director  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material  
Safety and Safeguards

Technical Contacts: G. M. McCann, RIII  
(312) 790-5741

S. W. Moore, NMSS  
(301) 492-0514

Attachments:

1. NRC letter dtd 6/13/84,  
"NRC Licensing Requirements for Fixed Gauges"
2. List of Recently Issued NRC Information Notices



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

Attachment 1  
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TO ALL FIXED GAUGE LICENSEES:

SUBJECT: NRC LICENSING REQUIREMENTS FOR FIXED GAUGES

We have received reports of gauges being installed in locations where the environmental conditions exceed the manufacturer's specifications. The following are representative of the problems encountered:

1. Breakdown of cooling system designed to maintain the gauges at temperatures at or below design specifications.
2. Installation of gauges where the temperature exceeded the manufacturer's recommended maximum for the gauge and no cooling system (the gauge temperature could result from high ambient air temperature or conduction of heat from a process vessel to the gauge).
3. Location of gauges in corrosive environments.
4. Location of gauges so that corrosive materials or material at high temperature could spill on the gauges.

The consequences of the situations in 1 and 2 were melting of the lead shields in the gauges, loss of the shield, and unnecessary radiation exposure of personnel.

The consequences of the situations of 3 and 4 were obliteration of labels and interference with proper shutter operation.

Section 30.31(a)(2) of 10 CFR Part 30 requires that NRC make a determination that an applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life and property. For several years we have not routinely asked for information concerning the location of gauges within a facility or the ambient environmental conditions to which gauges would be exposed. In light of the incidents involving gauges, we have concluded that it will be necessary for the following information to be included in applications which you may submit in the future:

1. A sketch or description of the proposed location of gauges within a facility.
2. The environmental conditions to which gauges will be exposed, e.g., temperature, corrosive atmosphere, and vibration.
3. If the ambient temperature will exceed the maximum operating temperature specified by the manufacturer thus creating a need to maintain a lower temperature by means of cooling jackets or similar measures, a description of the cooling system should be provided. In addition, a discussion of how the cooling system will be maintained and consequences of a failure of the cooling system should be provided.
4. If a cooling system is used to maintain the temperature below the maximum operating temperature specified by the manufacturer, a description of the method and procedures for detecting a cooling system failure and the action which will be taken should be submitted.
5. The schedule for maintenance of gauges including, but not limited to frequency, proper shutter operation assuring that labels are legible and visible and assuring that gauges are protected against corrosive materials or materials at high temperature.
6. The emergency procedures to be followed in the event of accidents involving damage of the gauge, including the names and telephone numbers of the individuals within the organization who should be notified and who would inturn, notify the State Personnel and the Nuclear Regulatory Commission.

For those gauges already in use, you should examine the environment in which the gauges are installed to ensure that the gauges are protected against possible adverse situations. In addition, you should institute a routine maintenance program as indicated in 5 above.

No response to this Notice is required. If you have any questions regarding this matter, please contact the appropriate Regional Office or this Office.

  
Richard E. Cunningham, Director  
Division of Fuel Cycle and  
Material Safety

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-89	Degradation of Kapton Electrical Insulation	11/21/88	All holders of OLs or CPs for nuclear power reactors.
88-88	Degradation of Westinghouse ARD Relays	11/16/88	All holders of OLs or CPs for nuclear power reactors.
88-87	Pump Wear and Foreign Objects in Plant Piping Systems	11/16/88	All holders of OLs or CPs for nuclear power reactors.
86-106, Supp. 3	Feedwater Line Break	11/10/88	All holders of OLs or CPs for nuclear power reactors.
88-86	Operating with Multiple Grounds in Direct Current Distribution Systems	10/21/88	All holders of OLs or CPs for nuclear power reactors.
88-85	Broken Retaining Block Studs on Anchor Darling Check Valves	10/14/88	All holders of OLs or CPs for nuclear power reactors.
88-84	Defective Motor Shaft Keys in Limitorque Motor Actuators	10/20/88	All holders of OLs or CPs for nuclear power reactors.
88-83	Inadequate Testing of Relay Contacts in Safety-Related Logic Systems	10/19/88	All holders of OLs or CPs for nuclear power reactors.
88-82	Torus Shells with Corrosion and Degraded Coatings in BWR Containments	10/14/88	All holders of OLs or CPs for BWRs.
88-81	Failure of Amp Window Indent Kynar Splices and Thomas and Betts Nylon Wire Caps During Environmental Qualification Testing	10/7/88	All holders of OLs or CPs for nuclear power, test, and research reactors.

OL = Operating License  
 CP = Construction Permit

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Richard E. Cunningham, Director  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material  
Safety and Safeguards

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"NRC Licensing Requirements for Fixed Gauges"
2. List of Recently Issued NRC Information Notices

<i>E Kraus</i> Editor EKraus 11/9/88	<i>W</i> IMAB VLMiller 11/9/88	<i>by telephone</i> RIII <i>for</i> GMcCann 11/15/88	<i>by telephone</i> RIII <i>for</i> BMallett 11/14/88
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OFC: IMOB/LL	: IMOB	: IMOB	: IMAB	: IMNS	: IMNS
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