UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
WASHINGTON, DC 20555-001

October 31, 2002

NRC INFORMATION NOTICE 2002-31 POTENTIALLY DEFECTIVE UF_6 CYLINDER VALVES (1-INCH)

Addressees:

All licensees authorized to possess and use source material and/or special nuclear material for the heating, emptying, filling, or shipping of uranium hexafluoride (UF_6) in 30- and 48-inch cylinders.

Purpose:

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees about safety concerns related to UF_6 cylinder valves manufactured by the Hunt Valve Company, Inc., of Salem, Ohio. The two safety concerns involve (1) cracked packing nuts and (2) the loss of material traceability and failure to conduct hardness testing of the valve stems.

NRC anticipates that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute new NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Hunt Valve Company is an approved supplier of one-inch and 3/4-inch UF_6 cylinder valves for the United States Enrichment Corporation (USEC) and others. These valves are required to be manufactured under NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications," and ANSI N14.1, "American National Standard for Nuclear Materials - Uranium Hexafluoride - Packaging for Transport." On December 4, 2000, Hunt Valve Company made a 10 CFR Part 21 notification concerning discovery of defective packing nuts for one-inch UF_6 valves. During visual inspections, several packing nuts were observed to have surface cracks. The cracked packing nuts were originally isolated to heat codes **AXP** and **AFD**. Subsequently, additional defective nuts were identified for the following heat codes:

AFM ATE AFB AFC AXN BXN BXP CCF CCG

The NRC has subsequently been informed of several other possible deviations from the purchase orders that occurred on UF_6 valves. Those deviations allegedly involved the loss of material traceability and the failure to conduct hardness tests for valve stems. Possible suspect valve stem heat codes are PEN and PFV. The NRC is continuing to investigate this matter, and will release additional information when it becomes available.

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Discussion:

There are two types of UF_6 cylinder valves in use in NRC licensed activities (1) a 3/4-inch valve designated as cylinder valve 51 (by ANSI N14.1) which are not known to be affected by the defects addressed in this notice and (2) a one-inch valve designated as cylinder valve 50. These UF_6 valves form part of the pressure boundary for Model No. 30B (30-inch diameter) cylinders that contain low enriched uranium (up to 5 percent U^{235}) and various 48-inch diameter cylinders containing enriched, natural and depleted (tails) uranium. As such, the valves perform several safety functions.

First, UF_6 is a chemically hazardous material. The related hazards involve soluble uranium toxicity (a heavy metal health threat to the kidneys) and hydrogen fluoride (exterior chemical burns, interior lung damage due to inhalation and electrolyte imbalance), which is a chemical reaction by-product that occurs when UF_6 is exposed to moisture in the air. Second, both natural, depleted and low-enriched uranium are slightly radioactive. In addition, for enriched uranium, nuclear criticality could occur if a sufficient amount of water was accidentally introduced into a cylinder.

The UF_6 valves perform their intended safety functions in two ways. Before UF_6 cylinders are filled, emptied or sampled, the UF_6 is liquified by heating and pressurizing it to well above atmospheric pressure. When the valve is open, the packing nut serves as a secondary barrier to prevent leakage past the valve stem. For emptying and sampling UF_6 cylinders, the cylinders are typically heated in a secondary pressure vessel designed to contain any UF_6 leakage. However, in some applications, UF_6 cylinders may be filled with liquid UF_6 while the cylinder is not in such a secondary pressure vessel.

When the cylinders are put in storage or transported, the valves are closed and the seated valve stem provides the primary pressure barrier. The barrier provided by the valve is an important design safety feature during transport of filled cylinders. Transportation containers must be capable of withstanding normal transport conditions and accidents, including impact, fire, and water immersion. Radiological and criticality safety of enriched UF_6 in transport relies on the cylinder and valve preventing the release of material and assuring that there is no water leakage into the cylinder, even in the event of an accident and immersion in water.

UF_6 valves that could have cracked packing nuts or valve stems that do not meet the purchase order material traceability or hardness requirements may not be able to fully meet the safety margins required for certain plant operations and transportation, and routine procurement receipt inspections may not be able to detect all of these deficiencies.

Related Generic Communications

- Information Notice No. 89-78: "Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves" dated November 22, 1989.

- Information Notice No. 97-24: "Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves" dated May 8, 1997.

This information notice does not require any 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 project manager in the NRC's Office of Nuclear Material Safety and Safeguards (NMSS).

/RA/

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2. List of Recently Issued NRC Information Notices

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Information Notice No.	Subject	Date of Issuance	Issued to
2002-30	Control and Surveillance of Portable Gauges During Field Operations	10/30/2002	All NRC licensees authorized to possess, use, transport, and store portable gauges.
2002-28	Appointment of Radiation Safety Officers and Authorized Users Under 10 CFR Part 35	09/27/2002	All medical licensees.
2002-23	Unauthorized Administration of Byproduct Material for Medical Use	07/16/2002	All medical licensees.
2002-19	Medical Misadministrations Caused By Failure to Properly Perform Tests on Dose Calibrators for Beta- and Low-Energy Photon-Emitting Radionuclides	06/14/2002	All nuclear pharmacies and medical licensees.
2002-17	Medical Use of Strontium-90 Eye Applicators: New Requirements for Calibration and Decay Correction	05/30/2002	All U.S. Nuclear Regulatory Commission medical licensees that use strontium-90 (Sr-90) eye applicators.
2002-16	Intravascular Brachytherapy Misadministrations	05/01/2002	All Medical Licensees.

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OL = Operating License
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2002-29	Recent Design Problems in Safety Functions of Pneumatic Systems	10/15/2002	All holders of operating licenses or construction permits for nuclear power reactors.
2002-28	Appointment of Radiation Safety Officers and Authorized Users Under 10 CFR Part 35	09/27/2002	All medical licensees.
2002-27	Recent Fires at Commercial Nuclear Power Plants in the United States	09/20/2002	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2002-26	Failure of Steam Dryer Cover Plate After a Recent Power Uprate	09/11/2002	All holders of operating license or construction permits for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2002-25	Challenges to Licensees' Ability to Provide Prompt Public Notification and Information During an Emergency Preparedness Event	08/26/2002	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

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