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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, DC 20555-0001

August 29, 2003

NRC BULLETIN 2003-03: POTENTIALLY DEFECTIVE 1-INCH VALVES FOR URANIUM HEXAFLUORIDE CYLINDERS

Addressees:

For Action:

(1) U.S. Nuclear Regulatory Commission (NRC) licensees and certificate holders authorized to possess and use source material and/or special nuclear material for the heating, emptying, and filling of uranium hexafluoride (UF_6) in 30- and 48-inch cylinders.

(2) Registered users of certificates of compliance for enriched (fissile) UF_6 packages, under 10 CFR Part 71.

For Information:

(1) Holders of Certificates of Compliance for enriched (fissile) UF_6 packages under 10 CFR Part 71

(2) U.S. Department of Transportation (DOT)

(3) U.S. Department of Energy (DOE)

Purpose:

NRC is issuing this bulletin to advise addressees of the performance and safety concerns with 1-inch valves for UF_6 cylinders manufactured by the Hunt Valve Company (hereafter, Hunt) of Salem, Ohio; and to request Action Addressees to take specified actions intended to identify potentially defective Hunt valves under their control, ensure cylinders with Hunt valves already installed are safely used and transported during a transition period, not to exceed twelve months, and ensure that only valves verified to be compliant with NRC regulations, NRC licenses and certificates, and DOT regulations are in use by the end of the transition period. All Action Addressees are required to provide NRC with a written response to this bulletin.

In the special cases of Hunt 1-inch valves already installed on cylinders containing depleted UF_6, that will not be transported offsite or subjected to further processing, replacement of the valves is not being requested, but the affected Action Addressees are requested to develop a safety justification for planned continued use of the Hunt valves on these cylinders.

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Background:

NRC has identified performance and safety concerns with 1-inch valves for UF_6 cylinders manufactured by Hunt. These safety concerns are based on:

(1) NRC Inspection Report 99902011-2001-201, issued October 25, 2001, which identified a number of significant deficiencies with Hunt's compliance with quality assurance (QA) requirements.

(2) NRC Information Notice (IN) 2002-31, "Potentially Defective UF_6 Cylinder Valves (1-Inch)," issued on October 31, 2002, discussed safety concerns related to UF_6 cylinder valves manufactured by Hunt. At that time, those safety concerns involved: (1) cracked packing nuts; and (2) the loss of material traceability and failure to conduct hardness testing, for a series of heat codes, for valve stems purchased by the United States Enrichment Corporation (USEC).

(3) NRC IN 2002-31, Supplement 1, "Potentially Defective UF_6 Cylinder Valves (1-Inch)," issued on March 24, 2003, discussed additional safety concerns related to UF_6 cylinder valves manufactured by Hunt. USEC conducted a testing program, on a sample of valves, to demonstrate that the 1-inch UF_6 Hunt valves would be able to perform their intended safety function. As a result of those tests, several 1-inch valves manufactured by Hunt for UF_6 cylinders failed the pressurized seat leakage acceptance criteria of the American National Standards Institute (ANSI) N14.1 Standard, "Uranium Hexafluoride-Packaging for Transport." All failed valves were from Hunt Valve Vendor Lot 200027-85.

Discussion:

The integrity of the 1-inch valves on UF_6 cylinders is an important safety issue, because the valve functions as part of a single containment boundary during processing, storage, and transportation. The main functions of the containment boundary are to prevent the release of radioactive and chemically hazardous material to the workplace and the environment. During on-site operation, the valve is part of the primary containment boundary that protects workers from exposure to UF_6 and hydrofluoric acid. The cylinders and valve are fabricated and used in accordance with rigorous standards (i.e., ANSI N14.1), because the packages are processed, stored, and transported with a single containment boundary. The containment boundary also prevents leakage of water into the cylinder. In the case of enriched (fissile) UF_6, such leakage could lead to an inadvertent nuclear criticality event. However, an inadvertent criticality could only result from an unlikely sequence of events, including multiple independent failures, and therefore, is considered improbable.

ANSI N14.1 states that the valves and cylinders for UF_6 are designed to withstand an internal pressure of 200 psig (1.38×10^6 Pa), and an external pressure of 25 psig (1.72×10^5 Pa). The valves are hydrostatically tested to 400 psig (2.76×10^6 Pa), to demonstrate that they meet these design conditions with an adequate margin of safety. The design condition of 200 psig (1.38×10^6 Pa) is beyond the pressures expected during normal operating conditions. The

hydrostatic test provides an added margin of safety for routine transportation conditions, and during potential transportation accidents.

The NRC staff has concerns regarding Hunt's QA program being able to assure that its 1-inch valves meet the ANSI N14.1 Standard. NRC is concerned that the potential deficiencies with the 1-inch valves identified in IN 2002-31 may not be limited to the heat and vendor lots identified in IN 2002-31 and its supplement. NRC has further concerns that the potential deficiencies cannot be limited through the QA documentation provided by Hunt. Because of the uncertainty involving Hunt's QA programs, staff believes it may not be possible to determine which 1-inch valves meet the 400 psig (2.76×10^6 Pa) hydrostatic test requirement, without performing actual physical testing. It likely would not be practical to reinstall valves that have been removed from filled cylinders for testing.

Applicable Regulatory Requirements:

Several provisions of NRC's regulations, (e.g., 10 CFR 70.23(a)(3) and (a)(4)), facility licenses, and certificates of compliance address the adequacy of equipment, facilities, and procedures to protect health and minimize danger to life or property, and address the packaging and transportation of radioactive material. The manufacture, testing, and use of UF_6 cylinder valves consistent with the provisions of the ANSI N14.1 Standard provides an adequate level of assurance that the health and safety of the public and workers are protected, both for on-site operations and during transportation. NRC has specified the use of the ANSI N14.1 Standard through the NRC certificates of compliance for fissile UF_6 transportation packages. 10 CFR Part 71, "Packaging and Transportation of Radioactive Material," applies to any licensee authorized by specific or general license to receive, possess, use, or transfer licensed material. In addition,10 CFR 76.60 (g) requires that USEC comply with the applicable provisions of 10 CFR Part 71. 10 CFR 71.5, "Transportation of Licensed Material," invokes DOT regulations under 49 CFR Parts 170 through 184. DOT regulations at 49 CFR 173.420 require that the UF_6 cylinders meet the ANSI N14.1 Standard.

Requested Actions:

Action Addressees that process, use, store, or transport UF_6 are requested to take the actions described below:

A. Addressees are requested to review their inventory, and determine whether 1-inch valves manufactured by Hunt are in their possession. If Action Addressees are not in possession of such valves, then no further action is requested, beyond submitting a written response to that effect, as described below. However, if Action Addressees are in possession of, or in the future will receive such valves, then the actions described below in B, C, D, and E are requested.

B. For 1-inch Hunt valves that are not yet installed on cylinders, Action Addressees are requested to:

    1. Replace such valves with equivalent valves that comply with existing NRC regulations, NRC licenses and certificates, and DOT regulations; or

2. Identify such valves, and, prior to installation of a Hunt valve on a cylinder, determine that it complies with existing NRC regulations, NRC licenses and certificates, and DOT regulations. This determination should not reference nor rely on QA documentation provided by Hunt. Action Addressees are expected to demonstrate, through their QA programs, that their valves meet NRC and DOT requirements. The determination should include:

    a. A testing program to demonstrate that each valve to be placed in service meets the pressure test requirements specified in Section 6.15.8 of the ANSI N14.1 Standard;

    b. A demonstration, to provide added assurance of valve quality, that the material specifications, certification requirements, and dimensional requirements specified in Sections 6.15.2, 6.15.3, and 6.15.4 of the ANSI N14.1 Standard, respectively, have been met. This can be accomplished through statistical sampling; and

    c. A demonstration that the remaining requirements specified in Section 6.15 of the ANSI N14.1 Standard have been met. This demonstration may include, but not necessarily be limited to, receipt and inspection records, and visual inspections of the valves.

C. For Hunt 1-inch valves already installed on cylinders containing depleted UF_6, that are not transported offsite or subjected to further processing, Action Addressees are requested to develop a safety justification for planned continued use of the Hunt valves on these cylinders.

D. For 1-inch Hunt valves already installed on cylinders that may be transported offsite or subjected to further processing, or that contain natural or enriched UF_6, Action Addressees that process, use, store, or transport UF_6 are requested to:

1. Describe the standard operating procedures pertaining to the handling of UF_6 cylinders with 1-inch valves installed, and state whether they include each of the following procedures, pertaining to the processing, use, storage, or transport of such cylinders:

    a. Ensuring that, at the time of valve installation, the cylinder and valve were successfully subjected to the 100 psig (6.9×10^5 Pa) air test required in the ANSI N14.1 Standard;

    b. Ensuring that the valve is closed and not leaking prior to each shipment, while also ensuring that the valve's packing nuts are tightened only in conformance with the ANSI N14.1 Standard;

    c. Ensuring that the valve is verified to be capable of maintaining a negative pressure without substantial leakage, prior to heating, filling, or emptying; and

2. Provide information on how you plan to demonstrate that, after a transition period not to exceed twelve months from the date of issuance of this bulletin, all valves installed on UF_6 cylinders (except for those subject to C above) comply with existing NRC regulations, NRC licenses and certificates, and DOT regulations. Alternatively, a plan that would result in complete replacement of all the Hunt valves already installed on cylinders, by equivalent valves that comply with existing NRC regulations, NRC licenses and certificates, and DOT regulations, over a twelve-month period, would be considered acceptable.

E. Maintain, for inspection, the documentation of the specific actions taken, and the responses to the above requests for information.

Required Response:

In accordance with 10 CFR 2.204, 10 CFR 40.31(b), 10 CFR 70.22(d), 10 CFR 71.39, and 10 CFR 76.70(e), to determine whether any license or certificate should be modified, suspended or revoked, each Action Addressee is required to respond as described below. This information is sought to verify compliance with the current bases of the license or certificate for the facilities or transportation packages covered by this bulletin.

Each Action Addressee is required to prepare and have available for future NRC inspection, documentation demonstrating completion of the Requested Actions within twelve (12) months from the date of issuance of this bulletin. This information is required to be retained by the Action Addressees for 24 months from date of issuance of this Bulletin.

Within 30 days of issuance of this bulletin, all Action Addressees must provide to NRC, in writing, a statement whether they will perform the actions and meet the completion dates requested above. Alternatively, this response may state that there are no Hunt 1-inch valves in the Action Addressee's inventory, whether installed on cylinders under their control, or not. All Action Addressees that choose not to prepare the requested information, or are unable to meet the requested completion date, must provide to NRC, in writing, alternative courses of action such addressees propose to take, including the safety bases for the acceptability of the proposed alternative courses of action.

The required written responses should be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, under oath or affirmation under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 71.39. In addition, submit copies of the response to: (1) Director, Office of Nuclear Material Safety and Safeguards; and (2) the appropriate regional administrator.

Related Generic Communications:

- Information Notice 2002-31, Supplement 1, "Potentially Defective UF_6 Cylinder Valves (1-Inch)," March 24, 2003.

- Information Notice 2002-31, "Potentially Defective UF_6 Cylinder Valves (1-Inch)," October 31, 2002.

- Information Notice 97-24, “Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves,” May 8, 1997.

- Information Notice 89-78, “Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves,” November 22, 1989.

Backfit Discussion:

Under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 40.31(b), 10 CFR 70.22(d), 10 CFR 71.39, and 10 CFR 76.70(e), as appropriate, this bulletin transmits an information request for the purpose of verifying compliance with existing applicable regulatory requirements (see the “Applicable Regulatory Requirements” section of this bulletin). Specifically, the requested regulatory information will enable the NRC staff to determine whether potentially nonconforming valves are being used in the processing and transportation of licensed material and whether addressees can establish an adequate safety basis for qualifying and using the nonconforming valves.

Federal Register Notification:

A notice of opportunity for public comment on this bulletin was not published in the *Federal Register* because the NRC staff is requesting actions, by licensees and certificate holders, on an expedited basis, for the purpose of assessing compliance with existing applicable regulatory requirements and the need for subsequent regulatory action. This bulletin was prompted by the discovery of seat leakage on a number of valves that were required to have been previously tested to the ANSI N14.1 Standard requirements by the vendor. A Public Meeting will be separately announced, to be held 2-3 weeks after this bulletin is issued. As the resolution of this matter progresses, comments on the actions requested and the technical issues addressed by this bulletin may be sent to the U.S. Nuclear Regulatory Commission, Attn: Document Control Desk, Washington, D.C. 20555-0001.

Small Business Regulatory Enforcement Fairness Act:

NRC has determined that this action is not subject to the Small Business Regulatory Enforcement Fairness Act of 1996.

Information Addressees:

NRC is issuing this bulletin to Information Addressees to alert them to potential deficiencies in 1-inch valves for UF_6 cylinders manufactured by Hunt. It is expected that the recipients will review the information for applicability to their facilities and consider actions, as appropriate. However, the requested actions and the required responses applicable to the Action Addressees are not applicable to the Information Addressees; therefore, no specific action nor written response is required from them.

Paperwork Reduction Act Statement:

This Bulletin contains information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget, approval number 3150-0012.

The burden to the public for these mandatory information collections is estimated to average 350 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of these information collections, including suggestions for reducing the burden, to the Records Management Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to INFOCOLLECTS@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0012), Office of Management and Budget, Washington, DC 20503.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

If you have any questions about this matter, please contact one of the technical contacts listed below, or the appropriate Office of Nuclear Material Safety and Safeguards project manager.

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Attachments: 1. Referenced Standards
2. List of Recently Issued NRC Bulletins

REFERENCED STANDARDS

American National Standards Institute, ANSI N14.1 - 1995, “Uranium Hexafluoride - Packaging for Transport,” ANSI, New York, New York.