

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

February 22, 2000

NRC INFORMATION NOTICE 2000-03: HIGH-EFFICIENCY PARTICULATE AIR FILTER  
EXCEEDS MASS LIMIT BEFORE REACHING  
EXPECTED DIFFERENTIAL PRESSURE

Addressees:

All Nuclear Regulatory Commission (NRC) licensed fuel-cycle conversion, enrichment, and fabrication facilities.

Purpose:

The NRC is issuing this information notice to alert addressees to a potentially significant nuclear criticality risk for high efficiency particulate air (HEPA) filters which could in some instances accumulate special nuclear material (SNM) beyond a safe mass. Recently, the SNM mass limit was exceeded in a HEPA filter housing because the established differential pressure control was based on SNM with significantly different flow restriction characteristics than the actual process SNM. Review of a change in application of the HEPA filter failed to consider the effect of the different SNM on the filter housing differential pressure control. Recipients are expected to review this information for applicability to their facilities and consider actions, as appropriate, to control the risk of a nuclear criticality. Suggestions contained in this information notice are not NRC requirements. Therefore, no specific actions or written response is required.

Description of Circumstances:

On June 3, 1999, a fuel cycle facility licensee reported that a nuclear criticality safety mass limit within a primary SNM bearing HEPA filter had been exceeded. Subsequent licensee investigation revealed that the SNM bearing filter was being used to remove dry triuranium octoxide ( $U_3O_8$ ) with a mass limit based on differential pressure that would occur if dry uranium dioxide ( $UO_2$ ) were the sole process material in the air stream. The inappropriate differential pressure limit degraded the margin of safety to the extent that a criticality safety limit was violated. The failure to consider the effect of the different material on the established differential pressure control is considered to have high potential safety significance.

ML003685310  
Template: NRR-052

Discussion:

On June 2, 1999, a fuel cycle licensee discovered that approximately 50 kgs (110.23 lbs) of  $U_3O_8$  were held up in a primary HEPA filter in excess of nuclear criticality safety limits. The HEPA filter had a mass limit of 25 kgs (55.12 lbs)  $UO_2$  equivalent, which was one of the two primary criticality controls for the equipment. The licensee investigation determined that the HEPA filter was designed so that a differential pressure of 10.16 cm (4 inches) would be reached before 25 kgs (55.12 lbs) of fissile material had accumulated. This differential pressure limit was established for filtration of dry  $UO_2$  by HEPA filters widely used in the facility. The HEPA filter in which the mass accumulated was connected to equipment that produced dry  $U_3O_8$  which exhibited different characteristics for flow at pressure drop across the filter media.

One cause of this event was the failure of the licensee to determine that a change did not comply with the basis for an original operating limit. When evaluating changes in the use of equipment for which risk significant limits and controls are established, licensees should consider all aspects of the equipment or operation upon which the limits and controls were originally based.

An additional cause of this event appeared to be low airflow through the filter. The vacuum for the filter was set just above the 10.16 cm (4 inch) differential pressure limit. This airflow was sufficient for  $UO_2$  but due to the different particle characteristics of  $U_3O_8$ , the 10.16 cm (4 inch) differential pressure limit may never have been reached regardless of the amount of material trapped. Licensees should consider reviewing recent changes to equipment or operations to see if operating parameters have been changed in a way that undermines risk significant safety limits and controls.

This event highlights the need to understand clearly the basis for established safety limits when reviewing new installations or configuration changes. A new or changed configuration may undermine the basis for proposed limits which were valid in other applications.

It is expected that addressees will evaluate the above information for applicability to licensed activities. This information notice requires no specific actions or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate regional office.

Michael F. Weber, Director  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Technical Contact: Dennis C. Morey, NMSS  
301-415-6107  
E-mail: [dcm@nrc.gov](mailto:dcm@nrc.gov)

Attachments:

1. List of Recently Issued NMSS Information Notices
2. List of Recently Issued NRC Information Notices

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\*See previous concurrence

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DATE	1/ /2000		1/12/2000		1/20/2000		1/ 24/2000		1/13/2000		1/24/2000		2/14/2000	

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LIST OF RECENTLY ISSUED  
 NMSS INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2000-02	Failure of Criticality Safety Control to Prevent Uranium Dioxide (UO <sub>2</sub> ) Powder Accumulation	2/22/2000	All NRC licensed fuel-cycled conversion, enrichment, and fabrication facilities
99-33	Management of Wastes Contaminated With Radioactive Materials	12/28/99	All medical licensees
99-32	The Effect of the Year 2000 Issues on Medical Licensees	12/17/99	All NRC medical licensees
99-31	Operational Controls to Guard Against Inadvertent Nuclear Criticality	11/17/99	All NRC licensed fuel cycle conversion, enrichment and fabrication facilities
99-30	Failure of Double Contingency Based on Administrative Controls Involving Laboratory Sampling and Spectroscopic Analysis of Wet Uranium Waste	11/8/99	All fuel cycle licensees and certificates performing laboratory analysis to determine uranium content, in support of administrative criticality safety controls
99-29	Authorized Contents of Spent Fuel Casks	10/28/99	All power reactor licensees and spent fuel storage licensees and applicants
99-28	Recall of Star Brand Fire Protection Sprinkler Heads	9/30/99	All holders of licenses for nuclear power, research and test reactors, and fuel cycle facilities
99-27	Malfunction of Source Retraction Mechanism in Cobalt-60 Teletherapy Treatment Units	9/2/99	All medical licensees authorized to conduct teletherapy treatments
99-26	Safety and Economic Consequences of Misleading Marketing Information	8/24/99	All Distributors and/or Manufacturers of Generally Licensed Products
99-24	Broad-Scope Licensees' Responsibilities for Reviewing and Approving Unregistered Sealed Sources and Devices	7/12/99	All medical licensees' of broad-scope and master materials licensees

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2000-01	Operational Issues Identified in Boiling Water Reactor Trip and Transient	2/11/2000	All holders of licenses for nuclear power reactors
99-34	Potential Fire Hazard in the use of Polyalphaolefin in Testing of Air Filters	12/28/99	All holders of licenses for nuclear reactors and fuel cycle facilities
99-33	Management of Wastes Contaminated With Radioactive Materials	12/28/99	All medical licensees
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99-01, Rev. 1	Degradation of Prestressing Tendon Systems in Prestressed Concrete Constrainments	10/7/99	All holders of operating licensees for nuclear power reactors