Department of Energy
National Nuclear Security Administration
Washington, DC 20585

September 1, 2000

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

The Secretary's Action Plan, in response to the Board's DNFSB/TECH-23, made a commitment in Deliverable 3.2 to issue a revision to The Department of Energy Handbook (DOE-HDBK-3010-94), ***Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities***, by September 1, 2000.

A Change Notice was issued on March 1, 2000 for DOE-HDBK-3010-94. The first paragraph of Volume 1, Section 5.4.1, on Page 5-30 was deleted. The PDF version of the Handbook currently in the DOE Technical Standards home page has been updated incorporating the Change Notice. A copy of the Change Notice is attached for information.

If you have any questions, please call me at (202) 586-2179, or have your staff call Richard Crowe at (301) 903-6214.

Sincerely,

Madelyn R. Creedon
Deputy Administrator
for Defense Programs

Attachments

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

MEMORANDUM FOR THE DEPUTY ADMINISTRATOR

FROM: James C. Landers
Assistant Deputy Administrator for Program Support

SUBJECT: **ACTION**: DEPARTMENT OF ENERGY RESPONSE TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD, IDENTIFICATION OF TECHNICAL ERROR IN DEPARTMENT OF ENERGY HANDBOOK 3010-94

ISSUE: The Defense Nuclear Facilities Safety Board (DNFSB) identified an apparent error in Department of Energy Handbook (DOE-HDBK-3010-94), *Airborne Release Fractions Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, that needed to be corrected.

DISCUSSION: In Section 2.3.2 of DNFSB/TECH-23 a technical error was identified in Volume 1, Section 5.4.1, on Page 5-30 of DOE-HDBK-3010-94. The paragraph in question wrongfully attributed the ability of High Efficiency Particulate Air filters to function at temperatures well above the 250 degrees Fahrenheit maximum temperature rating of the filters. After discussions with representatives from the filter manufacturers, from filter (fibrous glass) media producers, and the glass fiber manufacturers, it was agreed that the Handbook paragraph identified by the DNFSB provided incorrect information. To correct this error, the paragraph was deleted from the Handbook by a Change Notice issued March 1, 2000.

SENSITIVITIES: None

POLICY IMPACT: None

RECOMMENDATION: That you sign the attached letter to the Chairman of the DNFSB.

Attachments

TS

NOT MEASUREMENT SENSITIVE

DOE-HDBK-3010-94
December 1994

CHANGE NOTICE NO. 1
March 2000

DOE HANDBOOK

AIRBORNE RELEASE FRACTIONS/RATES AND RESPIRABLE FRACTIONS FOR NONREACTOR NUCLEAR FACILITIES

Volume I - Analysis of Experimental Data

U.S. Department of Energy
Washington, D.C. 20585

AREA SAFT

Change Notice No. 1

DOE-HDBK-3010-94

March 2000

Airborne Release Fractions/Rates and Respirable Fractions

For Nonreactor Nuclear Facilities

Page / Section	Change
p. 5-30, Section 5.4.1	Delete the first paragraph of this section since it contains erroneous information.

5.4 HEPA FILTERS

5.4.1 Thermal Stress

HEPA filters, both unused and removed from service due to high differential pressures (clogged), were tested using solid particles at a range of temperatures less than required for failure. The efficiencies of the filters prior to testing for 1.8 μm particles ranged from 99.97% to 99.9999989%. Two high flow (2000 cfm) and one 1000 cfm HEPA filters with glass fiber media and various sealant and gasket materials were tested. No releases were found at temperatures below 150°C (175°C for one of the high flow filters). For the 1000 cfm type filter, the release rates for temperatures from 175°C and 190°C started at 1E-6/min and reduced to 5E-8/min within 1 hour (the lower limit of detection was 2E-8/min). The high flow HEPAs were tested to temperatures of 200°C and 250°C with release rates starting at 2E-4/min and 2E-5/min and reducing to 3E-7/min in 30 min and 2E-8/min in 60 min. The decay in release was exponential during the initial 30-minutes approaching the 60-min rate asymptotically. There was no release of contamination from a oven-fired, mineral sealant, high flow type filter at temperatures up to 350°C and the release in other types of HEPA filters is associated with the emission of smoke (binder, degradation of inert dust on filter, pyrolysis of gaskets). Thus, it appears that the heat-induced release from 1000 cfm HEPA filter prior to failure may be as high as 1E-5. It is assumed that HEPA filters destroyed by flame intrusion or by the impact of air at a temperature sufficiently high to melt the glass fiber are subjected to high temperature air to result in the release given above for heat-induced release. The RF is assumed to be 1.0 without an experimental basis. ARFs for high-flowrate HEPA filter may be an order of magnitude higher (1E-4). On these bases, bounding ARF and RF values for the impact of heat upon loaded HEPA filters are assessed to be 1E-4 and 1.0.

5.4 HEPA FILTERS

5.4.1 Thermal Stress

The ARF from the heat-induced damage to a HEPA filter is estimated to be very small. HEPA filters resisted temperature as high as 825 °C for period of tens of minutes before loss of efficiency and 500 °C for in access of 45 min (Hackney, 1983). The filter medium is very fine diameter glass fiber that softens and melts when heated and thus, tends to retain materials adhering to the fibers. The release rate for several types of HEPA filter in flowing air at elevated temperatures less than required to induce failure (up to 400 °C) are very low (Ammerich et al., 1989).

HEPA filters, both unused and removed from service due to high differential pressures (clogged), were tested using solid particles at a range of temperatures less than required for failure. The efficiencies of the filters prior to testing for 1.8 μm particles ranged from 99.97% to 99.9999989%. Two high flow (2000 cfm) and one 1000 cfm HEPA filters with glass fiber media and various sealant and gasket materials were tested. No releases were found at temperatures below 150 °C (175 °C for one of the high flow filters). For the 1000 cfm type filter, the release rates for temperatures from 175 °C and 190 °C started at 1E-6/min and reduced to 5E-8/min within 1 hour (the lower limit of detection was 2E-8/min). The high flow HEPAs were tested to temperatures of 200 °C and 250 °C with release rates starting at 2E-4/min and 2E-5/min and reducing to 3E-7/min in 30 min and 2E-8/min in 60 min. The decay in release was exponential during the initial 30-minutes approaching the 60-min rate asymptotically. There was no release of contamination from a oven-fired, mineral sealant, high flow type filter at temperatures up to 350 °C and the release in other types of HEPA filters is associated with the emission of smoke (binder, degradation of inert dust on filter, pyrolysis of gaskets). Thus, it appears that the heat-induced release from 1000 cfm HEPA filter prior to failure may be as high as 1E-5. It is assumed that HEPA filters destroyed by flame intrusion or by the impact of air at a temperature sufficiently high to melt the glass fiber are subjected to high temperature air to result in the release given above for heat-induced release. The RF is assumed to be 1.0 without an experimental basis. ARFs for high-flowrate HEPA filter may be an order of magnitude higher (1E-4). On these bases, bounding ARF and RF values for the impact of heat upon loaded HEPA filters are assessed to be 1E-4 and 1.0.