October 30, 1997

The Honorable Federico F. Peña
Secretary of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585-1000

Dear Secretary Peña:

The staff of the Defense Nuclear Facilities Safety Board (Board) has reviewed various aspects of the ventilation systems at the Rocky Flats Environmental Technology Site (RFETS). The enclosed report is the staff's summary of the issues identified during a recent visit to RFETS.

The Board would like to draw several key issues to your attention. These issues are of concern not only for RFETS, but potentially for other facilities in the defense nuclear complex as well. They include the need for an assessment of the vulnerability of the complex to the problem of high-efficiency particulate air (HEPA) filter degradation from wetting; the need for guidance on acceptable fire deluge test methods that do not wet the HEPA filters; the need for guidance on acceptable ventilation strategies to be used in fire fighting, including consideration of possible damage to the HEPA filters due to smoke blockage; the need to restore and maintain filter testing capabilities as necessary to meet standards requirements and ensure adequate design margins; and the need to provide guidance on an acceptable test methodology and criteria for bypass leakage tests.

Please provide the Department's response to the issues identified in the enclosed report at your earliest convenience.

Sincerely,

John T. Conway
Chairman

c: The Honorable Alvin L. Alm
The Honorable Victor H. Reis
Mr. Peter N. Brush
Mr. Mark B. Whitaker Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 11, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: R. W. Zavadoski

SUBJECT: Review of Ventilation Systems at Rocky Flats Environmental Technology Site

This report documents a review by a member of the staff of the Defense Nuclear Facilities Safety Board (Board) R. W. Zavadoski. This review focused on the ventilation systems at Rocky Flats Environmental Technology Site (RFETS), with emphasis on high-efficiency particulate air (HEPA) filter degradation by filter wetting, ventilation deluge system testing, fire-fighting strategies, qualification testing of filters required by standards, and the recently completed bypass leakage study.

Filter Aging, Filter Wetting, and Deluge System Test Methods. A study relative to the aging of HEPA filters is referenced in a letter from Mr. M. D. Brailsford, Vice President, Kaiser-Hill Company, dated July 14, 1997, numbered 97-RF-034749, entitled *Documentation of milestone completion, Complete Filter Life Study -MDB-395-97*, and addressed to Mr. D. Lowe, Manager of Engineering, Department of Energy, Rocky Flats Field Office. This study found that age alone cannot be used as a limiter of the operational lifetime of a HEPA filter. In addition to age, filter loading, wetting, and manufacturer's design are all important when considering how long a filter should remain in service. The study found that wetting of the filters can reduce the strength of the filter paper below the original specification. This concern is important because the first bank of HEPA filters is intentionally wetted during the annual testing of the fire protection deluge system. This wetting could jeopardize the integrity of an installed safety system if the wetted bank were a credited stage as analyzed in the Safety Analysis Report, or if the wetting of the bank should lead to a filter "blow-out," which could cascade down the filter banks. The contractor stated that they would first look at HEPA filter stages credited in the safety analysis that are wetted, and then at stages that could fail by a cascading effect. Potential solutions are to reduce the material at risk; use another stage, if available; and change out the filters with new ones fitted with screens. An integral part of any solution is to determine how to run the annual fire surveillance without actually wetting the filters. The Department of Energy (DOE) Rocky Flats Field Office will attempt to alert the complex to the problem of wetting of safety-class filter systems for fire protection requirements.

Fire-Fighting Strategies. The smoke from fires can disable a HEPA filtration system. The contractor at RFETS has examined the strategy for fighting fires and operating the various

ventilation systems, and found that some enhancements are required to account for the weakening of the filters from previous wettings and the disabling effects of smoke. The contractor is attempting to have a new strategy in place by November 1997.

Qualification Testing. Although the current manufacturer's design for the HEPA filters meets the minimum paper strength specification, the RFETS aging study found that the designs of existing filters are considerably weaker than they were formerly. Over the years, DOE's share of the HEPA filter business has steadily decreased—from almost total dominance to a small share (10–20 percent). At one time, the filter manufacturers supplied a product that was substantially above the minimum specifications (e.g., filter paper thickness), which in essence provided additional defense in depth. Today's major consumers, computer chip manufacturers, do not need this extra margin. At the same time, the status of Qualified Products List (QPL) testing has changed. Edgewood Arsenal no longer performs the tests, and the test equipment at RFETS is being dismantled and sent to Lawrence Livermore National Laboratory. This merely places the equipment at a given location and does not ensure that the QPL testing program is again viable.

Bypass Leakage Studies. The staff met with DOE and contractor personnel at RFETS to discuss and observe various concerns related to ventilation systems. One such concern relates to the potential for bypass leakage around the filtration system and in the negative-pressure section upstream of the fan. In response to DNFSB/TECH-3, *Overview of Ventilation Systems at Selected DOE Plutonium Processing and Handling Facilities*, a study, documented in a memorandum from Ms. J. M. Roberson, Manager, Department of Energy, Rocky Flats Field Office, dated March 31, 1997, entitled *Transmittal of Assessment of Ventilation System Bypass Leakage in Plutonium Facilities Report*, and addressed to Mr. A. L. Alm, Assistant Secretary for Environmental Management, was performed at RFETS to determine whether bypass leak paths existed. Prior to this study, the doors to the filter housings were tested for bypass leakage. The study identified additional leak paths through some unsealed fan shafts and damper operators. As a result of the study, testing procedures are being modified to account for the various leak paths. However, the rationale for the test methodology and the suitability of the acceptance criteria have not been determined. The DOE Rocky Flats Field Office intends to provide the lessons learned from this study to the rest of the complex.

Future Staff Actions. The staff intends to follow up on review of the above areas through future interactions with DOE.