

John T. Conway, Chairman  
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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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June 26, 2002

The Honorable Jessie Hill Roberson  
Assistant Secretary for Environmental Management  
Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0113

Dear Ms. Roberson:

The staff of the Defense Nuclear Facilities Safety Board (Board) recently reviewed the H-Canyon ventilation system at the Savannah River Site. The staff focused on an exhaust duct from the Old HB-Line that could allow an unfiltered ground-level release of contamination during canyon accidents, especially a seismic event. Although compensatory measures are in place to address this issue, there are no plans to correct this design deficiency in the canyon's safety-class ventilation system.

The Board recognizes the vital role played by H-Canyon in reducing the risk posed by remnants of weapons production. In light of the ongoing and long-term mission work planned for H-Canyon and its outside facilities, the Board believes that timely resolution of this issue would be appropriate. The enclosed report prepared by the Board's staff is forwarded for your information and use as appropriate.

Sincerely,

John T. Conway  
Chairman

c: Mr. Jeffrey M. Allison  
Mr. Mark B. Whitaker, Jr.

Enclosure

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

## Staff Issue Report

June 4, 2002

**MEMORANDUM FOR:** J. K. Fortenberry, Technical Director

**COPIES:** Board Members

**FROM:** J. Malen

**SUBJECT:** H-Canyon Ventilation System

This report documents issues identified by the staff of the Defense Nuclear Facilities Safety Board (Board) during a review of the H-Canyon ventilation system. The review focused on the interface between the safety-class canyon exhaust system and the non-safety-class Old HB-Line (OHBL) exhaust system, which is the subject of a current Justification for Continued Operation (JCO). This review was conducted on May 8, 2002, by staff members T. Creese, T. Davis, J. Malen, and R. Zavadoski.

**Summary.** The H-Canyon chemical separation facility plays a vital role in the Department of Energy's (DOE) plans for reducing the risk posed by the hazardous remnants of weapons production in accordance with the Board's Recommendations 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, and 2000-1, *Prioritization for Stabilizing Nuclear Materials*. An exhaust duct from the Old HB-Line exits the canyon exhaust tunnel prior to the sand filters. Failure of this duct could allow an unfiltered ground-level release path for contamination during canyon accidents, especially a seismic event. Although compensatory measures are in place, there are no plans to correct this design deficiency in the canyon's safety-class ventilation system.

**Description of H-Canyon Ventilation System.** The H-Canyon ventilation system has several interfaces with the OHBL ventilation system. The canyon exhaust system has been designated as safety-class to mitigate consequences during canyon accidents. The canyon's underground exhaust tunnel runs perpendicular to the facility beginning at the warm canyon exhaust tunnel, intersecting the hot canyon exhaust tunnel, and continuing outside of the canyon footprint to two sand filters. Canyon exhaust is drawn through the sand filters by fans and vented to the atmosphere through a 195 foot stack. A portion of the OHBL exhaust duct enters the canyon exhaust tunnel upstream of the sand filters, maintaining a separate duct inside of the larger tunnel. After this temporary intrusion, the OHBL exhaust duct exits the canyon exhaust tunnel upstream of the sand filters and delivers flow to a bank of high-efficiency particulate air (HEPA) filters, located in the 292-H fan house.

The non safety-class OHBL ventilation system relies upon several aging, degraded, or seismically unqualified components. The exhaust fans are approximately 52 years old, and the HEPA filter bank is approximately 32 years old. Within the fan house, hangers for the ductwork

appeared to the staff to be undersized, and site ventilation engineers noted cracked welds at several connections. A recent internal seismic review recommended replacement of the hangers with seismically qualified restraints. Because of worker exposure concerns, similar investigations have not been completed to ensure the integrity of the hangers suspending the portion of OHBL duct inside the canyon exhaust tunnel.

**Continued Operation of H-Canyon and HB-Line.** The presence of fission products on the OHBL HEPA filters suggests a leak from the canyon exhaust tunnel into the OHBL exhaust duct. As early as 1988, Westinghouse Savannah River Company (WSRC) personnel noted high gamma radiation in the HEPA filter room. The most recent full-scale mission work in OHBL facilities was conversion of plutonium-238 solutions to oxides, causing contamination of process rooms and gloveboxes with alpha-emitting radionuclides. However, approximately half of the contamination currently captured by the OHBL HEPA filters consists of gamma-emitting isotopes—products of canyon processing. This contamination indicates that canyon exhaust is leaking into the OHBL exhaust duct.

The OHBL ventilation system is a seismically unqualified appendage to the safety-class canyon exhaust system. During an accident, canyon exhaust leaking into the OHBL duct could bypass the sand filters and be released unfiltered at ground level. This interface was not previously addressed in the H-Canyon authorization basis, and as a result, an Unreviewed Safety Question was reported to DOE in 2000. In response, DOE approved a JCO to allow continued operation of H-Canyon and HB-Line.

The JCO has six compensatory actions to prevent or mitigate an unfiltered ground-level release of contamination and to minimize worker exposure within Building 292-H. These actions include increased monitoring of components of the OHBL exhaust system for degradation and contamination; semiannual leak testing of the OHBL exhaust duct; and, in the event of an earthquake, development of a plan to ensure that the OHBL exhaust system is placed in the most favorable condition. WSRC intends to integrate this JCO into the permanent authorization basis next year.

Several options for correcting this deficiency permanently have been evaluated, but no firm plan exists. The most likely approach calls for installation of a HEPA filter bank and two exhaust fans in a minimally contaminated OHBL process room. Additional ducts downstream of the new fans would combine the filtered OHBL exhaust into the canyon exhaust upstream of the sand filters. The bypassed ductwork, HEPA filters, and fans would be abandoned in place but seismically isolated from the canyon exhaust.

**Discussion.** Despite the compensatory actions listed in the JCO, the seismically unqualified OHBL duct represents a potential ground-level release path for contamination during accidents. The approved JCO suggests no schedule for permanent reconfiguration of the OHBL exhaust duct, and it is not clear that DOE is appropriately pursuing corrective actions to eliminate this design deficiency. Increased occupancy of the H-Canyon outdoor facilities as a result of the Highly Enriched Uranium Blend Down Project could increase the consequence of an unfiltered ground-level contamination release from Building 292-H. In light of the ongoing

and long-term mission work planned for H-Canyon and its outside facilities, the Board's staff believes that this deficiency ought to be corrected in a timely manner.

Another potential safety issue exists with the OHBL ventilation supply system. Loss of OHBL exhaust fans can pressurize the OHBL process rooms relative to personnel occupied areas. In the past—most recently in October 1993—this failure has driven airborne contamination into occupied areas. As a result of the October 1993 incident, two workers received internal doses of 100 mrem, and all dismantlement and decontamination in OHBL was halted. A contingency plan is currently in place to help mitigate worker contamination in the event of future failure of the OHBL exhaust fans. WSRC is proposing the installation of automatic dampers to isolate the OHBL supply system upon failure of the OHBL exhaust fans and so prevent pressurizing the OHBL process rooms. It would be appropriate to perform this upgrade at the same time as the other OHBL ventilation system modifications.