[DNFSB LETTERHEAD]

July 10, 1997

The Honorable Alvin L. Alm
Assistant Secretary for Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, DC 205850104

Dear Mr. Alm:

Enclosed for your consideration and action, where appropriate, are the observations developed by the members of the staff of the Defense Nuclear Facilities Safety Board (Board) concerning the electrical and fire protection systems of the HCanyon at the Savannah River Site (SRS). These observations are based on reviews of available documents and discussions with Department of Energy (DOE) staff end contractor personnel at SRS on May 2830, 1997.

Based on discussions among the Board's staff end representatives from DOE and Westinghouse Savannah River Company, a number of actions were agreed upon involving some poststart safety systems upgrades and interim compensatory measures. These are documented in Attachment 1 to the Board's staff trip report. The Board believes that continued future operation of HCanyon will require completion of these upgrades and measures.

The Board believes that the HCanyon restart can proceed safely, provided that the approach described in Attachment 1 is adhered to and that DOE Operational Readiness Review prestart findings, briefed to the Board by DOE on June 25, 1997, are satisfactorily closed.

Please contact me if you have any questions.

Sincerely,

John T. Conway

Chairman

c. Mr. Mark B. Whitaker, Jr.

Dr. Mario Fiori

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

June 10, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: A. K. Gwal

SUBJECT: Review of HCanyon Electrical and Fire Protection Systems, May 28-30, 1997

This memorandum documents a review by members of the staff of the Defense Nuclear Facilities Safety Board A. K. Gwal and T. Davis of the HCanyon electrical and fire protection systems at the Savannah River Site (SRS), conducted on May 28-30, 1997. The review identified major issues in emergency power, fire protection, and lightning systems. It would be prudent to resolve these issues prior to restart.

The current HCanyon mission is to stabilize Mark16/22 spent nuclear fuel. The first phase of the restart program involves operation of the dissolver and headend processes. Phase II and Phase III of the restart will resume solvent extraction operations.

Emergency Power Systems. The safetyclass power system at HCanyon provides reliable power to the canyon exhaust fans during a loss of normal power. This system also provides power to nonsafety loads through three motor control centers. Institute of Electrical and Electronics Engineers (IEEE) 384, *Standard CriterinforIndependence of Class 1E Equipment and Circuits,* requires that nonsafety loads be adequately isolated from the safetyclass bus to ensure that failure of a nonsafety component would not cause failure of the safetyclass power system Adequate isolation of nonsafety loads is not currently provided at HCanyon.

Canyon Exhaust Fans. Large motors (e.g, those associated with the canyon exhaust fans) may experience large transient torques when power is lost and then restored shortly thereafter (less than 5 seconds). This happens because the motor continues to rotate and acts as a generator after loss of power, and may not be synchronized with normal power when the latter returns National Electrical Manufacturers Association Standard MG1, *Motors and Generators,* requires that this problem be analyzed and resolved to prevent motor failure.

Diversion Valves. The circulating cooling water diversion valves must be operated following a contamination alarm to prevent contamination release through the cooling towers. These motor-operated valves can be operated locally (both electrically and manually) or from the HCanyon control room Westinghouse Savannah River Company (WSRC) recently decided that electrical operation is preferred and has upgraded the functional classification of the electric operator and associated controls. Manual operation is also being maintained. However, it is not clear whether the power supply, currently classified as nonsafetyclass, will be reclassified to safety class. WSRC is still reviewing this situation.

Fire Protection Systems. The Fire Hazard Analysis is being thoroughly revised by WSRC and is scheduled to be issued by September 1997. Therefore, the Board's staff could not complete the review of fire protection systems. However, during a tour of the HCanyon facilities, the staff observed the following design deficiencies in the fire protection system, whose resolution prior to restart is necessary:

c A diesel fuel (combustible) tank inside the 292H Building is located in the vicinity of many circuit breakers and electric switches (ignition sources). This is a hazardous situation.

c Many electrical cables (combustibles) are in the cable trough located behind the indicating/control panels of the control room. These cable troughs have no fire protection system. A spark or short circuit could provide an ignition source and start a significant fire.

c Seismically designed tanks are provided to ensure a supply of water to the fire protection sprinklers during a seismic event. However, the interconnecting water supply piping and supports are not seismically designed.

Lightning Protection Systems. Inadequate lightning protection is provided for the safetyclass diesel generator (DG) building and an exhaust stack. Safetyclass exhaust fans do not appear to be within the lightning protection zone. Additionally, the exhaust stack has two air terminals, but they are not adequately grounded. It would be prudent to have an adequate lightning protection system, as required by DOE Orders and National Fire Protection Association Standard 780, *Lightning Protection Code,* for the DG building and the exhaust stack.

Future Staff Actions. The Board's staff will continue to follow the resolution of the issues identified in this report and will review the PreFire Plan package and Fire Hazard Analysis for HCanyon. The staff will also closely monitor the projects (S4404 and S4610) for electrical, fire protection, and ventilation upgrades.

Attachment 1

Summary of HCanyon Electrical Issues

Prestart Issues

1. Electrical Equipment Near Diesel Fuel Tank

Trip Report: A diesel fuel (combustible) tank inside the 292H Building is located in the vicinity of many circuit breakers and electric switches (ignition sources). This is a hazardous situation.

Resolution: Compensatory actions (Facility Fire Inspector and fire patrol) will be established until this issue is corrected during the ventilation upgrade project.

Prestart Deliverables: 1. Establish fire patrol

2. Establish facility fire inspector program

3. Commitment to correct problem (long term)

2. Control Room Fire (cable pits)

Trip Report: Many electrical cables (combustibles) are in the cable trough located behind the indicating/control panels of the control room. These cable troughs have no fire protection system. A spark or short circuit could provide an ignition source and start a significant fire.

Resolution: Compensatory actions (vents in cable access plates, portable Halon suppression and one hour fire patrol) will be established until issue is corrected as a part of fire protection proJect.

Prestart Deliverables: 1. Commitment to establish compensatory measures

2. Commitment to correct problem (long term)

3. Firewater Supply Piping

Trip Report: Seismically designed tanks are provided to ensure a supply of water to the fire protection sprinklers during a seismic event, but the interconnecting water supply piping and supports are not seismically designed.

Resolution: A contingency plan for loss of firewater distribution will be developed. Sitewide actions for responding to natural phenomena hazards (i.e., events that affect multiple facilities) will be assessed.

Prestart Deliverables: Commitment to develop contingency plan for loss of firewater distribution.

Poststart Action: Conduct sitewide assessment of actions that affect multiple facilities.

4. Lightning Protection

Trip Report: Inadequate lightning protection is provided for the safetyclass diesel generator (DG) building and an exhaust stack. Safetyclass exhaust fans do not appear to be within the lightning protection zone. Additionally, the exhaust stack has two air terminals, but they are not adequately grounded. It would be prudent to have an adequate lightning protection system, as required by DOE Orders and National Fire Protection Association Standard 780, *Lightning Protection Code,* for the DG building and the exhaust stack.

Resolution: Stack work has started and will be complete at the end of August. Protection for the 292H building will be completed as soon as possible (as a part of the ventilation upgrade project).

Prestart Deliverables: Schedule for completing work.

Other Issues

1. Emergency Power Systems

Trip Report: The safetyclass power system at HCanyon provides reliable power to the canyon exhaust fans during a loss of normal power. This system also provides power to nonsafety loads through three motor control centers. Institute of Electrical and Electronics Engineers (IEEE) 384, *Standard CriteriaforIndependence of Class lE Equipment and Circuits,* requires that nonsafety loads be adequately isolated from the safetyclass bus to ensure that failure of a nonsafety component would not cause failure of the safetyclass power system. Adequate isolation of nonsafety loads is not currently provided at HCanyon.

Resolution: Will be corrected as part of ventilation upgrade project. No action is necessary in the interim.

Action: Board staff will review HCanyon complete loss of power procedures.

2. Diversion Valves

Trip Report: The circulating cooling water diversion valves must be operated following a contamination alarm to prevent contamination release through the cooling towers. These motor-operated valves can be operated locally (both electrically and manually) or from the HCanyon control room. Westinghouse Savannah River Company (WSRC) recently decided that electrical operation is preferred and has upgraded the functional classification of the electric operator and associated controls. Manual operation is also being maintained. However, it is not clear whether the power supply, currently classified as nonsafetyclass, will be reclassified to safety class. WSRC is still reviewing this situation.

Resolution: WSRC position discussed in memo (NMSEHA970354 dated June 27, 1997).

Action: Board staff will continue to follow.

3. Canyon Exhaust Fans

Trip Report: Large motors (e.g., those associated with the canyon exhaust fans) may experience large transient torques when power is lost and then restored shortly thereafter (less than 5 seconds). This happens because the motor continues to rotate and acts as a generator after loss of power, and may not be synchronized with normal power when the latter returns. National Electrical Manufacturers Association Standard MG1, *Motors and Generators,* requires that this problem be analyzed and resolved to prevent motor failure.

Resolution: Fans have small time constant (~0.5 seconds). HCanyon is very unlikely to experience short power loss (less than 0.5 seconds).

Action: WSRC is performing test to verify time constant.

Applicability to FCanyon

Design and operation of the FCanyon facility at Savannah River Site is very similar to HCanyon. Therefore, many of the issues identified above may be applicable to FCanyon.

Action: Determine the applicability and appropriate actions at FCanyon for the issues identified above.