

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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April 29, 2010



The Honorable Inés R. Triay
Assistant Secretary for Environmental
Management
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Dr. Triay:

The staff of the Defense Nuclear Facilities Safety Board (Board) recently reviewed the Integrated Facility Aging Management (IFAM) program at the Savannah River Site (SRS). The Board has been mindful for several years of the deterioration resulting from the aging of key SRS facilities. Identification of aging systems, evaluation of necessary aging management measures, and implementation of those corrective measures are the Board's primary concerns.

In 2006, the Department of Energy (DOE) directed an engineering assessment of H-Canyon be performed to ensure that its facilities could operate cost-effectively through 2019. At that time, the Board concluded that the strategy for upgrading the safety basis appeared reasonable, but a systematic life extension evaluation was needed to ensure continued safe operations. In 2007, DOE Headquarters suggested SRS managers develop a robust integrated facility aging management plan for H-Canyon. Accordingly, DOE and its contractor established the IFAM program, which has generated more than 60 recommendations.

The IFAM program has identified repair or replacement needs that are placed on the H-Area Infrastructure Upgrades List. Funding to address the needs on this list has fallen short of 2007 planning assumptions. The contractor has used operating funds to complete many of the smaller and/or safety-related IFAM repairs, but many of the highest cost items continue to go unaddressed. The delay in addressing these items increases the potential risk that aging equipment will interrupt future operations, which could jeopardize DOE's plan for safe disposition of enriched uranium (and other hazardous materials) from across the defense nuclear complex. In the interim, to mitigate risks associated with failure of aging equipment, DOE and its contractor should compensate with enhanced surveillance, maintenance, and administrative controls.

The SRS contractor is aggressively preparing to resume spent fuel processing at H-Canyon later this year; however, DOE still has not conclusively identified and determined the scope and quantities of the materials that will be processed, and over what time period. This uncertainty makes it even more difficult for the contractor to decide which upgrades to pursue.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests DOE submit a report within 90 days of receipt of this letter providing a schedule for completing known upgrades necessary to support the H-Canyon mission, and DOE's plans for evaluating and addressing age-related degradation in H-Canyon.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter S. Winokur". The signature is fluid and cursive, with a large initial "P" and "W".

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Jack R. Craig
Mr. Mark B. Whitaker, Jr.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

March 12, 2010

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: C. Butch, D. Gutowski

SUBJECT: Aging Management for H-Canyon, Savannah River Site

The staff of the Defense Nuclear Facilities Safety Board (Board) reviewed open recommendations from Savannah River Nuclear Solutions' (SRNS) Integrated Facilities Aging Management (IFAM) program at the Savannah River Site (SRS) during February 9–10, 2010. The staff is concerned that funds are not available to address some of the maintenance needs and upgrades identified by the IFAM program for H-Canyon. Funding of H-Canyon infrastructure upgrades in preparation for the resumption of spent fuel processing later this year has fallen far short of initial assumptions.

Background. The IFAM program at SRS is tasked with (1) identifying age-related degradation that could compromise the integrity of safety-related or mission-critical systems and (2) recommending repairs or replacements necessary to mitigate risks associated with such degradation. IFAM covers all systems included in the Enriched Uranium Disposition Project, which includes H-Canyon and the associated support systems. The staff believes that the IFAM team is doing a thorough job in evaluating systems and providing recommendations for continued safe operations. System evaluations for H-Canyon will continue through the end of 2013 to support a proposed canyon end of life in 2019. The estimated cost of addressing a number of open recommendations from completed system evaluations is high. Several of these open items could significantly impact planned materials disposition work if the degraded equipment should unexpectedly fail.

IFAM Recommendations. There are more than 30 open IFAM recommendations related to H-Canyon. SRNS is acting on many of these recommendations, such as minor repairs, procurement of spares, and additional inspections, using funds from operating budgets as available. However, funding is lacking for many of the high-cost, high-impact repairs and upgrades. The following open recommendations have significant safety and programmatic risks:

- Removal of the old hot crane in H-Canyon
- Rewiring of H-Canyon nuclear incident monitoring system to replace aging cables

- Repair of degraded H-Canyon structural components
- Replacement of H-Area cooling water switchgear

Removal of the Old Hot Crane—The old hot crane is an original 1950s crane that operates on the same rail system as the new hot crane used in day-to-day operation of the facility. The control wiring, main bridge drive, hoist motor, and main trolley drive are all severely degraded as a result of years of operation in an acid vapor environment. Operators do not move the old hot crane and use it only for manipulations in Section 18 of the canyon, where it is parked.

Facility personnel realize the old hot crane is vulnerable to failure at any time. Should the crane fail, the facility will lose processing capability in Section 18, which houses process tanks and sump receipt tanks. Without Section 18, facility engineers will be forced to develop a new process flow sheet that does not use Section 18 tanks.

IFAM personnel recommended dismantlement and removal of the old hot crane. H-Canyon operations personnel agreed with this recommendation and prepared an estimate of the time, cost, and resources needed to accomplish this task. Removing the old hot crane is not simple and is expected to cost several million dollars. Once workers begin the hot crane replacement, H-Canyon processing may be shut down for 4 to 5 months. Workers in plastic suits will spend upwards of 100 days manually disassembling the crane and packing out the parts. Ideally, this activity would occur during a planned outage rather than a forced outage due to an unexpected failure. The upcoming resumption of spent fuel processing in the hot canyon increases the potential programmatic impact of a forced or planned outage to remove the crane.

Nuclear Incident Monitoring System (NIMS)—The H-Canyon Documented Safety Analysis credits the NIMS as safety significant equipment to detect an inadvertent criticality and notify facility workers. The IFAM recommendation for NIMS states:

The NIM alarm circuit wiring (Criticality, Trouble, Bypass) and power circuit wiring from Section 8 to Section 17 on second level of 221-H is in cable trays and has been exposed to excessive heat and chemical spills during the life of the installation. This wiring and all associated junction boxes should be replaced. The new circuits should be placed inside dedicated conduit.

This recommendation is currently unfunded and lacks a defined path forward. A separate recommendation notes similar degradation of cables to the outdoor traffic lights, which are wired into NIMS to control facility access after an incident.

The degradation of NIMS is an example of a weakness in the IFAM process: the process does not trigger a reevaluation of relevant Technical Safety Requirement (TSR) surveillance frequencies when an IFAM evaluation identifies degraded safety equipment. H-Canyon TSRs contain several surveillances of NIMS, some of which monitor portions of the wiring incidentally, but a functional test on each NIMS alarm circuit signal is required only every 5 years. American National Standards Institute (ANSI) 8.3-1997, *Criticality Accident Alarm*

System, Section 6.3, states: “Following modifications or repairs, or events which call the system performance into question, there shall be tests and inspections adequate to demonstrate system operability.” The staff believes identification of system degradation is such an event. However, the IFAM recommendation that the NIMS wiring and junction boxes be replaced because of past exposures did not trigger testing per ANSI 8.3, Section 6.3, nor did it prompt safety analysts to reevaluate the current infrequent surveillance.

H-Canyon Structural Components—The IFAM program identified a number of H-Canyon and supporting facility structural components exhibiting varying levels of degradation:

- Many pier supports for the canyon’s cell covers have crumbled. SRNS has installed temporary steel jigs to act in place of the supports, but they are of marginal design. Development of more robust supports is in progress.
- The canyon walls exhibit degradation, loss of concrete, and exposed rebar, both inside and outside of the canyon. The worst damage to the outside walls is lost concrete 6 inches deep in a nearly 5-foot-thick wall with intact rebar. SRNS is currently repairing most of the known areas with wall damage.
- Section 7 of the H-Canyon roof liner is degrading such that water is seeping through. There is no indication (e.g., rebar staining) of serious damage to the roof slab. Funding and resources to replace the roofing membrane are not yet available. Other sections of the canyon and supporting facilities also need roof repair to prevent water intrusion and further damage.

SRNS personnel have been acting on most of the recommended structural repairs. However, other structural components, such as the cell covers, have unknown levels of degradation, and the IFAM program has recommended additional inspections. The results of these inspections could lead to additional recommended repair work, and SRNS does not currently have the funding and resources to complete all existing structural repair recommendations. The staff believes that with continued evaluation and fully funded repairs, the canyon structure can remain functional through 2019, which is currently DOE’s projection for end of mission.

H-Area Cooling Water Switchgear—The H-Area cooling water switchgear provides electrical power to the cooling water system that supports H-Canyon. The H-Canyon documented safety analysis classifies the independent cooling water supply as a defense-in-depth system, credited with supplying cooling water to essential equipment. The switchgear dates from the 1950s, is of an obsolete design, and is nearing the end of its useful life. Should the switchgear fail, the cooling water system will lose power, and H-Canyon will be forced into an unexpected outage.

The IFAM program generated a recommendation to replace this switchgear, and the contractor has completed the design for a replacement. Procuring and installing this replacement

is currently the highest priority on the SRNS H-Area Infrastructure Upgrades List, but it is uncertain when funds and personnel will be available to proceed.

Conclusion. The staff believes the IFAM program provides valuable information regarding age-related degradation of safety- and mission-critical systems. DOE and SRNS use these recommendations to help prioritize funding for critical upgrades, but funding often is not available. Additionally, the Board's staff remains concerned that other projects on the H-Area Infrastructure Upgrades List may go unfunded. In a letter to DOE dated February 6, 2009, the Board noted that the H-Canyon lightning protection system did not meet modern standards. In response, DOE committed to add a project to the Upgrades List addressing the system, but DOE and SRNS have not funded this project.

The staff believes that systems awaiting safety-related upgrades merit consideration for additional compensatory measures until such upgrades are completed. DOE and SRNS could use IFAM evaluations and other system evaluations to identify any risks associated with continued operation of the systems in need of upgrades and develop compensatory measures to mitigate those risks.