DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004
(202) 208-6400

July 5, 1995

Mr. Mark Whitaker, EH-9
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Dear Mr. Whitaker:

Enclosed for your information and distribution are 20 Defense Nuclear Facilities Safety Board staff reports. The reports have been placed in our Public Reading Room.

Sincerely,

George W. Cunningham
Technical Director

Enclosures (20)

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 22, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

FROM: Dan Burnfield

COPIES: Board Members

SUBJECT: Hanford Site Decommissioning Trip Report, April 24-27, 1995

1. **Purpose:** This report documents an initial review by Defense Nuclear Facilities Safety Board (Board) staff members concerning actions to decommission inactive facilities at the Hanford Site. Staff reviewers were Dan Burnfield, Joe Sanders, Dermot Winters, and Roger Zavadoski. The facilities reviewed during this visit included PUREX, 300 Area Fuel/Fabrication facilities, N Reactor, the Waste Incinerator Facility at PFP, the Concentration Facility at REDOX, and to a limited extent, B Plant.

2. **Summary:** The staff reviewed the Stage 1 decommissioning activities (as defined by International Atomic Energy Agency (IAEA), *Decommissioning of Nuclear Facilities: Decontamination, Disassembly and Waste Management, Technical Reports Series No. 230*). The Department of Energy (DOE) refers to this process as deactivation. In general, however, the staff believes that decommissioning actions being taken at the Hanford Site are being managed inconsistently, appear to lack technical direction, and do not comply with the spirit of the IAEA documents regarding decommissioning. Specifically, IAEA suggests that the first contamination barrier be maintained as it was during operation, that the containment (confinement) building be kept in a state commensurate with the hazard, that the atmosphere inside the building be controlled appropriately, and that equipment necessary to monitor radioactivity both inside and outside a facility be kept in good condition and used whenever appropriate. The facilities reviewed on this trip will not meet these conditions upon completion of the Stage 1 decommissioning activities. Further, many facilities have not maintained an adequate authorization basis. Based on these deficiencies, it is not clear what level of safety is being maintained for the workers and the public. While no imminent hazards to health and safety were observed, the facility condition is expected to degrade over the remaining lifetime with only minimum surveillance and maintenance being performed.

3. **Background:** The IAEA has divided the decommissioning phase of the life cycle into three stages. The description provided by the IAEA for these three stages is contained in the Attachment to this report. DOE has also divided the decommissioning phase into three stages, much like the IAEA did. DOE terminology for these three stages has evolved over the past several years but has recently settled on deactivation, decommissioning, and environmental

restoration. Although there are similarities between the IAEA and the DOE stages, the demarcation between stages as specified by DOE is not as clear as that proposed by the IAEA. As the roles of the two DOE offices primarily responsible for decommissioning have evolved, the Board's staff has become concerned that this lack of clear direction by DOE could lead to deteriorating conditions in DOE's inactive facilities.

4. **Discussion:** The staff has the following specific concerns regarding the decommissioning activities at the Hanford Site.

   a. The memorandum of agreement between DOE and the EPA assumes that each facility will have adequate safety documentation throughout the decommissioning process. Many facilities (e.g., N reactor and the other production reactors) have not maintained or appropriately modified Safety Analysis Reports or Operational Safety Requirements since shutdown. No plans exist for developing new safety documentation for many of these facilities. Without this documentation there is no basis of operation for these facilities.

   b. The contractor's organizations, Westinghouse Hanford Company (WHC) and Bechtel Hanford Inc., which are performing decommissioning activities at the Hanford site have not adequately integrated their activities. This has resulted in variances in methodology and technology between facilities. The staff is concerned that the differences have not been adequately analyzed and optimized to produce a safe, effective, and cost efficient program. In addition, unexplained differences exist among the facilities being decommissioned by WHC. For example, for no apparent reason, the allowable levels of residual contamination for plutonium glove boxes vary from 150 grams to several kilograms.

   c. The first contamination barrier at the facilities varies from sealed glove boxes in the processing facilities to the water contained in the spent fuel basin at the N reactor. Irrespective of the type of barrier, however, it is not clear in any of the facilities visited that the barriers have been maintained or acceptably modified to ensure that they will maintain the same integrity as an operating facility. For example, the basin purification systems at the N reactor have not been operational since the late 1980s. The basin still contains a significant quantity of radioactive material and sludge, yet the water chemistry in the basin has not been maintained and there is biotic growth in the water. The facility plans to add hypochlorite to the basin to control the biological material, but has not evaluated the effect the chemical addition will have on the radioactive material stored in the basin. Other examples were noted at Building 308, a 300 area plutonium fuel fabrication facility, and at PUREX. In Building 308 the contractor sealed decontaminated processing glove boxes using an elastomer-type translucent sealant, "fifty-year caulk", latex paint, and the glove ports with an aluminum cover. By comparison, the PUREX staff stated that similar processing glove boxes at PUREX would be laid up using similar

techniques but that cracked windows of the gloveboxes would not be replaced. None of the facilities had performed a technical evaluation of the effects of radiolitic decomposition on hydrocarbon-type sealants.

d. The IAEA states that the ventilation system and containment (confinement system) may be removed or modified during Stage 2 of the decommissioning process following decontamination of the facility. In the processing facilities that the staff reviewed, the ventilation systems have been or are planned to be significantly modified during Stage 1 of decommissioning and before facility decontamination is complete. In the 300 Area plutonium fuel fabrication facility (described above), the ventilation system has been turned off. At several facilities, personnel were unable to adequately explain how the facilities ensure that their ventilation systems would maintain the correct ventilation parameters for surveillance and maintenance periods that could exceed 30 years. Some were relying on the natural draft of the chimneys over this period.

   The ventilation system at the B plant has approximately 750,000 Curies of ^{90}Sr and ^{137}Cs entrained in the filtration system. The filters are underground and have a water seal, but they were not designed to allow remediation. It is not clear how these filters can be adequately maintained for the remainder of the facility lifetime.

   The PUREX facility has two railroad tunnels that have been used for many years to store equipment that is highly contaminated with plutonium. The Stage 1 decommissioning plan requires that these tunnels to be sealed and the ventilation system removed. It is not clear how migration of plutonium from these tunnels will be precluded or how Stage 2 of the decommissioning process will progress if the tunnels become highly contaminated by plutonium migration from stored equipment.

e. The conduct of operations, radiological protection practices, and housekeeping of many of these facilities are not being adequately maintained. For example, at N Reactor and PUREX the radiological control technicians do not appear to have the requisite knowledge to perform their tasks. When exiting one facility, the Board's staff was required to undergo three separate surveys for contamination. On one of the surveys the radiological control technicians performing a hand frisk of personnel did not adequately frisk the personnel and the technique used could have resulted in cross-contamination of the personnel. In another case a staff member was instructed to take actions that resulted in a minor radiological deficiency because the radiological protection technicians did not exercise the necessary precautions.

5. **Future Staff Actions:** The staff considers additional reviews of the deactivated Hanford reactors to be necessary to understand the long-term effects of placing a facility in a surveillance and maintenance mode. In addition, further reviews of the activities associated with the deactivation of PUREX, U-plant, T-plant and REDOX are warranted. Deactivation plans for PNL and other 300 Area facilities should also be reviewed.

Stage 1 decommissioning

The first contamination barrier is kept as it was during operation, but the mechanical opening systems are permanently blocked and sealed (valves, plugs, etc.).

The containment building is kept in a state appropriate to the remaining hazard and atmosphere inside the building is subject to appropriate control. Access to the inside of the building is subject to monitoring and surveillance procedures.

The unit is under surveillance and the equipment necessary for monitoring radioactivity both inside and outside the plant is kept in good condition and used when necessary and in accordance with national legal requirements. Inspections are carried out to check that the plant remains in good condition. If necessary, checks are carried out to see that there are no leaks in the first contamination barrier and the containment building.

Stage 2 decommissioning

The first contamination barrier is reduced to minimum size and all parts easily dismantled are removed. The sealing of that barrier is reinforced by physical means and the biological shield in a reactor is extended if necessary so that it completely surrounds the barrier.

After decontamination to acceptable levels, the containment building and the nuclear ventilation system may be modified or removed if they are no longer required for radiological safety. Depending on the extent to which other equipment is removed or decontaminated, access to the former containment building, if left standing, can be permitted.

The non-radioactive buildings or equipment in the plant may be converted for new purposes.

Surveillance around the barrier can be relaxed but it is desirable for periodic spot checks to be continued as appropriate, together with surveillance of the environment. External inspection of the sealed parts should also be performed.

Stage 3 decommissioning

All materials, equipment and parts of the plant in which activity remains significant despite decontamination are removed. In all remaining parts contamination has been reduced to acceptable levels.

The plant and site are released for unrestricted use. From the point of view of radiological protection, no further surveillance, inspection or tests are necessary.

In some cases the whole plant, including inactive components, may be dismantled to make room for a replacement facility or other usage.