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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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October 16, 1996

The Honorable Alvin L. Alm
Assistant Secretary for Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Mr. Alm:

Members of the staff of the Defense Nuclear Facilities Safety Board (Board) and an outside expert recently performed a review at the Savannah River Site (SRS) on the readiness to conduct stabilization of plutonium-242 in the HB-Line. Enclosed is the trip report from this review.

The review identified deficiencies that could lead to a lack of proper control of operations to ensure protection of the public and workers. In addition, the facility had just completed readiness assessments by the Westinghouse Savannah River Corporation and the Department of Energy SRS. Noted deficiencies in training and qualification, engineering change control, and issue resolution could call into question the efficacy of the readiness review process at SRS. The observations are provided for your information and use for the remaining operations with plutonium-242 and upcoming operations with plutonium-239. The Board would appreciate being informed of actions taken to address the enclosed observations.

Please call me if I can be of further assistance.

Sincerely,

A handwritten signature in cursive script, reading "John T. Conway".

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Dr. Mario Fiori

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 5, 1996

MEMORANDUM FOR: G.W. Cunningham, Technical Director

COPIES: Board Members

FROM: Matthew B. Moury

SUBJECT: Review of Operational Readiness for Plutonium-242 Operations at HB-Line, Savannah River Site, August 20-22, 1996

1. **Purpose:** This report documents a review by Defense Nuclear Facilities Safety Board (Board) staff members M. Moury, S. Krahn, and outside expert R. West from August 20-22, 1996, of the Conduct of Operations, Maintenance, Training, and Safety Documentation Implementation to support the plutonium-242 process at the Savannah River Site's HB-Line.
2. **Summary:** The following comments summarize the findings from the review:
 - a. **Conduct of Operations.** Two evolutions were observed and the operators and supervisors were interviewed. Significant weaknesses were noted in supervision of evolutions, valve control, control of changes to operating procedure, and response to alarms.
 - b. **Training and Qualification.** Shift managers and first-line supervisors were not trained to an increased depth contrary to the requirements of the applicable Department of Energy (DOE) Order. Additionally, there was no different qualification card for personnel in these supervisory positions, to ensure their additional responsibilities were covered adequately.
 - c. **Safety Documentation.** No deficiencies were noted with the incorporation of process limits and controls into the operating procedures.
 - d. **Issue Resolution.** Several errors were noted in the completed actions for findings developed during the Facility Evaluation Board (FEB) review and the Readiness Assessment by the Westinghouse Savannah River Corporation (WSRC). These errors appeared to be due to the summary nature of corrective actions developed by WSRC.
 - e. **Level of Knowledge.** Interviews of shift personnel and two engineers revealed weaknesses in understanding of the authorization basis, valve control, process chemistry and nuclear reactions, and procedures for responding to alarms and their use.
 - f. **Readiness Assessments (RA).** Although the Readiness Assessment by DOE and WSRC complied with the requirements of the DOE Order, the actual assessments performed

appeared ineffective in determining the state of readiness of conduct of operations and procedures and lacked independence.

3. **Background:** Plutonium-238 processing for the Cassini orbiter was completed this year and the HB-Line is currently flushing systems and components to remove residual plutonium-238. H-Area is being prepared for stabilization of plutonium-242 solutions to an oxide through use of an oxalic acid precipitation method followed by filtration and calcination. This stabilization process will use the same equipment as was used in the recent plutonium-238 campaign, with only minor chemical process changes. Due to the lower activity and thermal load, the hazard level of the plutonium-242 campaign is lower than that of the plutonium-238 campaign. Plans for the facility following the plutonium-242 campaign include using its scrap recovery portion for dissolving plutonium-239 residues from FB-Line, for stabilization and storage.

RAs were conducted by WSRC and DOE to verify the readiness of the facility to conduct operations with plutonium-242. After the RAs, there were two significant occurrences in HB-Line with relevance to system control. On July 19, all room ventilation was lost because the discharge valve for an instrument air compressor was improperly shut. On July 30, a safety vent path for a product hold tank in the scrap recovery facility, the need for which had been established by an Operational Safety Requirement (OSR) recovery plan, was found improperly shut.

WSRC has reported that all prestart findings from DOE's RA have been closed. Based on this, DOE has authorized WSRC to commence stabilization of plutonium-242 in H-Canyon. DOE has withheld restart authorization for use of HB-Line pending closure of concerns related to the occurrence involving the instrument air compressor.

4. Discussion:

- a. Conduct of Operations. Due to the two occurrences noted above, the staff review focused, to a great extent, on evaluating the state of conduct of operations at the facility. Two flush evolutions were observed. In each case, there was lack of defense-in-depth in the control and supervision of the evolution. The control room operator, the only person with a copy of the procedure, directed all steps. The first-line supervisor was not actively involved in supervising the procedure. The valve operator in the line performing the work did not have a copy of the procedure, and he relied on orders from the control room operator for exercising valves. The preevolution brief was cursory and did not provide any assurance that the sequence of operations was understood by all involved personnel. Interviews of operators and supervisors revealed that they did not understand various valve operations orders.

During one evolution, an Immediate Procedure Change (IPC) that had been entered in the procedure was noted to differ from the change description on the attached IPC form. The control room operator considered two prerequisites for this evolution to be not applicable

and signed them off without verification; the control room operator simply mentioned his actions to the first line supervisor and performance of the procedure continued. The operator stated that this problem with the procedure had been noted previously, but no action had been taken.

During the evolution involving the precipitator feed tank, a low-level alarm occurred for a tank not associated with the evolution. Neither the first-line supervisor nor the control room operator took any action for the alarm, assuming without investigation that the alarm was spurious. No reference was made to any procedures for response to alarms. During subsequent interviews, it was found that two control room operators were unaware of whether a procedure existed for responding to this alarm, or where it might be found.

- b. **Training and Qualification.** Supervisory personnel were not trained to an increased extent, contrary to the requirements of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, Chapter IV, Section 4.c. The staff determined that the shift operations managers and first-line supervisors use the same qualification cards as the operators. The only additional training required for these supervisory positions was primarily related to their management skills and it did not include additional material on technical or shift operations. The identical finding was made in the Board's September 1992 report, *Investigation of the Operational Readiness Review and Associated Safety Issues for the HB-line Facility Savannah River Site Aiken, S.C.* [p. 132].
- c. **Safety Documentation.** An Unreviewed Safety Question Determination (USQD) performed by WSRC found that the safety documentation relevant to plutonium-238 provided sufficient process controls for ensuring safe operations for production of plutonium-242 oxide. The only change found to be necessary defined the allowable distribution of isotopes specified in the OSRs. The review found that the controls for the revised OSR and several others were properly implemented and the Linking Document Database was an accurate cross reference.
- d. **Issue Resolution.** The staff found several deficiencies with the resolution of findings. In general, the closure actions addressed programmatic issues to prevent recurrence; however, they did not fully address the specific technical issues in the findings. For example, a 1995 FEB review found several technical problems with maintenance procedures. The facility had committed to a one-year program to upgrade the quality of maintenance procedures to the level defined in WSRC 2S Manual, *Conduct of Operations*. The program did not address the technical issues raised by the FEB finding and not all technical problems had been resolved.

Another FEB finding noted that an installed safety-significant air compressor in a safety-significant system was not on the system drawing. The action taken by the facility in response to the FEB finding was to change the drawing to include the additional compressor. The original engineering documentation showed that this installation was a

temporary modification, and therefore the drawing was changed without proper configuration control and USQD review.

The closure packages developed by the WSRC RA for seven of the prestart findings were reviewed. One finding was apparently closed incorrectly. The deficiency (96-04-0322) related to inadequate identification of those steps that ensured that OSR *limits/requirements were met. The review showed that four out of ten procedures reviewed had deficiencies concerning this attribute, and not all applicable procedures had been revised.*

- e. Level of Knowledge. The shift operations manager and first-line supervisor did not understand the authorization basis for the plutonium-242 process. These two supervisors did not understand the alpha-neutron reaction involved with the process and why the shift from plutonium-238 to plutonium-242 caused a change in radiation during calcination. The first-line supervisor and operators did not know the significance of various valve control orders. The operators did not know what alarms were covered by alarm response procedures and where the required actions could be found for specified alarms. The shift technical engineer demonstrated weaknesses in calculating batch size for plutonium-242 operations, understanding the alpha-neutron reaction during calcination, and the hydrogen concerns during operations. The process engineer, on the other hand, was very knowledgeable about all aspects of the process. Except for the process engineer, all the personnel interviewed had difficulty explaining the reasons for the process steps and the related requirements in the safety basis.
- f. Readiness Assessments. The WSRC RA appropriately focused on differences between processing of plutonium-238 and plutonium-242 and modifications in safety requirements and procedures required by these differences, and the associated training and qualification program. The RA was also intended to verify readiness in conduct of operations, radiological controls, and condition of the plant. The review was primarily administrative in nature, and the RA team leader stated that no walkdown was performed for any procedure and no evolution was observed.

The scope of the DOE RA was similar to that of the WSRC RA. The team reviewed the WSRC RA and found it to be adequate. In conduct of operations, the team observed the performance of one surveillance, intermittently observed the control room activities during one shift, and interviewed the DOE facility representatives.

Both RAs appeared to meet the requirements of DOE Order 425.1, *Startup and Restart of Nuclear Facilities*, since the Order contains few requirements for conducting RAs. However, both reviews were ineffective in determining the state of readiness in the functional area of conduct of operations including procedures. With both team leaders having line responsibilities for the plutonium-242 process, the reviews would have

benefited from additional objectivity brought by increased independence and more performance-based evaluations of readiness instead of record reviews.

- 5. Future Staff Actions:** The staff will continue to follow the plutonium-242 process as a part of the normal oversight. In addition, the staff will follow preparations to process plutonium-239 in 1997.