

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 12, 1994

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Daniel G. Ogg, SRS HLW Program Manager

SUBJECT: Savannah River Site (SRS) Defense Waste Processing Facility (DWPF)
- Trip Report (May 5-6, 1994)

1. **Purpose:** This memorandum documents a DNFSB staff review at the DWPF during May 5-6, 1994. The focus of the review was maintenance planning and the long-term storage of in-process materials at DWPF. The review team consisted of Daniel Ogg and Michael Merritt.
2. **Summary:** The staff found that advance maintenance planning has taken place at the DWPF and that lessons learned from the operation of the F- and H- Canyons have been incorporated into that planning. However, some deficiencies were noted in maintenance procedures including the lack of incorporation of radiological controls and the lack of a rigorous verification and validation process.

The Savannah River Technology Center (SRTC) has analyzed the potential degradation of in-process materials and continues to study the characteristics of the DWPF chemical process and the behavior of materials in use in DWPF tanks and vessels. No significant process chemistry problems are expected by WSRC during extended shut-down periods at the facility.

3. **Background:** The Westinghouse Savannah River Company (WSRC) continues to test the chemical processing capabilities of the DWPF at the Savannah River Site. Cold Chemical Run testing was started in the fall of 1992 and the most recent testing milestone, melter heat-up, began in early May 1994. To date, no radioactive materials have been introduced into DWPF and the facility is "clean." Radioactive operations are currently scheduled to begin in December 1995.
4. **Discussion:**
 - a. DWPF Maintenance Planning: DWPF management has actively sought to incorporate F- and H-Canyon experience and lessons-learned into the design, construction, and maintenance planning at DWPF. Several improvements in the existing canyon configuration were identified by canyon operations and management personnel based on

experience at F- and H- Canyons. These improvements included stainless steel lined maintenance cells, enhanced run-in and testing capability, the inclusion of a laydown cell, remote radiation measurement capability in the Remote Equipment Decontamination Cell (REDC), improved lighting and viewing, a dedicated maintenance crane, and removable steam coils in evaporators.

The DWPF engineering organization provides support for maintenance planning by working closely with maintenance personnel. Engineering is integrally involved in the review of maintenance procedures and uses a formal review procedure to accomplish this task. The staff will continue to review the involvement of the engineering organization in maintenance and other aspects of DWPF operation.

Further discussions with maintenance managers revealed that verification and validation of maintenance procedures, as discussed in DOE Order 4330.4A, *Maintenance Management Program*, is not rigorous or formalized. Maintenance procedures lacked references to technical specification and system limitations as required by DOE Order 4330.4A.

Little progress has been made to establish a working radiological controls program as evidenced by the lack of training materials for operating personnel, and lack of radiological control procedures. The DNFSB staff found that the *Radiological Control Manual, DOE/EH-2056T, Rev. 1* (RCM) implementation is immature and RCM requirements, such as hold points are not yet incorporated into maintenance and operating procedures. Radioactive operations are not scheduled until December 1995, however, few plans or schedules for RCM implementation have been developed. Given the quantities of highly radioactive waste to be processed and the very high radiation levels that are expected in the canyon, the DNFSB staff believes that more attention by WSRC management is necessary for the timely implementation of the radiological control program. The staff intends to closely follow this effort as it develops at DWPF.

- b. Long Term Storage of Solutions: The Savannah River Technology Center (SRTC) is analyzing potential degradation products that might evolve during extended shut-down periods at DWPF. In the high level waste feed stream to the melter, tetraphenylborate has been identified as the primary "bad actor." Analyses conducted by the SRTC indicate that the affect of tetraphenylborate degradation on the process is limited to the potential evolution of water-soluble organics. No additional generation of benzene or hydrogen is expected and satisfactory glass can still be made from feed contaminated with these degradation products.

Lay-up planning for extended periods of shut-down at the DWPF includes flammability mitigation. Vessels containing in-process materials will be de-inventoried, maintained under a constant CO₂ purge flow, and periodically sampled. While the plans for these

mitigative actions appear adequate, few procedures or requirements for these activities currently exist.

- c. In-Service Inspections: Also planned, but not yet proceduralized, are vessel in-service inspections including erosion/corrosion analyses, infrared thermography, and ultrasonic testing. Additionally, DWPF personnel will conduct mock-ups of major vessel replacements. Most DWPF process vessels are constructed of the nickel/chromium/molybdenum (Ni/Cr/Mo) alloy, N10276 (C-276) and the quencher is made of the Ni/Cr/Mo alloy, ALLCOR. The SRTC is currently running a materials evaluation program during cold chemical runs to confirm the suitability of these vessel materials.
- d. Predictive Maintenance: Vibration analysis, oil/wear analysis, and motor/current analysis are not planned for equipment inside the canyon. The staff is concerned that this may not allow for adequate warning of an impending problem with rotating machinery such as agitators, pumps, and blowers which will be subjected to adverse chemical and radiological conditions.
- e. Safety Analysis: The Safety Analysis Report (SAR) does not consider the "maintenance mode" at DWPF, however, SRTC indicated that consideration was given to potential accidents during maintenance activities and these accidents were found to be bounded by the worst case operational accident. Lay-up parameters are proposed for periods of extended shut-down but are not yet approved and not required to be Operational Safety Requirements (OSRs). The staff believes that certain maintenance activities, such as large vessel replacements, pose enough of a risk to warrant additional safety requirements such as OSRs.

5. Future Staff Action:

The development of maintenance procedures and the implementation of a Radcon program at DWPF require further review by the DNFSB staff. Procedure technical review practices and engineering staff qualifications will be reviewed for adequacy.