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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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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,

A handwritten signature in black ink, appearing to read "G. W. Cunningham", is written over the typed name and title.

George W. Cunningham
Technical Director

Enclosures (20)

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 17, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Robert F. Warther

SUBJECT: Implementation of Recommendations 90-2 *Standards* (maintenance portion only) and 92-2 *Facility Representatives* at the Defense Waste Processing Facility

1. **Purpose.** This report documents reviews of the implementation of Recommendation 90-2 (identify, assess for adequacy, determine extent of implementation of standards) and Recommendation 92-2 (improve Facility Representative (FR) program) at the Defense Waste Processing Facility (DWPF).
2. **Summary.** The DWPF has implemented a very good maintenance program that meets the requirements and guidance contained in the Department of Energy (DOE) Order 4330.4B *Maintenance Management Program* and the DWPF Standards/Requirements Identification Document (S/RID). The DWPF maintenance manager started with a very large self assessment program and divided it into small, manageable assessment units. Continuous program improvement is achieved through a process of approximately 40 assessments per month against specific criteria in SCD-4 by DWPF line management. Each assessment consists of one individual using one criterion of SCD-4 such that an ongoing program of self assessment and improvement is maintained. It should be noted that many of the personnel assigned to the DWPF, including the maintenance manager, were previously managers at the K-reactor, the first facility to implement Recommendation 90-2.

The DOE FR program at the DWPF is one of the best observed in the complex to date. Five FRs are assigned to the DWPF, including one senior FR that acts as mentor to the other more junior FRs. The written examination bank requires some additional questions to fully meet DOE-STD-1063-93 *Establishing and Maintaining a Facility Representative Program at DOE Nuclear Facilities*. The oral examination bank questions include "draw and explain" system questions, as well as DWPF-specific questions regarding the Safety Analysis Report (SAR), Operational Safety Requirements (OSRs), and Limiting Conditions for Operations (LCOs). Additionally, the FR does not complete qualification until he or she completes an interview with the Field Office Manager. The Field Office Manager questions reportedly range from policy to specific technical questions concerning recent occurrences at the Savannah River Site (SRS).

3. **Background.** The review was conducted from February 13, 1995 through February 16, 1995 and focused in the maintenance functional area. Robert Warther of the Defense Nuclear Facilities Safety Board (DNFSB) technical staff conducted the review. Don Wille and Roger Zavadoski of the DNFSB technical staff also participated in a portion of these reviews, in addition to reviewing configuration management, design bases, and ventilation systems which will be reported on separately. Recommendation 90-2 was written in March 1990. That recommendation stated that the Department should identify, assess for adequacy, and determine the extent of implementation of standards at specific defense nuclear facilities. During its acceptance of that recommendation, the DOE stated that it would implement this recommendation at all its defense nuclear facilities.

Recommendation 92-2 was written in June 1992. It contained two principal elements. First, the DOE should conduct an analysis of the FR program. Second, based on the results of the analysis, the DOE should implement a formal, technically rigorous FR program.

4. **Discussion.** The trip was conducted in two parts. The first part of the review consisted of an assessment of the implementation of maintenance requirements contained in DOE Order 4330.4B and the DWPF S/RID. The second portion of the review consisted of a review of DOE's implementation of the FR Program and Recommendation 92-2.
 - a. Implementation of Recommendation 90-2. The scope of the review for implementation of this recommendation was limited to the maintenance functional area. The S/RID was not reviewed during this trip. The entire DWPF S/RID sent to EM-1 for signature was requested, and will be reviewed upon receipt by the Board. The following was observed with respect to implementation of the order requirements.
 1. *S/RID Adequacy.* Based on discussions with the DWPF maintenance manager, the maintenance section of the DWPF S/RID includes virtually all requirements and guidance contained in Chapter II (maintenance of nuclear facilities) of DOE Order 4330.4B, and augments the order with requirements and guidance from Federal laws, nuclear and chemical industry standards, and consensus standards. WSRC has a Maintenance Implementation Plan (MIP) that shows full implementation of the maintenance program by 1996. However, DWPF personnel are well ahead of schedule, and will likely complete implementation of the maintenance S/RID by the end of fiscal 1995.
 2. *Maintenance Element 1 Organization.* The DWPF maintenance organization is a relatively small organization of 192 personnel. Of these 192 personnel, 144 are craft personnel. This ratio of craft personnel to managers, supervisors and administrative staff is one of the highest observed at the defense nuclear facilities. The number of maintenance personnel does not include maintenance planning, work control, or maintenance of building and grounds (e.g., pavement, roofing, etc.).

3. *Maintenance Element 5 Types of Maintenance.* The maintenance manager at the DWPF has implemented one of the more mature maintenance programs in the complex. The DWPF maintenance program includes preventive and corrective maintenance sub-elements, as well as one of the few predictive maintenance programs at the defense nuclear facilities. Table I details the types of maintenance at the DWPF.

The predictive maintenance program is a subset of planned maintenance and includes:

- (a) Vibration analysis for over 130 rotating components. Most of this equipment is monitored biweekly.
- (b) Oil analysis for 12 components
- (c) Motor current analysis for 31 components
- (d) E l e c t r o n i c Characterization and Diagnostics (ECAD) for all thru-wall and remote canyon jumper circuits at the component and system levels.

Maintenance Type	# maintenance action items
Instrument calibration	4500
Planned maintenance	1700
Inspections and surveillances	450
System and component overhauls	450
Lubrication requirements	375

Table I Maintenance requirements at DWPF

This predictive maintenance program was implemented about one year ago. Westinghouse Savannah River Company (WSRC) has developed baseline information for most components. WSRC personnel stated that use of information from the predictive maintenance program has resulted in the replacement of approximately 50 components prior to catastrophic failure.

4. *Element 14 Facility Condition Inspection and Element 15 Management Involvement.* Progress toward and monitoring of maintenance program implementation is measured using a relatively complete set of about 25 maintenance performance indicators. Most of these performance indicators are updated weekly, with the balance of the performance indicator updates completed on a monthly basis. These performance indicators are maintained by one individual working less than half time. It is notable that one of the performance indicators is management and supervisor inspection and monitoring reports. The maintenance manager trends inspections scheduled, inspections completed, inspection reports completed, findings, and corrected findings. Tracking inspections by supervisors and managers is one of the maintenance manager's principal means of measuring implementation of Recommendation 90-2, and a primary means of demonstrating continuous improvement in maintenance.

5. *Element 16 Maintenance History and Element 17 Analysis of Maintenance Problems.* The maintenance history program at DWPF is a relatively new program. The antiquated Work Management System (WMS) is a financial management system adapted to perform some limited maintenance functions, including some maintenance history. WSRC is developing a modernized TECHBASE (Oracle-based) system for configuration management which will eventually download structure, system and component (SSC) data to WMS. In spite of the outdated nature of the WMS and the embryonic implementation of the TECHBASE system, WSRC personnel have been able to assemble some limited maintenance history information and use it within the framework of an engineered approach to improve SSC designs. For example, DWPF personnel noted several instances of analyzer failures, plotted number of failures versus month, and noted that the failure rate peaked in the winter and summer months. Based on this data, DWPF personnel identified two independent problems and were able to correct both.
6. *Recommendation 90-2 Self Assessments.* One phase 1 and two dedicated phase 2 self assessments have been completed by or for the DWPF maintenance department. Additionally, maintenance supervisors and managers have completed over 150 inspections in accordance with criteria consistent with SCD-4.
 - (a) The phase 1 self assessment was conducted against the requirements of the S/RIDs by EBASCO. This assessment was completed in September. No administrative non-compliances were identified.
 - (b) The dedicated phase 2 self assessments were conducted in accordance with SCD-4 in August 1992 for Cold Chemical Runs and in March 1994 prior to melter heat-up. These assessments were conducted by DWPF line management following training to conduct assessments. Four significant findings remain open from those assessments.
 - (c) The phase 2 self assessments discussed in the preceding paragraphs were dedicated self assessments dictated by the facility manager. However, the DWPF maintenance manager has conducted over 150 maintenance self assessments using the criteria of SCD-4. These self assessments meet the intent of the Board's Recommendation 90-2 and Revision 5 of DOE's Recommendation 90-2 Implementation Plan.
 - (d) The maintenance manager intends to complete a third dedicated self assessment prior to the Westinghouse Operational Readiness Review (ORR) scheduled for September 1995.
- b. Implementation of Recommendation 92-2. One plausible reason for the success of the DWPF maintenance program is continuous technical involvement by the DOE FRs. DOE-SR has combined the FR programs for the tank farms, In-Tank Precipitation (ITP), and DWPF under one umbrella organization for training and qualification. The DWPF program

in particular was reviewed, but comments regarding the DWPF program are likely applicable to the ITP and tank farms.

The most important observation noted for this program is the FRs' desire to witness evolutions, procedures, and operation of the SSCs first-hand. For example, the DWPF is experiencing some problems with the grappers. The FR went to the machine shop to visually sight the grapper and understand the technical and potential safety issues. Similarly, during observation of a filter replacement, the FR asked pointed questions regarding unexpected filter pressure readings noted the previous day. Other general observations regarding the FR program include the following:

1. DOE has assigned 15 FRs to the tank farms, ITP and DWPF/Saltstone. Seven of these FRs are qualified in accordance with DOE-STD-1063-93. Five FRs are assigned to the DWPF. One of these FRs is a senior FR, and acts as a mentor to the more junior FRs.
2. The senior FR at DWPF has assumed a very proactive role at the DWPF. His office is located adjacent to the canyon. More importantly, he personally sights many of the jobs and evolutions in progress. Most recently, it was the DWPF FR, not the M&O operations staff, that noted an unexpected increase in the DWPF melter feeder tank level during a startup test. He brought the level increase to the attention of the Control Room Supervisor who took immediate action to isolate the source of water. This action stands in stark contrast to other FRs who have refused to take conservative action even when faced with known procedural violations and were urged to take action by the DNFSB staff. The technical oversight by the DWPF FR could serve as a model for other less developed FR programs. It could also serve as a positive example for other DOE training programs (e.g., engineering, design) to demonstrate the benefits of technically competent personnel who enter the plant and understand their programs.
3. The FR written and oral examination banks for DWPF were reviewed by the DNFSB staff. In general, this program has a strong technical basis and meets the intent of Recommendation 92-2 and DOE-STD-1063-93, and largely meets all the requirements of the recommendation and standard. The following was observed:
 - (a) The written examination questions were compared to the DOE standard. The DOE standard requires that the written questions be partitioned into (1) management, assessment and oversight; (2) administrative; (3) general technical; and (4) regulatory areas. Seventy six questions were included in the written examination bank provided to the DNFSB staff. Of these 76 questions, 24 were related to management, assessments and oversight; 38 were related to general technical area; 10 were related to regulatory requirements; and 4 were related to facility-specific requirements. No questions were provided that relate to administrative requirements.

- (b) In general, few "draw and explain" system operation questions were included in the written examination bank. DWPF personnel stated that most of these questions are asked during the oral examination. This was substantiated by a large number of "draw and explain operation" type questions in the oral examination bank.
- (c) The oral examination bank consists of a good cross section of general, duties, orders and standards, and facility-specific questions. The oral examination questions were relevant and rigorous for FR qualification.
- (d) The DWPF oral examination qualification boards consist of three members. Upon successful completion of the oral examination, the Field Office Director interviews the FR for final qualification. To date, all FRs qualified under the existing program have been interviewed by the Field Office Head.

The single largest comment related to the FR written and oral examination banks are related to update frequency. The most recent questions included in the written examination bank date back to summer 1994. Some of the oral questions were submitted and approved in December 1994. DWPF personnel responsible for the examination banks stated that additional questions were in the review cycle.

- 4. The FR program includes a schedule for Duty Officer assignments to ensure that a constant DOE presence is maintained during the startup program.
5. **Future Actions.** The DNFSB staff intends to perform the following as follow-up to this trip:
- a. Review selected functional areas of the DWPF S/RID.
 - b. Return to DWPF to observe an FR qualification board.
 - c. Review WSRC ORR and phase 2 self assessments.