

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 2, 1994

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director

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**FROM:** Larry Zull, Technical Staff

**SUBJECT:** Trip Report on Sandia National Laboratory (SNL) Review of Reservoir Loading and Welding at the Savannah River Site (SRS) Replacement Tritium Facility (RTF), January 5-7, 1994

1. Purpose: The purpose of this trip was to observe a Sandia National Laboratory War Reserve Qualification (WRQ) review of reservoir loading and welding processes for two reservoir models to be processed at the RTF. This review was part of the process of qualifying RTF to process reservoirs for war reserve production.
2. Summary:
  - a. Sandia National Laboratory personnel reviewed and observed reservoir loading and welding processes at the RTF. Data previously obtained from loading twelve test reservoirs, including fill gas composition and weld requirements, were also reviewed and compared to production standards. Operator training records, the computerized reservoir information management system, and reservoir handling and storage operations were also reviewed.
  - b. The results of the Sandia review were favorable. A few changes in calculational methods and information recorded for each reservoir were requested to be made. It was also recommended that a local Heise pressure gage used to verify weld head nitrogen pressure be relocated for easier readability. Pending final reviews of requested information, an approval letter for production of the two reservoir models evaluated is expected to be issued.
  - c. Sandia does not specify or evaluate health and safety requirements related to reservoir loading, welding, unloading, transport, or storage operations. However, Sandia personnel did provide a few occupational safety observations at the closeout briefing with the contractor and DOE.
3. Background: The RTF has completed all major testing in the Startup Test Program, with the exception of the Thermal Cycling Absorption Process (TCAP) and the In-Bed Accountability Process (IBA). Testing of the TCAP process, which separates tritium from deuterium, and the IBA process, which determines the amount of tritium stored on the hydride beds, is in progress, with completion expected by March 11, 1994. These tests

are being performed in parallel with the program to qualify the loading, welding, and unloading of reservoirs for war reserve production.

4. Discussion:

- a. The Sandia National Laboratory is the design agency for six reservoir models to be processed at the RTF. Sandia specifies the standards for the design, fabrication, loading, welding, finishing and acceptance of war reserve production reservoirs. The Sandia on-site review at RTF was part of the reservoir production qualification process.
- b. In preparation for the Sandia reviews, twelve reservoirs of the model to be certified were test loaded in December 1993. The production parameters, including weld integrity and fill gas composition of the ten reservoirs, were evaluated at SRS, and found to satisfy the design agency standards. The two other reservoirs were shipped to Mound for an independent evaluation of the production parameter values.
- c. The Sandia reviews began on Wednesday, January 5, 1994, with briefings by the contractor, the Westinghouse Savannah River Company (WSRC), on the following topics: tritium facility process flow, status of RTF testing and operations, pinch weld equipment qualification, operator weld/radiography qualification, fill pressure accuracy verification, gas mixture composition verification, moisture and mercury controls, hydrocarbon protection and contamination control, the Automated Reservoir Management System (ARMS), and the Distributed Control System (DCS).

In regard to the schedule for testing and operations, the RTF expects the startup testing program to be completed by March 11, 1994. From January to March 1994, the unloading of reservoirs will be transitioned from the existing tritium facility to the RTF. All eight reservoir models to be processed at RTF are expected to have completed design agency (Sandia and Los Alamos National Laboratory) reviews by the end of March. By May 1994 the RTF is expected to assume all loading functions, and the lay-up of loading functions in the existing tritium facility Building 234-H is expected to begin.

The loading and welding fixturing in RTF is similar to the existing tritium facility. However, RTF has several design and operational improvements. Operations at RTF are conducted in gloveboxes with nitrogen recirculation and purge stripper systems to prevent the release of tritium to the environment. Also, operations are controlled with a microcomputer based Distributed Control System (DCS), which performs all aspects of process control, such as equipment operation, monitoring, alarming, and various control algorithms. In the existing tritium facility, loading operations are performed manually under hoods that exhaust to the environment. Although the DCS has the capability to perform automatic sequences of

operations, the DCS will not be operated in this mode until automatic sequence testing is performed later this year.

At both the RTF and the existing tritium facility, reservoir information is tracked with the Automated Reservoir Management System (ARMS), a database program which stores information on all reservoirs at the Savannah River Site.

- d. On Thursday, January 6, 1994, operations involved in the loading of four reservoirs on Loading Line 2 were observed. The movement of the fill gas from the mix tanks to the loading line manifold was observed on a DCS screen schematic. The review team also observed final loading pressure adjustments in the control room, observed the operation of the mass spectrometer to analyze the composition of the fill gas, and dressed in protective clothing to observed pinch welding in the loading room. The procedure for inserting a reservoir in a loading fixture used for training was also demonstrated. The handling of reservoirs and the transfer of reservoirs between the RTF and Building 234-H were demonstrated. The Automatic Leak Detection (ALD) equipment for the reservoir in Building 234-H was observed and discussed.

The review team asked questions and discussed the operations with contractor personnel. Procedures and logs were also reviewed, including the operator qualification log in the control room, the filled-in loading procedures for some of the twelve test reservoirs previously loaded, and the mass spectrometer calibration log. In the loading room, the review team noted that a weldscope on the floor under a loading line glovebox should be relocated or shielded so it could not be kicked. It was also recommended that a local Heise pressure gage used to verify weld head nitrogen pressure be relocated for easier readability.

- e. On Friday, January 7, 1994, the review team observed the cutoff of the fill stem above the weld and the recording of weld measurements as part of the normal finishing operations. Traceability of records was examined by reviewing the information for selected reservoirs contained in the Automated Reservoir Management System (ARMS). The review team then caucused and held a closeout meeting with WSRC and DOE.
- f. The results of the Sandia review were favorable. RTF was complimented for good operator training and process knowledge. A few changes in calculational methods and information recorded for each reservoir were requested. Pending final reviews of the requested information, an approval letter for production of the reservoir model evaluated is expected to be issued.
- g. Sandia does not specify of evaluate health and safety requirements related to reservoir loading, welding, unloading, transport, or storage operations. Sandia only specifies physical requirements for the design, fabrication, and acceptance of war reserve production reservoirs. It is assumed that the health and safety aspects

of reservoir production operations have been evaluated in the Safety Analysis Report, in systems design reviews, in the conduct of occupational health and safety reviews, in the development of procedures, and in the conduct of operations reviews previously conducted by the contractor and DOE. However, Sandia personnel did mention a few occupational safety related observations (such as the location of the weld scope mentioned earlier) at the closeout briefing with the contractor and DOE.

- h. RTF plans to qualify four reservoir types for war reserve production. This will allow eight reservoir models to be loaded on four loading lines. The last design agency review is scheduled for March 15, 1994. Sandia will certify four reservoir models in addition to the two reservoir models evaluated during the January 5-7, 1994 reviews.

Two weeks after the Sandia review, the Los Alamos National Laboratory completed a War Reserve Qualification (WRQ) review of two different reservoir models at RTF. WSRC stated that the LANL WRQ had been successfully completed on January 20, 1994.

- 5. Future Staff Actions: The DNFSB Staff intends to follow the results of the design agency reviews, but does not believe that it is necessary to observe any further WRQ reviews at this time. The results of the LANL WRQ review on January 19-20, 1994, will be reviewed with WSRC during the next DNFSB Staff review trip to the RTF on February 8-10, 1994. The DNFSB Staff will also continue to follow the closeout of previously identified DNFSB Staff concerns, and other scheduled RTF activities.