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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 22, 1997

MEMORANDUM

FOR: G.W.Cunningham, Technical Director
COPIES: Board Members
FROM: Monique Helfrich
SUBJECT: Review of the Caustic Waste Treatment System in Building 371 at the Rocky Flats Environmental Technology Site and its Readiness to Operate, July 15-17, 1996

1. Purpose: This trip report documents the July 15-17, 1996, review of the adequacy of Tap and Direct Drain (T&D) and the Caustic Waste Treatment System (CWTS) activities in Building 371 at the Rocky Flats Environmental Technology Site (RFETS). This review was conducted by Monique Helfrich and Joel Blackman of the Defense Nuclear Facilities Safety Board's (Board) staff.

2. Summary: The Authorization Basis (AB) for the operation of CWTS and the T&D activity in Building 371 is still under development, as is the process used by contractor personnel to develop the AB. Department of Energy Rocky Flats Field Office (RFFO) and contractor personnel appear to be on the right path for AB development. However, the Board's staff will need to follow this process to ensure that the resulting AB achieves its goal of protecting the worker and the public, particularly because the development of the set of operational controls (both administrative and physical), which is the key to implementation of the AB, has not been completed. In addition, the Board's staff will need to continue to follow some issues related to the design of the tap and drain system.

3. Background: During the late fall of 1995, the Board's staff conducted a review of the AB for Building 371. Readiness to operate the CWTS to process liquids generated by the tap and draining of plutonium bearing solutions from process piping and tanks was a major element of the review since it was a near-term operation to be conducted in Building 371. In May 1996, a plan of action for the startup of CWTS was issued by contractor personnel.

A caustic waste processing system was originally constructed and operated in Building 371. However, it was difficult to operate in a continuous mode due to plugging. Insight gained from this operating experience was used to design a new caustic waste processing system (the CWTS) which includes the use of a batch system and substitution of magnesium hydroxide for potassium hydroxide. This change reduces the potential for plugging. The current AB for the T&D and CWTS operations is based on the original 1981 Building 371 Final Safety Analysis Report (FSAR), Operational Safety Requirements based on the analysis in the FSAR, and process hazards assessments conducted on the CWTS (an Integrated Safety Assessment, [ISA]), and on the T&D (an Activity Control Envelope, [ACE]). While significant differences exist between the original CWTS constructed and operated in the building and the new CWTS, the original bounding hazards analysis appears to envelop the current operation. However, the original hazards analysis only considered risk to the public, and Board staff review of the CWTS ISA revealed that it too only considered risk to the public. While the T&D ACE did address worker safety hazards, it did not provide a linkage between hazards (postulated accidents) and specific preventative/mitigative measures. The general conclusion of the ACE was that existing procedures/processes were adequate. Thus worker safety has not been addressed for the CWTS, and the adequacy of existing procedures to protect the worker during the T&D process could not be assessed by the Board's staff.

In addition to concerns with the adequacy of the AB for the T&D and CWTS to support operations, the Board's staff had technical concerns regarding the design of the tap and drain system, which were to be addressed in the onsite review.

4. Discussion: The review of the CWTS and its readiness to operate consisted of technical discussions with RFFO, Kaiser-Hill (K-H), and Safe Sites of Colorado (SSOC) personnel and a tour of the CWTS. The following observations were made as a result of these discussions.

a. Improvements to Authorization Basis:

(1) The current version of the ACE for T&D is much improved over the version originally reviewed by the Board's staff in the fall of 1995. The form and technical content of the ACE have been improved, and the ACE does, in general, identify the set of operational controls (both administrative and physical) necessary to prevent or mitigate potential accidents. However, the ACE still does not contain the specific linkage between hazards identification and preventative/mitigative procedures. Based on discussions with K-H and SSOC personnel, the Board's staff understands that a separate linking matrix is being prepared to remedy the observed deficiency, which will be used to supplement the ACE in this area.

During the onsite visit and in subsequent follow-on discussions with RFFO and the Board's site representatives, the Board's staff discussed the issue of the formalization of the set of operational controls identified by the ACE process as necessary to support the activity, and how it will be included in the AB. As a result of these discussions, the Board's staff understands that RFFO personnel intend to review and approve the ACE. Since the control set identified may or may not be already included in the existing AB for the building, the methodology for formalizing and including the set of controls determined from the ACE as part of the AB needs to be worked out.

In addition, the Board's staff observed that while site personnel involved in the development of the AB understand the process and underlying intent of the AB, the same level of knowledge and understanding has not been achieved by the building personnel. They are not as yet aware of many subtleties currently being discussed by the Board's staff, RFFO, and contractor personnel.

(2) The concept of an Authorization Agreement (AA) is better defined than was presented at the Recommendation 95-2 briefing to the Board on July 10, 1996. RFFO personnel indicated that they are moving in the direction of formalizing the AA along the lines of the Nuclear Regulatory Commission's licensing model. However, the AA process is still under development (i.e., it has not been formalized or implemented) and must be reconciled with existing contractual obligations.

b. Readiness to Operate

(1) The schedule for startup of the CWTS has been delayed a number of times over the past several months. One of the major causes of these delays has been due to an over-commitment of Building 371 resources. During meetings with Building 371 personnel, it was indicated that the corporate Operational Readiness Review had been postponed indefinitely until a new schedule is developed based on a careful assessment of commitments and priorities versus building resources.

(2) The fixture for tapping and draining the piping system consists of a stainless steel semi-circular saddle, eccentric to the centerline of the pipe, which is secured to the pipe by two U-bolts. The tap is attached to a low spot in the piping system to drain the affected solution. A cutting tool assembly is built into the saddle and is manually actuated using a socket wrench to bore through the pipe wall. Once the pipe wall is pierced, a valving arrangement constructed internally into the saddle body permits the fluid to be drained into Tygon tubing attached to the saddle. An elastomeric gasket provides a seal between the pipe wall and the saddle. The design was developed by Building 371 personnel and is in the final stages of development. It is intended that taps used to drain the solution from tanks or lines will be left in place until decommissioning. At that time, it might be used to flush the line or another tap might be installed.

The following potential problems were observed by the Board's staff:

(a)The tap assembly is prevented from rotating about the centerline of the pipe by the development of friction between the U-bolts and the pipe wall. General practice in piping analysis neglects friction developed at this contact surface since it is insufficient to provide sufficient torsional resistance. Contractor personnel indicated that the tap (eccentric mass) would be temporarily supported during draining to prevent possible rotation. However, in the long term, due to relaxation of the elastomeric seal and removal of the temporary support, the tap may loosen and become a source for release of contamination. Contractor personnel indicated they would consider installing a glove bag around the tap after draining to prevent possible airborne releases.

(b)In addition, Building 371 personnel also indicated they would look into the long-term stability of the elastomeric gasket to insure that it would not creep excessively under clamping pressure, and would maintain its integrity in the presence of nitric acid solutions.

(c)Building 371 personnel indicated that some of the piping to be drained was located close to the floor. An example given was the piping adjacent to the tanks being drained. Due to clearance constraints, the saddle will then have to be installed on the side of the piping. In this orientation, a small volume of solution will remain in the piping after completion of the draining process using existing techniques. As such, a means to remove the remaining solution will have to be found to ensure that it does not become a source of contamination in future deactivation and decommissioning operations.

c. Need to Develop Long-Term Strategy (i.e., Working Smart)

(1) Site personnel have not developed end-point criteria for the tanks and piping in Building 371. Of the 77 miles of process piping in Building 371, 30 percent has been involved in the transfer of process materials and has the potential for containing liquids that will need to be drained and sent to the CWTS for treatment. There has been no formal development of a strategy for integrating the initial draining of these pipes with the ultimate flushing and draining that may be required during decommissioning.

(2) During discussions, RFFO personnel acknowledged the need to consider long-term issues in its strategy.

5. Future Staff Actions: The staff will review the safety implications of any changes to the May 1996 Plan of Action for starting up the CWTS that are made by site personnel in order to catch up with schedule commitments made to the Colorado Department of Public Health and Environment. The staff will review the development of a long-term strategy for draining and processing liquids in Building 371. The staff will continue to follow the development and implementation of the AB process at RFETS and will review the final form of the AA.