

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 14, 1995

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

**COPIES:** Board Members

**FROM:** F. Bamdad

**SUBJECT:** Trip Report to Rocky Flats, January 3-6, 1995 - Review of Criticality Safety and Building 707 Thermal Stabilization Preparations

1. **Purpose:** The purpose of this trip was to review nuclear criticality and safety of Buildings 371 and 771 at the Rocky Flats Environmental Technology Site (RFETS), and to review selected activities for preparations for startup of Thermal Stabilization in Building 707. This review was performed by F. Bamdad (staff) and T. Quale (outside expert).
2. **Summary:** The staff made the following observations during this trip:
  - a. EG&G Rocky Flats relies heavily on administrative controls for implementation of safety issues pertinent to criticality hazards of operations. The "double contingency" criteria are often implemented through two or more administrative controls or operator actions. The staff believes that such reliance on operator performance for implementation of double contingency does not seem to be adequate at RFETS due to past history and performance of the operations and could lead to future criticality infractions or accidents.
  - b. The first two stages out of four stages of the High Efficiency Particulate Air (HEPA) filters for the ventilation system for the thermal stabilization area (J-module) have not been Dioctylphthalate (DOP) tested as required by current building Operational Safety Requirement (OSR). An Unreviewed Safety Question (USQ) had been approved by the Rocky Flats Field Office (RFFO) which justified not testing these stages. The OSR, however, was not revised to reflect this change. The staff believes that operations which are not in strict compliance with the OSR represent poor conduct of operations and degrade the safety culture in the building. In fact, cognizant personnel in the building including the shift manager did not understand the basis for not complying with the OSR.
3. **Background:** The staff reviewed nuclear and criticality safety at RFETS during a trip on November 28 through December 2, 1994. Several issues were identified by the staff that indicated lack of an aggressive program at RFO and EG&G for implementation of safety issues. The staff recognized the need for further review of the RFETS safety program which was partially performed during this trip.

#### 4. Discussion:

- a. The staff reviewed several criticality analyses performed by EG&G-RF in support of solid and liquid stabilization programs to be conducted in Building 707 and Building 771. The staff believes that the EG&G facility safety engineering group is not being as conservative in these analyses as is prudent. For example,
  1. Procedures for draining tanks which have solutions with unconfirmed plutonium concentrations allow the solution to be drained into three 4-liter bottles for sampling. A 12-liter volume in a single spherical unit with moderate reflection could possibly pose a criticality concern when the plutonium concentration is 100g/liter. Highly concentrated solutions do exist in Building 771 and could accidentally be drained through valve misalignment. Limiting the sample volume to 10 liters or requiring physical separation of the bottles could eliminate any criticality concern even with solutions at 500g/liter Pu concentration and fully reflected.
  2. EG&G assumes that a nominal  $K_{\text{eff}}$  of 0.95 is acceptable for analytical results. The staff believes that the 0.95 is too high a criticality coefficient threshold for computer program calculations, considering the uncertainties of these programs and the sensitivity of the results to the analyst's inputs and assumptions.
- b. In the letter dated February 1, 1994, the Board transmitted a trip report to the Department of Energy (DOE) and cited some safety concerns with regard to OSR deficiencies and lack of HEPA filter surveillance and maintenance at RFETS. DOE has received and recently approved two USQ documents which reduce the safety surveillance requirements (DOP testing) for the HEPA filters in Buildings 707, 371, 771 and 774.

Safety documents in support of the resumption of operation in Building 707 (including the Safety Analysis Report (SAR)) assume that all four stages of the HEPA filters are tested and maintained to a specified standard. Some of these HEPA filters, however, have not been tested with the frequency specified in the OSR and, therefore, are in violation of their safety requirements. Rather than trying to bring the HEPA filters into compliance with the OSR and SAR requirements, RFFO has approved an USQ which proposes maintaining only two stages of the HEPA filters in compliance with the OSR requirements, instead of all four stages. This reduction in filter stages has resulted in an increase in risk to the public by a factor of 20 for explosion from briquetting (no longer performed), and by a factor of 6 for fire in glovebox J-60, (frequency of 0.02 per year).

RFFO has accepted the increase in risk for startup of Thermal Stabilization.

RFFO utilized the USQ justification to authorize Thermal Stabilization operations to proceed with only two stages of HEPA filters meeting the surveillance requirements. Although the technical justification for relaxing the OSR requirements (the USQ documents) was prepared and approved by RFFO in September 1994, the corresponding OSR was not revised because RFFO safety engineers did not think it was necessary. The staff believe that the OSR is one of the key safety documents that the operations people should be encouraged to respect and implement. Operations which are not in strict compliance with OSR revision to support the building condition (even if the technical justification has been approved) is an example of poor conduct of operations and degrades the safety culture. Such degraded safety culture and lack of conduct of operations in Building 771 led within the last few months to a criticality infraction with potential for significant consequences and to an unauthorized valve alignment incident.

5. **Future Actions and Followups:** The observations made by the staff during this trip and the one on November 28 through December 2, 1994 identify some concerns with the safety culture of the RFFO and EG&G Safety Engineering groups. It appears that the safety engineers are more willing to support the activities than questioning the safety issues related to the activities. The staff will investigate this finding further and review the independent safety oversight organizations during a trip scheduled for early February 1995.