

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 16, 1994

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Roy E. Kasdorf

SUBJECT: Rocky Flats - Planning to Meet the Draft Plutonium Standard

1. **Purpose:** This memorandum provides the report of a trip by the Board staff, Kasdorf and Massie, and outside expert Quale, on August 2, 1994 to review the Rocky Flats (RF) plans and preparations to meet the standard being prepared for plutonium storage.
2. **Summary:** Based on this review, the Board staff notes the following:
 - a. The Department of Energy (DOE)-RF intends to restart thermal stabilization operations in B707 consistent with past practices. However, DOE-RF plans to raise the thermal stabilization temperature in B707 by the end of the year, and to obtain new equipment that can meet all requirements of the draft plutonium standard.
 - b. DOE-RF does not believe there is any urgency in raising the thermal stabilization temperature in B707. DOE-RF believes plutonium oxide stabilized at 500°C is safe for the interim period until new equipment is obtained and the oxide is processed to meet the draft standard requirements. DOE-RF does not believe additional handling or processing is required for oxide stabilized at 500°C compared to oxide stabilized at higher temperatures. DOE-RF believes all the oxide will need to be reprocessed to meet requirements of the draft standard regardless of the stabilization temperature.
3. **Background:** The DOE is currently preparing a standard that provides for the safe storage of plutonium metal and plutonium oxide for an interim period (20 years) until a decision is made on the final disposition of these materials. This draft standard contains requirements for storage including:
 - a. thermal stabilization of oxide at 1000°C for one hour,
 - b. hermetically sealed storage container for the metal and oxide,
 - c. packaging in an atmosphere with a moisture content of less than 100 ppm, and
 - d. no organic material (e.g., plastic) in the storage containers.

The current storage practices at RF do not comply with the draft standard. The Board has noted that past practices may not be adequate for storage since these materials were

typically not stored for an extended period as currently planned. To provide for better storage conditions, the Board previously questioned why DOE-RF could not accelerate RF plans to comply with the draft standard. The Board also thought it would be prudent to raise the thermal stabilization temperature as high as practical using the existing equipment.

4. Discussion: The Board staff was informed of the following during the review:

a. DOE-RF plans to restart thermal stabilization in B707 soon, at a thermal stabilization temperature of about 500°C and no hold time, consistent with past practice. Due to the Board's concern about the adequacy of the past practices, DOE-RF is planning two parallel actions:

1. Raise the thermal stabilization temperature in B707.

EG&G has tested the existing J-25 and J-60 furnaces. EG&G believes that the temperature in these furnaces can be safely raised to 800°C in J-25 and is still evaluating J-60.

The J-25 furnace has been tested to 930°C for one hour. EG&G is attempting to add a heat shield over the crucible to get to a higher temperature.

The J-60 furnace has been tested to 830°C for one hour. The testing was stopped prematurely due to a misunderstanding of a temperature limit; however, subsequent inspection of the furnace showed some sagging of the induction coils. Although the furnace vendor considered the furnace could go to 1000°C, RF engineering had predicted the sagging could occur. This is still being evaluated but line management opposes testing at any higher temperatures.

To support operation at a temperature higher than 500°C, DOE-RF considers that the following actions must be taken:

- (a) Determine the adequacy of the Environmental Assessment,
- (b) Review the readiness of the equipment and operators, and
- (c) Revise the operating procedures.

DOE-RF estimates that these actions could be complete by December 1994. DOE-RF does not intend to raise the stabilization temperature until these actions are complete.

2. Obtain new equipment.

DOE-RF tasked EG&G to develop a plan and schedule for obtaining new equipment that would meet all requirements of the draft plutonium standard. This plan is to be available in September 1994.

EG&G currently plans to use a furnace similar to a Los Alamos design. However, EG&G intends to look at a furnace and glovebox being developed by Hanford. EG&G also intends to use a storage container designed by Los Alamos with the dimensions changed to accommodate material at RF. EG&G believes that obtaining a glovebox that can provide the desired atmosphere (e.g., low moisture content) for packaging is limiting in terms of getting equipment. EG&G estimates that the equipment could be available in about 18 months after funding is obtained.

- b. DOE-RF does not believe there is any urgency in raising the thermal stabilization temperature. DOE-RF acknowledges that raising the temperature to about 800°C will provide a more stable oxide. However, DOE-RF believes that oxide stabilized at 500°C will be safe for the interim period until they can meet all requirements of the draft standard. DOE-RF believes that all the oxide processed in the near term regardless of the thermal stabilization temperature will need to be reprocessed to meet the draft standard requirements. DOE-RF does not believe that additional handling or processing is required for oxide thermally stabilized at 500°C compared to oxide stabilized at 800°C or a higher temperature.
 - c. EG&G presented some preliminary Los Alamos test data. These data showed plutonium oxide thermally stabilized at 1000°C had not reabsorbed enough moisture after 45 days to fail the loss-on-ignition (LOI) test specified in the draft standard. The LOI after an initial rise was constant after 45 days at less than 0.1%. This may indicate that oxide stored over longer periods may not reabsorb enough moisture to fail the 0.5% LOI specified in the draft standard. These data could justify not thermally stabilizing the material at RF twice to meet the temperature requirements. EG&G is still pursuing raising the temperature on the existing equipment and is investigating plans to retrofit a furnace that could go to 1000°C into B707.
5. **Future Staff Actions:** No specific staff action is required at this time. The staff will continue to follow the RF actions to raise thermal stabilization temperature on existing equipment and to obtain new thermal stabilization equipment.