

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 22, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: H. W. Massie, Jr.

SUBJECT: Rocky Flats - Status of Plutonium Residue Processing

1. **Purpose:** This memorandum provides a report of a trip by the Defense Nuclear Facilities Safety Board (Board) staff, Massie and Von Holle, and outside experts Leary and Clark, on May 2-3, 1995 to review the Rocky Flats plans and preparations for processing plutonium residues in order to meet Board Recommendation 94-1. The staff also reviewed the technical scope of Los Alamos National Laboratory's (LANL's) work in direct support of Rocky Flats residue processing.
2. **Summary:** Based on this review the Board staff notes the following:
 - a. Implementation of pyrochemical oxidation of salt residues is proceeding well. LANL has developed the process parameters for the salt oxidation which will be utilized by the architect engineer (Stone and Webster) to complete conceptual and Title I & II designs in an expedited fashion. Building 779 will be utilized for this effort. It appears that the schedule requirements of Recommendation 94-1 can be met for the salt residues.
 - b. The schedule for chemical processing of the combustible residues is uncertain. Department of Energy Rocky Flats Field Office (DOE RFFO) stated at the meeting that incineration will not meet the schedule in the 94-1 Implementation Plan (IP) and proposed using a wet oxidation process in Building 371. The staff is not confident that the wet oxidation process under consideration is sufficiently developed to support Recommendation 94-1 commitments.
 - c. Processing of the wet category residues is being proposed to be conducted in Building 371. At this time, the Building 371 mission statement does not include residue processing. Any change in mission for Building 371 will have to be formally addressed by DOE RFFO, particularly as they implement Recommendation 94-3.

- d. Processing of the ash and the inorganic residues is planned to be conducted in Building 707. At this time, the staff believes that the requirements of Recommendation 94-1 can be met for these residues.
 - e. LANL's support to EG&G has been effective in helping to accelerate the schedule for residue stabilization at Rocky Flats. LANL's involvement in the new Kaiser-Hill organization is not clear.
3. **Background:** Board Recommendation 94-1 requires "that preparation be expedited to process the containers of possibly unstable residues at Rocky Flats Plant and to convert constituent plutonium to a form suitable for safe interim storage [within 3 years]." The DOE in its IP to Recommendation 94-1 committed to process higher risk residues within three years; except for the higher risk combustible residues which are to be processed within four and one half years. EG&G has completed its Integrated Program Plan (IPP) which provides details regarding the processing of residues.
4. **Discussion/Observations:**

Rocky Flats has a total of 106 metric tons of plutonium bearing residues which are subdivided into five major categories: 1) salts, 2) combustibles, 3) ash, 4) wet/miscellaneous, and 5) inorganics. These residues contain about 3 weight percent of plutonium and approximately one-half of the total residues are classified as high risk. The residue project organization is provided in Attachment 1. The status of each of these residue categories (called "buckets" by EG&G) are presented below.

- a. Salt Residues: Building 779 was chosen as the location to process salt residues with pyrochemical oxidation; the oxidation agent will be calcium carbonate or sodium carbonate. An architect engineer (Stone & Webster) has been selected to finalize Title I and II design. In order to meet the requirements of Recommendation 94-1, EG&G (Kaiser-Hill after 6/30/95) will utilize the four existing furnaces in room 160 of Building 779 to initiate processing of higher-risk salt residues by October 1996. In parallel, EG&G will procure, design and install six additional furnaces. LANL is providing direct support to EG&G for the development of the process parameters (temperature, pressure, carbonate amounts, etc.), preliminary procedures, and the training of Rocky Flats process operators. LANL has completed 25 successful salt oxidation runs utilizing LANL's salt residues, which are similar to Rocky Flat's salt residues. The operations requirements have been established by EG&G and were provided to Stone and Webster.

The manager of Residue Stabilization stated that additional funding(\$3.5M) is needed in order to maintain the schedule for processing of salt residues. The budget request is under review by DOE RFFO.

The staff notes that the new Rocky Flats integrating contractor, Kaiser-Hill, has a performance goal to complete their operational readiness review for salt processing by the end of the third quarter of FY96. DOE RFFO stated that the salt residue effort is planned to be a model for the rest of the residues.

- b. Combustibles: Since the staff visit of April 19, 1995, EG&G has selected wet oxidation as the primary option for processing of combustible residues. In the past, combustible residues were incinerated, but the old incinerator is no longer operable. DOE RFFO stated that preparing a new incinerator for combustible residues could not be accomplished in time to meet the requirements in Recommendation 94-1; this is primarily due to time required to conduct an environmental impact statement and to obtain environmental permits required by the Clear Air Act in order to operate an incinerator.

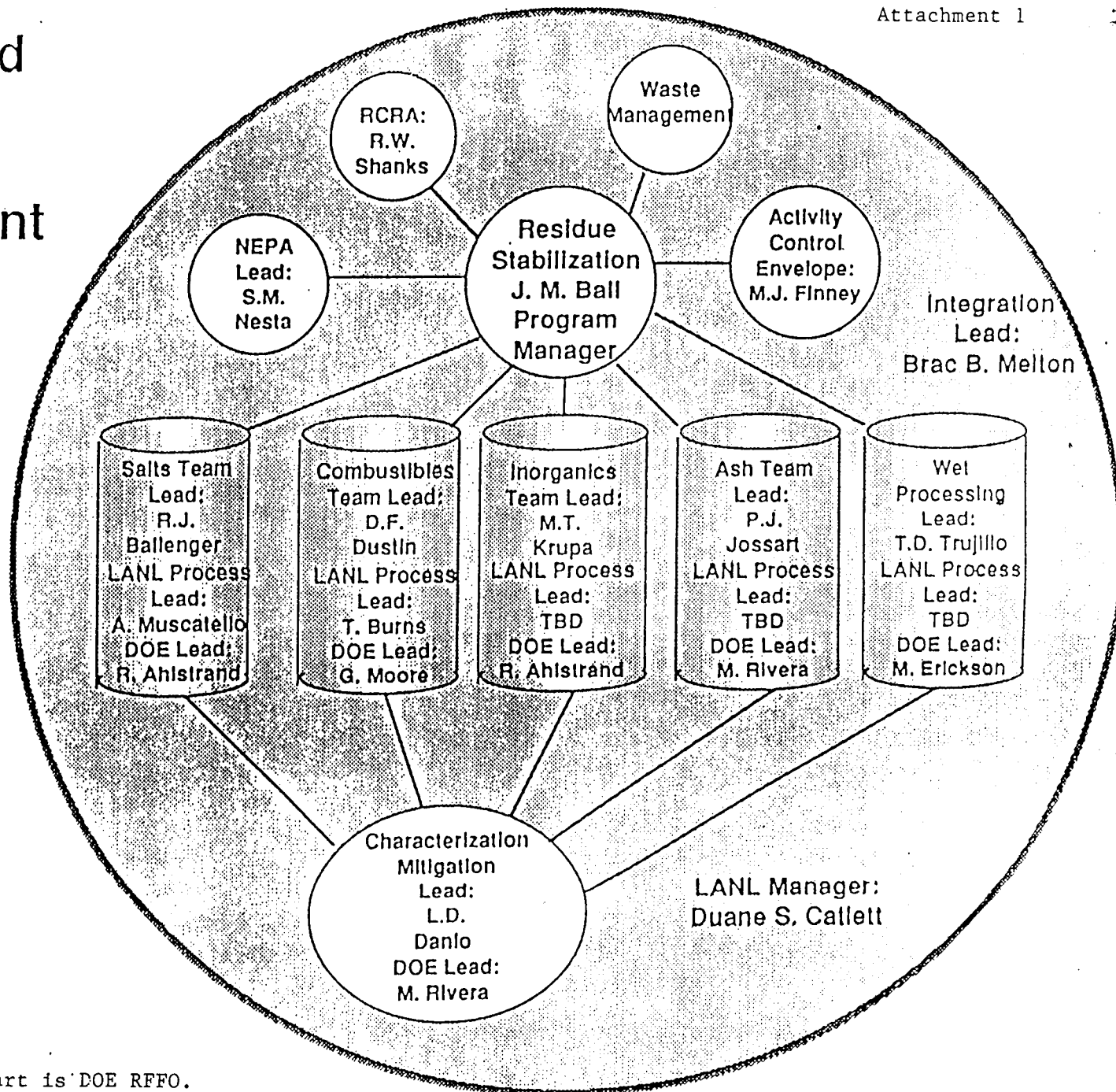
EG&G presented a preliminary plan to initiate a "treatability" or pilot project utilizing a wet oxidation process on the higher risk residues. EG&G is proposing to process the combustible residues in Building 371 over a total period of 8 years. The staff notes that the proposed wet oxidation process has not been demonstrated on plutonium bearing residues and also has not been scaled up to a size adequate to process salt residues to meet the Recommendation 94-1 commitment. At this time, the mission of Building 371 does not include residue processing. The staff notes that all of the combustible residue drums have been vented; this should alleviate drum pressurization hazards.

- c. Ash: EG&G has prepared a draft conceptual design report for calcination of incinerator ash residues in Building 707, modules E and F. Existing ovens may be utilized to calcine the higher risk residues at a temperature of 800°C, similar to the calcination of the brushed metal oxides. A capital project is being proposed to obtain additional furnaces to allow calcining of remaining residues at 1000°C. A draft conceptual design report has been prepared and an architect engineer will be selected soon to finalize Title I & II design. EG&G will consolidate Title I & II design in order to meet the requirements of Recommendation 94-1. The staff believes that progress on this project is satisfactory.
- d. Wet/Miscellaneous: This category of residues is comprised of 26 different types of residues and will likely require several types of processes from washing and repacking to calcination. EG&G stated that Building 371 is the likely location for treating the wet residues. Acid-contaminated leaded gloves require the most immediate attention and could be washed and dried along with transuranic waste. No commitment has been made yet for the early processing of the leaded rubber gloves, but DOE RFFO

expects that this issue can be resolved soon. The wet residues will likely be processed in Building 371 over 8 years.

- e. Inorganics: This group of residues are generally low risk and are a lesser concern. EG&G plans to repack these residues in Building 707 over 8 years. EG&G repackaged 2 LECO crucible (which are small containers used for laboratory testing of plutonium) drums, a low risk residue, in FY94 and has reinitedated this work. This work is being conducted in Module A of Building 707. EG&G stated that a primary mission of the LECO crucible work is to keep the residue workforce trained. It will be at least one year before the other residue categories are ready for processing (e.g., completion of operational readiness reviews and establishing an authorization basis).
 - f. LANL Support: LANL is involved in all aspects of the residues work including development of residue storage standards, conducting salt oxidation tests on LANL residues, developing salt oxidation process parameters for Rocky Flats salt residue processing, conducting tests of pyrolysis methods, and developing non-destructive assay methods. A LANL process engineer has been assigned to each of the five residue categories. The staff believes that the cooperative EG&G and LANL effort has been effective in accelerating the plutonium stabilization schedules at Rocky Flats. However, it is not yet clear how LANL will interact with the new integrating contractor, Kaiser-Hill.
5. **Future Actions:** The Board staff will continue to review the implementation of Recommendation 94-1 regarding the residues, particularly options for processing of combustible residues. The next review meeting is planned for late June 1995. The staff will also discuss with DOE RFFO the need to address residue processing in the mission of Building 371 with regard to Recommendation 94-3.

Accelerated Residue Program - Management Approach



Note: DOE in the above chart is DOE RFFO.