

Waste

June 21, 1996

MEMORANDUM TO: Robert C. Pierson, Chief  
Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

FROM: John Austin, Chief [Original signed by:]  
Performance Assessment and High-Level  
Waste Integration Branch  
Division of Waste Management, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST - BUILDING 21 FINAL STATUS  
SURVEY REPORT, COMBUSTION ENGINEERING, INC.

As requested in your April 25, 1996, memorandum, the Performance Assessment  
and High-Level Waste Integration Branch (PAHL) staff has completed its review  
of the Combustion Engineering Inc. Final Status Survey Report (FSR).

The attached report presents PAHL's comments and conclusions resulting from  
the review. In summary, the FSR presented radiological survey and methodology  
consistent with NRC's guidelines and common practices. However, we believe  
that additional information is necessary to verify background and certain  
surface activity measurements. In particular, we have concerns regarding  
predominantly negative values for certain survey units.

Dr. Bobby Eid of my staff has conducted the review.

Attachment: As stated

Contact: Bobby Eid, NMSS/DWM  
415-5811

Ticket No. PAHL008

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The attached report presents PAHL's comments and conclusions resulting from the review. In summary, the FSR presented radiological survey and methodology consistent with NRC's guidelines and common practices. However, we believe that additional information is necessary to verify background and certain surface activity measurements. In particular, we have concerns regarding predominantly negative values for certain survey units.

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

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FROM: John Austin, Chief *John Austin*  
Performance Assessment and High-Level  
Waste Integration Branch  
Division of Waste Management, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST - BUILDING 21 FINAL STATUS  
SURVEY REPORT, COMBUSTION ENGINEERING, INC.

As requested in your April 25, 1996, memorandum, the Performance Assessment and High-Level Waste Integration Branch (PAHL) staff has completed its review of the Combustion Engineering Inc. Final Status Survey Report (FSR).

The attached report presents PAHL's comments and conclusions resulting from the review. In summary, the FSR presented radiological survey and methodology consistent with NRC's guidelines and common practices. However, we believe that additional information is necessary to verify background and certain surface activity measurements. In particular, we have concerns regarding predominantly negative values for certain survey units.

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**Comments on the Final Status Survey Report Of  
Building 21 of the Combustion Engineering, INC. Facility**

**Background:**

Combustion Engineering Inc. (CE) holds an NRC's License No. SNM-1067 for the former Windsor Nuclear Fuel Manufacturing Facility (Building 17/21 Complex) located in Windsor, Connecticut. CE submitted several revisions to the Decommissioning Plan (DP) for cleanup, remediation, and the complete decommissioning of Building 17/21 Complex. CE submitted the latest DP version on April 24, 1995 which was approved by NRC on May 30, 1995. Recently, CE completed remediation and cleanup of Building 21 which represents a portion of the Building 17/21 Complex. On March 29, 1996, CE submitted a Final Survey Report (FSR) for Building 21 and requested release of the building, and its immediate environs, for unrestricted use in accordance with the requirements of 10 CFR 70.38.

This report presents staff review and comments on the CE's FSR, and the attachments, submitted on March 29, 1996.

**General Comments:**

**1. The Final Survey's Approach and Methodology Specific to Building 21:**

The FSR reflected an approach and methodology consistent with NRC's guidance (e.g. NUREG/CR-5849) and common practices. For example, the licensee's approach and survey methods employed in classification of survey areas (e.g., affected/unaffected), adoption of contaminants' release guidelines, selection of survey instruments, background measurements, and gridding of survey areas, are consistent with the protocols of NUREG/CR-5849 and the NRC's confirmatory survey practices specifically, those commonly used for sites under the Site Decommissioning Management Plan. Therefore, the overall approach and radiological survey methodology for decommissioning of Building 21 are acceptable as presented in the FSR.

**2. Potential Impacts From Adjacent Facilities Within Building 17/21 Complex:**

As indicated above, the approach and methodology specific to Building 21, as presented in the FSR, are adequate and consistent with NRC's guidance and practices. Decommissioning of Building 21 separately (e.g., independent of the rest of Building 17/21 complex) is acceptable; however, this approach requires adequate treatment and analysis of potential impacts from neighboring facilities within the complex. Therefore, the licensee should provide more detailed analysis of potential subsurface contamination associated with the nuclear material used previously in Building 17 and the potential transport of such material to areas contiguous to, or under, Building 21 (e.g., sewer lines and subsurface drainage lines).

Attachment

### 3. Background Measurements and the Predominant Negative Activity Data:

Background surface activity data presented in Table 2-3 for Beta measurements, using the two instruments with Serial Nos. #116240 and #118236, indicate an average activity of 1267.00 and 1596.00 dpm/100cm<sup>2</sup> respectively. The range for these measurements was reported to be within 1060- 2110 dpm/cm<sup>2</sup> and the uncertainty level was reported in the range of 150-190 dpm/cm<sup>2</sup>. Beta-Gamma surface activity data reported for several survey units (e.g., Survey Units B2-1, B21-3.1, B21-3.2, and B21-6), were dominantly negative values. For example, 20 Beta-Gamma measurements for the survey unit B21-1 (Table 2-5) were all negative values falling in the range of -256 to -40 dpm/cm<sup>2</sup>. Comparison of these negative values with the positive background measurements, presented in Table 2-3, indicates that the areas or locations selected for background measurements may have not been compatible with the survey units. Although it is an acceptable practice to have some negative values in the background data, or in the surface activity measurements (due to instruments instability and/or fluctuations in background conditions); however, typically, the negative values are compensated for by the positive values of the measurements. Therefore, having 100 percent negative values for the whole survey unit indicates possible inappropriate selection of background locations and/or inconsistencies in the selection and use of instruments, or inconsistencies in selection of instrument calibration procedures. Therefore, the licensee should provide rationale and justification for background selection and discuss causes of having predominantly negative activity values in certain survey units. Further, inconsistencies in instruments selection and calibration (if any) should also be identified.

#### Specific Comments:

1. The licensee reported, on page 8, that "audits for analysis of soil samples revealed some deficiencies." The licensee should provide additional information explaining the nature of these deficiencies and its impact, if any, on the analysis results reported in the FSR.
2. All building floor and lower walls (up to 2 m) were gridded at 1 m intervals. Table 6 of the FSR shows that one reading was taken every 4 m<sup>2</sup> (instead of 1 m<sup>2</sup>) for a total of 48 measurements. The licensee indicated, on page 6, that the combination of instrumentations and techniques were chosen to provide a detection sensitivity of <25 percent of the guideline levels. Apparently, the licensee used this statement to justify having systematic measurements at a spacing of 2 m instead of 1 m interval. The detection sensitivity of <25 percent is the basis used by the licensee (in accordance with NUREG/CR-5849) to justify selection of the alternate 2 m interval, therefore, the licensee should describe in detail the combination of instruments and

select such a spacing interval. In addition, the licensee should demonstrate, using background and actual uncertainty data, how the <25 percent sensitivity criteria was established.

3. The licensee presented a list of "Detection Sensitivity" (DS) data for various instruments. The licensee indicated, in Table 3, that the DS values were "nominal values." The licensee should explain how these "nominal values" were derived or measured. In addition the licensee should explain how these values are related to the acceptable response range, using the daily response checks, for each instrument.
4. The licensee defined the grid square perimeter, marked by the coordinates L0, L12, Y12, Y0, as the boundary of the affected area. The licensee designated the affected/unaffected areas for Building 21 based solely on information regarding storage and handling of radioactive material in these areas. The licensee should describe how the boundary, between the affected and unaffected area, was established. In addition, the licensee considered only a small corner of Building 21 as the affected area. The area around the loading/unloading zone and the corridors used for transporting of radioactive material, within Building 21 area, were not considered. The licensee should provide the basis for exclusion of these latter two areas from being classified as affected areas and provide further justification for establishing the boundary between the affected and the unaffected areas within, and around the vicinity of, Building 21.
5. AC Ducts and drainage channels: The licensee conducted direct radiological measurements and analyzed swabs obtained from two heaters suspended from the ceiling of the warehouse. However, CE did not conduct survey and analysis of the AC ducts and drainage channels within the affected/unaffected survey units. It should be noted that these near surface structures may contain radiological contamination and need to be surveyed in order to confirm their status regarding potential radiological contamination.
6. Zero alpha background: The licensee assumed a zero background for alpha measurements. The licensee contemplated that this assumption is based on a conservative approach to background measurement. Although this approach appears to be conservative, it is still necessary for the licensee to verify if (or if not) the selected zero background was associated with the instruments' low responses or with low sensitivities of the instruments used. Therefore, for adequate characterization of background, the licensee needs to demonstrate having adequate instrument

sensitivities. The negative beta background measurements (general comment No. 3) is another concern that the licensee needs to address in the context of instrument response, low sensitivity, and verification of background and surface activities measurements.

7. **Missing references list:** the licensee cited some references in the FSR text; however, the FSR report submitted to NRC contained no list of references. The licensee should submit a reference list matching those references cited in the text of the FSR document.
8. **Background surface activity measurements:** The licensee reported (page 13) that "The two instruments utilized for scanning and direct measurements, while both recently calibrated, yielded significantly different results for background readings." Therefore, the licensee decided to utilize the specific instrument's background when calculating residual activity rather than the average background for the two instruments. The licensee should identify the two instruments employed in the background measurements and clarify if the unacceptable difference in background measurements is related to the type of measurements (e.g., alpha or beta), or to variation in instrument's efficiency, sensitivity, and/or response.
9. **Surface activity measurements:** The licensee presented, in Tables 2-5 and 2-6, surface activity measurements of Building 21 interiors and exteriors. The data showed frequently very high negative values much exceeding the uncertainty values reported in these Tables. For example, negative values as low as  $-547 \text{ dpm}/100 \text{ cm}^2$  were reported. The maximum uncertainty value reported for surface activity was  $220 \text{ dpm}/100 \text{ cm}^2$ . The licensee should verify the adequacy of these values and the implication on values of background measurements, instruments' sensitivities, instruments' calibrations, and the minimum detectable limits.
10. **Identification of Instruments Used to Generate the Surface Activity Data:** The licensee presented surface activity measurements (Tables 2-5 and 2-6) without defining the type of instruments used or listing the instrument's identification numbers. The licensee should report instruments' identification numbers along with the measured data in order to verify the "Minimum Detectable Activity" (MDA) and the uncertainties in these measurement. In addition, the licensee should make reference to specific background data that were used to establish the MDA's and the uncertainties of the survey measurements.

**Summary and Conclusion:**

In summary, the overall approach and methodology of the FSR are consistent with NRC guidelines and common practices. However, licensee is requested to address the above comments, verify the predominantly negative values in the surface activity survey measurements, and provide additional information to clarify the issues and concerns discussed above.