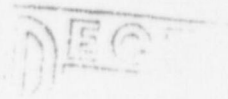


ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION



July 25, 1994

Mr. Blaine Murray
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

**SUBJECT: DOCUMENT REVIEW - DECOMMISSIONING SURVEY FOR THE L-77
RESEARCH REACTOR, BRIGHAM YOUNG UNIVERSITY (DOCKET
NO. 050-262)**

Dear Mr. Murray:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) has reviewed the subject document. In general, it is the opinion of ESSAP that the document lacks certain information/data which would enable the reader to determine the true and complete radiological status of the site. The inclusion of additional information, as described in the attached comments, would substantially improve the thoroughness and technical quality of the document.

The attached comments are offered for your consideration. If you have any questions or comments please contact me at (615) 576-0065 or Jack Beck at (615) 576-5031.

Sincerely,

Wade C. Adams
Health Physicist/Project Leader
Environmental Survey and
Site Assessment Program

WCA:dac

cc. T. Mo, NRC/NMSS/TWFN/8A33
D. Tiktinsky, NRC/NMSS/TWFN/8A23
PMDA, NRC/NMSS/TWFN/8A23
L. Nordehaug, NRC/Region IV/Walnut Creek Office
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**DOCUMENT REVIEW
DECOMMISSIONING SURVEY FOR THE
L-77 RESEARCH REACTOR
BRIGHAM YOUNG UNIVERSITY
(DOCKET NO. 050-262)**

General Comments

1. The primary contaminants at this site and the applicable exposure rate and surface contamination guidelines should be specified. Survey results should be reported in the same units as the guidelines and should be directly compared to those guidelines. The data provided in this report are not sufficient to demonstrate compliance with the NRC surface contamination guidelines.
2. In general, it is the opinion of ESSAP that the documentation lacks certain information/data that are consistent with that provided from similar facilities in which similar types of work have been performed. Further detail should be provided for the technical reviewer to evaluate the adequacy of:
 - (a) Methodologies for:
 - (1) surface scans (alpha, beta, and gamma)
 - (2) direct measurements
 - (3) grid block averaging
 - (4) miscellaneous sample collection if applicable (drain, vents, residues)
 - (5) calculations of direct measurements and MDAs
 - (b) Instrument calibration and QC procedures (i.e. routine operational checks)/operating parameters (including efficiencies, backgrounds, and detection capabilities)
 - (c) Procedures for evaluating results, relative to guidelines and conditions.
3. The report presents the results, but does not provide a discussion and/or assessment of the data. ESSAP recommends that information be included that discusses the final status of the decommissioned areas.
4. In general, the quality of data presentation and report preparation is poor. Although the raw data (e.g., for removable surface contamination and sample analyses) are provided, the results are not tabulated. Figures, when provided, are not drawn to scale or labeled clearly. Figures should also be labeled with the direction and should have a figure title and a legend. It is also recommended that the pages in each section be physically bound (e.g., by a staple) and the sections separated (e.g., by a title page). Page numbers would be useful in determining if data or text is in a particular order or missing.
5. Measurement locations should be indicated on the figures, or if taken in a particular pattern, e.g. at 1 m intervals, the pattern should be identified.

6. It is not clear from the report whether there are miscellaneous parts/items/equipment to be released, for which ESSAP is expected to perform radiological surveys.

Specific Comments

1. Page 4-1: Proposed Final Radiation Survey Plan

- (a) It appears that this is section 4 of a larger report. If so, then perhaps other portions of the report may contain vital information that should be provided in a final status report, i.e., site history, procedures, guidelines, etc.
- (b) How were termination survey locations selected?
- (c) Please explain what is meant by the word "surveyed". Does this mean that surfaces were scanned and that direct (static) measurements and removable activity measurements were performed? Please provide a description of the procedure (See General Comment 2).
- (d) Provide an explanation for establishing a "virtual" 3-m square grid. What criteria was used to select a single 1 m square grid out of the 3-m square grid pattern for survey activities?
- (e) Provide more detail on drain and floor penetration survey activities. Were there other types of penetrations i.e., walls, ceilings, and ventilation systems that should have been accounted for in the survey?
- (f) The report states that 1 m² averages of grid blocks are determined by performing a 5 minute surface scan over the 1 m² surface and integrating the counts. The maximum activity in a 100 cm² area (hot-spot) was determined in a similar manner with a one minute surface scan. Removable activity was estimated for each 1 m² area by smearing a 100 cm² area of each 1 m². Were these techniques appropriate and how can these measurements be directly compared to NRC guidelines, particularly for the maximum guideline condition?
- (g) Are the calibration sources (²³⁰Th and Tc-99), used to calibrate the survey instrumentation, appropriate for the radionuclides of concern (See General Comments 1 and 2)?
- (h) Provide the model number for the Eberline alpha scintillation detector.

2. Page 4-2:

- (a) Use of the Eberline PG-2 low energy gamma probe (NaI scintillator) for determining exposure rates by integrating over a 5 minute period within a 1 m² is questionable. Any measurement of a gamma radiation level with this instrument

is influenced by the specific energy of the gamma source for which the instrument was calibrated and calibration with Cs-137 might not be appropriate. The use of this instrument for measuring gamma radiation levels is an unusual choice since it is a low energy gamma probe and its response to high energy gammas, which would most likely result from the possible contaminants, may be poor. Was the measurement performed at contact or 1 m above the surface?

- (b) Different surfaces have different backgrounds, such as sheetrock and brick walls. Were these types of background differences accounted for during the final survey data calculations?

3. Letter to Alexander Adams on March 9, 1992, RE: Response to questions received from A. Adams on January 9, 1991.

- (a) ESSAP only received two pages of the completed letter since the signature page is missing.
- (b) Core samples were to be obtained by drilling a 1/4 inch hole in the respective material and then counting the material in a liquid scintillation counter. Was this performed, and, if so, what were the results?
- (c) The guidelines provided do not include the maximum limit for a 100 cm² area and do not indicate that the limit listed is for the average contamination over 1 m².

4. Instrument Calibration Data

- (a) The efficiencies of 61% and 64% for an HP-260 seem high, and may be based on 2 π geometry; if so, the measurement data may be underestimated by a factor of 2. The same may be true for the AC-3-7 alpha scintillator. Please provide more detail on how the calibrations were performed. For example, the calibration sheet should provide information on the calibration source used (i.e., radionuclide, activity, NIST traceability, etc).
- (b) The SPA-3 instrument, mentioned in the calibration data, is different from the one mentioned in Specific Comment 2a. This instrument was calibrated with Cs-137. Due to the energy dependence of the SPA-3, the response of this instrument to the gamma energies present should be indicated.
- (c) The lines on the QC Charts should be labeled to indicate QC Positive and QC Negative. On June 10, the QC Negative value was exceeded for the Gamma QC Chart and then the instrument was retested and passed. Please indicate how these values were calculated and what were the appropriate procedures to follow when an instrument failed its daily QC check.

5. Figures

- (a) The figures are difficult to follow since sections marked on one figure are shown in other figures at different sizes and there are no scales provided (See General Comment 4).
- (b) One of the Control Room grid blocks is not labeled. Perhaps this is grid block CRC5. Also need to provide direction for the floor and ceiling since it is difficult to determine if one is looking "up" at the ceiling.
- (c) It is difficult to determine the location of some of the walls when trying to relate back to the floor plan. An example is that the wall section labeled LRTW6 is indicated as a north wall when it is actually facing west.
- (d) The figure for the Large Room West Wall is missing.
- (f) The Reactor Room Floor figure indicates that grid blocks RRF21 and RRF22 are rectangular in shape. Are these grid blocks approximately 1 m²?
- (g) Does the Reactor Room West Wall not extend all the way to the ceiling as is indicated by the figure of the Reactor Room East Wall?

6. Raw Survey Data

- (a) The units for the data should be reported or presented in the column headings.
- (b) Please provide an explanation for SLOC 01A-01F and if the measurements were performed in a particular pattern.

7. Difference Data

- (a) It is stated that the raw count is multiplied by a correction factor to obtain the difference data. Provide an explanation for the terms used in the correction factor and include a sample calculation.
- (b) Background data should be provided. Different surfaces have different natural backgrounds associated with the material from which it is made, i.e., a higher background measurement is typically associated with red brick than for asphalt or concrete (See Specific Comment 2b). It was not clear from the data how backgrounds were subtracted from individual measurements. Backgrounds should be subtracted prior to dividing by the correction factor.
- (c) Provide an explanation and an example calculation for the acronym BEU.

- (d) With one exception, all of the GAMMAD measurements are negative. This appears to indicate that an inappropriate gamma background was used in the calculations. Provide more information on how background levels were determined. Were the backgrounds determined in the same manner as the raw counts, i.e., a 5 minute scan over a 1 m² grid block?
- (e) The Acceptance Criteria does not mention the maximum guideline value.