DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
ABERDEEN PROVING GROUND MD 21005-5067

July 15, 2010

Experimentation Support Group

J-6
MS-16

Nuclear Regulatory Commission
Region I
Attn: Mr. Dennis Lawyer
475 Allendale Road
King of Prussia, Pennsylvania 19406

SMB-141/04006394

REFERENCE: Email from Mr. Dennis Lawyer (NRC) to Mr. Richard Markland (ARL) dated June 15, 2010 requesting additional information concerning Application for a License Amendment, Control 144649.

Dear Mr. Lawyer,

Enclosed you will find, in a question/answer format, the information requested in the referenced email.

The changes requested in the above reference require some additional measurements and a revision of the Final Status Survey Report (FSSR). Once this is accomplished, we will forward the revised FSSR.

Please contact Mr. Richard A. Markland at (410) 278-6354 with any questions.

Sincerely,

Pamela E. Fry
Experimentation Support Manager

Enclosure

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144649
NMSS/RGN1 MATERIALS-002

PIKA'S RESPONSES TO NRC COMMENTS ON THE FSSR FOR 1103A AREA

1. Survey Unit 25 does not appear to meet the criteria based on the information submitted. Please refer to Appendix B2 Static Results page 21 of 26. In the Tech initial is the measured portion for each spot above the criteria and the average. When added together it is 1.06 which is greater than the 1.0 criteria. Please explain in detail why this area is releasable or perform more decontamination and perform a follow up survey.

Reply: It appears that the data submitted for this Survey unit does not support release. PIKA reviewed the calculations and found that the instrument efficiency was higher than what was used in the spreadsheet. An efficiency for a different instrument was incorrectly entered for SU25. After the error was corrected, the unity rule calculation came to 0.73, which meets the criterion. Appendix B2 and the text will be revised to show the new results.

2. Not enough detailed information is provided to determine the Methodology of determining how instrument alpha efficiency was determined for the instrumentation used in the field. Please provide the size of alpha source used, the NIST certified value for the source, and the calculation to determine alpha efficiency.

Reply: The efficiencies were determined by a vendor, Ludlum Instruments. PIKA obtained the certificates for sources used by Ludlum, and these will be added to Appendix E of the FSSR. The method used is as follows. A nominal 2 inch diameter Pu-239 source is placed under the detector and a one minute count is taken. The result (net of background) is ratioed to the 2 pi source emission rate, as certified by the source vendor. Alpha backscatter was ignored, since it is less than a 1.5% correction (per the source vendor).

An example for one instrument (LMI 2360, sn 193654) is:

Source #5282 (Eberline), 2 pi emission rate: 18,100 ± 541 per minute.

Count rate over source (per Ludlum), 9260 cpm.

Ratio: 9260/18100 = 0.51, which is the instrument efficiency.

3. It appears from your alpha surveys that you are using a surface efficiency of 0.5 for alpha contamination. Per ISO-7503 recommendations, the alpha surface efficiency should be 0.25. The 0.25 surface efficiency for alpha is in agreement with NUREG01507,
Minimum Detectable Concentrations with typical Radiation Survey Instruments for Various Contaminants and Field Conditions. Please specify the surface efficiency value used and its basis or adjust all of your alpha measurements and reevaluate the survey units.

ENCLOSURE

Reply: A surface efficiency of 0.5 was applied to the instrument efficiencies, as you noted. After further review, PIKA agrees that a surface efficiency of 0.25 is more appropriate for surfaces such as concrete walls and floors. For other surfaces, however, we feel that a higher surface efficiency is warranted. A number of survey units have a surface of metal siding, which has a much smoother surface than concrete. This is also true of the smooth steel of the storage vaults. NUREG-1507, Table 5.5, presents a surface efficiency of 0.555 for stainless steel and Th-230, using a ZnS detector. This roughly matches our conditions with smooth metal surfaces, U-234, -235 and -238 having similar emissions, and the Ludlum 43-93 ZnS scintillation probe.

Alpha activities will be re-calculated for all concrete surface survey units and the FSSR will be revised accordingly.

4. The removable surface activity survey did not appear to account for a alpha self-absorption factor for counting the wipes. Please justify the self-absorption factor of 1.0 or adjust the results of the wipe tests and evaluate.

Reply: The wipe test efficiency was determined using a spiked fiber wipe, similar to what is used in the field. This was prepared as a counting standard by Eckert & Ziegler to accurately determine the efficiency of our wipe counter (Ludlum Model 2929). The standard rests in an aluminum planchette that is similar to the planchettes used in counting the field wipes. PIKA feels that this counting standard accurately reflects conditions that could affect results, including self-absorption. A copy of the source certification will be added to Appendix E of the FSSR.

5. Appendix E does not appear to have the certificates of calibration For the instruments used in Appendix B. Please provide these certificates.

Reply: There were five instruments used, one for beta scanning (Ludlum Model 2350-1), one for gamma scanning (Ludlum Model 2221/FIDLER), and three for alpha static measurements (Ludlum Model 2360). Appendix E will be updated to include certificates of calibration for each of these.