



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

December 27, 2004

Docket No. 07003071  
Control No. 135989

License No. SNM-1990

Michael L. Neese  
Dean of Student Services  
West Virginia Institute of Technology  
Department of Physics  
405 Fayette Place  
Montgomery, WV 25136-2437

**SUBJECT: WEST VIRGINIA INSTITUTE OF TECHNOLOGY, REQUEST FOR  
ADDITIONAL INFORMATION CONCERNING APPLICATION FOR  
AMENDMENT TO LICENSE, CONTROL NO. 135989**

Dear Mr. Neese:

This is in reference to your letters dated October 28 and November 15, 2004 requesting to amend Nuclear Regulatory Commission License No. SNM-1990. The letter dated October 28, 2004, included the "Final Status Survey (FSS) for WVU Institute of Technology" prepared by Ecology Services, Inc. In order to continue our review, we need the following additional information:

1. Section 4.1 of the FSS report states that the Derived Concentration Guideline Level (DCGL) was developed using the computer code DandD version 2.1.0, and based on the critical member of the public receiving not more than 15 millirem in a year from residual radioactivity due to uranium-238 and progeny (U-238 + C). The calculated DCGL was stated as 150 disintegrations per minute (dpm) per 100 centimeters-squared (cm<sup>2</sup>).
  - a. Enclosure 1, Section B.2 states that the DCGL was derived using DandD version 1. Confirm which version of the DandD software was used.
  - b. Provide the input and output files for the DandD runs used to determine this value.
  - c. The DCGL of 150 dpm appears to be the total dpm for the uranium-238 and its progeny. For each type of measurement used, describe the radiations and energies detected, and the method(s) and/or calculation(s) used to relate the measurement results to the DCGL.
2. Section 6.0 of the FSS refers to site conditions meeting the surface soil contamination criteria for a Group 2 decommissioning facility. However, there are no results of soil samples. Confirm if contaminated soil was or was not present.

3. Section 6.0 of the FSS states that Room 105 was designated as a survey unit. Specify if the floors and walls were considered separate survey units, or if the entire room was a single unit. If any other survey areas were designated, describe them.
4. Section 6.0 of the FSS states that floor and wipe samples were performed in each grid on the floor. Explain why the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) survey design method, using random numbers to generate a starting point for survey sample locations, was not used. Also, provide the method for selecting static survey and wipe measurement locations on walls or other areas.
5. Section 6.1 of the FSS describes the criteria for the various classes of survey areas. However, it does not specify how your survey unit(s) was (were) classified. Please specify which areas of your facility were considered Class 1, Class 2, and Class 3 areas.
6. Section 6.2 states that grids were not used for Class 2 areas. MARSSIM recommends the use of grids in Class 2 areas; explain why grids were not used in your Class 2 areas.
7. Section 6.2.1 states that the radionuclides of concern were not constituents of background. However, natural uranium (uranium-238 and progeny) is a constituent of natural background, and is present in many building materials such as concrete, floor tiles, cinderblock, etc. Therefore, the Wilcoxon Rank Sum (WRS) test should be used, and not the sign test. Provide any data or other bases for using the sign test rather than the WRS test.
8. Section 6.3 states that scanning speeds were one-half the detector width per second; however, the Ludlum 43-1 probe has a circular surface area. Specify what value you used as the "width" of this detector, and explain why that value is reasonable considering the shape of the detector surface.
9. Section 6.4.2 states that wipe samples were analyzed for gross alpha activity. Specify the instrument used, its minimum detectable activity for the alphas expected to be present, and describe how the gross alpha measurement was used to determine that removable contamination did not exceed 10% of the DCGL.
10. Enclosure 1, Section A, states that WVU Institute of Technology has terminated activities with licensed materials. Confirm that you have terminated activities only with natural uranium, and that you still possess the plutonium-239 neutron sources.
11. Enclosure 1, Section E, "Statistical Tests for Wipe Samples" appears to discuss surveys and sampling other than wipe tests. Confirm if items E.1 through E.11 only describe wipe tests, or if this section discusses other types of surveys.
12. Enclosure 1, Section E, Item 4 contains Table 4, "Determination of Required Sample Population." Explain the basis for the lower bound of the gray region (LBGR) shown as 1.5 dpm, and the basis for the standard deviation of 0.6 dpm. If these values are based on measurements, provide the data supporting these results.

13. Enclosure 1, Section E, Item 6, "Calculation of Instrument  $MDC_{SCAN}$ " states that MARSSIM Section 6.7.2.1 was used to perform this evaluation. However, that section of MARSSIM applies only to beta and gamma scans, and the detector used was a Ludlum 43-1 alpha scintillator. Provide corrected information. In addition, show the equation you used and describe each factor and value you use in the equation, as well as those values shown in Table 6 and Table 7, if still applicable.
14. The efficiency of 28% shown in Table 8 of Enclosure 1, Section E, Item 6, "Calculation of  $MDC_{STATIC}$ ," appears to be the instrument efficiency. The surface efficiency and probe geometry do not appear to be included. Explain why these factors are not included here, or provide corrected information if they should be included. In addition, describe the basis for the efficiency(ies) used in your calculations, such as tables of reference, product information, or actual testing results including the source used, its size, and its known activity.
15. The background of 9 cpm is used for both the static and scan minimum detectable concentrations in Enclosure 1. Provide the basis for this number, and the standard deviation for this measurement.
16. Enclosure 1, Item 8, re-states the MARSSIM guidelines for performing scanning surveys. Describe the scanning surveys that were actually performed in the Class 1, Class 2, and Class 3 areas at your facility.
17. Enclosure 1, Item 9, re-states the MARSSIM guidelines for evaluation of survey results. Provide the evaluation(s) for your actual survey results, for uranium-238, a radionuclide that is present in natural background.
18. The "Radiation Safety Survey" sheet attached to Enclosure 1 requires additional explanation.
  - a. State which locations in the Area Diagram represent floors or walls. State which area(s) were Class 1, Class 2, or Class 3 survey units.
  - b. "Area 1" and "Area 2" are designated on the diagram, and are listed in the "Static Measurements with 43-1 Probe". Describe "Area 1" and "Area 2" refer to.
19. Describe the locations at which wipe samples were collected, for which results are listed in the "Report of Sample Analysis". Also, explain what is meant by "missed activity" in this report. Also, please note that MARSSIM requires that actual results be reported, not "less than MDA" values which cannot be used in the statistical analyses.

Please note that on October 25, 2004, the NRC suspended public access to ADAMS, and initiated an additional security review of publicly available documents to ensure that potentially sensitive information is removed from the ADAMS database accessible through the NRC's web site. Interested members of the public may obtain copies of the referenced documents for review and/or copying by contacting the NRC Public Document Room pending resumption of public access to ADAMS. The NRC Public Document Room is located at NRC Headquarters in Rockville, MD, and can be contacted at 800-397-4209 or 301-415-4737 or [pdr@nrc.gov](mailto:pdr@nrc.gov).

M. Neese  
West Virginia Institute of Technology

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We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 135989. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5040.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

***Original signed by Elizabeth Ullrich***

Betsy Ullrich  
Senior Health Physicist  
Commercial and R&D Branch  
Division of Nuclear Materials Safety

Enclosure:  
10 CFR Parts 20 and 40

cc:  
Keith R. Honey, Ph.D., Radiation Safety Officer

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