



January 19, 2006

U.S. Nuclear Regulatory Commission
Region 1, DNMS - Commercial and R&D Branch
Elizabeth Ullrich, Senior Health Physicist
475 Allendale Road
King of Prussia, PA 19406-1415

MS16

Q-5

Subject: West Virginia University Institute of Technology, Request for additional information concerning application for amendment to license, Control Number: 137512

Re: West Virginia University Institute of Technology
NRC License No. SNM-1990, Docket 07003071

RECEIVED
JAN 20 2006
10:50

Dear Ms. Ullrich,

This is in reference to your letter dated December 27, 2005 requesting additional information to amend Nuclear Regulatory Commission License No. SNM-1990.

1. Question:

Based on the authorized quantities listed on previous amendments of the license, amounts of material reported to be possessed during inspections, and the waste disposal records dated March 26, 1982, April 17, 2002, and April 17, 2003, the inventory of uranium possessed in storage and /or in the sub-critical assemblies was not always well known or properly verified. After the 1982 return of 2492 kilograms of uranium that used in the water moderated assembly, the NRC was informed that 1358 kilograms of uranium in canisters remained in the graphite-moderated assembly. However, the April 17, 2002 disposal record lists 1456 kilograms of uranium disposed of, and the April 17, 2003 waste disposal record lists 73 kilograms of uranium disposed of. Confirm that a thorough search and survey was performed to identify any other canisters of uranium. Describe which locations were searched, and who performed the search for any additional material; if additional material is possessed, submit a description of the material and your plans for disposal of the material.

1. Response:

Ecology Services Inc. can confirm that the weights manifested for disposal are gross container weights, that being the weight of the uranium, shipping container, and any canisters or packing material. The weight of the drum used for shipping is 17 kgs. In two shipments a total of nine drums were used. This equates to 153 kgs. for shipping containers and the remaining 18 kgs. for miscellaneous packing material.

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137512
NRC REGIONAL MATERIALS UNIT

Dr. Barry Illman stated that after the April 2002 shipment it was thought that all uranium had been removed from their facility. During his survey of room 105 of the Engineering Classroom Bldg in December 2002 he discovered several aluminum canisters in the bottom of a storage cabinet in room 105 that contained uranium. At that time he contacted WVUIT administration to notify them of the situation; he also then contacted the NRC to notify them that there was still uranium on site. In April of 2003 Ecology Services Inc. shipped the remaining uranium from his facility for disposal. After that shipment he searched and surveyed room 105 of the Engineering Classroom Building and found that there was no remaining uranium on site. The search and survey was confined to room 105 of the Engineering Classroom Building since that is the only area that the uranium was ever used on their campus.

2. Question:

In your response to Item 16.a., you stated that an error was made in the spreadsheet, and supplied a new Table 8. However, using the data in the table, the probability "P" is calculated to be 0.75, not 0.903 as shown in the table.

- a. Provide an example calculation, using actual data, showing how you calculated the probability in Table 8.
- b. Explain why the contamination activity, "G" changed from 128 dpm/probe area to 250 dpm/100 cm². Explain why the width of the detector in the direction of the scan, "d" changed from 5 cm to 7 cm. Explain why scan speed, "v" changed from 2.5 cm/s to 1.5 cm/s and confirm if scans were actually performed of 100% of the floors at 1.5 centimeters per second.

2. Response:

The calculation of values in Table 8 were determined using the following formula:

Where the values used are shown in the table as follows:

The changes in parameter values were made to correct for the probe used, i.e. the Ludlum 43-90 detector. Since this probe covers 100 cm², G is the DCGL, or 250. A smaller probe would use only the covered fraction of the DCGL. D is 7 cm, since the 43-90 detector has an active area width of 7 cm. (measured). "v" is the detector speed necessary to achieve the desired level of confidence (> 90%).

Considering the number of questions and changes in this report, and the NRC's concerns about the actual conduct of this survey, We believed it was prudent to conduct a confirmatory survey to insure that the final reported data actually represents the final status of the survey area. Such a survey was conducted on January 12, 2006. The confirmatory effort consisted of a scanning survey, using the Ludlum 43-90 detector operating at the required speed shown above, covering 100% for the floor surfaces, and a static measurements survey at the locations shown in the attachment. The results of this survey confirmed that the radiological status of the facility is that which was reported in the initial report.

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3. Question:

In your response to Item 17.b., you revised the page "Radiation Safety Survey" which lists the static measurements made with the 43-1 probe. However, you did not provide the calculations and instrument data used to determine the results of the static surveys shown on the "Radiation Safety Survey" page. Using the information in the revised "Radiation Safety Survey" page, we still cannot replicate the results. Provide sample calculation which show how you converted the measurement data in cpm to the results in dpm.

3. Response:

Since the confirmatory survey provides more current data, we will use it for demonstration purposes. The data was collected using a Ludlum model 43-90 alpha scintillation detector, which has the following operational parameters:

<i>Instrument</i>	<i>Ludlum model 12</i>
<i>Detector</i>	<i>Ludlum model 43-90</i>
<i>Detector area (open)</i>	<i>100 cm²</i>
<i>Detector Efficiency (4Pi)</i>	<i>12%</i>
<i>Background count rate</i>	<i>2 cpm</i>
<i>Background count time</i>	<i>1 min</i>
<i>Sample count time</i>	<i>1 min</i>

The results in dpm/100 cm², which using this detector are also dpm/detector, are calculated using the following:

As an example, in the survey document, Grid area (C,2) shows 14 gross cpm. This would produce 0, as shown in the results column.

Note that the minimum detectable activity (MDA) used in the survey is calculated as follows:

Which in this case, would be 79.8 dpm/100cm².

Sincerely,



Nasser Razmianfar
Director and Radiation Safety Officer

CC: Gerald E. Lang, WVU Provost and Vice President for Academic Affairs and Research
Charles Bayless, Campus President, WVU Institute of Technology
Scott M. Hurst, Assoc. Provost, WVU Institute of Technology

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CONFIRMATORY RADIATION SAFETY SURVEY

COMPANY NAME:
WVU Institute of Technology
RADIATION SAFETY OFFICER:
MR. STEVE ROOT

BUILDING:
Engineering Classroom Building
ROOM NO.: **105**

SURVEYOR: **G. KECK**

SURVEY DATE: **01/12/06**

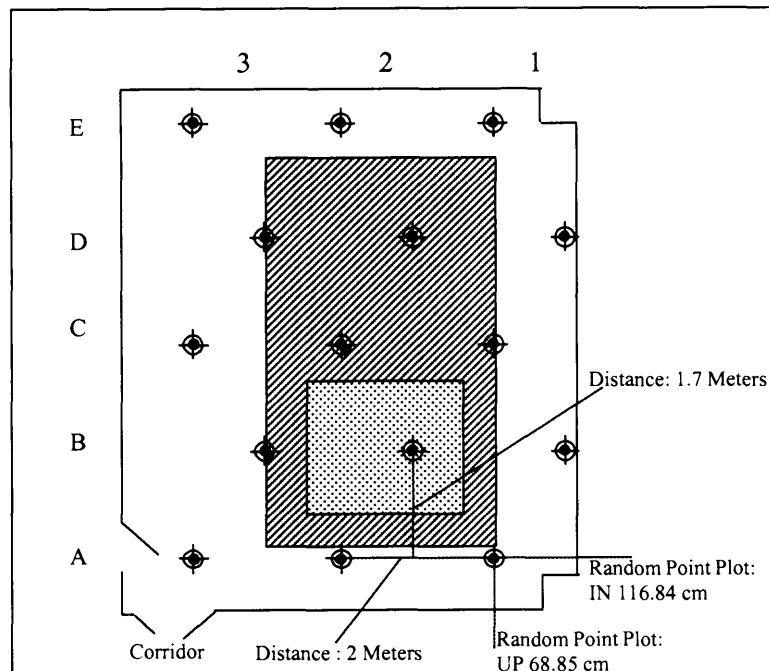
INSTRUMENT

MODEL; SN; CALIBRATION DATE; BACK-
GROUND READING.

**Ludlum-12 w/ 43-90; SN: 86123 ;
background = 2.0 cpm**

**Ludlum-2401-s; 118176;
background = 8 μ R/hr**

AREA DIAGRAM:



MEASUREMENTS WITH 43-90 PROBE:

GRID AREA	GCPM	DPM/100CM ²
(A,1)	7	<MDA
(A,2)	8	<MDA
(A,3)	6	<MDA

(B,1)	3	<MDA
(B,2)	6	<MDA
(B,3)	7	<MDA

(C,1)	9	<MDA
(C,2)	14	100.00
(C,3)	4	<MDA

(D,1)	4	<MDA
(D,2)	4	<MDA
(D,3)	9	<MDA


(E,1)	6	<MDA
(E,2)	2	<MDA
(E,3)	6	<MDA

All calculations to convert cpm data
into dpm performed with
RadCalcLE version 1.0
Ludlum Measurements Edition

SUMMARY OF RESULTS:

Wipe location/ #	dpm/ 100 cm ²

COMMENTS: TOTAL AREA COVERS 46.8 SQUARE METERS.

Raised surf 
Concrete 