CUA

THE CATHOLIC UNIVERSITY OF AMERICA

Environmental Health and Safety
Washington, DC 20064
202-319-5500
Fax 202-319-4446

May 09, 2016

Mail Control No. 590584

License No. SUD-157

Docket No. 040-06329

Subject: Request for Additional Information

Attention: Dennis Lawyer, Health Physicist
United States Nuclear Regulatory Commission-Region I
2100 Renaissance Blvd. Suite 100
King of Prussia, PA 19406-2713

Dear Mr. Lawyer;

Enclosed are the two replies to your request for additional information you requested in your email dated Monday May 2, 2016.

1. The calibration certificate state that the instrument 4 π efficiency is 11.00%. In your survey, a 4 π efficiency of 10.79% was used. In NUREG-1575, Rev 1, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Page 6-25, in section 6.5.4, it states:

> *The source efficiency is defined as the ratio of the number of particles of a given type emerging from the front face of a source and the number of particles of the same type created or released within the source per unit time. The source efficiency takes into account the increased particle emission due to backscatter effects, as well as the decreased particle emission due to self-absorption losses. For an ideal source (i.e., no backscatter or self-absorption), the value of the source efficiency is 0.5. Many real sources will exhibit values less than 0.5, although values greater than 0.5 are possible, depending on the relative importance of the absorption and backscatter processes.*
>
> *Source efficiency may be determined experimentally,. Alternately, ISO-7503-1 (ISO 1988) makes recommendations for default source efficiencies. A source efficiency of 0.5 is recommended for beta emitters with maximum energies above 0.4 MeV. Alpha emitters and betta emits with maximum beta energies between 0.15 and 0.4 MeV have a recommended source efficiency of 0.25. Source efficiencies for some common surface materials and overlaying materials are provided in NUREG-1507 (NRC 1997b).*

Based on the efficiency on the certificate and the efficiency used in the survey, it appears that a source efficiency of 0.5 was used for this survey of alpha measurements. Please state how the lower source efficiency for alpha particles was accounted during this survey and how the 4 π efficiency of 10.79% was determined.

Response:

Ecology Services, Inc. (ESI) (the contractor) wishes to reassure the NRC that the appropriate surface and detector efficiencies were utilized to calculate Minimum Detectable Concentrations (MDCs). For this Final Status Survey ESI used the Pu-239 detector efficiency of 21.58% (4pi) to determine the total efficiency to be 10.79% (e_s= 0.25).

The calibration certificate also contains detector efficiency for Th-230. The drastic difference between the Pu-239 and Th-230 efficiencies prompted ESI to evaluate the Th-230 source. The Th-230 source was determined to be leaking and was taken out of service immediately. Due to this recent discovery, please disregard the efficiency published for Th-230 on this calibration certificate.

A revised calibration certificate is attached.

2. For Maloney Hall, for use of unsealed materials with half-lives greater than 120 days, submit records for disposal made pursuant to 10 CFR 20.2002 (alternate disposal procedures, including burial authorized prior to January 28, 1981), 20.2003 (disposals to the sanitary sewerage system), 20.2004 (incineration of wastes), 20.2005 (disposal of specific wastes including liquid scintillation cocktail and animal tissue), and 20.2103(b)(4), evaluations of effluent releases. Also please submit records important for decommissioning as described in 40.36(f). Examples of such records include but are not limited to: records of contamination, identifying the radionuclides, quantities and concentrations; as-built drawings and modifications of structures and equipment in restricted areas and locations of inaccessible contamination such as buried pipes; a single list, and updated at least every 2 years, of areas to which access is limited for the purpose of radiation protection (restricted areas). Or state that there are no records and the records were not required as you had no events for these processes in Maloney Hall.

Response:

There are no records and the records were not required as CUA has no events for these processes in Maloney Hall as mentioned above.

If you have any questions or need further information, please contact me at 202-319-5789 and email alar@cua.edu or the Radiation Safety Officer, Mahmoud Haleem at 202-319-5206 and email Haleem@cua.edu .

Thank you in advance for your time.

Sincerely,

Mr. Louis Alar
Director, Environmental Health & Safety

Cc: Mr. Mahmoud S. Haleem, Radiation Safety Officer
Dr. Aaron Barkatt, Chair, Radiation Safety Committee

Enclosure

ECOLOGY SERVICES, INC.

9135 GUILFORD ROAD SUITE 200
COLUMBIA, MARYLAND 21046
(800) 932-7299
FAX (301) 490-0172

Certificate of Calibration

Issued To:

Ecology Services, Inc.
9135 Guilford Rd., Suite 200
Columbia, MD

Calibrated on: 1/19/2016
Calibration cycle: 360
Calibration Due: 1/13/2017

Job Number:

Instrument Identification:		***SN:***
Ludlum	2221	313977
Detectors:		
Ludlum model 43-90		PR228907

Calibration Data: **Counts per minute**

Equipment: Ludlum model 500-8 Pulse Generator (SN: 117553)

Scale/ Range:	*Actual (Test Point):*	*As Found Reading:*	*Indicated Reading:*	*Correction Factor:*
x1	200	200	200	1.00
	400	400	400	1.00
x10	2K	2K	2K	1.00
	4K	4K	4K	1.00
x100	20K	20K	20K	1.00
	40K	40K	40K	1.00
x1K	200K	200K	200K	1.00
	400K	400K	400K	1.00
Scaler	200	200	200	1.00
	2000	2004	2004	1.00
	20000	20038	20038	1.00
	200000	200379	200379	1.00

Precalibration Checks:

Battery reading:	5.3
Detector shield:	N/A
Condition received:	Good
Contamination levels (dpm):	< 100
Input Sensitivity (mV):	5
High Voltage (V):	400
Audio response:	Sat
Meter deflection/response:	Sat
Reset:	Sat
Light:	Sat
Zero adjust:	N/A
Temperature (C):	N/A
Pressure (mmHg):	N/A
Relative humidity (%):	N/A

Detector Response: Detector 1

Detector Orientation: ***Parallel***

Radionuclide:	239Pu
Source SN:	P5564
Efficiency (4Pi):	**21.58%**
Uncertainty (+/-):	10%

Check Source:

Radionuclide:
Scale/Range:
Indication:

Serviced by:

Reviewed by:

ESI Q.C. 1

Comments:
Revised 5/2/16

Ecology Services, Inc., certifies that the above instrument has been calibrated by standards traceable to the National Institutes of Standards and Technologies (NIST), has been derived from accepted values of natural physical constants or has been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662-A, ANSI N323-1978, NCRP Report No. 112, NRC Reg Guide 10.8 Rev. 2, 1987, and 10 CFR Part 35.