HOWARD UNIVERSITY

Br. 1

RADIATION SAFETY OFFICE

October 25, 2013

Betsy Ullrich, MS, CHP
Senior Health Physicist, RI
U.S. Nuclear Regulatory Commission
2100 Renaissance Blvd
King of Prussia, PA 19406
(610) 337-5040

03011063

SUBJECT: **AMEND LICENSE 08-00386-19 TO REMOVE RADIOACTIVE WASTE STORAGE FACILITY LOCATED AT 500 COLLEGE STREET**

Dear Ms. Ullrich:

At this time I am requesting an amendment to the Howard University License Number 08-00386-19 to remove the Waste Facility located at 500 College Street from the license. The amendment is requested because the Waste Facility is no longer being used for the storage of low level radioactive waste generated by the research labs at Howard University. The address of the facility is as follows:

Waste Facility at 500 College Street
Howard University - Washington, DC20060

The Radiation Safety Committee has discussed the plans for closing the facility located at 500 College Street. All members agreed with the plan and voted unanimously to close the facility. As per the decision, the Radiation Safety Office decided to conduct surveys and assure that the facility is releasable for unrestricted use as per the NRC guidelines (results attached)

Upon receiving your approval to amend this license, the waste facility at 500 College Street will be released to the University for Non-restricted Use.

2041 Georgia Avenue, NW
Suite 6000 Towers Bldg.
Washington, DC20060

p: (202) 806-7216
f: (202) 806-5432

Thank you for your time and consideration in this matter. Please feel free to contact me directly should you need any additional information.

Sincerely,

Satya R. Bose, Ph.D., DABR
Director of Radiation Safety
& Radiation Safety Officer

Attachment:

1. Close-Out Survey of 500 College Street

Cc: Wayne A. I. Frederick, M.D., F.A.C.S., MBA
Provost and Chief Academic Officer
Howard University

Sergei A. Nekhai, Ph.D.
Chair, Radiation Safety Committee
Department of Medicine, Associate Professor
Center for Sickle Cell Disease, Co-Director

CLOSE-OUT REPORT OF
500 COLLEGE STREET WASTE STORAGE FACILITY

I. Introduction

The premises to be released consist of a part of building in 500 College Street in Howard University Campus. This facility located in the basement of the chemistry building was established for storage of radioactive waste material generated in research labs on the campus of Howard University. With the establishment of a new waste storage facility, it has been decided by the Radiation Safety Committee for releasing the facility for unrestricted use. As per the decision, the Radiation Safety Office decided to conduct surveys and assure that the facility is releasable for unrestricted use as per the NRC guidelines.

The size of the facility is 13' 9" x 19'. A detailed map of the site is attached (Attachment 1).

History of the Facility

Waste material was placed inside 55 gal metal drums, 35 gal metal drums and in recent years 55 gal poly drums for liquid. The drums were placed on 2 x 4 broads to keep them off the floor surface and Heavy gaged plastic bags were placed inside each drum and then bags of waste were placed inside the heavy gaged plastic bags.

The primary use of the radioactive waste storage facility was to decay in storage and holding radioactive waste material until pick up from an outside vendor for disposal. The radioactive waste with activity less than a 90 day half-life was stored in 55 gal drums segregated by isotope and held for at least 10 half-lives and then surveyed and discarded as regular waste.

Decayed wastes were disposed using vendors such as RSO (Radiation Service Organization) in Laurel, MD and Bionomics in Tennessee.

Routine Radioactive Monitoring

Routine weekly surveys were done over the period of activity. The surveys consisted of exposure rate survey and removable contamination survey. More complete version of the routine weekly surveys, were also conducted every quarter. These documented surveys are located in the Radiation Safety Office and are available for review.

Initial Cleaning and Survey

In order to perform this closeout project the University hired a local vendor, Radiation Service Organization, Inc. (RSO, Inc.) from Laurel, Maryland for disposing existing wastes as well to perform an initial survey of the facility. The survey conducted by the RSO after the disposal of

the waste is attached. The facility has not been used since then. However, routine weekly and quarterly surveys have been conducted after the initial cleanup.

II. Survey Procedures

Removable contamination, total contamination and exposure rate surveys were conducted.

Removable Contamination Surveys

In order to determine the removable contamination present in the surfaces, smear samples were taken. A "S" pattern was used to sample the removable contamination from an area of approximately 100 cm^2. Thirty smears were taken throughout the facility and the location of the smears were recorded (attachment 3).

The smears were first counted on Model 2470-0100 Automatic Gamma Counter to detect possible low level gamma activity. An I-129 source and a background was counted along with the smears for one minute each. The count-rates were converted to dpm/100cm^2 based on counting efficiency for I-129.

Once the smears have been counted on gamma-counter, they were counted on a Liquid Scintillation Counter to detect removable beta activity. H-3, and C-14 standards and a background were counted along with the smears for one minute each. The count-rates were converted to dpm/100cm^2 based on efficiency for H-3.

Total Contamination Surveys

A total of 60 readings were taken inside the facility. The map indicating the locations of the surveys is attached (attachment 4).

Following meters were used for total contamination surveys.

Table: Survey Meters Used for Total Contamination Surveys

	Meter 1	Meter 2
Survey Meter Model	Ludlum Model 3	Ludlum Model 2200
Survey Meter Serial #	S/N 104875	S/N 9016
Probe	44-9, PR 104691	44-2, PR 221417
Detector	GM Pancake	1" x 1" (dia x thick) NaI
Calibration Date	4/3/2013	9/18/2013

A 100% scan of the facility was performed using Ludlum Model 2 meter with a Geiger-Mueller Pancake detector. The detector is sensitive to alpha, beta and gamma-radiation. The probe was held at approximately one cm above the surface. The highest count-rate reading on each location was recorded. Ten readings were taken outside the waste storage facility and in a room adjacent

to the waste storage facility to get a better idea of the location-specific background. The background was found to be approximately 50 cpm.

A general purpose scaler, Ludlum Model 2200, was also used to determine the fixed contamination. The meter was used with probe 44-2 (scintillator detector). The meter provides a digital display of the counts recorded within a specified period of time. The readings were taken approximately at the center of each location indicated on the map. The readings were taken for a minute.. The distance between the probe and the surface was approximately one centimeter. The probe was kept at this fixed distance using a clamp throughout the survey. Ten readings were taken outside the waste storage facility and in a room adjacent to the waste storage facility to determine location-specific background. The average background was found to be 1802 cpm.

Exposure Rate Surveys

The following meter was used to determine the exposure rates in the facility:

A 100% scan of the floor surfaces was performed using the exposure rate meter. The highest exposure-rate reading on each area was recorded. Ten readings were taken outside the waste storage facility and in a room adjacent to the waste storage facility to be used as a background. The average background was found to be about 0.02 mR/hr.

Table: Exposure Rate Meter Information

Survey Meter Model	Ludlum Model 2
Survey Meter Serial #	S/N 72726
Probe	44-9-18, PR 1960488
Detector	GM Pancake
Calibration Date	12/12/2012

IV. Survey Results

The survey results for the removable and total contamination surveys and the associated maps are attached with this report.

Gamma Counter Results:

Survey results indicate reading varied from 131 to 191 cpm with an average of 167 cpm. The maximum count rate of 191 cpm corresponds to to 55.2 dpm/1100cm^2 (see attachment 3.1).

LSC Results:

Using the Liquid Scintillation Counter, the maximum removable contamination was found to be 140 dpm/100cm^2 (corresponds to 103 cpm) (see attachment 3.2).

Total Contamination and Exposure Rates Survey:

The maximum total contamination was observed to be 80 cpm using a GM Pancake Probe and 2933 cpm using a NaI Scnitillator Probe. The exposure rate measured with Ludlum Model 2 was found to be less than 0.03 mR/hr (see attachment 4.1).

V. Discussions and Conclusions

Limits

NUREG 1556 Vol 12 Appendix P mentions the criteria of 5000 dpm/100cm^2 total contamination and 1000 dpm/100 cm^2 removable contamination for most beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) to release for unrestricted use.

NRC limits the exposure in unrestricted area to less than 2 mrem/hour.

As an ALARA measure, the following limits—which are, in all cases, lower than the above mentioned limits—are used:

Removable Contamination	2.5 X background (dpm/100cm^2)
Total Contamination	2.5 X Background count rate
Exposure Rates	0.2 mrem/hour

Conclusions

The removable contamination, total contamination and the exposure rates surveys, performed by the Radiation Safety Office, show contamination and exposure levels much less than the permissible levels. Based on the survey results, the facility may be released for unrestricted use.

VI. Attachments

The attachments mentioned throughout this report are as follows:

Attachment 1	Detailed map of the site
Attachment 2	Initial survey conducted by RSO, Inc.
Attachment 3	Map of the location of the wipes
Attachment 3.1	Results of removable contamination survey (using gamma counter)
Attachment 3.2	Results of removable contamination survey (using LSC)
Attachment 4	Map of the location of contamination & exposure rate surveys
Attachment 4.1	Results of total contamination & exposure rate surveys

2012-195

Page 1 of 1

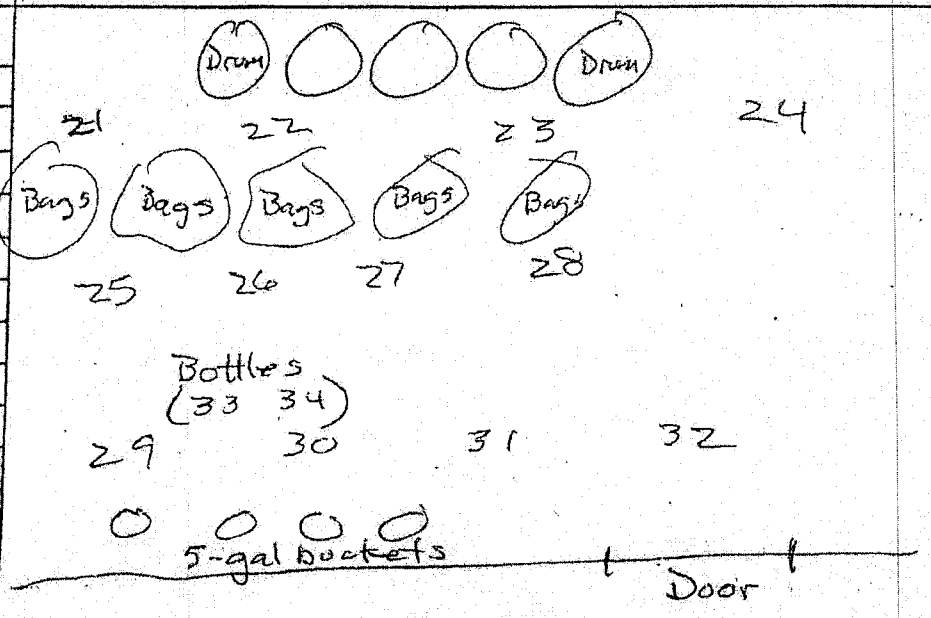
RADIOLOGICAL SURVEY
- ☐ Direct Measurements
- ☐ Surface Scan
- ☑ Removable Contamination
- ☐ Other

RSO, Inc.
P.O. BOX 1526
LAUREL, MARYLAND 20725-0953
(301) 953-2482

COMPANY NAME: Howard Univ.
CONTACT: Dr. Bose
PHONE NO.:

SURVEYOR	Last name, first name		Survey Date
	Wellner, D		3-14-12

AREA DIAGRAM



Locations	B			
1	2100			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
5				
6				
7				
8				
9				
0				

REMARKS: Waste Storage Room Bldg #500
Floor wipes plus bottles surfaces (21-34)

RSO LAB 3/16/2012

RSO, INC. Rev 3 7/91

ATTACHMENT 2

NIH

Assay Definition-

Assay Description:
HOWARD U.

Assay Type: DPM (Triple)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\NIH\Triple Lable DPM
Raw Results Path: C:\Packard\Tricarb\Results\NIH\Triple Lable DPM\20120316_1206.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\NIH\Triple Lable DPM\1410.csv
Assay File Name: C:\Packard\TriCarb\Assays\Triple Lable DPM.lsa

Count Conditions-

Nuclide: Triple Label
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Sets:
Low Energy: 3h ug 03-09-12
Mid Energy: 14C UG 03-09-12
High Energy: 32P-UG-02-28-05
Count Time (min): 1.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

Regions	LL	UL	Bkg Subtract	2Sigma % Terminator
A	0.0	12.0	1st Vial	0.00
B	12.0	156.0	1st Vial	0.00
C	156.0	2000.0	1st Vial	0.00

Count Corrections-

Static Controller: On Luminescence Correction: On
Colored Samples: On Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

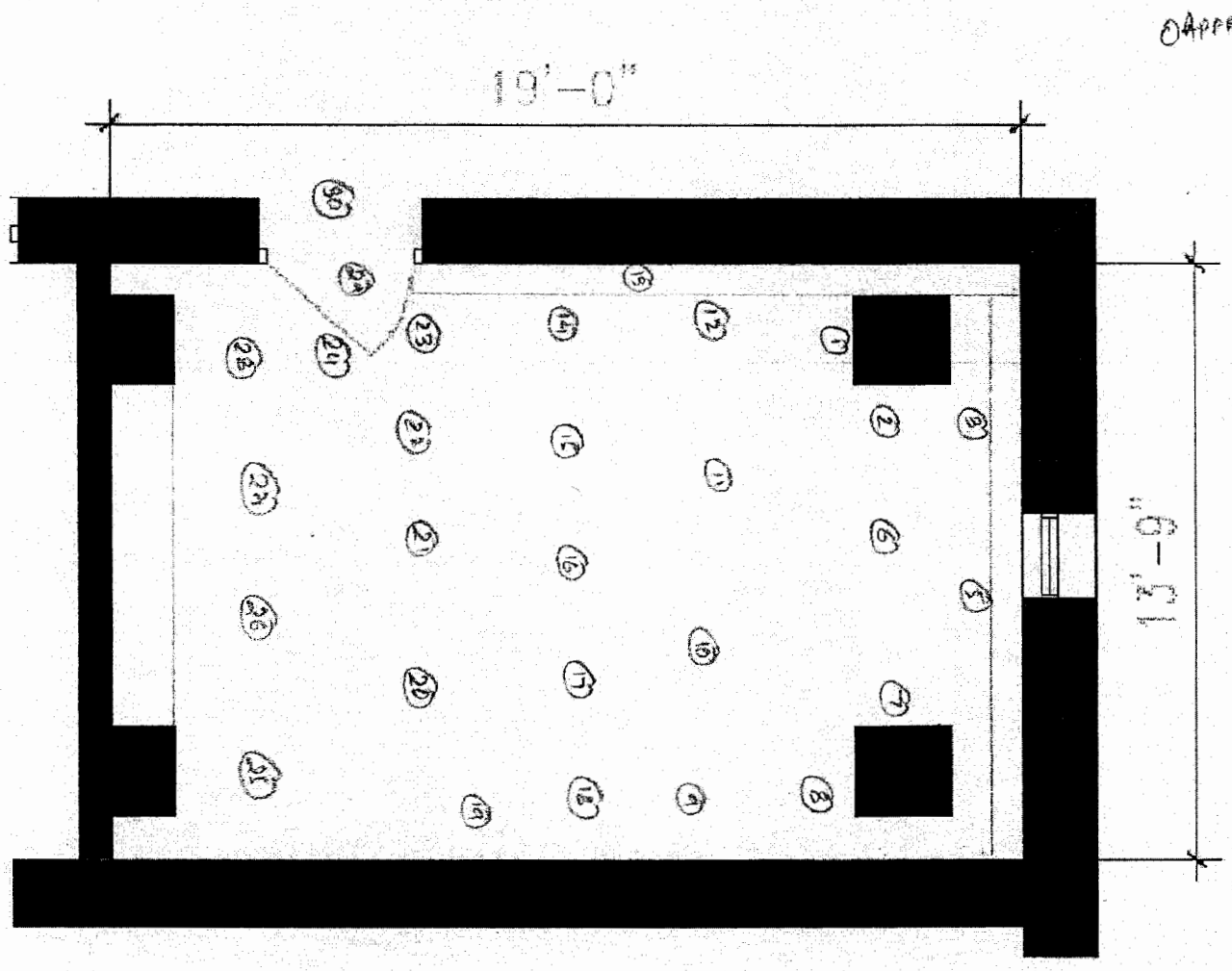
Cycle 1 Results

S#	Time	CPMA	CPMB	CPMC	DPM1	DPM2	DPM3	tSIE	LUM
1	10.00	4	8	6	0	0	0	545	1
2	1.00	-1	1	-3	-4	3	-3	552	0
3	1.00	1	-3	-2	3	-4	-2	562	0
4	1.00	5	-4	6	14	-7	7	597	0
5	1.00	1	4	-1	0	5	-1	535	0
6	1.00	1	1	3	2	0	4	533	0
7	1.00	5	3	0	11	3	0	589	0
8	1.00	-0	4	4	-2	4	5	501	0

NIH

9	1.00	-0	2	0	-2	2	0	535	0
10	1.00	2	1	-2	5	1	-2	504	0
11	1.00	2	4	-2	4	5	-2	477	0
12	1.00	-3	2	-2	-10	3	-2	528	0
13	1.00	-0	-2	3	0	-4	4	510	0
14	1.00	-0	1	-1	-1	1	-1	499	0
15	1.00	-3	3	1	-12	4	1	450	0

500 College Street
Radiation Safety Office, Waste Storage Facility



ATTACHMENT 3

HOWARD UNIVERSITY
500 COLLEGE STREET, WASTE STORAGE FACILITY
REMOVABLE CONTAMINATION SURVEY

Date of wipes:	10/15/2013	Counter Used	2470-0100 Automatic Gamma Counter
Source used	I-129	Calibration Date	2/19/2013
Efficiency	67%		
MDA (dpm)	90.55		
Trigger level (dpm)	578		

Map Location #	Count Rate (cpm)	Removable Contamination (dpm/100cm^2)	Contamination > Trigger level?
Source	75772		
Background	154		
1	169	22.3	No
2	174	29.3	No
3	131	0.0	No
4	156	1.9	No
5	183	42.5	No
6	147	0.0	No
7	190	53.6	No
8	155	0.9	No
9	155	0.2	No
10	161	10.6	No
11	145	0.0	No
12	191	55.2	No
13	186	47.0	No
14	160	8.1	No
15	163	12.3	No
16	175	30.4	No
17	183	43.5	No
18	180	38.5	No
19	163	12.3	No
20	153	0.0	No
21	180	39.1	No
22	160	8.7	No
23	171	24.6	No
24	151	0.0	No
25	148	0.0	No
26	183	42.7	No
27	177	33.2	No
28	171	25.3	No
29	174	28.8	No
30	163	12.5	No
Range	131-191		
Average	167		

Survey by: Deepesh Poudel
Deepesh Poudel
Jr. Health Physicist

Olumide Owoade
Radiation Safety Technician

Reviewed by: Satya Ranjan Bose
Satya R. Bose, Ph.D., DABR
Radiation Safety Officer

See attached for map and printout of survey results.

ATTACHMENT 3-1

500 college street

Protocol ID	6	Protocol name	RSO Misc C	Run ID	1572	10/15/2013 13:48

Pos	Time	Any Isotope CPM
1	60	75771.79
2	60	154.36
3	60	169.23
4	60	173.96
5	60	131.39
6	60	155.6
7	60	182.73
8	60	147.26
9	60	190.14
10	60	154.93
11	60	154.5
12	60	161.42
13	60	144.67
14	60	191.24
15	60	185.72
16	60	159.74
17	60	162.56
18	60	174.66
19	60	183.41
20	60	180.1
21	60	162.56
22	60	152.65
23	60	180.47
24	60	160.19
25	60	170.82
26	60	150.9
27	60	148.46
28	60	182.91
29	60	176.56
30	60	171.27
31	60	173.62
32	60	162.72

original file C:\Documents and Settings\All Users\Documents\Wizard2\001572.csv
file saved as C:\Data\Wizard2\RSO Misc Contamination Checks1572

HOWARD UNIVERSITY
500 COLLEGE STREET, WASTE STORAGE FACILITY
REMOVABLE CONTAMINATION SURVEY

Date of wipes:	10/16/2013	Counter Used	LSC (HUH 6B-24)
Source used	H-3	Calibration Date	10/15/2010
Efficiency	40%		
MDA (dpm)	86.61		
Trigger level (dpm)	294		

Map Location #	Count Rate (cpm)	Removable Contamination (dpm/100cm^2)	Contamination > Trigger level?
Source (H-3)	81083		
Background	47		
1	38	0	No
2	28	0	No
3	28	0	No
4	38	0	No
5	44	0	No
6	50	8	No
7	26	0	No
8	102	138	No
9	41	0	No
10	29	0	No
11	103	140	No
12	26	0	No
13	38	0	No
14	33	0	No
15	48	3	No
16	33	0	No
17	33	0	No
18	47	0	No
19	31	0	No
20	24	0	No
21	43	0	No
22	29	0	No
23	29	0	No
24	32	0	No
25	74	68	No
26	35	0	No
27	38	0	No
28	26	0	No
29	45	0	No
30	39	0	No
Range	24-103		
Average	41		

Survey by: Deepesh Poudel
Deepesh Poudel
Jr. Health Physicist

Olumide Owoade
Radiation Safety Technician

Reviewed by: Satya Ranjan Bose
Satya R. Bose, Ph.D., DABR
Radiation Safety Officer

See attached for map and printout of survey results.

ATTACHMENT 3-2

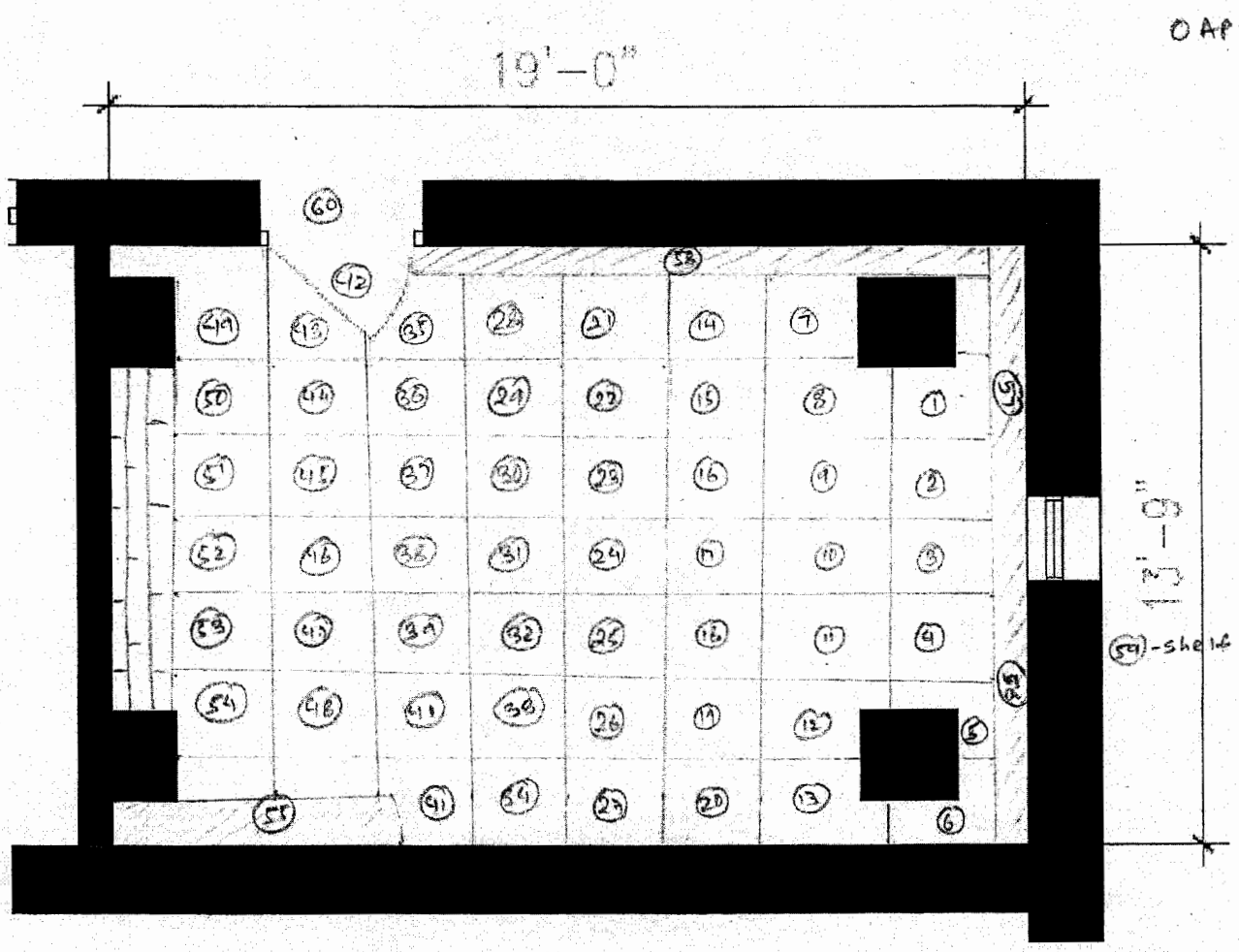
Protocol #: 8 Name:P32(open)/H3/L14 16-OCT-2013 07:21
Region A: LL-UL= 0.0-2000 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region B: LL-UL= 0.0-18.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL=18.0-50.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 1.00 QIF = SIS

500 college street

SW	TIME	CPMA	SIS	FLAG
1	1.00	126955.	32.150	
2	1.00	81083.0	20.095	
3	1.00	47.00	12.206	
4	1.00	38.00	16.203	
5	1.00	28.00	10.857	
6	1.00	28.00	18.221	
7	1.00	38.00	9.373	
8	1.00	44.00	11.016	
9	1.00	50.00	13.006	
10	1.00	26.00	23.674	
11	1.00	102.00	7.131	
12	1.00	41.00	10.336	
13	1.00	29.00	17.120	
14	1.00	103.00	8.077	
15	1.00	26.00	17.999	
16	1.00	38.00	14.260	
17	1.00	33.00	12.402	
18	1.00	48.00	15.158	
19	1.00	33.00	18.190	
20	1.00	33.00	13.442	
21	1.00	47.00	11.350	
22	1.00	31.00	18.801	
23	1.00	24.00	22.929	
24	1.00	43.00	8.560	
25	1.00	29.00	10.352	
26	1.00	29.00	13.879	
27	1.00	32.00	16.432	
28	1.00	74.00	16.606	
29	1.00	35.00	13.406	
30	1.00	38.00	10.967	
31	1.00	26.00	13.828	
32	1.00	45.00	9.730	
33	1.00	39.00	11.305	

500 College Street

Radiation Safety Office, Waste Storage Facility



ATTACHMENT 4

HOWARD UNIVERSITY
500 COLLEGE STREET, WASTE STORAGE FACILITY
TOTAL CONTAMINATION & EXPOSURE RATES SURVEY

Survey Meters Info

	Meter 1	Meter 2	Meter 3
Survey Meter Model	Ludlum Model 2200	Ludlum Model 3	Ludlum Model 2
Survey Meter Serial #	S/N 9016	S/N 104875	S/N 72726
Probe	44-2, PR 221417	44-9, PR 104691	44-9-18, PR 1960488
Detector	1" x 1" (dia x thick) NaI	GM Pancake	GM Pancake
Calibration Date	9/18/2013	4/3/2013	12/12/2012
Date of Survey	10/16/2013	10/17/2013	10/17/2013

Background

B1	1700 cpm	40 cpm	0.02 mR/hr
B2	1714 cpm	60 cpm	0.02 mR/hr
B3	1244 cpm	40 cpm	0.02 mR/hr
B4	1753 cpm	60 cpm	0.02 mR/hr
B5	1829 cpm	60 cpm	0.02 mR/hr
B6	1856 cpm	40 cpm	0.01 mR/hr
B7	2005 cpm	40 cpm	0.01 mR/hr
B8	2063 cpm	60 cpm	0.02 mR/hr
B9	1943 cpm	60 cpm	0.02 mR/hr
B10	1915 cpm	40 cpm	0.01 mR/hr
Average	1802 cpm	50 cpm	0.02 mR/hr

Survey Results

Map Location #	Survey using Meter 1 Gross Count Rate (cpm)	Survey using Meter 2 Gross Count Rate	Survey Using Meter 3 Exposure Rate (mR/hr)
1	1686	60	0.03
2	1853	60	0.02
3	1921	40	0.01
4	1812	80	0.02
5	1609	40	0.02
6	2624	40	0.02
7	1763	40	0.02
8	1911	40	0.03
9	1945	40	0.03
10	1954	60	0.02
11	2073	60	0.03
12	2104	40	0.02
13	2122	60	0.02
14	1902	40	0.01
15	2017	60	0.01
16	1980	80	0.02
17	2007	60	0.01
18	2115	60	0.01
19	2140	60	0.01
20	2299	60	0.01
21	1840	60	0.01
22	2008	40	0.02
23	2933	40	0.02
24	2022	40	0.02
25	2107	60	0.03
26	2148	40	0.02
27	2316	40	0.02
28	1923	60	0.01
29	2087	80	0.02
30	2010	80	0.02

Survey results continued on next page.

ATTACHMENT 4.1

HOWARD UNIVERSITY
500 COLLEGE STREET, WASTE STORAGE FACILITY
TOTAL CONTAMINATION & EXPOSURE RATES SURVEY

Survey Results (Continued from previous page)

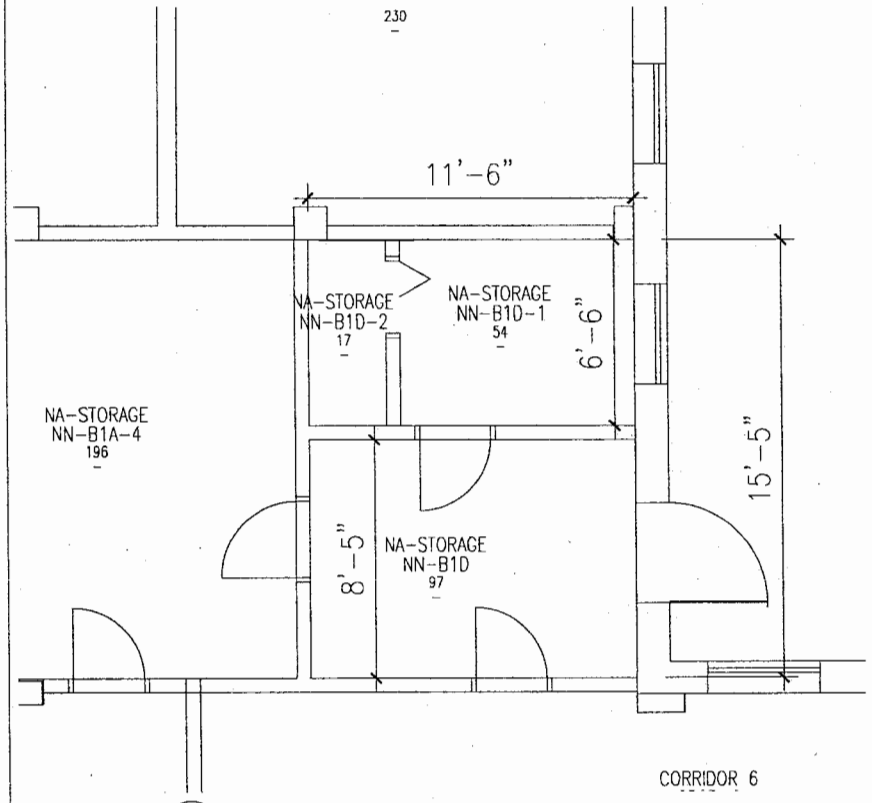
Map Location #	Survey using Meter 1 Gross Count Rate (cpm)	Survey using Meter 2 Gross Count Rate (cpm)	Survey Using Meter 3 Exposure Rate (mR/hr)
31	2044	80	0.02
32	2187	60	0.02
33	2166	80	0.01
34	2294	80	0.02
35	1828	40	0.02
36	1936	60	0.02
37	2012	60	0.02
38	2005	80	0.02
39	2169	60	0.01
40	2217	40	0.01
41	2185	60	0.02
42	1688	40	0.02
43	1755	40	0.02
44	1833	60	0.02
45	1993	60	0.01
46	2097	40	0.01
47	2107	40	0.01
48	2205	40	0.01
49	1709	60	0.02
50	1839	60	0.02
51	2126	80	0.01
52	2152	80	0.02
53	2098	60	0.01
54	2065	60	0.02
55	2246	40	0.02
56	2148	40	0.02
57	2112	40	0.02
58	2200	60	0.02
59	2315	60	0.02
60	1602	40	0.02
Range	1602-2933	40-80	0.01-0.03
Average	2043	55	0.02

Survey By: Deepesh Poudel
Deepesh Poudel
Jr. Health Physicist
Radiation Safety Office

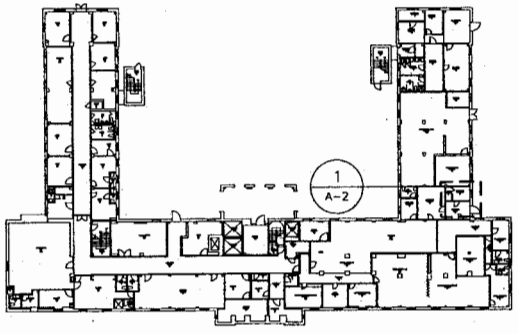
Olumide O. Owoade
Radiation Safety Technician
Radiation Safety Office

Reviewed By: Satya Rajan Bose
Satya R. Bose, Ph.D., DABR
Radiation Safety Officer
Director of Radiation Safety
Radiation Safety Office

Please see attached for survey map.



1 PARTIAL PLAN – BASEMENT
SCALE: 1/4" = 1'-0"



2 KEY PLAN – ANNEX I – BASEMENT
SCALE: NTS

1867
HOWARD UNIVERSITY
President Sidney A. Ribeau

ARCHITECTURAL AND ENGINEERING SERVICES
2244 10th Street, NW,
Washington, DC 20059
Phone: (202) 806-1966
Fax: (202) 483-3564
Email: HUae@howard.edu
Web: www.ae.howard.edu

Harold A. Bruggeman, AIA
Associate Vice President of Facilities, Real Estate and University Architect

Victor R McNaughton, AIA
Director for Architectural and Engineer Services

Project:
LC91301 – A-1

Key Plan:

Submissions and Dates
05/16/13

Drawing Title:
RADIATION SAFETY OFFICE SPACES

PROJECT MANAGER:
DRAWN BY: JR
SCALE: As Noted

A-1

This is to acknowledge the receipt of your letter/application dated 10/25/13, and to inform you that the initial processing which includes an administrative review has been performed.

Amendment (08-00386-19)

[X] There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

[ ] Please provide to this office within 30 days of your receipt of this card

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A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 582468.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader