



INDIANA UNIVERSITY

OFFICE OF THE EXECUTIVE VICE PRESIDENT FOR UNIVERSITY ACADEMIC AFFAIRS

University Environmental Health and Safety

IUPUI/IUMC Radiation Safety Office

November 16, 2018

Materials Licensing Section
U.S. Nuclear Regulatory Commission, Region III
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4351

RE: Amendment to NRC License #13-02752-03

Dear Sir/Madam:

Condition 10.C. of the NRC broad scope license referenced above authorizes use of byproduct material at 6920 Parkdale Place, Suite 107, Indianapolis, IN 46254. IUPUI/IUMC has formally ceased all licensed activities at this location. All byproduct material has been removed, a formal decommissioning survey was performed by the IUPUI/IUMC radiation safety office, and no surface contamination was detected. A copy of the decommissioning survey report will be maintained on file for review during future NRC inspections. We request this location be deleted from the NRC license as an authorized location for byproduct material use.

Please do not hesitate to contact me if you have any questions.

Sincerely,

T. Michael Martin, PhD, CHP
Director of Health Physics/Radiation Safety Officer

IUPUI/IUMC
IU Health Physicians Cardiology
(6920 Parkdale Place, Suite 107)
Decommissioning Report

NRC License Number 13-02752-03

November 9, 2018

1. Summary

Indiana University at Indianapolis/Indiana University Medical Center (IUPUI/IUMC) is permanently ceasing all licensed activities under the NRC Broad Scope radioactive materials license number 13-02752-03 at 6920 Parkdale Place, Suite 107, Indianapolis, IN 46251, and is requesting that this location be removed from the broad scope license. IU Health Physicians Cardiology is located at 6920 Parkdale Place, Suite 107, Indianapolis, IN 46251. IUPUI/IUMC plans to release this building for unrestricted use. A decommissioning survey was completed by the radiation safety office on October 17, 2018. The decommissioning survey consisted of a direct radiation survey and surface contamination (wipe test) survey of all areas within the suite, including areas of radioactive material use. Results of the direct radiation survey was compared to the specified criteria in NUREG 1156 Vol. 9, Rev. 2, Table R.1 for ambient dose rate for unrestricted areas. Direct radiation survey results were less than specified criteria. Results of the surface contamination (wipe test) survey were compared to the specified criteria in NUREG 1156 Vol. 9, Rev. 2, Table R.3 for surface contamination levels in unrestricted areas. Results of the surface contamination were less than the specified criteria. All sealed sourced use for calibration and reference source purposes were removed this location and placed under the radiation safety office control until means of disposal are completed.

2. Historical Use of Radioactive Material at IU Health Physicians Cardiology

On February 25, 2011, NRC license amendment No. 93 was issued to Indiana University at Indianapolis/Indiana University Medical Center (IUPUI/IUMC), NRC license number 13-02752-03 to allowed radioactive material use at IU Health Physicians Cardiology at 6920 Parkdale Place, Suite 107, Indianapolis, IN 46251. Licensed material approved for use at this location included those used for diagnostic medical imaging for which a written directive is not required as well as calibration and reference sources. Radionuclides that were used at the location and their possession limits are listed in Table 1.1 below.

Table 1.1 – Radionuclides Used at IU Health Physicians Cardiology

Nuclide	Half-Life (days)	Authorized Use	Possession Limit (mCi)
^{99m} Tc	0.25	10 CFR 35.100 & 35.200	270
²⁰¹ Tl	3.04	10 CFR 35.100 & 35.200	50
⁵⁷ Co sealed sources	271	10 CFR 35.65	50
¹³⁷ Cs sealed sources	11,012	10 CFR 35.65	5

Direct radiation surveys were performed at the end of each day by authorized users in all areas of radioactive material use. Weekly wipe tests were also performed by authorized users in all areas of radioactive material use. Routine surveys focused on areas of use to identify any potential residual contamination and to ensure residual contamination does not exceed 200 cpm/100 cm². Results for direct radiation surveys and weekly wipes test completed at this location for 2018 are included in the appendix. Quarterly radiation safety audits were performed at this location in all areas of radionuclide use by members of the radiation safety office. Sealed source checks and leak tests, where required, were performed on all sealed sources bi-annually. No incidents involving radioactive material use were reported during the time frame of operation at this location.

2. Site Description

6920 Parkdale Place, Suite 107, Indianapolis, IN 46251 is a suite that is a rented space by IU Health Physicians Cardiology. The space was used for the sole purpose of performing diagnostic cardiology studies and is included as part of the IUPUI/IUMC license facilities for the broad scope license. Approximately 10 patients were seen at this location per month. Radioactive material use only occurred once a week, on Fridays. Rooms approved for radioactive use include: Nuclear Medicine Imaging Room, Stress Lab, and the Hot Lab. A map of the suite is included in the appendix.

3. Decommissioning

Although this location only used very short-lived radionuclides consist with diagnostic medical imaging, a comprehensive decommissioning survey was performed in all rooms of the suite. The decommissioning survey consisted of a direct radiation survey and a surface contamination (wipe test) survey. A total of 88 samples were taken plus 1 background sample. Wipe samples were taken at locations as indicated on the survey map included in the appendix. The decommissioning survey was performed by members of the radiation safety office on October 17, 2018. The results were compared to Appendix R – “Model Procedure for Area Surveys” of NUREG 1556 Vol. 9, Rev. 2., and were found to be acceptable for areas of unrestricted access for both direct radiation survey and surface contamination (wipe test) survey.

4. Survey Instrumentation

Instrumentation used for this decommissioning survey are listed below in Table 3.1. A portable Geiger Muller (GM) meter was used for the direct radiation survey and was calibrated within the year as required by 10 CFR 35.61. A gamma counter was used to count samples collected for the surface contamination (wipe test) survey. Wipe samples were counted for one minute each, including the background wipe sample (sample #1). Results from the gamma counter are reported in counts per minute (CPM). Results are included in the appendix. Calibration and efficiency checks for these instruments are included in the appendix.

Table 3.1: Instrumentation Specifications

Instrument	Instrument Type	Model	Efficiency
PE Wizard 2	Gamma Counter	2470	87.4% (99mTc)
Ludlum	Portable GM	14C	-

The Minimum Detectable Activity (MDA) was calculated for technicium-99m using the following equation from NUREG 1507, Table 3.1 - “Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions.”

$$MDA = \frac{3 + 3.29 \sqrt{B_r \cdot t_s \cdot \left(1 + \frac{t_s}{t_b}\right)}}{t_s \cdot E}$$

Where:

- MDA = minimum detectable concentration level (dpm/wipe)
- B_r = background count rate (counts per minute)
- t_b = background count time (minutes)
- t_s = sample count time (minutes)
- E = instrument efficiency for radionuclide emission of interest (cpm/dpm)

MDA calculation for ^{99m}Tc :

$$^{99m}\text{Tc} MDA = \frac{3 + 3.29 \sqrt{(210) \cdot (1) \cdot \left(1 + \frac{(1)}{(1)}\right)}}{(1) \cdot (0.874)} = 80.6 \text{ dpm}$$

4. Conclusion

It was determined from the direct radiation survey and all wipe test results that IU Health Physicians Cardiology located at 6920 Parkdale Place, Suite 107, Indianapolis, IN 46254, was below contamination limits for unrestricted access. The radiation safety office subsequently released canceled the radionuclide use permit at this location and released the location for unrestricted use. IUPUI/IUMC is requesting that this location be removed from the broad scope license.

Radioactive Material Use Permit
Granted under Broad Scope
NRC License # 13-02752-03

IU Health Physicians Cardiology
6920 Parkdale Place, Suite 107
Indianapolis, IN 46254



INDIANA UNIVERSITY

Radiation Safety Office
Indianapolis

Radionuclide Use Permit

Authorization Number: CARE01

Issued To: Ronald Mastouri, MD

Issued Date: 03/07/2011

Expiration Date: 12/31/2018

Amended Date:

In accordance with the statements and representatives made in your application for Project Approval, Project Amendment, and/c your Progress Report, an approval authorizing the below named individuals to order, possess, and use the materials or items designated below in accordance with NRC regulations, state regulations, University regulations, and such other conditions as ar herein specified is hereby issued.

1. Personnel / Status

Approved

Geralyn Billman, RT (N)

Kim Cansler,

Michael McFall , CNMT

Auth NM Physician

Yazid Fadl, MD

Ronald Mastouri, MD

DOT - approved

Geralyn Billman, RT (N)

Kim Cansler,

Michael McFall , CNMT

2. Locations of Use

Approved

Eagle Highlands C 3/8/11

Eagle Highlands H 3/8/11

Eagle Highlands T 3/8/11

3. Nuclides / Chemical Forms / Exp. Limit / Poss. Limit

Nuclide / Chemical Form	Exp. Limit	Poss. Limit	Other	Limit Date
Co-57SS	10.00	30.00	A	3/8/11
dose calibrator sources (A - 3/8/2011)				
flood sources (A - 3/8/2011)				
Cs-137SS	5.00	5.00	A	3/8/11
dose calibrator sources (A - 3/8/2011)				
sealed sources (A - 3/8/2011)				
rod source (A)				
Tc-99m	30.00	270.00	A	3/7/11
sestamibi (A - 3/7/2011)				
bulk pertechnetate (A - 7/17/2013)				
Tl-201	10.00	50.00	A	3/7/11
chloride (A - 3/7/2011)				

4. Authorized Use

Diagnostic cardiology studies (approx 10/month).

Bulk pertechnetate utilized for equipment QA.

5. Conditions of Authorization



INDIANA UNIVERSITY

Radiation Safety Office
Indianapolis

Radionuclide Use Permit

A direct radiation survey shall be performed at the end of each day of all areas where radiopharmaceuticals are routinely prepared for use, stored, and/or administered.

At the beginning of each day, a long-lived source shall be assayed in the dose calibrator(s) on a commonly used setting to determine constancy. As approved 3/12/96, this will be done by comparing the result with the average of the readings from the previous week.

All shipments of radiopharmaceuticals which are delivered to the department or picked up shall be surveyed and logged in per established procedures. surveys shall be completed within 3 hours of receipt or within 3 hours from the beginning of the workday if items are received after hours.

All radiopharmaceuticals to be administered to humans (except unit doses) shall be assayed in a dose calibrator prior to administration.

Syringe shields and vial radiation shields should be implemented according to Section Q of the Nuclear Medicine/PET Radiation Safety Procedures Manual.

All syringe and vial shields shall be properly labeled.

Utilizing a long-lived check source, the relative activity on all commonly used settings of the dose calibrator(s) shall be measured and recorded to assure constancy on a weekly basis.

Contamination (wipe) surveys shall be performed on all areas where radionuclides are routinely prepared for use, administered, and/or stored on a weekly basis.

All dose calibrators shall be tested for linearity twice a year and accuracy annually.

An inventory of sealed sources shall be prepared and recorded.

Waste shall be surveyed and recorded before disposal. The record shall include the date of storage, the date of disposal, the item, the measurement of waste (must be at background levels), the background measurement, the instrument used, and the initials of the individual performing the survey. All shielding must be removed before the survey is made. all labels must be defaced or removed before disposal.

A survey meter is required.

Personnel monitoring (whole body and ring badges) are required for individuals who utilize radioactive materials.

Daily Direct Radiation Survey and Weekly Wipe Test
Results for 2018

IU Health Physicians Cardiology
6920 Parkdale Place, Suite 107
Indianapolis, IN 46254



BIODOSE

IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

6850 Parkdale Place Suite 107, Indianapolis, IN 46254

Lic.#

October 17, 2018

Area Monitoring Report

Group Name : DAILY SURVEYS

Date Range: 01/01/2018 To 12/31/2018

Date/Time	Tech	In st	Batt	Ck.Src mR/hr	Bkg mR/hr	Area 1 mR/hr	Area 2 mR/hr	Area 3 mR/hr	Area 4 mR/hr	Area 5 mR/hr	Area 6 mR/hr	Area 7 mR/hr	Area 8 mR/hr
01-05-18 14:38	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
01-19-18 14:14	KLC	1	P*	0.60*	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02
02-02-18 14:07	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
02-09-18 13:35	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
02-16-18 13:46	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
03-02-18 13:47	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
03-09-18 13:09	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
03-30-18 12:21	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02
04-06-18 14:30	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
04-13-18 14:21	KLC	1	P*	0.60*	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
06-01-18 13:53	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
06-08-18 14:30	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
07-13-18 14:35	KLC	1	P*	0.60*	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
07-20-18 15:12	KLC	1	P*	358.00*	490.000	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

Area Monitoring Report : Group Name : DAILY SURVEYS

Date Range : 01/01/2018 To 12/31/2018

Date/Time	Tech	In st	Ck.Src Batt	mR/hr	Bkg mR/hr	Area 1 mR/hr	Area 2 mR/hr	Area 3 mR/hr	Area 4 mR/hr	Area 5 mR/hr	Area 6 mR/hr	Area 7 mR/hr	Area 8 mR/hr
08-03-18 14:14	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
08-10-18 11:03	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
08-31-18 13:36	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
09-07-18 14:04	KLC	1	P*	0.60*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
10-05-18 09:18	KLC	1	P*	0.61*	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
10-12-18 13:37	KLC	1	P*	0.61*	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Note:

Areas Underlined are over trigger limit.

QC Readings marked with '*' (asterisk) indicates that QC was not part of the Area Monitor test.

Battery Check: "P" = Pass "F" = Fail

Test Not performed or Not Required : "-"

Default Trigger Limit : 0.05 mR/hr

Current Area Trigger Limits (mR/hr):

TECHNOLOGIST -	0.05	HOT LAB COUNT -	1.00	HOT LAB DOSE C -	1.00
HOT LAB FLOOR -	1.00	HOT LAB TRASH -	1.00	INJECTION CHAI -	1.00
STRESS ROOM -	0.10	CAMERA ROOM -	0.10		

Instrument Information

#	Name	Manufacturer	Next Cal	Serial Number	Efficiency
1	14C	LUDLUM	07-28-2018	240059	N/A
1	14C	LUDLUM	07-03-2019	240059	N/A

IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

Area Monitoring Report : Group Name : DAILY SURVEYS

Date Range : 01/01/2018 To 12/31/2018

Original area names:

Generic Name	Actual Area Name	Generic Name	Actual Area Name	Generic Name	Actual Area Name
Area 1	TECHNOLOGIST	Area 2	HOT LAB COUNTER	Area 3	HOT LAB DOSE CALIBRA
Area 4	HOT LAB FLOOR	Area 5	HOT LAB TRASH	Area 6	INJECTION CHAIR
Area 7	STRESS ROOM	Area 8	CAMERA ROOM		

Tech Information:

Tech	Complete Tech Name
KLC	CANSLER, KIM

Technologist Signature: - _____

R.S.O. Signature: - _____

Report Printed: 10/17/2018 10:56:02AM



IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

6850 Parkdale Place Suite 107, Indianapolis, IN 46254

Lic.#

October 17, 2018

Area Wipe Report

Group Name : WEEKLY WIPE TEST

Date Range : 01/01/2018 To 12/31/2018

Date/Time	Tech	In st	Batt	Ck.Src CPM	Bkg CPM	Area 1		Area 2		Area 3		Area 4		Area 5		Area 6		Area 7	
						CPM	DPM	CPM	DPM	CPM	DPM	CPM	DPM	CPM	DPM	CPM	DPM	CPM	DPM
01-05-18 13:17	KLC	2	--	363*	458	51	64	0	0	34	43	7	9	51	64	50	63	37	46
01-19-18 14:15	KLC	2	--	363*	479	10	13	0	0	0	0	0	0	22	28	24	30	20	25
02-02-18 13:57	KLC	2	--	364*	470	30	38	0	0	0	0	0	0	47	59	48	60	0	0
02-09-18 13:37	KLC	2	--	360*	505	0	0	0	0	5	6	0	0	0	0	0	0	0	0
02-16-18 13:47	KLC	2	--	362*	449	52	65	74	93	29	36	16	20	44	55	5	6	42	53
03-02-18 13:26	KLC	2	--	361*	496	0	0	0	0	0	0	0	0	34	43	0	0	0	0
03-09-18 13:10	KLC	2	--	359*	475	0	0	6	8	25	31	15	19	0	0	0	0	0	0
03-30-18 12:19	KLC	2	--	358*	474	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04-06-18 13:59	KLC	2	--	361*	467	0	0	18	23	7	9	0	0	0	0	22	28	0	0
04-13-18 13:38	KLC	2	--	361*	485	6	8	0	0	0	0	0	0	0	0	0	0	0	0
06-01-18 13:55	KLC	2	--	356*	540	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06-08-18 14:30	KLC	2	--	359*	524	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07-13-18 14:00	KLC	2	--	355*	485	0	0	0	0	0	0	0	0	0	0	0	0	47	59
07-20-18 15:14	KLC	2	--	1*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08-03-18 14:16	KLC	2	--	355*	468	18	23	5	6	0	0	0	0	0	0	40	50	0	0

IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

Area Wipe Report : Group Name : WEEKLY WIPE TEST

Date Range : 01/01/2018 To 12/31/2018

08-10-18 11:03 KLC	2	--	356*	451	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08-31-18 13:44 KLC	2	---	353*	457	2	3	14	18	24	30	21	26	4	5	12	15	22	28
09-07-18 14:06 KLC	2	--	352*	529	4	5	0	0	0	0	0	0	0	0	0	0	0	0
10-05-18 09:18 KLC	2	--	350*	573	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12-18 12:10 KLC	2	--	350*	469	8	10	24	30	14	18	19	24	0	0	4	5	26	33

Note:

Above all values listed are NET values.

Areas Underlined are over trigger limit.

Battery Check: "P" = Pass "F" = Fail

Test Not performed or Not Required: "--"

Check source reading was done today but not as part of this survey/wipe test: "*" "

Wipe Area : 100.00 Sq. CM

Default Trigger Limit : 2000.00 DPM

Current Area Trigger Limits (DPM):

HOT LAB COUNTER	-	2,000.00	HOT LAB DOSE CALIBRA	-	2,000.00	HOT LAB FLOOR	-	2,000.00
HOT LAB TRASH	-	2,000.00	INJECTION CHAIR	-	2,000.00	STRESS ROOM	-	2,000.00
CAMERA ROOM	-	2,000.00						

Instrument Details:

#	Instrument	Manufacturer	Next Cal Date	Serial No	Efficiency
2	15W	CRC15W		171174	80.00%

Original area names:

Generic Name	Actual area name	Generic Name	Actual area name	Generic Name	Actual area name

IU Health Methodist Medical Plaza ? Eagle Highlands

Nuclear Medicine Department

Area Wipe Report: Group Name : WEEKLY WIPE TEST

Date Range : 01/01/2018 To 12/31/2018

Area 1	HOT LAB COUNTER	Area 2	HOT LAB DOSE CALIBRA	Area 3	HOT LAB FLOOR
Area 4	HOT LAB TRASH	Area 5	INJECTION CHAIR	Area 6	STRESS ROOM
Area 7	CAMERA ROOM				

Tech Information:

Tech	Tech Name
KLC	CANSLER, KIM

Technologist Signature: - _____

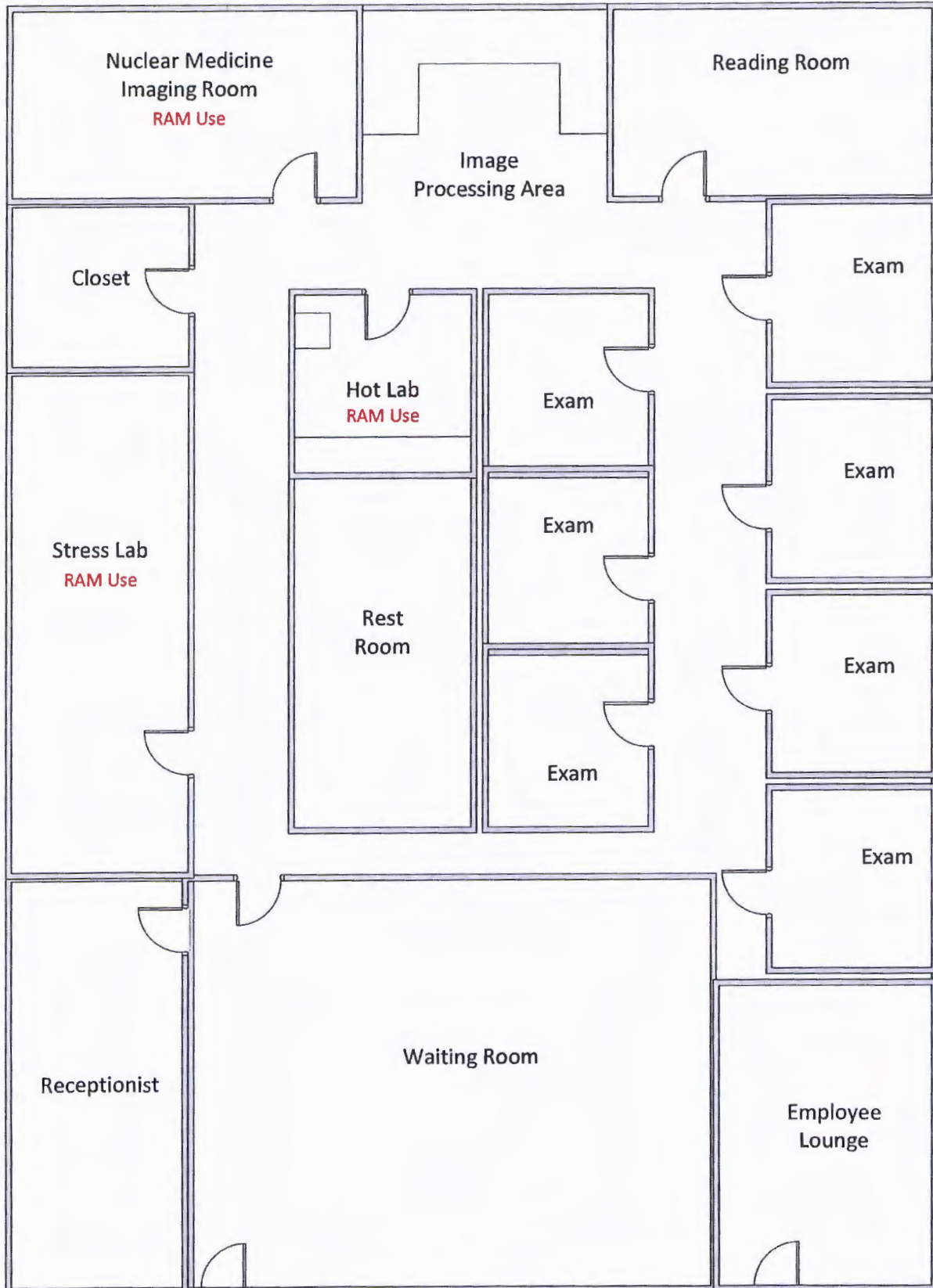
R.S.O. Signature: - _____

Report Printed: 10/17/2018 10:57:46AM

Map of IU Health Physicians Cardiology
(Eagle Highlands)

IU Health Physicians Cardiology
6920 Parkdale Place, Suite 107
Indianapolis, IN 46254

EAGLE HIGHLANDS SUITE 107



Google Maps 6920 Parkdale Pl #107



Imagery ©2018 Google, Map data ©2018 Google 50 ft

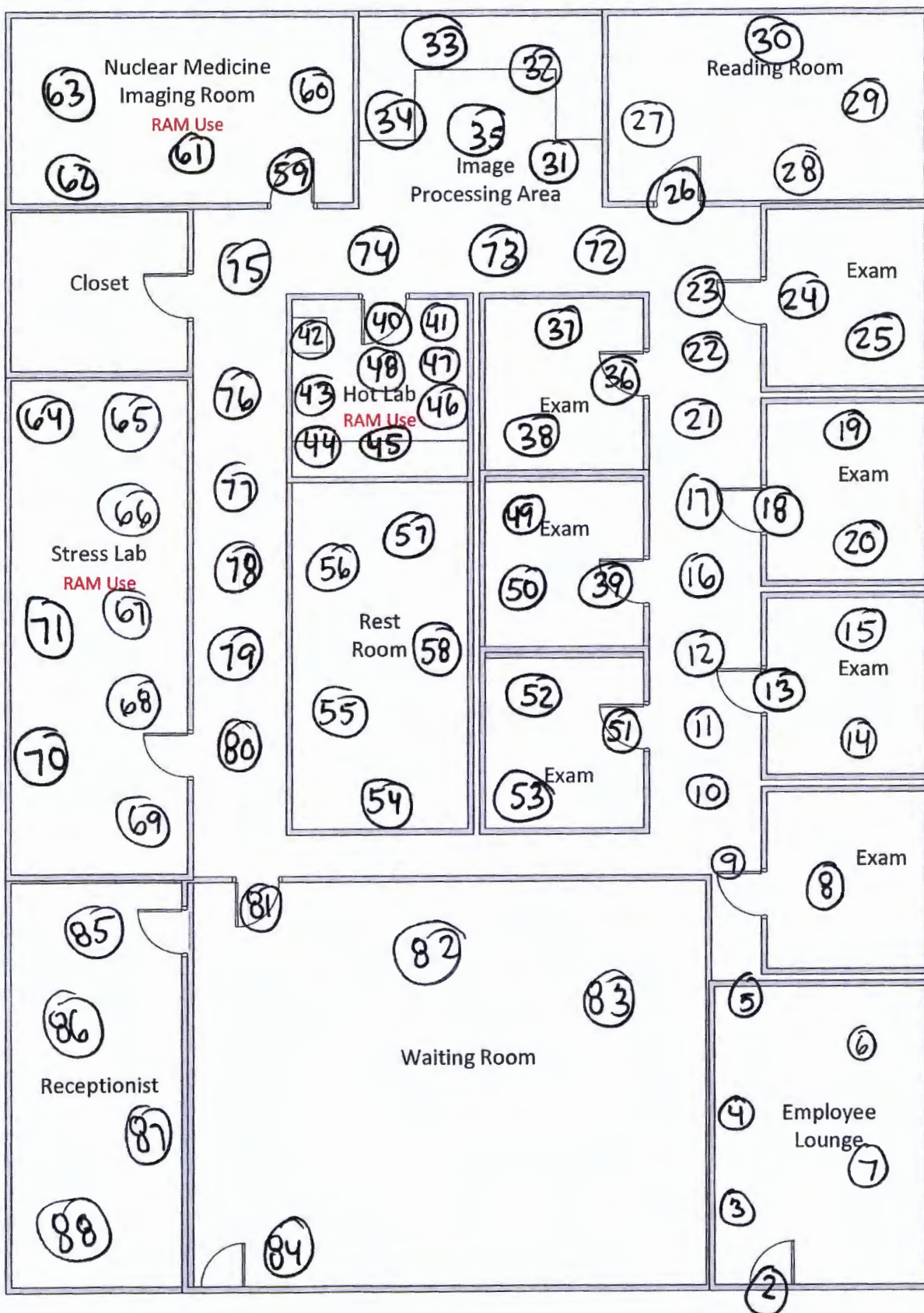


6920 Parkdale Pl #107
Indianapolis, IN 46254

Decommissioning Wipe Test Locations
and Wipe Test Results

IU Health Physicians Cardiology
6920 Parkdale Place, Suite 107
Indianapolis, IN 46254

EAGLE HIGHLANDS SUITE 107



① = background wipe

Protocol name	Measurement date & time	Pos	Tc-99m Counts	Tc-99m Error %	I-131 CPM	I-131 Error %	
Nuclear Medicine Wipes	10/17/2018 14:20	1	210	6.9	87.25	10.6	Background Wipe
Nuclear Medicine Wipes	10/17/2018 14:21	2	222	6.71	81.74	10.92	
Nuclear Medicine Wipes	10/17/2018 14:22	3	214	6.84	61.5	12.48	
Nuclear Medicine Wipes	10/17/2018 14:24	4	200.5	7.06	76.1	11.32	
Nuclear Medicine Wipes	10/17/2018 14:25	5	213	6.85	68.52	11.87	
Nuclear Medicine Wipes	10/17/2018 14:26	6	231.5	6.58	82.56	10.85	
Nuclear Medicine Wipes	10/17/2018 14:27	7	209	6.92	76.94	11.25	
Nuclear Medicine Wipes	10/17/2018 14:29	8	185	7.35	92.93	10.32	
Nuclear Medicine Wipes	10/17/2018 14:30	9	221	6.73	75.87	11.31	
Nuclear Medicine Wipes	10/17/2018 14:31	10	235	6.53	88.65	10.49	
Nuclear Medicine Wipes	10/17/2018 14:33	11	218.5	6.77	81.82	10.92	
Nuclear Medicine Wipes	10/17/2018 14:34	12	205	6.99	65.62	12.13	
Nuclear Medicine Wipes	10/17/2018 14:35	13	225.5	6.66	64.28	12.21	
Nuclear Medicine Wipes	10/17/2018 14:36	14	238	6.48	85.56	10.66	
Nuclear Medicine Wipes	10/17/2018 14:38	15	231	6.58	58.87	12.7	
Nuclear Medicine Wipes	10/17/2018 14:39	16	209	6.92	83.07	10.85	
Nuclear Medicine Wipes	10/17/2018 14:40	17	216.5	6.8	92.22	10.32	
Nuclear Medicine Wipes	10/17/2018 14:41	18	217	6.79	70.49	11.71	
Nuclear Medicine Wipes	10/17/2018 14:43	19	203.5	7.01	75.96	11.33	
Nuclear Medicine Wipes	10/17/2018 14:44	20	234.5	6.53	70.26	11.7	
Nuclear Medicine Wipes	10/17/2018 14:45	21	209	6.92	69.87	11.77	
Nuclear Medicine Wipes	10/17/2018 14:47	22	223	6.7	72.44	11.55	
Nuclear Medicine Wipes	10/17/2018 14:48	23	203.5	7.01	66.74	12.04	
Nuclear Medicine Wipes	10/17/2018 14:49	24	191.5	7.23	54.77	13.22	
Nuclear Medicine Wipes	10/17/2018 14:50	25	249	6.34	83.2	10.79	
Nuclear Medicine Wipes	10/17/2018 14:52	26	228.5	6.62	78.52	11.11	
Nuclear Medicine Wipes	10/17/2018 14:53	27	224.5	6.68	64.13	12.22	
Nuclear Medicine Wipes	10/17/2018 14:54	28	204.5	7	82.19	10.91	
Nuclear Medicine Wipes	10/17/2018 14:55	29	221	6.73	59.04	12.71	
Nuclear Medicine Wipes	10/17/2018 14:57	30	208.5	6.93	90.38	10.43	
Nuclear Medicine Wipes	10/17/2018 14:58	31	211	6.89	78.89	11.12	
Nuclear Medicine Wipes	10/17/2018 15:00	32	233	6.55	70.41	11.69	
Nuclear Medicine Wipes	10/17/2018 15:01	33	216	6.81	61.22	12.5	

Protocol name	Measurement date & time	Pos	Tc-99m Counts	Tc-99m Error %	I-131 CPM	I-131 Error %	
Nuclear Medicine Wipes	10/17/2018 15:02	34	212	6.87	81.12	10.97	
Nuclear Medicine Wipes	10/17/2018 15:03	35	210.5	6.9	67.54	11.96	
Nuclear Medicine Wipes	10/17/2018 15:05	36	198	7.11	83.48	10.84	
Nuclear Medicine Wipes	10/17/2018 15:06	37	224.5	6.68	85.87	10.66	
Nuclear Medicine Wipes	10/17/2018 15:07	38	225.5	6.66	75.49	11.33	
Nuclear Medicine Wipes	10/17/2018 15:08	39	221.5	6.72	80.74	10.98	
Nuclear Medicine Wipes	10/17/2018 15:10	40	223	6.7	73.51	11.47	Samples #40-48 from Hot Lab (area of RAM Use)
Nuclear Medicine Wipes	10/17/2018 15:11	41	202	7.04	70.85	11.71	
Nuclear Medicine Wipes	10/17/2018 15:13	42	222.5	6.71	79.73	11.04	
Nuclear Medicine Wipes	10/17/2018 15:14	43	232	6.57	76.35	11.26	
Nuclear Medicine Wipes	10/17/2018 15:15	44	215	6.82	71.91	11.6	
Nuclear Medicine Wipes	10/17/2018 15:16	45	217.5	6.78	67.43	11.95	
Nuclear Medicine Wipes	10/17/2018 15:17	46	240.5	6.45	72.03	11.55	
Nuclear Medicine Wipes	10/17/2018 15:19	47	193	7.2	73.22	11.54	
Nuclear Medicine Wipes	10/17/2018 15:20	48	231	6.58	65.01	12.13	
Nuclear Medicine Wipes	10/17/2018 15:21	49	203	7.02	69.79	11.79	
Nuclear Medicine Wipes	10/17/2018 15:22	50	219.5	6.75	72.5	11.55	
Nuclear Medicine Wipes	10/17/2018 15:24	51	226	6.65	56.93	12.91	
Nuclear Medicine Wipes	10/17/2018 15:25	52	200	7.07	84.4	10.78	
Nuclear Medicine Wipes	10/17/2018 15:27	53	227	6.64	95.21	10.15	
Nuclear Medicine Wipes	10/17/2018 15:28	54	192	7.22	78.29	11.18	
Nuclear Medicine Wipes	10/17/2018 15:29	55	214.5	6.83	72.64	11.55	
Nuclear Medicine Wipes	10/17/2018 15:30	56	202	7.04	94.77	10.2	
Nuclear Medicine Wipes	10/17/2018 15:32	57	231.5	6.58	83.64	10.78	
Nuclear Medicine Wipes	10/17/2018 15:33	58	205	6.99	72.85	11.55	
Nuclear Medicine Wipes	10/17/2018 15:34	59	218	6.77	58.31	12.79	Samples #59-63 from Imaging Room (area of RAM Use)
Nuclear Medicine Wipes	10/17/2018 15:35	60	223	6.7	79.65	11.05	
Nuclear Medicine Wipes	10/17/2018 15:37	61	223.5	6.69	95.13	10.16	
Nuclear Medicine Wipes	10/17/2018 15:38	62	206	6.97	72.93	11.54	
Nuclear Medicine Wipes	10/17/2018 15:40	63	217	6.79	73.64	11.47	
Nuclear Medicine Wipes	10/17/2018 15:41	64	198.5	7.1	82.33	10.91	Samples #64-71 from Stress Lab (area of RAM Use)
Nuclear Medicine Wipes	10/17/2018 15:42	65	197	7.13	67.86	11.96	
Nuclear Medicine Wipes	10/17/2018 15:43	66	192	7.22	87.79	10.59	

Protocol name	Measurement date & time	Pos	Tc-99m Counts	Tc-99m Error %	I-131 CPM	I-131 Error %
Nuclear Medicine Wipes	10/17/2018 15:45	67	223	6.7	79.65	11.05
Nuclear Medicine Wipes	10/17/2018 15:46	68	209.5	6.91	80.14	11.04
Nuclear Medicine Wipes	10/17/2018 15:47	69	229	6.61	65.11	12.13
Nuclear Medicine Wipes	10/17/2018 15:48	70	201	7.06	86.39	10.66
Nuclear Medicine Wipes	10/17/2018 15:50	71	221	6.73	73.5	11.48
Nuclear Medicine Wipes	10/17/2018 15:51	72	222.5	6.71	86.04	10.65
Nuclear Medicine Wipes	10/17/2018 15:52	73	221	6.73	79.75	11.04
Nuclear Medicine Wipes	10/17/2018 15:54	74	229	6.61	70.24	11.71
Nuclear Medicine Wipes	10/17/2018 15:55	75	238	6.48	61.77	12.41
Nuclear Medicine Wipes	10/17/2018 15:56	76	205	6.99	71.98	11.62
Nuclear Medicine Wipes	10/17/2018 15:57	77	213.5	6.85	79.89	11.05
Nuclear Medicine Wipes	10/17/2018 15:59	78	230	6.6	90.88	10.37
Nuclear Medicine Wipes	10/17/2018 16:00	79	235.5	6.52	63.93	12.22
Nuclear Medicine Wipes	10/17/2018 16:01	80	203.5	7.01	63.63	12.31
Nuclear Medicine Wipes	10/17/2018 16:03	81	234	6.54	70.11	11.71
Nuclear Medicine Wipes	10/17/2018 16:04	82	198.5	7.1	75.06	11.4
Nuclear Medicine Wipes	10/17/2018 16:05	83	230.5	6.59	81.55	10.92
Nuclear Medicine Wipes	10/17/2018 16:07	84	234.5	6.53	83.57	10.78
Nuclear Medicine Wipes	10/17/2018 16:08	85	227	6.64	79.56	11.05
Nuclear Medicine Wipes	10/17/2018 16:09	86	222.5	6.71	98.28	10
Nuclear Medicine Wipes	10/17/2018 16:10	87	214.5	6.83	75.78	11.32
Nuclear Medicine Wipes	10/17/2018 16:12	88	236.5	6.5	67.02	11.95

Calibration and Efficiency Checks for
Decommissioning Survey Instrumentation

IU Health Physicians Cardiology
6920 Parkdale Place, Suite 107
Indianapolis, IN 46254



INDIANA UNIVERSITY

OFFICE OF RESEARCH ADMINISTRATION
RADIATION SAFETY - INDIANAPOLIS

RADIATION SURVEY INSTRUMENT
CALIBRATION REPORT

RSO Form

X-1

Rev Oct 2013

Authorized Calibration Personnel Information

Name (Printed) :	Signature:	Calibration Date:
John R. Bullock		07/03/18

Instrument Information

Make:	Model:	Serial:	Probe Type:
Wdium	14C	240059	<input type="checkbox"/> Pancake <input checked="" type="checkbox"/> End Window <input type="checkbox"/> N/A <input type="checkbox"/> Side Window <input type="checkbox"/> Internal

Source Information

Manufacturer:	Model:	Serial:	Cal Date:	Cal Activity:	mR/hr@1m (on cal date) :	mR/hr@1m (today) :
Tech Ops	773	S509	11/20/84	153 mCi	49.00	22.57

Gamma Calibration Data

Scale	Calculated Exposure (mR/hr)	Calculated Distance (cm)	Filter	Observed Exposure Rate (mR/hr)	Adjusted Exposure Rate (mR/hr)	Correction Factor
X			0			
			0			
X 100	140.00	40.2	0	130		
	70.00	56.8	0	80		
X 10	14.00	127.0	0	13		
	7.00	179.6	0	7.		
X 1	1.40	127.0	1	1.4		
	0.70	179.6	1	0.7		
X 0.1	0.14	127.0	2	0.14		
	0.07	179.6	2	0.075		

Beta Calibration Data

Nuclide	Emax (MeV)	Activity (μCi)	Assay Date	Calculated dpm	Observed cpm	Efficiency
¹⁴ C	0.156	0.098	8/1/1978	216,512	4,000	1.8%
⁹⁹ Tc	0.292	0.039	2/24/1978	86,569	8,000	9.2%
³⁶ Cl	0.719	0.0208	3/30/1978	46,134	6,000	13.0%
²¹⁰ Pb	1.16	0.02005	4/1/2001	24,766	3,000	12.1%
¹²⁹ I	0.15	0.082	8/25/1982	182,040		

Additional Checks

Check Source Reading: 0.65 mR/hr <input checked="" type="checkbox"/> mR/hr <input type="checkbox"/> cpm	Battery Condition: <input checked="" type="checkbox"/> Okay <input type="checkbox"/> Replaced	Speaker Working? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Next Calibration Due: 07/03/19
--	--	--	-----------------------------------

Comments:

Permit Holder Information

Name: Mastouri	Location (Bldg. & Room): (EARE01)	Phone:
-------------------	--------------------------------------	--------

Eagle Highlands Cardiology

Date Performed: 8/2/2018

Radionuclide	Channel Energy Range	Isotope Standard	Standard Activity (uCi)	Standard Activity (dpm)	Standard Date	Counts/min	Efficiency
²² Na	433 - 1417 keV	²² Na Rod	0.0551	122338	6/1/2016	21881	17.9%
⁵¹ Cr	240 - 400 keV	¹³³ Ba Rod	0.0883	196028	6/1/2016	154561	78.8%
⁵⁷ Co	75 - 165 keV	⁵⁷ Co Rod	0.0130	28915	6/1/2016	23945	82.8%
⁶⁰ Co	1050 - 1550 keV	⁶⁰ Co Rod	0.0743	164846	6/1/2016	6550	4.0%
⁶⁸ Ge*	450 - 550 keV	²² Na Rod	0.0551	122338	6/1/2016	21678	17.7%
¹⁰³ Pd	15 - 100 keV	¹²⁹ I Rod	0.0633	140526			0.0%
¹¹¹ In	150 - 270 keV	⁵⁷ Co Rod	0.0130	28915	6/1/2016		0.0%
¹²⁵ I	15 - 75 keV	¹²⁹ I Rod	0.0633	140526		112322	79.9%
¹³¹ I	260 - 470 keV	¹³³ Ba Rod	0.0883	196028	6/1/2016	36324	18.5%
¹³⁷ Cs	600 - 730 keV	¹³⁷ Cs Rod	0.0947	210212	6/1/2016	14204	6.8%
¹⁹² Ir	250 - 380 keV	¹³³ Ba Rod	0.0883	196028	6/1/2016	36520	18.6%
¹⁹⁸ Au	385 - 450 keV	¹³³ Ba Rod	0.0883	196028	6/1/2016	86690	44.2%
^{199m} Tc	121 - 159 keV	⁵⁷ Co Rod	0.0130	28915	6/1/2016	25275	87.4%

Rod Source	Activity (uCi)	Date	Half Life (yrs)	Days Past	Decayed Activity (uCi)
129I Rod	0.0633				0.0633
133Ba Rod	0.1019	6/1/2016	10.5	792	0.088300923
137Cs Rod	0.09953	6/1/2016	30.17	792	0.094689879
22Na Rod	0.09823	6/1/2016	2.602	792	0.055107263
57Co Rod	0.0995	6/1/2016	0.7397	792	0.013024789
60Co Rod	0.09877	6/1/2016	5.272	792	0.074255114
Mock ¹³¹ I Rod	9.574				9.574



**IUPUI
OFFICE OF ENVIRONMENTAL
HEALTH AND SAFETY**

INDIANA UNIVERSITY-PURDUE UNIVERSITY
INDIANAPOLIS

RADIATION SAFETY - Gatch Hall 159
1120 W. Michigan Street
Indianapolis, IN 46202-5111

1000 0606 0102



CERTIFIED MAIL



U.S. POSTAGE
NOV 27 2008
\$ 008.25



Materials Licensing Section
U.S. Nuclear Regulatory Commission, Region III
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4351

Handwritten signature

RECEIVED NOV 27 2008