Br. 1

06-23559-01
03028939

U.S. NRC Region I
Attention: Licensing Department
2100 Renaissance Blvd., Suite 100
King of Prussia, PA 19406-2713

RECD 10519 15 AM 07 05

586987

NMSS/RGNI MATERIALS-002

MIDDLESEX CARDIOLOGY ASSOCIATES, P.C.

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Jean-Anne McCracken, PA-C
Donna Valva, APRN

May 11, 2015

06-23559-01
03028939

To Whom It May Concern:

It was noticed by our physicist that on our license it listed our previous address of 520 Saybrook Rd. We would like this address removed. Attached is a copy of the decommissioning paper work for the lab.

One of our cardiologists has left the practice – Dr. Anitha Yarlagadda and needs to be removed from our license.

Thank you,

Dr. Joseph Corning MD
Radiation Safety Officer
Middlesex Cardiology Associates; P.C.

RECD 05 19 15 AM 07 05

Heritage Medical, 420 Saybrook Road, Middletown, Connecticut 06457 860.347.4258 FAX: 860.975.0193
51 Main Street, Old Saybrook, Connecticut 06475 860.388.3564 FAX: 860.388.4318
14 Jones Hollow Road, Marlborough, Connecticut 06447 860.295.9920 FAX: 860.295.9166

Middlesex Cardiology
520 Saybrook Road
Middletown, Connecticut

Prepared by

Radiation Safety Associates, Inc.
19 Pendleton Drive, PO Box 107
Hebron, Connecticut 06248
(860) 228-0487

12 November 2013

1.0 INTRODUCTION

Middlesex Cardiology is a private medical practice specializing in the treatment and prevention of diseases of the heart and blood vessels. The practice is located in an 8400 square foot facility at 520 Saybrook Road in Middletown, CT. As part of their practice they perform nuclear cardiac studies and cardiac stress tests studies utilizing the short lived isotope Tc-99m (t ½ 6.02 hours). For a brief period in 2010, when Tc-99m was in short supply, they used Tl-201 (t ½ 73.06 hours) as a substitute. They also possess sealed sources of Ba-133, Co-57 and Cs-137 as check and calibration sources. The practice has been located at its present location for 10 years. This decommissioning survey and report is being performed because the practice will be moving to another facility and will be removing the 520 Saybrook Road address from its license.

Over the course of the last 10 years, it is estimated that the rate of use of Tc-99m was approximately 1.5 Ci/week with total use of about 780 Ci over the period of occupancy. Tc-99m decays to Tc-99 (t ½ 213,000 years). Because of the large disparity in half- life between Tc-99m and Tc-99, it is anticipated that no Tc-99 will be present at levels which exceed its DCGL of 1.3E6 dpm/100cm^2.

At the time of the survey, the offices at 510 Saybrook Road had been unoccupied for a period of 1 week. All of the radiation detection instrumentation had been moved to the new location along with the sealed sources and any radioactive waste in decay in storage.

This facility has been determined to be subject to a group 1 decommissioning. This survey is being performed because all activities of the practice are being moved to a new facility and the current facility is being released for unrestricted use.

2.0 SITE DESCRIPTION

The affected area of the Middlesex Cardiology offices consists of an area approximately 26 by 35 feet (910 sf). The area is broken down into the following rooms:

1. Camera Room 1, used for nuclear cardiac studies. The dimensions of this room are 12 X 19 feet (228 sf).
2. Camera Room 2, used for nuclear cardiac studies. The dimensions of this room are 13 X 15 feet (195 sf).
3. Stress Test Room 1, used for cardiac stress tests. The dimensions of this room are 11 X 13 feet (143 sf).
4. Radioactive Materials Storage Area, dimensions; 5 X 8 feet (40 sf).

5. Patient Dressing Room. This is an area 8.5 X 17 feet (used to prep patients for procedures.

6. A lavatory and Records Storage area totaling 60.5 sf (5.5 X 11 feet)

Middlesex Cardiology has been operating in these offices since 2003. In that time there were no spills of radioactive materials and routine monthly surveys detected no elevation of beta activity. All sealed source leak tests were negative for leaking sources. In the normal course of operations, the Tc-99m used was ordered in patient specific dosages, delivered in syringes, and administered to the patient through an intravenous set-up. The patient labeled syringes were returned to the Tc-99m supplier and the IV tubing and associated waste was placed in Decay in Storage prior to being disposed of at a Medical Waste Facility. In the event that a patient dosage was not delivered to the intended patient, the dose was held in Decay in Storage for several days and returned to the manufacturer.

At the time of the survey all radioactive materials, furniture, gamma cameras and records had been removed and transferred to their new location. The space consisted of bare walls, built in drawers and countertops, linoleum and carpeted floors.

This survey is being conducted under the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance for radiological surveys for demonstrating compliance with dose or risk-based regulations or standards.

3.0 SUMMARY OF INVESTIGATIONS

This radiological survey of the facility was performed on 26 August 2013. Based upon the history of radioactive materials use and advice from the RSO, the nuclear laboratory spaces were presumptively designated MARSIMM Class 2 areas. Historical Site Assessment revealed no history of radioactive spills and routine surveys demonstrated no actionable beta contamination.

The survey consisted of a 100% scan of all floors and walls up to 2 meters in the class II areas, with a gas proportional counter. Random direct measurements and wipes were taken in the designated Class 2 areas and in the surrounding Class 3 areas. Finally, a random start square grid was superimposed on the Class 2 area and a total of 18 direct and wipe samples were taken at the intersection points of the grid.

All wipes taken for removable contamination were counted on a Packard 2000CA Liquid Scintillation Counter. Measurements for total contamination were made using hand held and floor walker mounted gas proportional detectors calibrated to detect Tc-99. Measurements were made for lengths of time sufficient to achieve the detection limit for the isotopes used in the laboratory.

Calibration certificates for the instruments used and calculations of MDA can be found in Attachment C.

No single measurement for total or removable contamination exceeded the DCGL for the isotopes of interest, nor was the action level of 1000 dpm/100 cm2 exceeded..

4.0 OBJECTIVES

The objective of this survey is to determine the level of contamination, if any, present in those portions of the Middlesex Cardiology offices located at 520 Saybrook Road, Middletown, that were used for licensed activities. The purpose is to provide information required to plan and execute a decontamination and decommissioning program if needed or to release the facility for unrestricted use.

5.0 DERIVED CONCENTRATION GUIDELINE LEVELS (DCGLs)

Remediation goals for the final status survey will achieve the derived concentration guidelines (DCGLs) established for the area. The isotope used at this facility is a short lived metastable isotope with a half life of 6.02 hours. The time since radioactive materials were last used in these offices (1 week) guarantees that there should be no detectable Tc-99m present. Since Tc-99m decays to Tc-99, a long lived beta emitting isotope, the DCGL for Tc-99 will be used for determining compliance with exposure based decommissioning limits.

The DCGL for Tc-99 is 1.3E+6 dpm/100cm2. This value is taken from Table 5.19, "Concentration (dpm/100cm^2) equivalent to 25 mrem/y for the specified value of P_{crit}," published in the Federal Register on Wednesday, November 18, 1998 (FR, Vol. 63, No. 222, Notices, p.5-43 – 5-46). The State of Connecticut imposes a more restrictive exposure limit of 19 mrem/y which would reduce the Tc-99 DCGL to 9.88E+5 dpm/100cm^2 .

6.0 DATA QUALITY OBJECTIVES

As part of the DQO process the objective of the survey and the null and alternate hypotheses should be clearly stated. In demonstrating that this objective is met, the null hypothesis, H_0, tested is that residual contamination exceeds the release criterion; the alternative hypothesis, H_a, is that residual contamination meets the release criterion.

Since the isotope of interest is not expected to be found in the background, the Sign Test is used to determine the number of data points needed for statistical tests. The Type I error (α) was specified as 0.05 and Type II decision error (β) was set at 0.05.

The shift, Δ, also referred to as the lower bound of the gray region (LBGR), was set as 50% of the DCGL.

The square roots of the DCGLs were taken as the standard deviation values used for calculation of the sample sizes.

These data are summarized in the following table.

	NRC DCGL (dpm/100 cm^2)	State of CT DCGL (dpm/100 cm^2)	Δ (dpm/100 cm^2)	σ (dpm/100 cm^2)	Δ/σ	Number of samples required per survey unit as per Sign Test
Tc-99 Total	1.3E+06	9.88E+5	6.5E+5	806.22	806.23	14

A site specific action level of 1000 dpm/100cm^2 was established to determine the need for decontamination.

Direct surveys and measurements were performed using the instruments listed in Attachment B. Using the background data from an unaffected hallway area, the background and sample count times were established to make the MDA less than the DCGL for Carbon-14.

Wipes were counted for Tc-99 on a Packard Tri-Carb liquid scintillation counter calibrated against quenched Tc-99 standards.

7.0 PROCEDURES - OVERVIEW

7.1 Class 2 Area

Camera Rooms 1 and 2, Stress Room 1, the Radioactive Materials Storage Room and the Patient Changing room were designated as Class 2 areas for this survey. All other areas including the walls above 2 meters in the Class 2 area were designated as Class 3.

7.2 Reference Area

Background measurements were taken outside of the Class 3 areas on surfaces similar to those inside the survey units but which were not subject to exposure from licensed radioactive materials. The area was an adjacent laboratory with similar materials for floors, walls, laboratory benches, drawers and cabinets.

8.0 CONCLUSIONS

Direct survey measurements from all areas sampled in offices indistinguishable from background. Wipe survey results demonstrated no result that indicated the presence of either Tc-99m or its daughter Tc-99.

Based upon the results of this survey, the average member of the critical group is unlikely to receive an annual dose of more than 19 mrem resulting from licensed radioactive material remaining at this facility.

Jay R. Dockendorff
Health Physicist

LIST OF ATTACHMENTS

A. Instrumentation used during radiological surveys, and calibration certificates for these instruments

B. MDA Calculations

C. Maps of facility and Class 1 areas

D. Survey results

ATTACHMENT A

Instrumentation

Table 1. Instrumentation for Radiological Surveys

Type of Measurement	Instrumentation		Bkgd.[a]	4π Eff. (%)	Detection Sensitivity
	Detector	Instrument			
Surface scans and activity: beta	Large area (584 cm^2) gas proportional, Floor monitor Ludlum, Model 43-37	Scaler/Count-rate meter[b], Ludlum, Model 2224		9.6 (^{99}Tc)	4.82 dpm/100cm^2(scan)
Surface scans and activity: alpha/ beta	Gas proportional, Hand held monitor (126 cm^2) Ludlum, Model 43-68	Scaler/Count-rate meter[b], Ludlum, Model 2224		16.9 (^{99}Tc)	254.52 dpm/100 cm^2 (activity)

[a]Nominal Values
[b]Monitoring audible signal.

CERTIFICATE OF CALIBRATION
(COUNT-RATE INSTRUMENT)

RSA Laboratories, Inc.
19 Pendleton Drive, P.O. Box 61
Hebron, Connecticut 06248
(860) 228-0721 Fax (860) 228-4402

Customer and Contact: **Radiation Safety Associates, Inc. Attn: K. Paul Steinmeyer (860) 228-0487**
Customer Address: **P.O. Box 107, 19 Pendleton Drive, Hebron, CT 06248**

Inst. Mfr. & Model **Ludlum Model 2224**	Inst. Type **Scaler/Ratemeter**	Inst. s/n **119815**
Det. Mfr. & Model **Ludlum Model 43-68**	Det. Type **Gas Proportional**	Det. s/n **091223**
Cal. Date **17 June 2013**	Due Date **17 June 2014**	Cal. Interval **1 year**

Environmental conditions: Temperature: 72°F Relative Humidity 52% Atmospheric Pressure 29.60 inches Hg
Pre-calibration Checks:

■ Contamination survey	■ Battery check	□ Slow response check	
■ Mechanical check	■ Audio check	□ Window operation	■ Det. volts 1580 Vdc
■ Meter zero	■ Reset check	■ Plateau check	
■ Geotropism check	□ Fast response check	□ Alarm set	■ Input sens. *See comments

■ Pulse generator s/n 94926 □ Oscilloscope s/n 171-04928 ■ Voltmeter s/n 57410002
■ HV Readout (2 points) Ref./Inst. **900** V/ **900** V Ref./Inst. **1700** V/ **1700** V

Comments: * **Alpha threshold = 140 mV; Beta threshold = 3.6 mV; Beta window = 3.6 mV to 30 mV.**
Local background = 1 cpm alpha, 298 cpm beta. All efficiences measured on contact.

S/N of source used for precision check #6 Isotope Cs-137 Dedicated Source? □Yes ■No
Reading #1 33,000 cpm Reading #2 33,000 cpm Reading #3 33,000 cpm Mean **33,000** cpm
Precision: ■ ± < 10% □ ± 10-20% □Out of tolerance

Range Multiplier	Reference Calibration Point	Instrument Indication
x 1000	400,000 cpm	400,000 cpm
x 1000	100,000 cpm	100,000 cpm
x 100	40,000 cpm	40,000 cpm
x 100	10,000 cpm	10,000 cpm
x 10	4000 cpm	4000 cpm
x 10	1000 cpm	1000 cpm
x 1	400 cpm	400 cpm
x 1	100 cpm	100 cpm
1 kilo count	100,000 cpm	100,002 cpm

All ranges calibrated electronically

Range multiplier	Cal. Source Used (Isotope and S/N)	Source Activity (dpm)	Instrument Reading (cpm)	4π Instrument Efficiency (%)
1 min. count	C-14 #4456	202,100	1 (α) 13,198 (β)	0.0% 5.9%
1 min. count	Pm-147 #1613-32	19,193	0 (α) 2,143 (β)	0.0% 10.1%
1 min. count	Tc-99 #D702	23,064	1 (α) 4,198 (β)	0.0% 16.9%
1 min. count	Cs-137 #2886	14,561	1 (α) 4,238 (β)	0.0% 27.0%
1 min. count	Cl-36 #D756	23,598	2 (α) 6,100 (β)	0.0% 24.6%
1 min. count	Sr-Y-90 #D721	36,851	2 (α) 10,072(β)	0.0% 27.1%
1 min. count	Th-230 #9[illegible]	38,600	1,766 (α) 4,670 (β)	4.5% 11.2%

RSA Laboratories ID# **15583** Instrument indicates within ± 10% of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determination is 1 cm unless otherwise specified. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton Date: **17 June 2013**

CERTIFICATE OF CALIBRATION
(COUNT-RATE INSTRUMENT)

RSA Laboratories, Inc.
19 Pendleton Drive, P.O. Box 61
Hebron, Connecticut 06248
(860) 228-0721 Fax (860) 228-4402

Customer and Contact: **Radiation Safety Associates, Inc. Attn: K. Paul Steinmeyer (860) 228-0487**
Customer Address: **P.O. Box 107, 19 Pendleton Drive, Hebron, CT 06248**

Inst. Mfr. & Model **Ludlum Model 2224**	Inst. Type **Scaler/Ratemeter**	Inst. s/n **119815**
Det. Mfr. & Model **Ludlum 43-37**	Det. Type **Gas-Proportional**	Det. s/n **160827**
Cal. Date **17 June 2013**	Due Date **17 June 2014**	Cal. Interval **1 year**

Environmental conditions: Temperature: **72°F** Relative Humidity **52%** Atmospheric Pressure **29.60** inches Hg

Pre-calibration Checks:

☒ Contamination survey	☒ Battery check	☐ Slow response check	
☒ Mechanical check	☒ Audio check	☐ Window operation	☒ Det. volts **1580** Vdc
☒ Meter zero	☒ Reset check	☒ Plateau check	
☒ Geotropism check	☐ Fast response check	☐ Alarm set	☒ Input sens. *See comments

☒ Pulse generator s/n 94926 ☐ Oscilloscope s/n 171-04928 ☒ Voltmeter s/n 57410002
☒ HV Readout (2 points) Ref./Inst. **900** V/ **900** V Ref./Inst. **1700** V/ **1700** V

Comments: * **Alpha threshold = 140 mV; Beta threshold = 3.6 mV; Beta window = 3.6 mV to 30 mV.**
Local background ≈ 1 cpm alpha, 480 cpm beta. Th-230 efficiency measured on contact.

S/N of source used for precision check **#6** Isotope **Cs-137** Dedicated Source? ☐Yes ☒No
Reading #1 **19,000 cpm** Reading #2 **19,000 cpm** Reading #3 **19,000 cpm** Mean **19,000 cpm**
Precision: ☒ ± <10% ☐ ±10-20% ☐Out of tolerance

Range Multiplier	Reference Calibration Point	Instrument Indication
x 1000	400,000 cpm	400,000 cpm
x 1000	100,000 cpm	100,000 cpm
x 100	40,000 cpm	40,000 cpm
x 100	10,000 cpm	10,000 cpm
x 10	4000 cpm	4000 cpm
x 10	1000 cpm	1000 cpm
x 1	400 cpm	400 cpm
x 1	100 cpm	100 cpm
1 min. count	100,000 cpm	100,002 cpm

All ranges calibrated electronically.

Range Multiplier	Cal. Source Used (isotope and S/N)	Source Activity (dpm)	Instrument Reading (cpm)	4π Instrument Efficiency (%)
1 min. count	C-14 #4456	202,100	2 (α) 8,695 (β)	0.0% 4.0%
1 min. count	Pm-147 #1613-32	18,193	0 (α) 1,287 (β)	0.0% 4.4%
1 min. count	Tc-99 #D702	23,064	1 (α) 2,688 (β)	0.0% 9.6%
1 min. count	Cs-137 #2886	14,561	0 (α) 2,202 (β)	0.0% 11.8%
1 min. count	Cl-36 #D700	23,598	1 (α) 2,861 (β)	0.0% 10.1%
1 min. count	Sr/Y-90 #D711	36,051	2 (α) 4,265 (β)	0.0% 10.5%
1 min. count	Th-230 #91TH2200210	38,900	1,796 (α) 1,333 (β)	4.6% 2.2%

RSA Laboratories ID# **15583**. Instrument indicates within ±10% of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determinations is 1 cm unless otherwise specified. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: **Kurt D. Newton** _____ Date: **17 June 2013**

ATTACHMENT B

MINIMUM DETECTABLE ACTIVITY

ATTACHMENT C

Minimum Detectable Activities have been calculated using RadCalc Version 1.1.

ATTACHMENT C

DETECTION LIMITS--SURFACE CONTAMINATION BETA (Tc-99)
Ludlum Model 2224, SN 119815; Ludlum 43-68, SN 091223

INPUT DATA:
Background Count = 1009 total counts
Background Counting Time = 5 minutes
Sample Counting Time = 1 minutes
Detector Efficiency = 16.9 %
Detector Area = 126 cm^2

RESULTS:
Minimum Detectable Activity (MDA) = 254.519 dpm/100 cm^2

All values calculated to 95% CL via MARSSIM methods

$$\frac{k_l^2 + 2\ k_l \sqrt{R_b\ t_s \left(1 + \frac{t_s}{t_b}\right)}}{(t_s)\ (E) \left(\frac{A}{100}\right) (C)}$$

where:
k_l = one-sided confidence level factor for the chosen confidence level (95% = 1.645). (The MARSSIM method sets the k_l^2 term = 3.)
R_b = background count rate in cpm
t_s = sample count time in minutes
t_b = background count time in minutes
E = detector efficiency in counts per disintegration
$\frac{A}{100}$ accounts for the detector area. (A = 126 cm^2.)
C = conversion factor from dpm to other desired activity unit, if applicable. In this case, C = 1. MDA is in dpm/100 cm^2.

$$\frac{3+3.29\sqrt{(201.8)\ (1)\left(1+\frac{1}{5}\right)}}{(1)\ (0.169)\left(\frac{126}{100}\right)(1)}$$

$$= \frac{54.20}{.21294} = 254.52\ dpm/100\,cm^2$$

DETECTION LIMITS--SURFACE CONTAMINATION WIPES (Tc-99)
Packard Tri-Carb 3000CA

INPUT DATA:
Background Count = 26.40 cpm
Background Counting Time = 10 minutes
Sample Counting Time = 1 minutes
Detector Efficiency = 94.38 %
Detector Area = N/A

RESULTS:
Minimum Detectable Activity (MDA) = 21.96 dpm/100 cm²

All values calculated to 95% CL via MARSSIM methods

A more rigorous method for MDA (or LLD) determination is the MARSSIM method, shown below.

$$MDA_{wipe} = \frac{k_1^2 + 2\ k_1\sqrt{R_b\ t_s\left(1+\frac{t_s}{t_b}\right)}}{(t_s)\ (E)\left(\frac{A}{100}\right)(C)}$$

where:
k_1 = one-sided confidence level factor for the chosen confidence level (95% = 1.645). (The MARSSIM method sets the k_1^2 term = 3.)
R_b = background count rate in cpm (= 0.19 cpm in this case)
t_s = sample count time in minutes (= 10 minute in this case)
t_b = background count time in minutes (= 300 minutes in this case)
E = detector efficiency in counts per disintegration (= 31.38% or 0.3138 in this case)

$\frac{A}{100}$ accounts for the area covered by the wipe sample. ($A = 100\ cm^2$.)

C = conversion factor from dpm to other desired activity unit, if applicable.
In this case, C = 1. MDA is in dpm/100 cm^2.

Shown below is the specific MARSSIM MDA calculation for the wipe samples reported in Item 7.

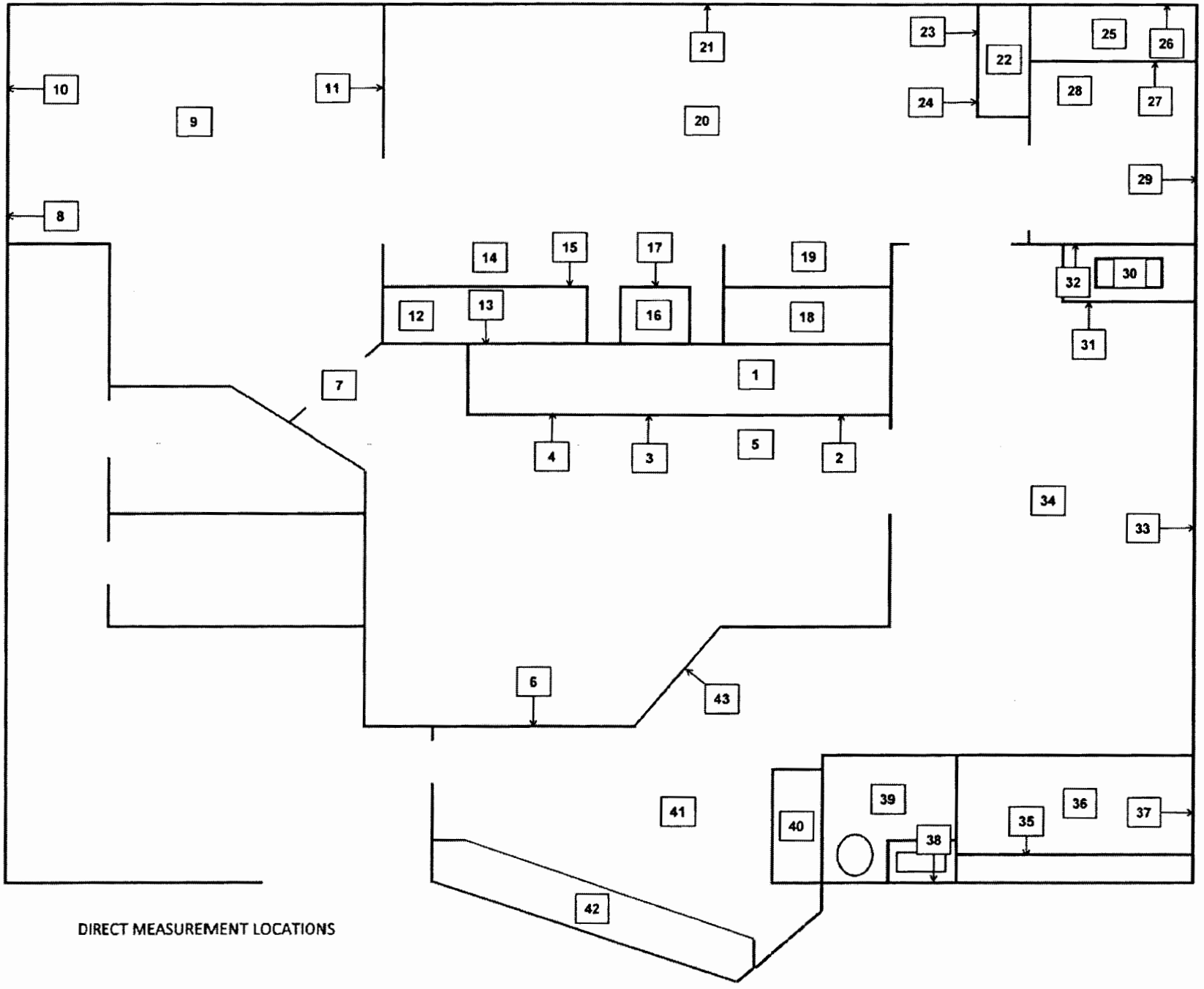
$$\frac{3 + 3.29\sqrt{(26.40)\ (1)\left(1 + \frac{1}{10}\right)}}{(1)\ (.9438)\left(\frac{100}{100}\right)(1)}$$

$$\frac{3 + 3.29\sqrt{29.04}}{.944} = \frac{20.73}{.944} = 21.96 dpm/100\,cm^2$$

ATTACHMENT C

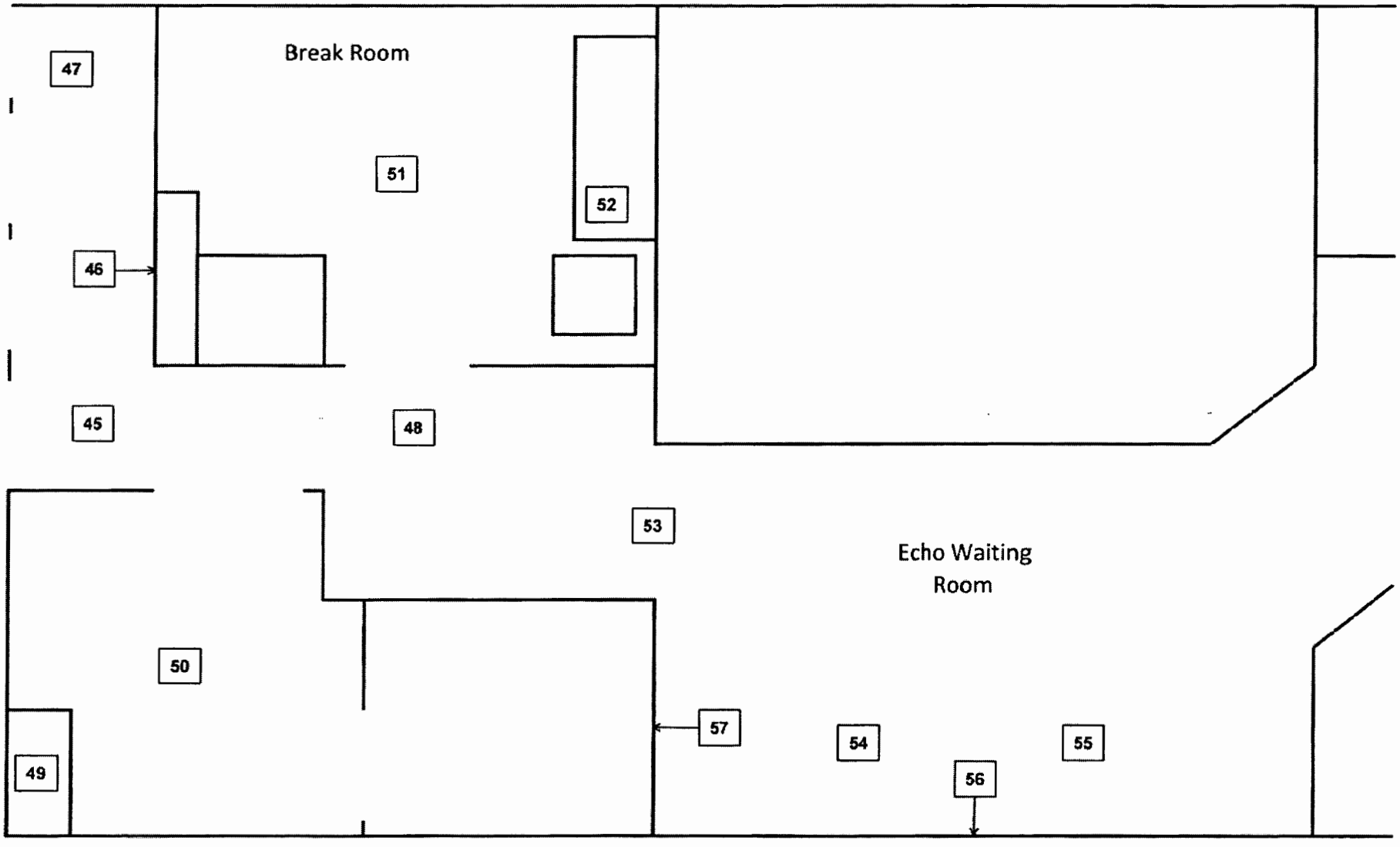
Survey Area Maps

MIDDLESEX CARDIOLOGY SCOPING SURVEY



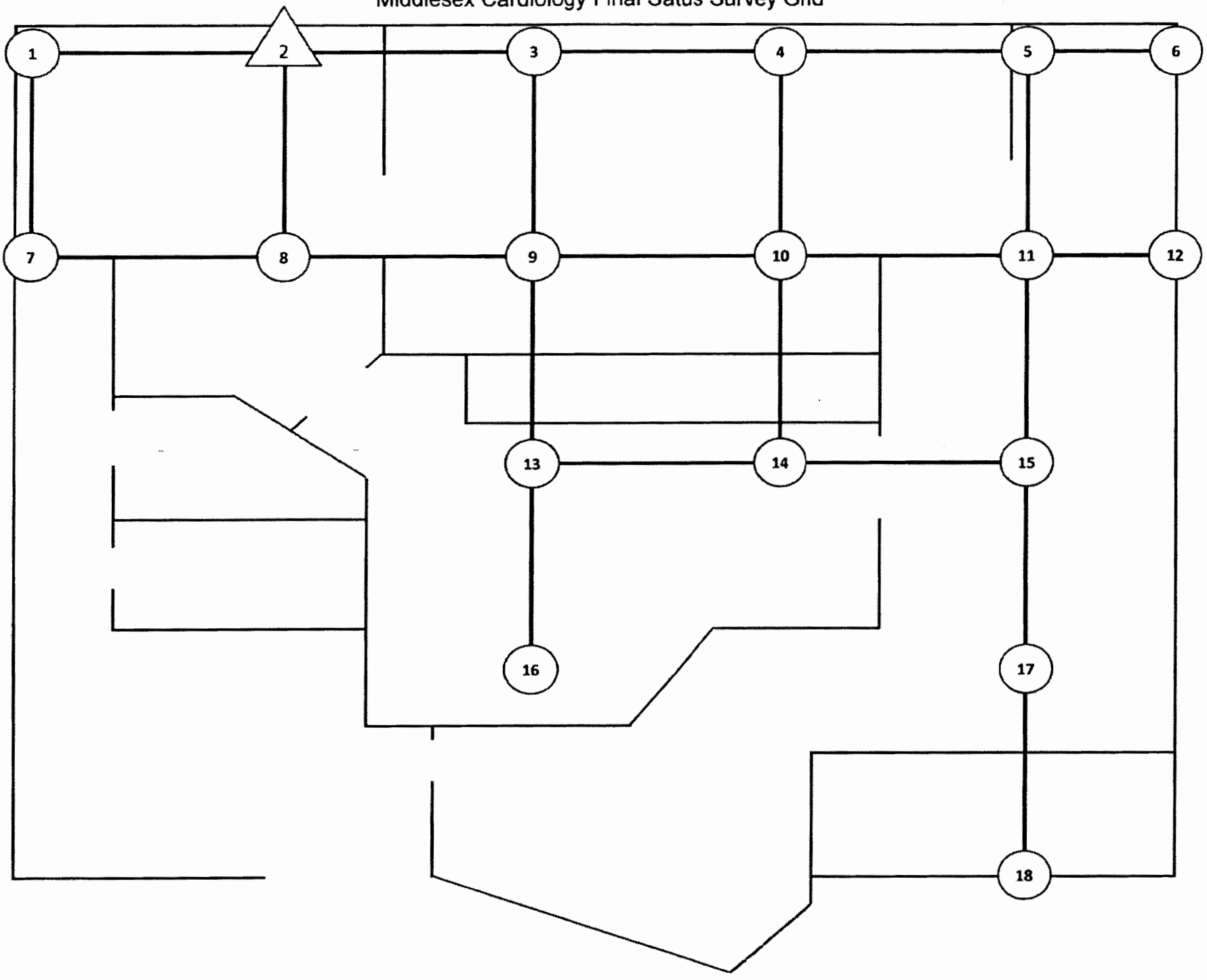
DIRECT MEASUREMENT LOCATIONS

MIDDLESEX CARDIOLOGY CLASS 3 SURVEY AREAS

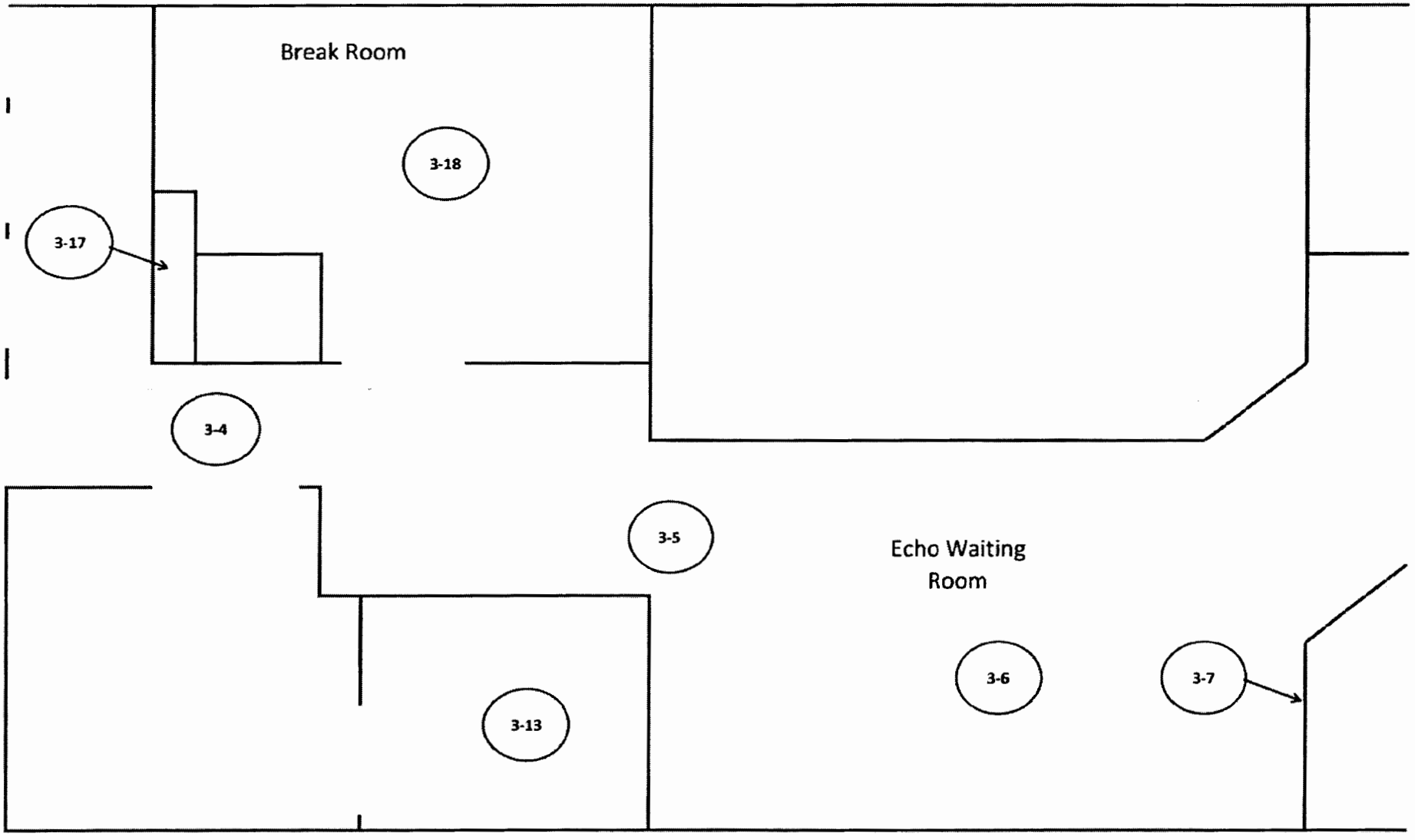


DIRECT MEASUREMENT LOCATIONS

Middlesex Cardiology Final Satus Survey Grid



MIDDLESEX CARDIOLOGY CLASS 3 SURVEY AREA WIPES



ATTACHMENT D

Survey Results

Middlesex Cardiology-520 Old Saybrook Road, Middletown, CT
Scoping Survey-Direct Measurements
Date: 8/26/2013

Instrument: Ludlum 2224 s/n 119815 w/43-68 s/n 091223
MDA: 254 dpm/100 cm^2
Tc-99 efficiency (%): 16.9
Background (5 min. count): 1009 **Beta cpm:** 202

#	Location	Gross Beta cpm	Beta dpm
1	Camera Rm 2 - countertop	174	-131
2	Camera Rm 2 - middle drawer left	200	-9
3	Camera Rm 2 - top drawer right	180	-103
4	Camera Rm 2 - cabinet middle left	188	-66
5	Camera Rm 2 - floor workstation	209	33
6	Camera Rm 2 - wall	196	-28
7	Camera Rm 2 - floor doorway	190	-56
8	Stress Test Rm 1 - cabinet right	200	-9
9	Stress Test Rm 1 - floor middle	197	-23
10	Stress Test Rm 1 - wall	204	9
11	Stress Test Rm 1 - wall	193	-42
12	Camera Rm 1 - counter workstation	197	-23
13	Camera Rm 1 - cabinet middle	165	-174
14	Camera Rm 1 - floor workstation	204	9
15	Camera Rm 1 - drawer top	193	-42
16	Camera Rm 1 - cabinet top	192	-47
17	Camera Rm 1 - cabinet drawer mid	189	-61
18	Camera Rm 1 - countertop	209	33
19	Camera Rm 1 - floor countertop	174	-131
20	Camera Rm 1 - floor middle	181	-99
21	Camera Rm 1 - wall	201	-5
22	Camera Rm 1 - countertop	188	-66
23	Camera Rm 1 - drawer left	211	42
24	Camera Rm 1 - cabinet right	206	19
25	Rad Storage Rm - countertop	192	-47
26	Rad Storage Rm - shelf bot right	213	52
27	Rad Storage Rm - cabinet right	164	-178
28	Rad Storage Rm - floor countertop	192	-47
29	Rad Storage Rm - wall	212	47
30	Dressing Rm - sink	200	-9
31	Dressing Rm - cabinet left	219	80
32	Dressing Rm - shelf left	180	-103
33	Dressing Rm - wall	182	-94
34	Dressing Rm - floor middle	205	14
35	Storage Rm - center shelf middle	207	23
36	Storage Rm - floor middle	207	23

Middlesex Cardiology - Direct Measurements - cont.

37	Storage Rm - wall	168	-160
38	Lavatory - wall	217	70
39	Lavatory - sink shelf	222	94
40	Lavatory - floor	191	-52
41	Check-In Area - countertop	201	-5
42	Check-In Area - floor	189	-61
43	Check-In Area - countertop	177	-117
44	Check-In Area - floor entrance	219	80
45	Shower Area - floor hallway	222	94
46	Shower Area - cabinet shelf top	195	-33
47	Shower Area - floor shower entrance	240	178
48	Echo Card Rm 3 - floor hallway	229	127
49	Echo Card Rm 3 - floor middle	213	52
50	Echo Card Rm 3 - countertop	226	113
51	Kitchen - floor middle	219	80
52	Kitchen - countertop	193	-42
53	Echo Waiting Area - floor entrance	208	28
54	Echo Waiting Area - floor	220	85
55	Echo Waiting Area - floor	203	5
56	Echo Waiting Area - wall	204	9
57	Echo Waiting Area - wall	182	-94

Middlesex Cardiology-520 Old Saybrook Road, Middletown, CT
Final Status Survey-Direct Measurements
Date: 8/26/2013

Instrument: Ludlum 2224 s/n 119815 w/43-68 s/n 091223
MDA: 254 dpm/100 cm^2
Tc-99 efficiency (%): 16.9
Background (5 min. count): 1009 **Beta cpm:** 202

#	Location	Gross Beta cpm	Beta dpm
1	floor	222	94
2	floor	221	89
3	floor	201	-5
4	floor	177	-117
5	countertop	192	-47
6	wall	184	-85
7	floor	212	47
8	floor	212	47
9	floor	204	9
10	floor	174	-131
11	floor	197	-23
12	wall	161	-193
13	floor	194	-38
14	floor	201	-5
15	floor	205	14
16	floor	206	19
17	floor	186	-75
18	floor	207	23

RSA Laboratories

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Radiochemistry Analysis Data Sheet

Report No. **Report 1**

Customer: **Middlesex Cardiology**

Customer Samp No. **N/A**

Location: **520 Saybrook Avenue, Middletown, CT**

RSA Lab Sample No. **30409**

Project: **Decommissioning**

Date Collected: **8/26/2013**

Samp. Description: **Wipes**

Date Counted: **8/27/2013**

Matrix: **Wipes**

H-3 LLD dpm= 21.65

C-14 LLD dpm= 5.41

RSA ID#	CUST. ID#	Location	Tc-99 CPM	Tc-99 DPM			HE Beta CPM	
BG		BACKGROUND	26.40				6.40	
30409-1	W-1	Counter rad storage	0.62	0.65			1.60	
30409-2	W-2	Upper cabinet rad storage	0.00	0.00			0.00	
30409-3	W-3	Lower cabinet rad storage	0.00	0.00			2.61	
30409-4	W-4	Wall 0 - 3' rad storage	0.00	0.00			4.61	
30409-5	W-5	Floor rad storage	1.65	1.74			0.00	
30409-6	W-6	Camera 1 Countertop	0.00	0.00			0.00	
30409-7	W-7	Countertop	1.65	1.74			1.60	
30409-8	W-8	Window sill	0.00	0.00			0.60	
30409-9	W-9	Floor	0.00	0.00			0.00	
30409-10	W-10	Floor	0.00	0.00			0.00	
30409-11	W-11	Countertop	0.00	0.00			0.00	
30409-12	W-12	Countertop	3.71	3.92			0.60	
30409-13	W-13	Lower cabinet rad storage	0.62	0.65			0.00	
30409-14	W-14	Shelf	7.84	8.27			0.00	
30409-15	W-15	Wall	0.00	0.00			0.60	
30409-16	W-16	Wall	2.68	2.83			0.00	
30409-17	W-17	Stress 1 Floor	8.87	9.53			2.61	
30409-18	W-18	Floor	0.00	0.00			0.00	
30409-19	W-19	Floor	2.68	2.83			0.60	
30409-20	W-20	Floor	4.74	5.00			2.61	
30409-21	W-21	Wall	0.00	0.00			2.61	
30409-22	W-22	Cabinet	0.00	0.00			0.00	
30409-23	W-23	Wall	0.00	0.00			0.60	
QC,Tc-99	QC,Tc-99	QC Tc-99	407789.00	454631.00			62.76	
30409-24	W-24	Floor	5.77	6.10			1.60	
30409-25	W-25	Camera 2 Countertop	21.24	22.42			0.00	
30409-26	W-26	Countertop	3.71	3.92			0.00	
30409-27	W-27	Cabinet, upper	3.71	3.92			0.00	
30409-28	W-28	Cabinet, lower	7.84	8.27			0.00	
30409-29	W-29	Floor	8.87	9.35			0.00	
30409-30	W-30	Floor	1.65	1.71			0.00	
30409-31	W-31	Floor	0.00	0.00			1.60	
30409-32	W-32	Floor	0.00	0.00			0.00	
30409-33	W-33	Wall	0.00	0.00			0.00	
30409-34	W-34	Wall	3.71	3.90			0.00	

RSA Laboratories

A Division of Radiation Safety Associates

Radiochemistry Analysis Data Sheet

RSA ID#	CUST. ID#	LOCATION	Tc-99 CPM	Tc-99 DPM			HE Beta CPM	
30409-35	W-35	Wall	0.62	1	Avenue, Middletown, (		0.00	
30409-36	W-36	Dressing Room Sink	0.00	0.00			7.62	
30409-37	W-37	Sink Drain	0.00	0.00			2.61	
30409-38	W-38	Floor	0.00	0.00			0.00	
30409-39	W-39	Floor	0.00	0.00			0.60	
30409-40	W-40	Floor	7.84	8.26			0.00	
30409-41	W-41	Floor	0.00	0.00			2.61	
30409-42	W-42	Wall	2.68	2.83			4.61	
30409-43	W-43	Wall	0.00	0.00			0.60	
30409-44	W-44	Wall	0.00	0.00			5.61	
30409-45	W-45	Record Room Floor	0.00	0.00			2.61	
QC, BL	QC, BL	QC Blank	0.00	0.00			0.60	
30409-47	W-3-1	Class 3 Reception Desk R	0.00	0.00			5.61	
30409-48	W-3-2	Reception Desk L	4.74	5.00			5.61	
30409-49	W-3-3	Reception Floor	9.90	10.45			0.00	
30409-50	W-3-4	Hallway	2.68	2.83			0.60	
30409-51	W-3-5	Waiting Room Floor	0.00	0.00			4.61	
30409-52	W-3-6	Waiting Room Floor	9.90	10.44			1.60	
30409-53	W-3-7	Waiting Room Wall	8.87	9.36			2.61	
30409-54	W-3-8	Hallway Floor	0.00	0.00			6.62	
30409-55	W-3-9	Storage Rm Wall 2M	1.65	1.74			0.00	
30409-56	W-3-10	Camera 1 Wall > 2M	0.00	0.00			0.00	
30409-57	W-3-11	Camera 1 Wall > 2M	0.00	0.00			0.00	
30409-58	W-3-12	Stress 1 Wall > 2M	0.00	0.00			2.61	
30409-59	W-3-13	Echo Cardio Room 3 Floor	0.62	0.65			0.60	
30409-60	W-3-14	Bathroom Wall > 2M	0.00	0.00			0.00	
30409-61	W-3-15	Record Room Shelf	3.71	3.92			0.00	
30409-62	W-3-16	Reception wall	4.74	5.00			0.00	
30409-63	W-3-17	Staff lockers	17.12	18.06			0.00	
30409-64	W-3-18	Staff Kitchen	6.81	7.81			0.00	
30409-66	FS-1	Final Status Point 1	0.00	0.00			1.60	
30409-67	FS-2	Final Status Point 2	0.00	0.00			0.00	
30409-68	FS-3	Final Status Point 3	7.84	8.27			0.60	
30409-69	FS-4	Final Status Point 4	11.96	12.62			1.60	
QC,Tc-99	QC,Tc-99	QC Tc-99	394171.00	452459.0			11.63	
30409-70	FS-5	Final Status Point 5	12.99	13.70			3.61	
30409-71	FS-6	Final Status Point 6	15.06	15.88			4.61	
30409-72	FS-7	Final Status Point 7	16.09	16.97			2.61	
30409-73	FS-8	Final Status Point 8	12.99	13.70			0.60	
30409-74	FS-9	Final Status Point 9	0.00	0.00			0.00	
30409-75	FS-10	Final Status Point 10	5.77	6.09			0.00	
30409-76	FS-11	Final Status Point 11	2.68	2.83			0.60	
30409-77	FS-12	Final Status Point 12	6.81	7.18			2.61	
30409-78	FS-13	Final Status Point 13	7.84	8.27			0.00	
30409-79	FS-14	Final Status Point 14	0.00	0.00			0.60	

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Radiochemistry Analysis Data Sheet

RSA ID#	CUST. ID#	LOCATION	Tc-99 CPM	Tc-99 DPM			HE Beta CPM	HE Beta DPM
30409-80	FS-15	Final Status Point 15	0.00	0.00	Avenue, Middletown, C		0.00	
30409-81	FS-16	Final Status Point 16	0.00	0.00			0.00	
30409-82	FS-17	Final Status Point 17	5.77	6.09			1.60	
30409-83	FS-18	Final Status Point 18	3.71	3.92			4.61	

This is to acknowledge the receipt of your (letter)/application dated

05/11/2015, and to inform you that the initial processing which includes an administrative review has been performed.

06-23559-01 (Amendment)

[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** 586987
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.