



Kent General Hospital  
640 South State Street  
Dover, DE 19901  
302 674 4700

Milford Memorial Hospital  
21 West Clarke Avenue  
Milford, DE 19966  
302 422 3311

J-2

January 30, 2018

U. S. Nuclear Regulatory Commission  
Region I  
2100 Renaissance Blvd, Suite 100  
King of Prussia, PA 19406-2713

Re: License No. 07-14850-01

To Whom It May Concern,

03007565

We, Bayhealth Medical Center, License Number 07-14850-01, provide the additional documentation requested regarding:

- Survey meter calibration certificates
- Well counter operation check
- Sealed source inventory and leak documentation regarding transfer of sources between office locations
- Radioactive waste disposition

If you have any questions regarding this amendment, please contact me at 1.866.755.2756 x703.

Regards,

Adam M. Henry,  
Radiation Safety Officer

602129  
NMSS/RCN1 MATERIALS-002

## Sealed Source Leak Test

CDC Dover  
1100 FORREST AVE

Test Date/Time: 12/12/2017 3:50:22 PM

Dover, DE 19904

Description:	Scaler Ratemeter	Make:	Ludlum	Model:	2200
Serial#:	128309	ID:			15

### Standard Source:

Isotope	Serial #	Calibration Date	Nominal calib. Activity	Background Counts/min	Counting Efficiency
Co-57	548-36-1	9/15/1996 9:05:05 AM	103.2 nCi	1	30.8
Co-57	1881-079	7/1/2016 2:45:54 PM	10 mCi	1	30.8
Cs-137	548-36-2	9/15/1996 9:08:04 AM	85.9 nCi	1	30.8
Co-57	1710-7-3	12/1/2013 8:37:33 AM	5.596 mCi	1	30.8
Cs-137	513-110-2	10/1/1996 9:08:47 AM	190.7 uCi	1	30.8

### Source Test Data:

Isotope	Serial #	Model # Manufacturer	Calib. Activity	Calib. Date	Current Activity	Measured Sample Cpm	Test Results (uci removable act.)	Status
Co-57	548-36-1	.	103.2 nCi	9/15/1996	uCi		2.003 nCi	Passed
Co-57	1881-079	MED3727, Eckert & Ziegler	10 mCi	7/1/2016	2.578 mCi		9.013 nCi	Passed
Cs-137	548-36-2	.	85.9 nCi	9/15/1996	52.79 nCi		-14 -0.02 nCi	Passed
Co-57	1710-7-3	SRV-057-5M, Eckert & Ziegler	5.596 mCi	12/1/2013	129.32 uCi		-3 -0.004 nCi	Passed
Cs-137	513-110-2	.	190.7 uCi	10/1/1996	117.184 uCi		-8 -0.012 nCi	Passed

### Comments and Recommendations:

January 16, 2018 07:00

**Performed By:** Kimberly Griffiths

**Radiation Safety Officer:** \_\_\_\_\_

## Sealed Source Leak Test

**CDC Dover**  
1100 FORREST AVE

**Test Date/Time:** 10/25/2017 7:45:24 AM

Dover, DE 19904

<b>Description:</b> Scaler Ratemeter	<b>Make:</b> Ludlum	<b>Model:</b> 2200
<b>Serial#:</b> 128309	<b>ID:</b>	15

**Standard Source:**

Isotope	Serial #	Calibration Date	Nominal calib. Activity	Background Counts/min	Counting Efficiency
Co-57	548-36-1	9/15/1996 9:05:05 AM	103.2 nCi	60	30.8
Co-57	1881-079	7/1/2016 2:45:54 PM	10 mCi	60	30.8
Cs-137	548-36-2	9/15/1996 9:08:04 AM	85.9 nCi	60	30.8
Co-57	1710-7-3	12/1/2013 8:37:33 AM	5.596 mCi	60	30.8
Cs-137	513-110-2	10/1/1996 9:08:47 AM	190.7 uCi	60	30.8

**Source Test Data:**

Isotope	Serial #	Model # Manufacturer	Calib. Activity	Calib. Date	Current Activity	Measured Sample Cpm	Test Results (uci removable act.)	Status
Co-57	548-36-1	.	103.2 nCi	9/15/1996	uCi		-2 -0.003 nCi	Passed
Co-57	1881-079	MED3727, Eckert & Ziegler	10 mCi	7/1/2016	2.925 mCi		-1 -0.001 nCi	Passed
Cs-137	548-36-2	.	85.9 nCi	9/15/1996	52.96 nCi		-1 -0.001 nCi	Passed
Co-57	1710-7-3	SRV-057-5M, Eckert & Ziegler	5.596 mCi	12/1/2013	146.71 uCi		-1 -0.001 nCi	Passed
Cs-137	513-110-2	.	190.7 uCi	10/1/1996	117.548 uCi		-1 -0.001 nCi	Passed

**Comments and Recommendations:**

January 16, 2018 06:59

**Performed By:** Kimberly Griffiths

**Radiation Safety Officer:** \_\_\_\_\_

## Efficiency and M.D.A. Determination

For: Bayhealth - Cardiology Consultants of PA - Dover

Date: 6/22/2017

Unit: Ludlum 2200

S/N: 128309

Calibration Date: 9/15/1996  
 Cs-137 Source Strength: 0.08590 uCi  
 Source age (days from cal. date): 7585 days  
 uCi Today: 0.05334 uCi  
 uCi: 1955.7 d/s  
 (4  $\pi$ ) Source Term: 117,344 dpm  
 (2  $\pi$ ) Source Term: 58,672 dpm

Counting Interval 60 sec.			
Well Reading	35,849 Counts	597.5 cps	35,849 cpm
			cpm
			cpm

### Efficiency Data

Detector	Geometry	Source Term	Decimal	Percent (%)	cpm / uCi
Well Counter	In Bottom of Well	4 $\pi$ Source	0.3055	30.5%	672,109

### MDA and Count Conversion Data

Detector	Geometry	Background	MDA Values	Count Conversions From dpm's to cpm's	
				"200 dpm ="	"2000 dpm ="
Well Counter	In Bottom of Well	508 cpm	0.85 uCi	61 cpm	611 cpm

Definition: 1) EFFICIENCY (%) = (C.P.M. / D.P.M.) \* 100  
 2) D.P.M. = C.P.M. / EFF (in decimal form ex. 15.2% = 0.152)  
 window "off" threshold 0.50 kg

Yes / No

- ☐ Posted on detection equipment
- ☐ Updated in UDM / well system

Prepared By:   
 Keith M. H. H. H.  
 Radiation Medical Radiation Physicist  
 Keynote Physics Limited

# WELL COUNTER QUALITY CONTROL TEST

PERFORMED BY: KEYSTONE PHYSICS LIMITED

CONSULTANT RADIATION PHYSICISTS

CLIENT: Bayhealth - Cardiology Consultants of Pa, De (Dover)

DATE: 12/12/2017

Probe **Ludlum**

Model: **2200**

Reset to: WIN - off, THR-60, -HV 319

Baseline **662** keV

Window **30**

H.V. **316**

Counting interval: **6** sec.

## CHI-square Test

1	1207	26.9	723.61
2	1166	-14.1	198.81
3	1199	18.9	357.21
4	1144	-36.1	1,303.21
5	1139	-41.1	1,689.21
6	1178	-2.1	4.41
7	1159	-21.1	445.21
8	1201	20.9	436.81
9	1198	17.9	320.41
10	1210	29.9	894.01
Sum =	11801		6,372.90

The CHI-square value  
should be:  
**4<CHI<14**  
and must be:  
**2<CHI<22**  
The Coefficient of  
Variation must be  
<0.05

CHI-square Value = **5.4**

Should be: 4<CHI<14

Must be: 2<CHI<22

Std. Dev. = 25.2446

Coef. of Var. = 0.02139

Mean =

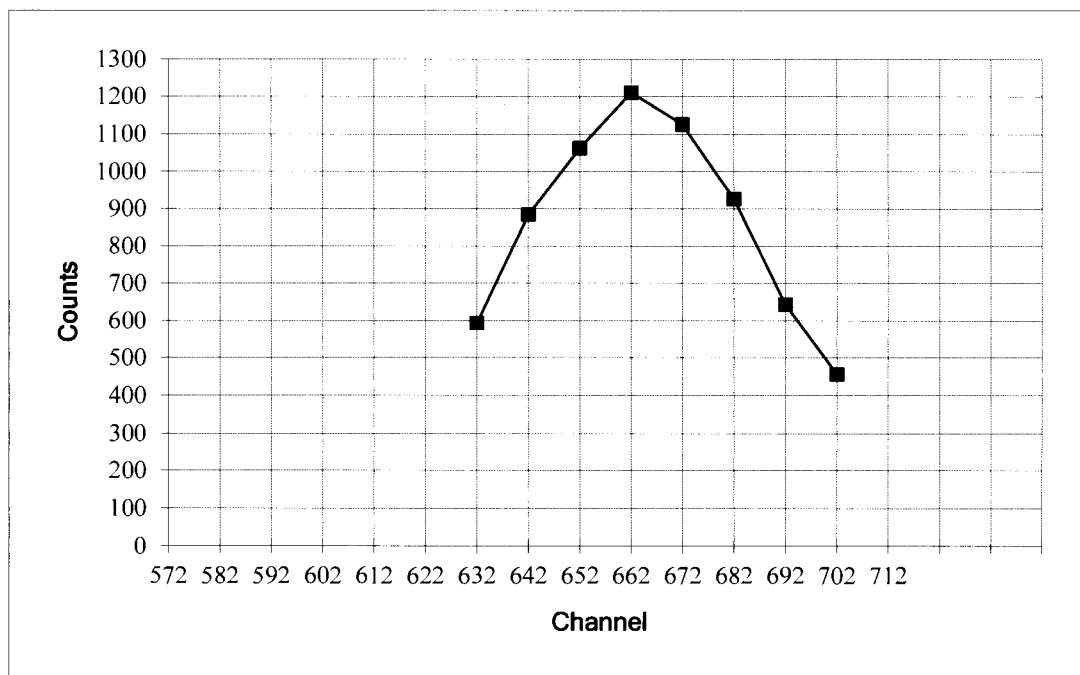
**1180.1**

● Well is statistically accurate

○ Well isn't statistically accurate

## Photopeak Resolution

Centerline	Counts
572	
582	
592	
602	
612	
622	
632	594
642	884
652	1063
662	1210
672	1126
682	926
692	644
702	456
712	



High 1/2 max = 694

Low 1/2 max = 633

centerline 662

FWHM= **9.21%**

This is good since the expected range  
is 6 to 30% (depending on the

Performed By:

CDC Dover  
1100 FORREST AVE  
Dover, DE 19904

## Waste Disposition Report

for December 11, 2017 to December 11, 2017

Bin Number	Bin Volume	Date Opened	Date Disposed	Disposal	Survey Inst	Surface Reading	Wipe Inst	Wipe Reading
Bin Type		Date Closed	Disposed By	Location	Serial #:	Bkg. Reading	Serial #:	Bkg. Reading
sharps Trash 8/24/17	0	8/24/2017 12 34 22 PM	12/11/2017 7 31 47 AM	Biohazard Trash	Survey Meter 1	0.01mR/hr	Scaler Ratemeter	0 DPM
Short Lived		12/8/2017 7 31 18 AM	Griffiths, Kimberly		130374	0.01mR/hr	128309	0 CPM
LL Trash 9/6/17	0	9/6/2017 9 56 21 AM	12/11/2017 10 13 40 AM	cold trash	Survey Meter 1	0.01mR/hr	Scaler Ratemeter	0 DPM
Short Lived		12/8/2017 10 13 23 AM	Griffiths, Kimberly		130374	0.01mR/hr	128309	0 CPM



CDC Dover  
1100 FORREST AVE  
Dover, DE 19904

## Waste Disposition Report

for December 06, 2017 to December 06, 2017

Bin Number	BinVolume	Date Opened	Date Disposed	Disposal	Survey Inst	Surface Reading	Wipe Inst	Wipe Reading
Bin Type		Date Closed	Disposed By	Location	Serial #:	Bkg. Reading	Serial #:	Bkg. Reading
CARDINAL H 061217 2 12:33:27 N/A	0	12/6/2017 12 34 24 PM	12/6/2017 2 18 54 PM	Return to Cardinal Health	Survey Meter 1	0 03mR/hr	Scaler Ratemeter	9 DPM
		12/6/2017 2 18 54 PM	Shepherd, Kara		130374	0 03mR/hr	128309	319 CPM
CARDINAL H 061217 1 07:14:47 N/A	0	12/6/2017 7 15 22 AM	12/6/2017 2 19 12 PM	Return to Cardinal Health	Survey Meter 1	0 03mR/hr	Scaler Ratemeter	9 DPM
		12/6/2017 2 19 12 PM	Shepherd, Kara		130374	0 03mR/hr	128309	319 CPM

# Certificate of Calibration

# A.M. Calibration Services

9600 Medical Center Drive  
Rockville Md 20850  
Phone: 301-379-6013

amcalibrationservices@gmail.com

Meter Owner:	<u>Bayhealth-Dover</u>	Manufacturer:	<b>Biodex</b>
Calibration Date:	9/21/2017	Model Number:	14-C
Calibration Due Date:	9/21/2018	Serial Number:	130380

Location

AM Calibration Radioactive Material License: MD-31-206-01

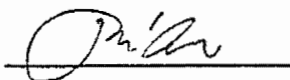
Inspection Item	
Batteries Changed	no
Internal Adjustment	no

## Instrument Calibration Information

44-7		132221	no cap	
Instrument	mR/hr		CF	Scale
Scale	Reading	True Reading	Scale CF	
x 1000.0	Dead	1306	1.088	1.060
x "		331	1.034	"
x 100.0	170	149	0.876	0.976
x "	35	37.7	1.077	"
x 10.0	11.5	13.7	1.191	1.054
x "	3.6	3.3	0.916	"
x 1.0	1.5	1.5	1.000	1.000
x "	0.38	0.38	1.000	"
x 0.1	0.14	0.14	1.000	1.000
x "	0.075	0.075	1.000	"
Check Source Reading =			1.10mR/hr	

This certifies that the instrument above was calibrated with a Cs-137 source, Shepherd Model 28-6 #10258-300mCi. Exposure rate for this source has been verified with instrumentation whose calibration is traceable to NIST standards. Measurements were made with CNMC Company electrometer Model 206 and Capintec Model PM30 (30 cc) cylindrical ionization chamber. And in accordance with ANSI-N323 and as recommended by manufacturer.

Calibrated By: Andrew J McAleer



# Certificate of Calibration

# A.M. Calibration Services

9600 Medical Center Drive  
Rockville Md 20850  
Phone: 301-379-6013

[amcalibrationservices@gmail.com](mailto:amcalibrationservices@gmail.com)

<b>Meter Owner:</b> Bayhealth- Dover	<b>Manufacturer:</b> Biodex
<b>Calibration Date:</b> 9/14/2017	<b>Model Number:</b> 14-C
<b>Calibration Due Date:</b> 9/14/2018	<b>Serial Number:</b> 130374

**Location**

AM Calibration Radioactive Material License: MD-31-206-01

<b>Inspection Item</b>	
Batteries Changed	no
Internal Adjustment	yes

Instrument Calibration Information

44-7		132218		no cap	
Instrument Scale	mR/hr		CF	Scale	
	Exposure	True Reading			
x 1000.0	1150	1306	1.135	1.070	
x "	330	331	1.003	"	
x 100.0	175	149	0.851	1.000	
x "	33	37.7	1.142	"	
x 10.0	12.5	13.7	1.096	0.982	
x "	3.8	3.3	0.868	"	
x 1.0	1.5	1.5	1.000	1.000	
x "	0.38	0.38	1.000	"	
x 0.1	0.14	0.14	1.000	1.000	
x "	0.075	0.075	1.000	"	
Check Source Reading =			1.15mR/hr		

This certifies that the instrument above was calibrated with a Cs-137 source, Shepherd Model 28-6 #10258-300mCi. Exposure rate for this source has been verified with instrumentation whose calibration is traceable to NIST standards. Measurements were made with CNMC Company electrometer Model 206 and Capintec Model PM30 (30 cc) cylindrical ionization chamber. And in accordance with ANSI-N323 and as recommended by manufacturer.

Calibrated By: Andrew J McAleer

