INGHAM
REGIONAL MEDICAL CENTER
A McLAREN HEALTH SERVICE

June 18, 2008

United States Nuclear Regulatory Commission
Region III, Office of Materials Licensing
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

RE: Amendment to NRC License No. 21-04073-01
Ingham Regional Medical Center

Dear Sir/Madam:

The purpose of this letter is to amend our current NRC license to reflect the following changes.

**Item #1**

We previously requested and received an amendment for re-location of our department. Enclosed are the results of the close-out survey of our Nuclear Medicine department at the above location.

A close-out survey was performed on June 4, 2008 of the above address and is enclosed for your review.

The last date of receipt and use of radioactive material at this site was May 19, 2008 for Tc-99m. Other radioactive materials used at this facility include, I-131 therapy capsule January 15, 2008, In-111 on March 4, 2008, Ga-67 on April 22, 2008, I-123 on May 7, 2008, and Y-90 on March 11, 2008. No other radioactive materials used at this facility.

A current copy of the leak test results for the sealed sources used at our facility is enclosed for your review. These sources include a Co-57 flood source, Cs-137, and Ba-133 vials for constancy and accuracy testing. These sources were removed to the new department prior to performing the close-out.

We did not dispose of radioactive material by release to sewers or incineration. In addition, there were no spills of any long-lived radioactive material or on-site burials of radioactive materials.

Thank you for your cooperation. If you have any questions or require additional information, please contact our physics consultant, Kevin B. Miller at 734-662-3197.

Respectfully Yours,

Patrick Salow
IROH Administrator
Ingham Regional Medical Center

401 W. Greenlawn Avenue • Lansing, Michigan 48910-2819 • (517) 334-2121

## Close-out Survey

***Date performed:*** June 4, 2008

***Performed by:*** Kevin B. Miller, Medical Physics Consultants

***Comments:*** Sealed sources and radioactive trash were transferred to our new location prior to performing the close-out survey.

### *Instruments*

Wipe tests analyzed with a Captus 3000 Well Counter S/N#900271.

Instrument: Well Counter

Radionuclide: Full Spectrum MDA for Full Spectrum:261dpm

Date completed: 06/06/08 Conversion factor: 2.38 cpm/dpm

Efficiency=40%

Area survey performed with the following survey meter:

| | |
|---|---|
| Manufacturer: | Ludlum |
| Type: | GM |
| Model Number: | 14C |
| Serial Number: | 81890 |
| Probe Model: | End Window |
| Annual Calibration Due: | 03/19/09 |
| Battery check acceptable: | YES |
| Operational check acceptable: | YES |
| Current reading: | 7.5 mR/hr |

### History of Radionuclides Used

**Unsealed**: The last date of receipt and use of radioactive material at this site was May 19, 2008 for Tc-99m. Other radioactive materials used at this facility include, I-131 therapy capsule January 15, 2008, In-111 on March 4, 2008, Ga-67 in April 22, 2008, I-123 on May 7, 2008, and Y-90 on March 11, 2008. No other radioactive materials used at this facility.

### Sealed

Cs-137 Vial, Ba-133 Vial, and Co-57 Flood last used May 19, 2008.

**Last date of byproduct radiopharmaceutical use: May 19, 2008.**

**Close-out Survey - continued**

**Visual Check:** The area was checked to ensure that all sealed sources and radioactive waste had been removed. No evidence of radioactive material was noted.

**Sealed Source Leak Testing:** No history of leaks from Sealed Sources.

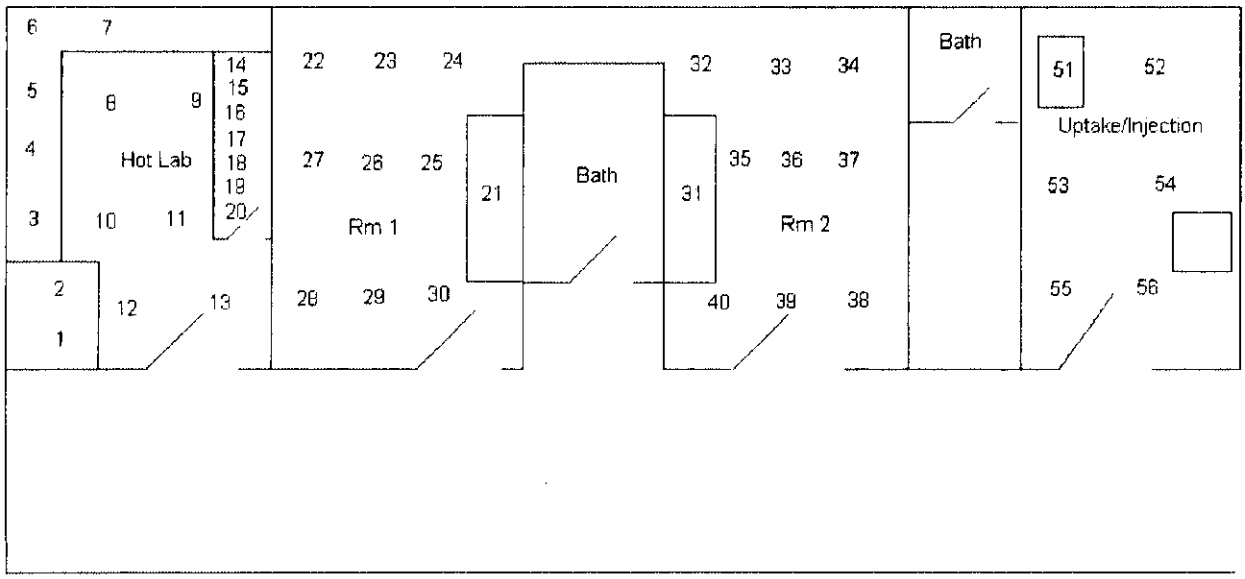
**Radiation Level Survey:** No area within the department demonstrated radiation levels in excess of the background reading of 0.02 mR/hr.

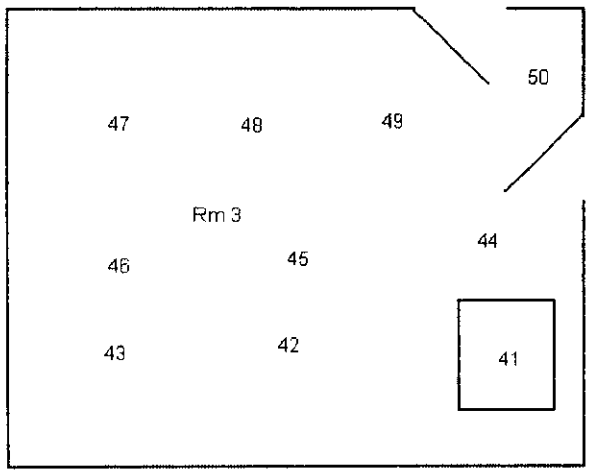
**Removable Contamination:** No area within the department demonstrated removable contamination in excess of 60 dpm's. There is no history of any spills of long-lived radioisotopes.

**Conclusion:** No radioactive materials remain in this department. No removable contamination is present.

Ingham Regional Medical Center
401 W. Greenlawn Avenue
Lansing, Michigan 48910-2819

## Old Nuclear Medicine Department



## Removable Contamination

**Hot Lab**

**Ingham Regional Medical Center**

**License # 21-04073-01**

| | | | |
|---|---|---|---|
| **Date:** | 6/4/2008 | **Performed By:** | Kevin B. Miller |
| **Well Counter:** | Captus 3000 | **MDA:** | 261 dpm |
| **Survey Meter:** | Ludlum 14C GM<br>Calibrated 03/19/08 | **Check Value:** | 7.5 mR/hr |

| | | cpm | net dpm | mR/h |
|---|---|---|---|---|
| 1 | Hot Lab Fume Hood | 481.00 | 0 | 0.02 |
| 2 | Hot Lab Fume Hood | 485.00 | 0 | 0.02 |
| 3 | Hot Lab Dose Prep | 529.00 | 60 | 0.02 |
| 4 | Hot Lab Dose Prep | 529.00 | 60 | 0.02 |
| 5 | Hot Lab Dose Prep | 529.00 | 60 | 0.02 |
| 6 | Sealed Source Storage | 485.00 | 0 | 0.02 |
| 7 | Sealed Source Storage | 485.00 | 0 | 0.02 |
| 8 | Hot Lab Floor | 485.00 | 0 | 0.02 |
| 9 | Hot Lab Floor | 487.00 | 0 | 0.02 |
| 10 | Hot Lab Floor | 487.00 | 0 | 0.02 |
| 11 | Hot Lab Floor | 487.00 | 0 | 0.02 |
| 12 | Hot Lab Floor | 497.00 | 0 | 0.02 |
| 13 | Hot Lab Floor | 497.00 | 0 | 0.02 |
| 14 | Hot Lab Waste Storage | 497.00 | 0 | 0.02 |
| 15 | Hot Lab Waste Storage | 494.00 | 0 | 0.02 |
| 16 | Waste Storage Floor | 494.00 | 0 | 0.02 |
| 17 | Waste Storage Floor | 525.00 | 50 | 0.02 |
| 18 | Waste Storage Floor | 525.00 | 50 | 0.02 |
| 19 | Waste Storage Floor | 525.00 | 50 | 0.02 |
| 20 | Waste Storage Floor | 494.00 | 0 | 0.02 |
| | | | | |
| | Background | 505 | | 0.02 |

***ACTION LEVELS: 2000 dpm***
***< 0.2 mR/hr***

**Efficiency (dpm/cpm):** 2.5

**COMMENTS: No evidence of removable contamination.**

**RSO Signature:** Bryan G. Tollefson 6/17/08

**Maximum removable contamination:** **60.0 net dpm/100 cm$^2$**

Removable Contamination

**Camera Room 1**

**Ingham Regional Medical Center**

**License # 21-04073-01**

**Date:** 6/4/2008 **Performed By:** Kevin B. Miller

**Well Counter:** Captus 3000 **MDA:** 261 dpm

**Survey Meter:** Ludlum 14C EWGM **Check Value:** 7.5 mR/hr

Calibrated 03/19/08

| | | cpm | net dpm | mR/h |
|---|---|---|---|---|
| 1 | Rm 1 Counter | 498.00 | 0 | 0.02 |
| 2 | Rm 1 Floor | 498.00 | 0 | 0.02 |
| 3 | Rm 1 Floor | 498.00 | 0 | 0.02 |
| 4 | Rm 1 Floor | 495.00 | 0 | 0.02 |
| 5 | Rm 1 Floor | 495.00 | 0 | 0.02 |
| 6 | Rm 1 Floor | 490.00 | 0 | 0.02 |
| 7 | Rm 1 Floor | 490.00 | 0 | 0.02 |
| 8 | Rm 1 Floor | 495.00 | 0 | 0.02 |
| 9 | Rm 1 Floor | 490.00 | 0 | 0.02 |
| 10 | Rm 1 Floor | 490.00 | 0 | 0.02 |
| | | | | |
| | | | | |
| | Background | 505 | | 0.02 |

***ACTION LEVELS: 2000 dpm*** **Efficiency (dpm/cpm):** 2.5

***< 0.2 mR/hr***

**COMMENTS: No evidence of removable contamination.**

**RSO Signature:** Bryan G. Tolleson 6/17/08

**Maximum removable contamination:** **0.0 net dpm/100 cm$^2$**

Removable Contamination

**Camera Room 2**

**Ingham Regional Medical Center**

**License # 21-04073-01**

**Date:** 6/4/2008 **Performed By:** Kevin B. Miller
**Well Counter:** Captus 3000 **MDA:** 261 dpm
**Survey Meter:** *Ludlum 14C EWGM* **Check Value:** 7.5 *mR/hr*
Calibrated 03/19/08

| | | cpm | net dpm | mR/h |
|---|---|---|---|---|
| 1 | Rm 2 Counter | 550.00 | 112.5 | 0.02 |
| 2 | Rm 2 Floor | 488.00 | 0 | 0.02 |
| 3 | Rm 2 Floor | 488.00 | 0 | 0.02 |
| 4 | Rm 2 Floor | 550.00 | 112.5 | 0.02 |
| 5 | Rm 2 Floor | 550.00 | 112.5 | 0.02 |
| 6 | Rm 2 Floor | 488.00 | 0 | 0.02 |
| 7 | Rm 2 Floor | 492.00 | 0 | 0.02 |
| 8 | Rm 2 Floor | 492.00 | 0 | 0.02 |
| 9 | Rm 2 Floor | 492.00 | 0 | 0.02 |
| 10 | Rm 2 Floor | 492.00 | 0 | 0.02 |
| | | | | |
| | | | | |
| | Background | 505 | | 0.02 |

***ACTION LEVELS: 2000 dpm*** **Efficiency (dpm/cpm):** 2.5
***< 0.2 mR/hr***

**COMMENTS: No evidence of removable contamination.**

**RSO Signature:** Bryan G. Tollenaar 6/17/08

**Maximum removable contamination:** **112.5 net dpm/100 cm$^2$**

Removable Contamination

**Camera Room 3**

**Ingham Regional Medical Center**

**License # 21-04073-01**

**Date:** 6/4/2008 **Performed By:** Kevin B. Miller
**Well Counter:** Captus 3000 **MDA:** 261 dpm
**Survey Meter:** Ludlum 14C EWGM **Check Value:** 7.5 mR/hr
Calibrated 03/19/08

| | | cpm | net dpm | mR/h |
|---|---|---|---|---|
| 1 | Rm 3 Counter | 492.00 | 0 | 0.02 |
| 2 | Rm 3 Floor | 492.00 | 0 | 0.02 |
| 3 | Rm 3 Floor | 492.00 | 0 | 0.02 |
| 4 | Rm 3 Floor | 500.00 | 0 | 0.02 |
| 5 | Rm 3 Floor | 500.00 | 0 | 0.02 |
| 6 | Rm 3 Floor | 500.00 | 0 | 0.02 |
| 7 | Rm 3 Floor | 515.00 | 25 | 0.02 |
| 8 | Rm 3 Floor | 515.00 | 25 | 0.02 |
| 9 | Rm 3 Floor | 515.00 | 25 | 0.02 |
| 10 | Rm 3 Floor | 515.00 | 25 | 0.02 |
| | | | | |
| | | | | |
| | Background | 505 | | 0.02 |

***ACTION LEVELS: 2000 dpm*** **Efficiency (dpm/cpm):** 2.5
***< 0.2 mR/hr***

**COMMENTS: No evidence of removable contamination.**

**RSO Signature:** Bryan G. Tollaman 6/17/08

**Maximum removable contamination:** **25.0 net dpm/100 cm$^2$**

Removable Contamination

**Injection/Stress Room**

**Ingham Regional Medical Center**

**License # 21-04073-01**

**Date:** 6/4/2008 **Performed By:** Kevin B. Miller
**Well Counter:** Captus 3000 **MDA:** 261 dpm
**Survey Meter:** Ludlum 14C EWGM **Check Value:** 7.5 mR/hr
Calibrated 03/19/08

| | | cpm | net dpm | mR/h |
|---|---|---|---|---|
| 1 | Counter/Bed | 508.00 | 7.5 | 0.02 |
| 2 | Update/Inj. Floor | 508.00 | 7.5 | 0.02 |
| 3 | Update/Inj. Floor | 508.00 | 7.5 | 0.02 |
| 4 | Update/Inj. Floor | 487.00 | 0 | 0.02 |
| 5 | Update/Inj. Floor | 487.00 | 0 | 0.02 |
| 6 | Update/Inj. Floor | 487.00 | 0 | 0.02 |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| | | | | |
| | | | | |
| | Background | 505 | | 0.02 |

***ACTION LEVELS: 2000 dpm*** **Efficiency (dpm/cpm):** 2.5
***< 0.2 mR/hr***

**COMMENTS: No evidence of removable contamination.**

**RSO Signature:** Bryan G. Tolleson 6/17/08

**Maximum removable contamination:** **7.5 net dpm/100 cm$^2$**

Conclusion

As of June 4, 2008 all radioactive materials were removed from the site and no removable contamination was present.

**Medical Physics Consultants, Inc.**

# *Sealed Source Leak Test*

Licensee: Ingham Reg'l. Med. Cntr.-Greenlawn Campus  Date: 06/04/08

Performed by: Kevin Miller

| Nuclide | Type | Calibration Activity | Calibration Date | Location | M/N | S/N |
|---|---|---|---|---|---|---|
| Cs-137 | Vial | 1000 uCi | 01/01/72 | Hot Lab | MALLIN | 1LK |
| Current Activity: | | 430.9 uCi | | | | |
| Ba-133 | Vial | 270 uCi | 06/06/95 | Hot Lab | NES-358 | 358019035 |
| Current Activity: | | 116.7 uCi | | | | |
| Co-57 | FF | 10 mCi | 10/01/07 | Hot Lab | PF24R-057-10M | 1254-151 |
| Current Activity: | | 5.316 mCi | | | | |

Comment: The sources listed above were leak tested using a dry wipe technique and were found to have less than 0.005 uCi removable activity. The following Minimum Detectable Activities are based upon a background at the indicated value. Background was at or below these levels when the above tests were completed.

Well Counter: Captus 3000

| Nuclide | MDA | Background |
|---|---|---|
| Cs-137 | $2.0 \times 10^{-4}$ uCi | 145 counts/1 min |
| Ba-133 | $8.8 \times 10^{-5}$ uCi | 204 counts/1 min |
| Co-57 | $1.7 \times 10^{-5}$ uCi | 53 counts/1 min |

***RADIATION SAFETY OFFICER:*** Bryan G. Tollenaar 6/17/08

**Medical Physics Consultants, Inc.**

# *Sealed Source Leak Test*

Licensee: Ingham Reg'l. Med. Cntr.-Greenlawn Campus  Date: 06/04/08

Performed by: Kevin Miller

| Nuclide | Type | Calibration Activity | Calibration Date | Location | M/N | S/N |
|---|---|---|---|---|---|---|
| Cs-137 | Vial | 1000 uCi | 01/01/72 | Hot Lab | MALLIN | 1LK |
| Current Activity: | | 430.9 uCi | | | | |
| Ba-133 | Vial | 270 uCi | 06/06/95 | Hot Lab | NES-358 | 358019035 |
| Current Activity: | | 116.7 uCi | | | | |
| Co-57 | FF | 10 mCi | 10/01/07 | Hot Lab | PF24R-057-10M | 1254-151 |
| Current Activity: | | 5.316 mCi | | | | |

Comment: The sources listed above were leak tested using a dry wipe technique and were found to have less than 0.005 uCi removable activity. The following Minimum Detectable Activities are based upon a background at the indicated value. Background was at or below these levels when the above tests were completed.

Well Counter: Captus 3000

| Nuclide | MDA | Background |
|---|---|---|
| Cs-137 | $2.0 \times 10^{-4}$ uCi | 145 counts/1 min |
| Ba-133 | $8.8 \times 10^{-5}$ uCi | 204 counts/1 min |
| Co-57 | $1.7 \times 10^{-5}$ uCi | 53 counts/1 min |

***RADIATION SAFETY OFFICER:*** Roger G. Tolleson 6/17/08

**Medical Physics Consultants, Inc.**

# *Radiation Detection Efficiency*

Licensee: Medical Physics Consultants, Inc. Date: 06/06/08

Instrument: Well Model: Captus 3000

Window: Full Spectrum Serial #: 900271

| | | | |
|---|---|---|---|
| *Source* | Activity: | 0.4539 uCi of | Cs-137 |
| | Activity: | 1007761 | dpm |
| | Counts: | 424600 | cpm |
| | Counts: | 422800 | cpm |
| | Counts: | 424000 | cpm |
| | Average Counts: | 423800 | cpm |
| | Counting Time: | 1 | Minutes ($T_t$ ) |
| | Net Source Counts: | 423275 | cpm |
| *Background* | Counting Time: | 1 | Minutes ($T_b$ ) |
| | Counts: | 525 | cpm |
| | Counts: | 0 | cpm |
| | Counts: | 0 | cpm |
| | Average Background: | 525 | cpm ($R_b$ ) |
| *Efficiency* | | **2.38** | **dpm/cpm** |
| | | **932433** | **cpm/uCi** |

## ***MINIMUM DETECTABLE ACTIVITY***

$$MDA = (K^2/T_t) + 2K[\{R_b/T_b\}(1+ T_b/T)]^{1/2}$$

where: K = 1.65 at 95% confidence level

$T_t$ = counting time of samples in minutes

$T_b$ = counting time of background in minutes

$R_b$ = background count rate in cpm

| | | |
|---|---|---|
| MDA for: Cs-137 | **110** | **cpm** |
| | **0.00012** | **uCi** |
| | **261** | **dpm** |

## MDA Test for Well

06/06/2008 15:00

Isotope: Cs137

**Minimum Detectable Activity: 240.4dpm**

$$MDA = \frac{\left(f\sqrt{N} + C\right)}{(Eff * T)}$$

$f$ = Precision Factor

$C$ = Correction Factor

$Eff$ = Efficiency

$T$ = Counting Time

N = Counts = 40
T = Live Time = 60.0sec
f = 4.65
C = 2.71
Eff = 0.134

## MDA Test for Well

06/06/2008 14:59

Isotope: I 131

**Minimum Detectable Activity: 151.1dpm**

$$MDA = \frac{\left(f\sqrt{N} + C\right)}{(Eff * T)}$$

$f$ = Precision Factor

$C$ = Correction Factor

$Eff$ = Efficiency

$T$ = Counting Time

N = Counts = 35
T = Live Time = 60.0sec
f = 4.65
C = 2.71
Eff = 0.200

## UPS CampusShip: View/Print Label

1. **Print the label(s):** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the dotted line.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   **Customers without a Daily Pickup**
   - Schedule a same day or future day Pickup to have a UPS driver pickup all your CampusShip packages.
   - Hand the package to any UPS driver in your area.
   - Take your package to any location of The UPS Store®, UPS Drop Box, UPS Customer Center, UPS Alliances (Office Depot® or Staples®) or Authorized Shipping Outlet near you. Items sent via UPS Return Services℠ (including via Ground) are accepted at Drop Boxes.
   - To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.

   **Customers with a Daily Pickup**
   - Your driver will pickup your shipment(s) as usual.

FOLD HERE