Radiation Sciences – Nuclear Medicine Technology Program
Hot Lab Log Book (Material)

Table of Content

Receiving Of A Radioactive Package

1. Date _____ and time _____
2. What is the content of the package?

3. Does the content match invoice? (circle one) Yes or No
4. Inspect the package on arrive.
    a. Is there damage? (circle one) Yes or No
    b. If yes, describe the damage. Was the RSO contacted?

    c. What is the package's label (circle one) White I, Yellow II, Yellow III)
    d. Survey @ surface = _____ mr/hr
    e. Survey @ 1 meter = _____ mr/hr
5. Complete 100 cm^2 wipe test of the package
    a. Results in cpm = _____
    b. What is the well counter efficiency?
    c. Results in dpm = _____
6. Monitor the empty package to assure that there is no radioactive contamination

Removable contamination should not exceed 0.001 uCi or 2200 dpm/cm^2

Nuclear Medicine Program - VCU

Constancy Log – Use ^{137}Cc

Date	^{137}Cs			^{99m}Tc			^{111}In			^{123}I			Pass Y/N	Name
	TA	MA	%SD	TA	MA	%SD	TA	MA	%SD	TA	MA	%SD		

Sealed Source Calibration Date _____of ^{137} Calibration Date _____

Cs – Serial # _____

df ^{137}Cs for 1 month = 0.99808 TA – Theoretical Activity MA – Measured Activity

DAILY AMBIENT RADIATION EXPOSURE RATE SURVEY

All Dose Rates Are in mR/hr **The Month and Year :**_____**Survey instrument:**_____

Location Date	1	2	3	4	5	6	7	8	9	Comments	SC Y/N	Initials

See department schematic to determine the corresponding numerical locations. SC - Source Check

Weekly Wipe Test
Department of Radiation Science
Nuclear Medicine Hot Lab

Well Counter Efficiency _____

Technologist _____

Date _____

Location	WIPE – CPM	BKG – CPM	NET – CPM	DPM
1				
2				
3				
4				
5				
6				
7				
8				
9				

See department schematic to determine the corresponding numerical locations.

Weekly Wipe Test
Department of Radiation Science
Nuclear Medicine Hot Lab

Well Counter Efficiency _____

Technologist _____

Date _____

Location	WIPE – CPM	BKG – CPM	NET CPM	DPM
1				
2				
3				
4				
5				
6				
7				
8				
9				

See department schematic to determine the corresponding numerical locations.

Dose Calibrator Accuracy Test

Using a low, medium, and high energy sealed source (repeat these steps for each source) determine dose calibrator accuracy. Suggest ^{57}Co, ^{137}Cs, and ^{60}Co

1. Select the appropriate dose calibrator setting and first measure record the background.
2. Now place the corresponding sealed source with the dose calibrator.
3. Assay the source x3 and record each reading.
4. Average the three reading.
5. Subtract the background.
6. Calculate the percent variation based on theoretical and measured levels of activity.
7. Record all your data.

Atomic Lab 100 Plus Date _____

Serial # 1781022, 1782007 Name _____

Accuracy Test – Sealed Source 1

Radionuclide _____ Reading 1_____ Background _____

Serial Number _____ Reading 2 _____ Average Activity _____

Theoretical Activity _____ Reading 3 _____ Net Activity _____

$$\frac{\text{Theoretical} - \text{Measured}}{\text{Theoretical}} \times 100$$ % Variation _____

Accuracy Test - Sealed Source 2

Radionuclide _____ Reading 1_____ Background _____

Serial Number _____ Reading 2 _____ Average Activity _____

Theoretical Activity _____ Reading 3 _____ Net Activity _____

$$\frac{\text{Theoretical} - \text{Measured}}{\text{Theoretical}} \times 100$$ % Variation _____

Accuracy Test - Sealed Source 3

Radionuclide _____ Reading 1_____ Background _____

Serial Number _____ Reading 2 _____ Average Activity _____

Theoretical Activity _____ Reading 3 _____ Net Activity _____

$$\frac{\text{Theoretical} - \text{Measured}}{\text{Theoretical}} \times 100$$ % Variation _____

What is the level of acceptable variation? _____

Is the accuracy test acceptable? _____+

Geometry Variation – Dose Calibrator

Date _____

Time the procedure was Started _____ **Ended** _____

Volume in mL	Measured Activity	Expected Activity	Percent Error
0.5			
1.0			
1.5			
2.0			
2.5			
3.0			

- Draw up between 1 – 10 mCi of ^{99m}Tc into a three mL syringe and expand to 0.5 mL.
- Measure and record each reading as quickly as possible.
- Background should not be an issue since that was measured with the morning QC. DC automatically subtracts it to give you net activity.
- Continue to expand you activity by 0.5mL intervals, measure it to the point where 3.0 mL is recorded.
- Activity levels should vary less than 10%.
- Greater amounts require a the determination of the correction factor.

$$\frac{\text{Measured - Expected}}{\text{Expected}} \times 100 = \% \text{ Error}$$

- Determine the difference between the measured and expected levels of activity for each volume and chart your answer above.
- Calculate % Error(s) for each

Questions

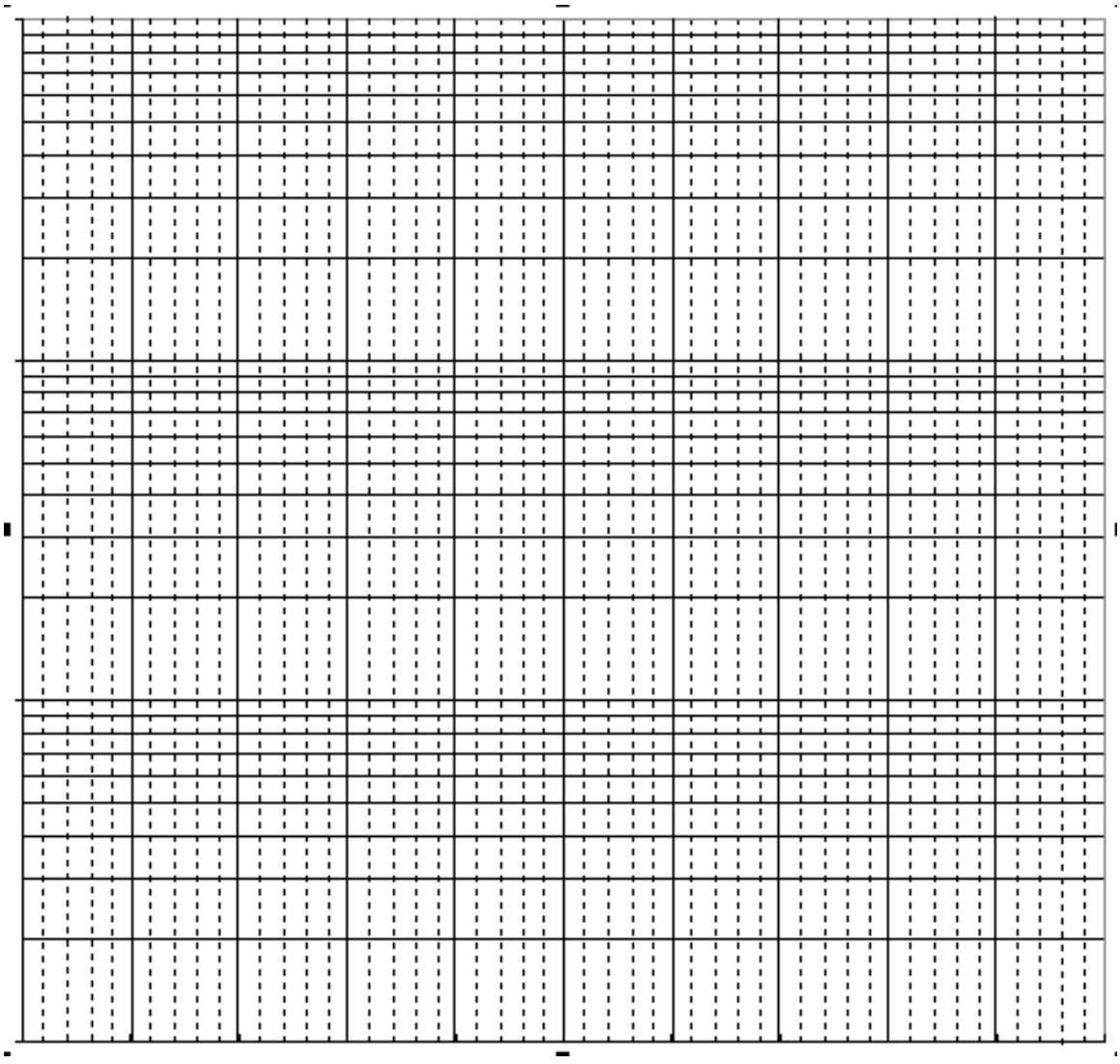
1. Is the variation acceptable?

2. If no, then what is/are the correction factors and where should it be applied?

Linearity Log

Date/Time	Measured Activity	Theoretical Activity	Difference in %

Plot the Linearity Curve



Kit Compounding and QC – One Strips

Show your calculations

Name of the Clinical Affiliate _____

Name of the pharmaceutical _____

Amount of ^{99m}Tc added to the kit _____mCi. Solution is _____mL.

Amount of saline used to expand the kit _____ mL. Kit concentration is _____mCi/mL?

How did you make the kit (ingredients, mixing, heating, sonic bath, incubation time?)

What color is the compounded solution? _____

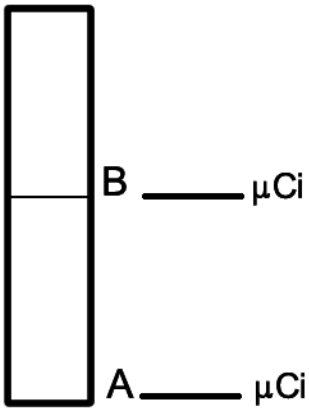
Actual measured amount of activity placed into the vial? _____mCi

What is the patient's prescribed dose? _____ mCi? How many mL are needed from the vial? _____mL

What was the dose measured in the dose calibrator? _____ mCi? (Calculate data below)

Using One TLC Strip

Write in the values and calculate the percentage.



% Bound Calculation

$$\frac{A}{A + B} \times 100$$

Kit Compounding and QC – Two Strips

Show your calculations

Name of the Clinical Affiliate _____

Name of the pharmaceutical _____

Amount of ^{99m}Tc added to the kit _____mCi. Solution is _____mL.

Amount of saline used to expand the kit _____ mL. Kit concentration is _____mCi/mL?

How did you make the kit (ingredients, mixing, heating, sonic bath, incubation time?)

What color is the compounded solution? _____

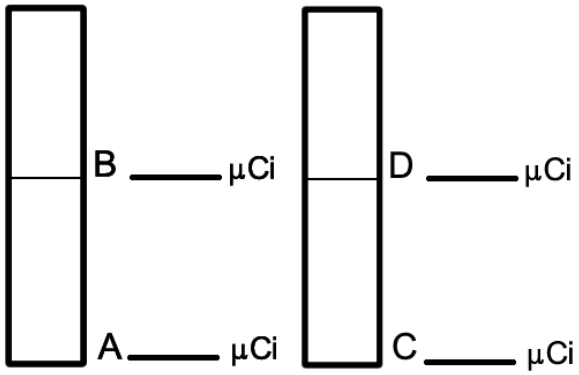
Actual measured amount of activity placed into the vial? _____mCi

What is the patient's prescribed dose? _____ mCi? How many mL are needed from the vial? _____mL

What was the dose measured in the dose calibrator? _____ mCi? (Calculate data below)

Using Two TLC

Write in the values and calculate the percentages.



% Bound Calculation

$$\frac{A}{A+B} \times 100$$

% HR Calculation

$$\frac{C}{C+D} \times 100$$

% Bound - % HR = % Radiochemical Purity

Kit Compounding and QC of Labeled RBCs

Show your calculations

Name of the Clinical Affiliate _____

Labeling Process

1. Take a 5 mL syringe and wet it with heparin. Then remove 3 mL of patient's whole blood and place this into a reaction vial.
2. Mix gently the contents within the reaction vial and the whole blood and let stand for 5 minutes.
3. To the reaction vial add **syringe 1** (sodium hypochlorite), invert 4-5 times, then add contents from **syringe 2** (citric acid, sodium citrate, and dextrose) and invert vial another 4-5 times.
4. Add 10 – 100 mCi of $^{99m}TcO_4^-$ in no greater than a 3 mL solution into the reaction vial and invert 4-5 times . Now let the reaction vial stand for 20 minutes before injecting the dose into the patient. How much activity did you add to the reaction vial in how many mL?

   _____ mCi and _____ mL
5. What was the measured dose to the patient? _____ mCi

QC the Bound RBCs

1. Remove 0.2 mL of RBC from reaction vial and place into test tube.
2. Add 2.0 mL of saline and gently mix the solutions before centrifuging for 5 minutes. Make use the centrifuge is balanced with an equal amount of liquid at the opposite end. In practice, usually a second tubes of RBCs are used, in case someone messes up the pipetting of plasma.
3. Remove supernatant and place into separate test tube.
4. Measure supernatant (A) in dose calibrator and measure packed cells (B) in the dose calibrator.
5. Calculate the Radiochemical purity of the tagged cells

$$\frac{B}{A + B} \times 100$$

SPILL/CONTAMINATION PROCEDURES
FOR LOW AND HIGH DOSE UNSEALED SOURCES

MINOR SPILLS OF LIQUIDS AND SOLIDS

1. **NOTIFY:** Notify persons in the area that a spill has occurred.

2. **PREVENT THE SPREAD OF CONTAMINATION:** Cover the spill with absorbent paper.

3. **ABSORB LIQUID:** Wear gloves and protective clothing such as a lab coat and booties, and clean up the spill using absorbent paper. Carefully fold the absorbent paper with the clean side out and place in a bag labeled “caution radioactive material” for transfer to a radioactive waste container. All contaminated gloves and any other contaminated disposable material should be placed in the bag.

4. **SURVEY:** With a G.M. survey meter, check for removable contamination to ensure contamination levels are below trigger levels. Check the area around the spill. Also, check hands, clothing, and shoes of self and anyone else who may be potentially contaminated.

5. **DECONTAMINATE:** Clean the area with a soap solution. Perform a swipe survey to check for removable contamination. Continue decontamination efforts until swipe surveys show less than the trigger level.

6. **REPORT:** Report the incident to the Radiation Safety Section and Nuclear Medicine Manager. Complete “Spill/Contamination Incident Report” and deliver to Nuclear Medicine Manager.

MAJOR SPILLS OF LIQUIDS AND SOLIDS

1. **CLEAR THE AREA:** Notify all persons not involved in the spill to vacate the room.

2. **PREVENT THE SPREAD OF CONTAMINATION:** Cover the spill with absorbent pads labeled “caution radioactive material”, but do not attempt to clean it up. To prevent the spread of contamination, clearly indicate the boundaries of the spill and limit the movement of all personnel who may be contaminated.

3. **SHIELD THE SOURCE:** If possible, the spill should be shielded, but only if it can be done without further contamination or significant increase in radiation exposure.

4. **CLOSE THE ROOM:** Close the room and lock or otherwise secure the area to prevent entry.

5. **CALL FOR HELP:** Notify the Radiation Safety Section immediately. Notify Nuclear Medicine Manager immediately. Complete “Spill/Contamination Incident Report” and deliver to Nuclear Medicine Manager (following personnel decontamination procedure).

6. **PERSONNEL DECONTAMINATION:** Remove contaminated clothing and flush contaminated skin with lukewarm water and then wash with mild soap. If contamination remains, induce perspiration by covering the area with plastic. Then wash the affected area again to remove any contamination that was released by the perspiration.

RADIATION SAFETY SECTION: 828-9131

NUCLEAR MEDICINE MANAGER: 828-4176

GUIDELINES FOR DETERMINING
MINOR SPILL VS. MAJOR SPILL

Estimate the amount of radioactivity spilled. Institute a major or minor spill/contamination procedure based on the table below. Spills/contamination above the millicurie trigger level are considered major. Spills below the millicurie trigger level are considered minor. Downgrade to minor spill following decay or restrict access pending complete decay.

Trigger Level Table

Radionuclide	**Millicurie Trigger Level** Minor Spill if Under/ Major Spill if over	**Trigger Levels Restricted area DPM**	**Trigger Level Unrestricted Area DPM**
Diagnostic	**mCi**		
F-18	100	20,000	2,000
Ga-67	10	20,000	2,000
I-123	10	2,000	2,000
In-111	10	2,000	2,000
Tc-99m	100	20,000	2,000
Tl-201	100	20,000	2,000
Therapeutic			
I-131	1	2,000	200
P-32	1	2,000	2,000
Sm-153	1	2,000	2,000
Sr-89	1	2,000	2,000
Y-90	1	2,000	2,000

NUCLEAR MEDICINE
RADIOACTIVE MATERIAL SPILL/CONTAMINATION INCIDENT REPORT

Technologist involved in spill: _____ Date: _____

Approximate millicurie amount of spill: _____ Isotope: _____
Location of spill room:

Major or Minor Spill (circle one)

Description of Incident:

Notification:

		Pre-Clean			Post-Clean		
Personnel Contaminated	**Contaminated**	**mR/hr**	**DPM**	**Time**	**mR/hr**	**DPM**	**Time**
	Yes No						
	Yes No						
	Yes No						
	Yes No						
	Yes No						

Survey and Contamination Control:

	Pre Clean			Post Clean		
Area/Items Contaminated	**mR/hr**	**DPM**	**Time**	**mR/hr**	**DPM**	**Time**

Decontaminate:

- **Contacted Radiation Safety YES NO If no why?**

- **Who did you speak to? _____ Date: _____ Time: _____**
- **What instructions were you given?**

- ❑ **Proceed with decontamination.**

- ❑ **Wait for Radiation Safety for decontamination supervision.**
  - ❑ **Other:**

Incident Reported to:

- ❑ Nuclear Medicine Faculty or Staff (required):

- ❑ Radiation Safety (required):

- ❑ Other
- ❑ :

Follow up actions:

Student Completing Report: _____ Date: _____

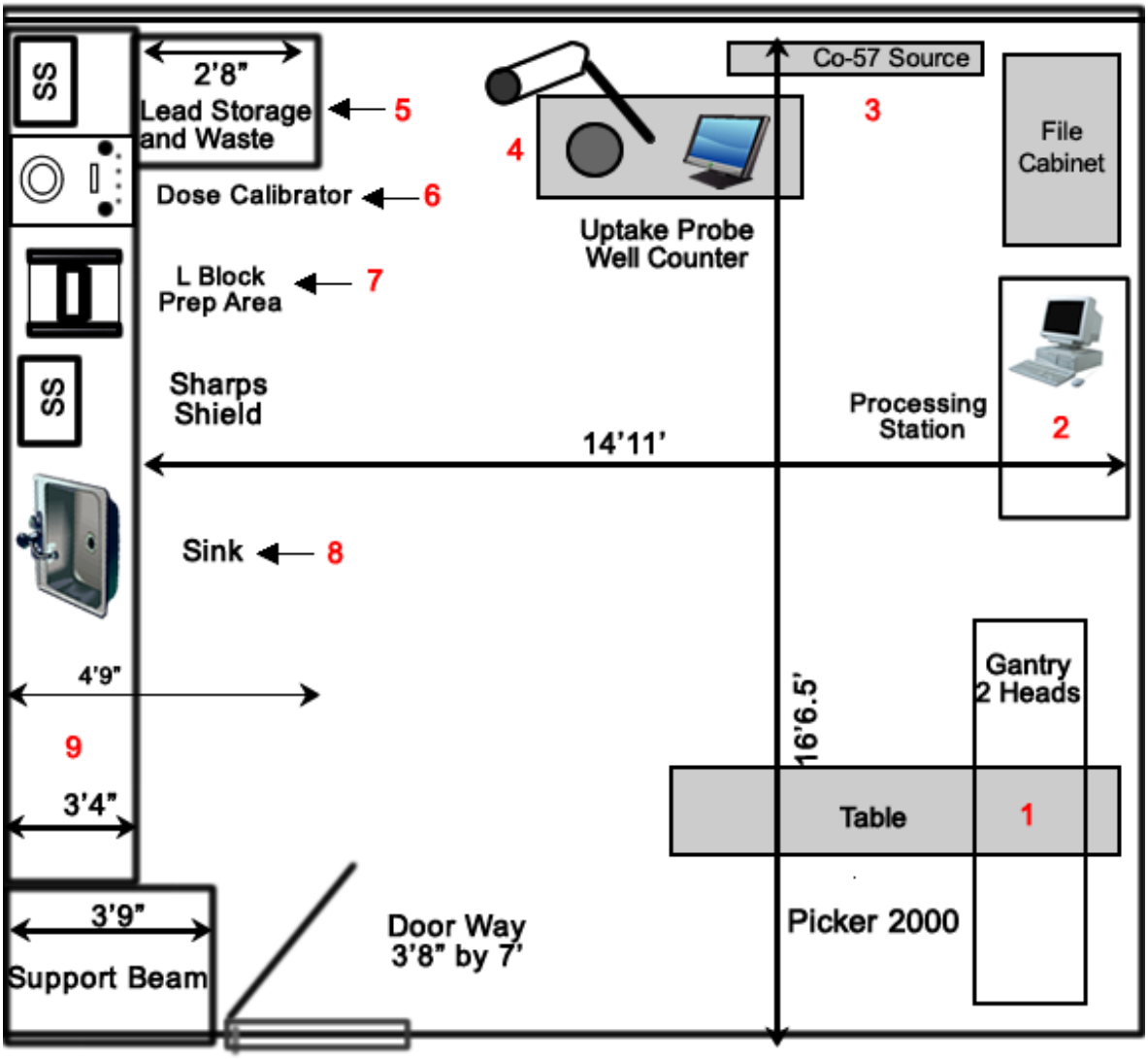
Faculty Reviewing Report: _____ Date: _____

Department Chair Reviewing Report: _____Date: _____

Additional Comments?

Map Room 2133 Nuclear Medicine Hot Lab

Survey and Wipe Test match have cooresponding numbers which define the area being monitored.



Nuclear Medicine Laboratory - Room 2133
701 West Grace Street