ENVIRONMENTAL HEALTH AND SAFETY
University of Nebraska-Lincoln

Safe Operating Procedure

(Revised 3/20)

CONTAMINATION SURVEYS FOR RADIOACTIVE MATERIAL LABORATORIES

The purpose of this document is to provide guidance for the performance of contamination surveys in laboratories where open source radioactive material (RAM) is utilized (i.e., used). The performance of documented contamination surveys in RAM laboratories is required by State and Federal regulation.

Documented contamination surveys are required monthly when RAM is used and must be performed for every location identified on the Authorized User's (AU) permit (i.e., RAM authorization). Sewer disposal is considered use of RAM and necessitates a monthly survey, regardless of whether any other use of radioactive material occurred in the laboratory.

If RAM is not used in a given month, it is still necessary to document this to be the case ***each month*** for ***every location*** identified on the AU's permit. A simple form for documenting RAM use for a given location is provided with this procedure. An example of a completed survey is provided in Appendix A.

The Radiation Safety Office has posted swipe survey counting instructions by each liquid scintillation counter (LSC). If you follow these instructions and use the correct protocol, several of the documentation requirements listed below will be reported with the LSC output. ***Do not edit or modify these protocols.*** The performance of the LSC is verified as acceptable each year by the Radiation Safety Office. In most cases, H-3 efficiency values are conservatively used as default when determining swipe results.

Surveys performed by the Radiation Safety Office staff are not substitutes for monthly survey requirements. These surveys are performed for confirmatory purposes.

The following steps are provided to guide laboratory personnel in conducting a contamination survey. Individuals that perform contamination surveys must be trained radiation workers.

Determine Survey Frequency

RAM use at any time during the month, including sewer disposal:

- Surveys of all use locations are required (monthly).
- Surveys should be performed within the month of use.
- If RAM is not used in a given month for a given room, it is still necessary to document this to be the case ***each month*** for every location identified on the AU's permit.

No RAM use at any time during the month:

- A contamination survey is not required. However, it is still necessary to document that no use occurred ***each month*** for ***every location*** identified on the AU's permit. A simple form for documenting no RAM use is provided at the end of this procedure. An example of "no use" documentation is provided in Appendix A.

Periodically, contamination surveys of shared rooms (e.g., LSC room, developer room, etc.) are performed and maintained by a single AU. That is, not every AU using the shared room is performing a monthly contamination survey of that location. If this is the case for a room on your authorization, you must document which AU is performing the contamination survey in your survey logbook. An example of such documentation is provided in Appendix A.

Note: If the AU you rely on to perform a survey fails to do such, then you would also be subject to a nonconformance citation by a regulatory inspector, since a survey was not performed for a room on your authorization.

Verify Required Survey Documentation

Your survey documentation must include the following information:

Map of the RAM use laboratory

- Electronic maps are available from the Radiation Safety Office. An example of a survey map is provided in Appendix A.
- The map should annotate major use/storage locations, including freezers, work stations, equipment, and RAM sinks.
- Swipe locations should be annotated on the map.

Date survey conducted

- Surveys are required at least once a calendar month.
- If use is sporadic, a survey should be performed in any month that RAM was used and the date of survey should closely follow the last date of RAM use.

Name of the person who performed the survey

- Signature or initials are acceptable.

Instrument used to count swipes

- Include the LSC serial number.
- The Radiation Safety Office has posted swipe survey counting instructions by each LSC. If you follow these instructions and use the correct protocol, the instrument serial number will be included in the report

LSC results

- Results should always be in units of DPM.
- The Radiation Safety Office has posted swipe survey counting instructions by each LSC. If you follow these instructions and use the correct protocol, the survey results will be reported in DPM.

Action Level

- Survey results above the action level require decontamination and are based on a swipe of at least 100 cm^2.
- The action level for all radionuclides, except I-125, is 1000 DPM. The action level for I-125 is 220 DPM.
- The Radiation Safety Office has posted swipe survey counting instructions by each LSC. If you follow these instructions and use the correct protocol, the action level will be included in the report

Conducting a Swipe Survey

The number of swipe samples taken will be dependent on size and use of the space surveyed. Generally, all the radiation labeled areas and a few non-radiation areas (such as phone, door knobs and floor area adjacent to radiation work area) should be swiped when conducting a survey. An example swipe survey is provided in Appendix A.

Remember, if RAM is not used in a given month, it is still necessary to document this to be the case ***each month*** for ***every location*** identified on the AU's permit.

Swipe surfaces and equipment

- Don appropriate PPE (e.g., laboratory coat, gloves, and eye protection).
- Swipe samples are taken with dry filter papers.
- Swipe an area of at least 100 cm^2 using moderate pressure.
- Document the location of each swipe on the survey map

Counting of swipe samples

- Carefully place swipes into individual LSC vials.
- Place scintillation cocktail into vial and secure the lid.
- Gently agitate the vial to wet the entire swipe.
- Most protocols will require a background vial that includes cocktail in the first position of the counting rack.
- Count the vials in accordance to the instructions posted near each LSC.

Review swipe survey counting results

- Contamination is generally considered “non-detect” if the result is less than 200 DPM.
- If a survey result is greater than 220 DPM for I-125 or 1000 DPM for all other radionuclides, the action level for contamination has been exceeded and decontamination is required. It is recommended that decontamination be performed even if the result is greater than 200 DPM but less than the action level.
- If contamination is not present, sign or initial the survey results and document the survey in your survey logbook.

Decontaminate and resurvey, if necessary

- If the action level is exceeded, then that location should be cleaned (multiple cleanings may be necessary) and resurveyed following the previous instructions, including documentation requirements.
- The survey demonstrating that decontamination has been successfully achieved must be documented in your survey logbook.

Swipe sample scintillation vials, once counted, should be treated as radioactive waste. Used vial collection containers must be labeled with the applicable radioisotope and posted with a RAM label.

Note: It is not uncommon for vials to leak, so double bag your collection containers or accumulate in flats.

An example of a completed survey is provided in Appendix A.

Appendix A: Example of Completed Contamination Survey

In this example, the Authorized User (John Isotope) has two rooms on his permit (Rooms 110 and 105). Room 105 is used for contamination swipe counting only, and this room is surveyed by a different Authorized User. Room 110 is used for research activities.

During the entire year, John Isotope uses radioactive material (H-3) for a single experiment in March. John Isotope uses his entire inventory of H-3 during that experiment. There is no radioactive material inventory or use for the remainder of the year.

A survey is performed for Room 110 in March and contamination above the action level is identified in the sink. The sink is decontaminated and resurveyed to verify the decontamination was successful.

The attached survey would represent John Isotope's survey documentation for the entire year of 2009.

The survey documentation includes:

- A reference that Room 105 is surveyed by another authorized user.
- Use documentation for Room 110.
- Contamination survey for March.
- Resurvey following decontamination.

John Isotope uses Room 105 for contamination swipe counting only. Kathy Proton's laboratory staff performs and documents the monthly surveys for Room 105. The following is an example of how John Isotope can document that Kathy Proton is surveying Room 105.

University of Nebraska – Lincoln

MONTHLY RADIOACTIVE MATERIAL USE DOCUMENTATION FORM

Authorization Information

Authorized User	John Isotope	Authorization Number	R-00009
Room	105 (LSC use only)	Calendar Year	2009

Radioactive Material Use Documentation

At the end of each month, determine if radioactive material had been used in the room identified above and check the appropriate box. If radioactive material had been used in a given month, then a contamination survey must be performed and documented. Please be sure to initial and date the form.

Month	Have Radioactive Materials Been Used This Month?		Initials	Date
	[1]Yes	No		
January				
February	Monthly swipes of this room are performed by K. Proton's staff. JW 1/3/2009			
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

[1]If radioactive material has been used in a given month, then a contamination survey must be performed and documented. Proper contamination survey documentation includes:

- *a map identifying survey locations*
- *contamination survey results in DPM*
- *name of the person performing the survey*
- *the date of the contamination survey*
- *instrument used*
- *action level (the action level for I-125 is 220 DPM, the action level for all other radionuclides is 1000 DPM)*

Below is John Isotope's RAM use documentation for Room 110. He only used RAM in March, so all other months were documented as "No Use". A survey was performed for March.

University of Nebraska – Lincoln

MONTHLY RADIOACTIVE MATERIAL USE DOCUMENTATION FORM

Authorization Information

Authorized User	John Isotope	Authorization Number	R-00009
`Room	110	Calendar Year	2009

Radioactive Material Use Documentation

At the end of each month, determine if radioactive material had been used in the room identified above and check the appropriate box. If radioactive material had been used in a given month, then a contamination survey must be performed and documented. Please be sure to initial and date the form.

Month	Have Radioactive Materials Been Used This Month?		Initials	Date
	[1]Yes	No		
January		X	JW	1/30/09
February		X	JW	2/28/09
March	X		JW	3/30/09
April		X	JW	4/30/09
May		X	JW	5/30/09
June		X	JW	6/30/09
July		X	JW	7/30/09
August		X	JW	8/29/09
September		X	JW	9/30/09
October		X	JW	10/31/09
November		X	JW	11/27/09
December		X	JW	12/20/09

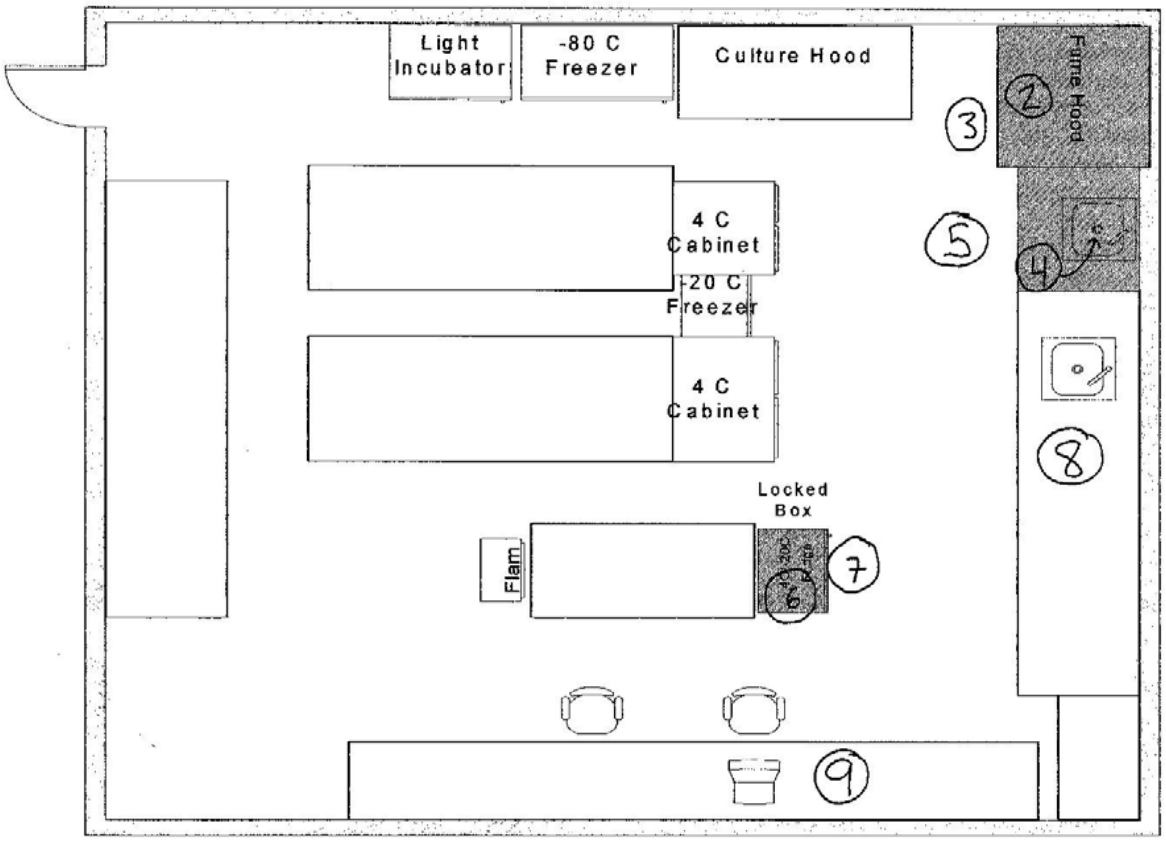
[1]If radioactive material has been used in a given month, then a contamination survey must be performed and documented. Proper contamination survey documentation includes:

- *a map identifying survey locations*
- *contamination survey results in DPM*
- *name of the person performing the survey*
- *the date of the contamination survey*
- *instrument used*
- *action level (the action level for I-125 is 220 DPM, the action level for all other radionuclides is 1000 DPM)*

Below is the map that John Isotope used to document his March survey. Note that each survey location is annotated on the map. Electronic copies of maps are available through the Radiation Safety Office.

LABORATORY SURVEY MAP

Authorized User:	John Isotope	Building:	Ag Warehouse 1
Authorized User #:	R-00009	Room:	110



Survey Date: 3/19/2009 Performed By: Joel Webb

Comments: Last RAM use was on 3/15/09.

Below are the LSC results of the survey performed in March. The isotope that he used during this month was H-3, so the contamination action level is 1000 DPM. Note that the action level and the serial number of the LSC are printed on the survey report. If you follow survey instructions posted by your LSC, then the action level and serial number of the LSC will be printed on the report. The result for survey location number 4 (sink) is 1551 DPM. Since the contamination action level is exceeded, decontamination and resurveying are necessary.

3/19/2009 4:36:02 PM QuantaSmart (TM) - 2.02 - Serial# 434174 Page # 1
Protocol# 8 - RSASingleChannel.lsa User: RSO

Routine Swipe Analysis

Room 110

Assay Definition-

Assay Description:
Routine Swipe Analysis ACTION LIMIT: 1000 DPM OR 220 DPM FOR I-125

Assay Type: Direct DPM
Report Name: Routine Swipe Analysis
Output Data Path: C:\Packard\Tricarb\Results\RSO\RSASingleChannel\20090319_1614
Raw Results Path: C:\Packard\Tricarb\Results\RSO\RSASingleChannel\20090319_1614\20090319_1614.results
Assay File Name: C:\Packard\TriCarb\Assays\RSASingleChannel.lsa

Count Conditions-

Nuclide: Direct DPM 3H
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: 3H
Count Time (min): 1.00
Count Mode: Normal Normalization Std DPM: 286700
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL	Bkg Subtract
A	0.0	2000.0	1st Vial

Count Corrections-

Static Controller: On Luminescence Correction: n/a
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				

Cycle 1 Results

P#	DATE	S#	Count Time	CPMA	DPM1	MESSAGES	
8	3/19/2009	1	10.00	41	0	B	
8	3/19/2009	2	1.00	21	108		
8	3/19/2009	3	1.00	0	0	I	
8	3/19/2009	4	1.00	653	*1551	Sink I	* will be decontaminated and resurveyed
8	3/19/2009	5	1.00	1	48		
8	3/19/2009	6	1.00	6	59		
8	3/19/2009	7	1.00	8	68		
8	3/19/2009	8	1.00	6	0	I	

JW 3/19/09

The sink was decontaminated and resurveyed. A detailed map of the sink survey locations is included.

3/20/2009 8:37:56 AM QuantaSmart (TM) - 2.02 - Serial# 434174 Page # 1
Protocol# 6 - RSASingleChannel.lsa User: RSO

Routine Swipe Analysis

Post Sink Cleanup
Room 110

Assay Definition-

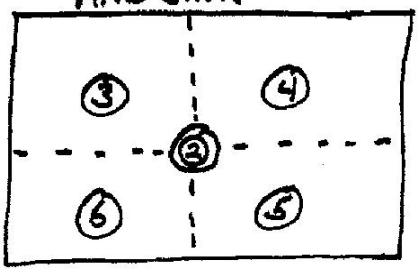
Assay Description:
Routine Swipe Analysis ACTION LIMIT: 1000 DPM OR 220 DPM FOR I-125

Assay Type: Direct DPM
Report Name: Routine Swipe Analysis
Output Data Path: C:\Packard\Tricarb\Results\RSO\RSASingleChannel\20090320_0818
Raw Results Path: C:\Packard\Tricarb\Results\RSO\RSASingleChannel\20090320_0818\20090320_0818.results
Assay File Name: C:\Packard\TriCarb\Assays\RSASingleChannel.lsa

Count Conditions-

Nuclide: Direct DPM 3H
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: 3H
Count Time (min): 1.00
Count Mode: Normal
Assay Count Cycles: 1
#Vials/Sample: 1
Normalization Std DPM: 286700
Repeat Sample Count: 1
Calculate % Reference: Off

RAD SINK



Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL	Bkg Subtract
A	0.0	2000.0	1st Vial

Count Corrections-

Static Controller: On
Colored Samples: n/a
Coincidence Time (nsec): 18
Luminescence Correction: n/a
Heterogeneity Monitor: n/a
Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				

Cycle 1 Results

P#	DATE	S#	Count Time	CPMA	DPM1	MESSAGES
6	3/20/2009	1	10.00	39	0	B
6	3/20/2009	2	1.00	5	58	
6	3/20/2009	3	1.00	13	0	I
6	3/20/2009	4	1.00	13	0	I
6	3/20/2009	5	1.00	9	0	I
6	3/20/2009	6	1.00	5	0	I

sink successfully decontaminated
SW 3/20/09

University of Nebraska – Lincoln
MONTHLY RADIOACTIVE MATERIAL USE DOCUMENTATION FORM

Authorization Information

Authorized User		Authorization Number	
Room		Calendar Year	

Radioactive Material Use Documentation

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February				
March				
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July				
August				
September				
October				
November				
December				

[1]If radioactive material has been used in a given month, then a contamination survey must be performed and documented. Proper contamination survey documentation includes:

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- ***instrument used***
- ***action level (the action level for I-125 is 220 DPM, the action level for all other radionuclides is 1000 DPM)***