

Selection of Survey Meters for Monitoring

Procedure: 7.522
Version: 1.0

Created: 5/23/16
Revised:

A. Purpose

To aid in the selection of a proper survey meter for all required surveys.

B. Applicability/scope

This procedure applies to Columbia University, including Morningside, Nevis, LDEO, Barnard College, Manhattanville and the Medical Center campuses, New York-Presbyterian and the New York Psychiatric Institute.

C. Definitions

- Beta emitter: radionuclides that decay by beta emission
- Gamma emitters: radionuclides that decay by gamma emission
- RAM: Radioactive Materials
- GM: Geiger Mueller Counter
- cpm: Counts Per Minute
- NaI(Tl): Sodium Iodide Counter
- LSC: Liquid Scintillation Counter

D. Procedures

There are two types of surveys typically performed in areas where RAM is used or stored. The first survey looks for ambient radiation exposure. The second one is to determine the presence of removable contamination.

When performing ambient radiation exposures surveys, the instrument of choice is an ion chamber. Ion chambers are independent of the energy from incident gamma or x-ray radiation and the reading output is in roentgen per hour. Some ion chambers have a sliding panel on the bottom of the detector to provide exposure rate estimates for beta emitters.

To perform surveys for potentially contaminated areas (i.e. hands, feet, bench tops, etc.) the instrument of choice is a Geiger-Muller Counter (GM). GM survey meters are dependent on the incident radiation type and energy and can paralyze in high radiation fields. This instruments is sensitive to beta radiation and the readout to be used is counts per minute (cpm). **Do not use for exposure rate measurements unless the instrument has been**

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calibrated for the specific energy or the radionuclide for which the survey is being performed.

Another instrument that can be used to survey for surface contamination is the NaI(Tl) detector. This detector is very sensitive to gamma radiation, but it can paralyze in high radiation fields. **Do not use for exposure rate measurements unless the instrument has been calibrated for the specific energy or the radionuclide for which the survey is being performed.**

When surface contamination is of concern, a wipe test to verify if the contamination is removable or fixed must be performed. A wipe evaluation in areas where beta emitters are been used must be assayed in a LSC. For areas where gamma emitters are used, a well counter should be used to assay the wipe.

For a guide to the selection of the proper survey instrument, please see Appendix A and Appendix B below.

E. Responsibilities

All personnel using RAM

F. Emergency contact

Radiation Safety: 212-305-0303

G. Medical Surveillance - N/A

H. Recordkeeping - N/A

I. Appendices

Appendix A. General Guidelines for Selection of Survey Meter		
Instrument selection	Radiation type	Use
Ion chamber / energy compensated GM	Photons (Gamma / X-ray)	Exposure rate / absorbed dose
GM	Beta / Gamma	Beta / Gamma activity
NaI(Tl)	Gamma / X-ray	Gamma activity
LSC	Alpha / Beta / Gamma	Removable activity
Well counter	Gamma	Removable activity

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Appendix B. Isotope-specific Guidelines for Selection of Survey Instrument					
Isotope	Half-life	Emission(s)	Energy	Detector	Radiation Field Survey
H-3	12.8 yrs	Beta	Low	Wipe	
C-11	20 min	Positron (Beta ⁺)	High	GM	
		Gamma	High	Nal(Tl)	Yes
N-13	10 min	Positron (Beta ⁺)	High	GM	
		Gamma	High	Nal(Tl)	Yes
C-14	5715 yrs	Beta	Low	Wipe	
O-15	2 min	Positron (Beta ⁺)	High	GM	
		Gamma	High	Nal(Tl)	Yes
F-18	108 min	Positron (Beta ⁺)	Medium	GM	
		Gamma	High	Nal(Tl)	Yes
Na-22	2.6 yrs	Positron (Beta ⁺)	Medium	GM	
		Gamma	High	Nal(Tl)	Yes
P-32	14 days	Beta	High	GM	
P-33	25 days	Beta	Medium	GM	
S-35	87 days	Beta	Low	Wipe	
Cl-36	301,000 yrs	Beta	Medium	GM	
Ca-45	163 days	Beta	Medium	GM	
Mn-54	312 days	Beta	Medium	GM	
Fe-55	2.7 yrs	Gamma	Low	Nal(Tl)	Yes
Co-57	272 days	Gamma	Medium	Nal(Tl)	Yes
I-125	60 days	Gamma	Low	Nal(Tl)	Yes
		X-rays	Low	Nal(Tl)	Yes
I-131	8 days	Beta	High	GM	Yes
		Gamma	High	Nal(Tl)	Yes
Cs-137	28 yrs	Gamma	High	Nal(Tl)	Yes

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J. Forms - N/A

K. References

- Los Alamos Radiation Monitoring Notebook
(<http://www.nrrpt.org/file/Los%20Alamos%20Radiation%20Monitoring%20Notebook%202011.pdf>)

L. Acknowledgements - N/A