

ANALYZING WIPE TESTS USING A LUDLUM SURVEY METER WITH MODEL 44-88 & 44-9 PANCAKE GM PROBES

NORTHEASTERN UNIVERSITY RADIATION SAFETY PROGRAM

Note: Model 44-7 end window GM probes should not be used to analyze wipes

1. Wipe the area using a 1" diameter filter paper. For flat areas such as work-benches and floors, the surface area per wipe should be 100 cm² (approximately 4 inches by 4 inches).
- 2a. Turn on the survey meter and perform a battery check. b. If the probe has a plastic cap/cover, REMOVE it. Flip the F/S response switch to 'S' (Slow response), and hold the probe against the check-source epoxied to the side of the meter. Ensure that you can reproduce its expected reading (noted on the yellow calibration sticker), at the appropriate multiplier position. Do NOT use the survey meter if you cannot reproduce the check source reading within 10%, or if the meter is past its calibration date (also written on the calibration sticker).
3. Place the GM pancake probe on a flat, low-background surface (preferably a clean lead brick; covered with duct-tape or equivalent to minimize the risk of lead poisoning). Turn the thumb switch to multiplier x0.1. Observe the reading over a 30 second interval. This is the BACKGROUND radiation reading, typically around 0.02 mR/h, or approximately 70 CPM (counts per minute).
4. Lay the wipe (**dirty side up**) flat on the lead brick. Place the GM pancake probe over the wipe, such that the frame of the probe rests directly on the lead brick. Make sure the wipe does not touch any part of the probe, to avoid contaminating it. Observe the reading as in the previous step. This is the GROSS reading.
5. Subtract the Background reading from the gross reading to get the NET reading in mR/h. Use Table-1 below to convert mR/h to CPM, and vice-versa.
6. Divide net CPM by efficiency (Table-2) to obtain DPM (disintegrations per minute). Note that these efficiencies are applicable only to the counting geometry described above. Routine area wipe tests are reported as DPM/100 cm². If a wipe test reveals contamination exceeding 200 DPM/100 cm², decontaminate the area and

mR/h x0.1 scale	CPM*	mR/h x1 scale	CPM	mR/h x10 scale	CPM
0.01	30	0.1	300	1	3000
0.02	70	0.2	700	2	7000
0.03	100	0.3	1000	3	10000
0.04	130	0.4	1300	4	13000
0.05	170	0.5	1700	5	17000
0.06	200	0.6	2000	6	20000
0.07	230	0.7	2300	7	23000
0.08	260	0.8	2600	8	26000
0.09	300	0.9	3000	9	30000
0.10	330	1.0	3300	10	33000
0.11	360	1.1	3600	11	36000
0.12	400	1.2	4000	12	40000
0.13	430	1.3	4300	13	43000
0.14	460	1.4	4600	14	46000
0.15	500	1.5	5000	15	50000
0.16	530	1.6	5300	16	53000
0.17	560	1.7	5600	17	56000
0.18	590	1.8	5900	18	59000
0.19	630	1.9	6300	19	63000
0.20	660	2.0	6600	20	66000

Table-1. Conversion between mR/h and CPM for Ludlum survey meters

test again.

*Rounded off

Isotope	Efficiency	Division Factor for step-6
³² P, ³³ P	15%	0.15
¹²⁵ I, ¹³¹ I	15%	0.15
^{99m} Tc, ¹¹¹ In	3%	0.03
³⁵ S, ¹⁴ C	7.5%	0.075

Table-2. Pancake GM probe efficiencies
for counting wipe tests

EXAMPLE 1- ³²P work-area wiped over 100 cm²:
 Bkg = 70 CPM; Gross = 0.04 mR/h (130 CPM)
 Net = 130 - 70 = 60 CPM
 Conversion: 60 / 0.15 = 400 DPM/100 cm²

EXAMPLE 2- ¹⁴C contaminated glassware:
 Bkg = 70 CPM; Gross = 0.07 mR/h (230 CPM)
 Net = 230 - 70 = 160 CPM
 Conversion: 160 / 0.075 = 2133 DPM