Western University
Unsealed Nuclear Substance Contamination Monitoring Record

Permit Holder: _____ **Room number:** _____

A. Indirect Monitoring (Wipe test using liquid scintillation counter or NaI counter)

Counter Type: _____ Make _____ Model _____

Contamination limit is 3 Bq/cm^2 or net count rate is 900 cpm (assuming 10% collection efficiency, 100 cm^2 wiped area and 50% detector efficiency (as a conservative approach for most unsealed nuclear substances used). If detector efficiency is less than 50% then net count rate in cpm equal to 3 Bq/cm^2 is: _____

Record results in the table below accordingly and keep the print out from the counter in the binder.

B. Direct Monitoring (Using Western calibrated contamination meter(s) for only P-32 and/or I-125)

Make and Model of Meter(s) Used: _____

Net count rate in cpm or cps equal to 3 Bq/cm2 for P-32 (from the calibration sticker) _____
Net count rate in cpm or cps equal to 3 Bq/cm2 for I-125 (from the calibration sticker) _____
Direct Monitoring can be used for weekly documented contamination monitoring if radioactive work only involved P-32 and/or I-125 during that week. Record results in the table below accordingly.

Note: If no radioactive work done for any specific week then contamination monitoring is not required. Indicate all non-radioactive work weeks such as ANo Radioactive Work@ in the table below accordingly. DO NOT LEAVE ANY WEEK BLANK

Numbered areas to be monitored indicated on the room diagram

Year ( )	Name of Tester	Nuclear Substance Used	Counted Unit	Back-ground	1	2	3	4	5	6	7	8	9	10
1 Wk Jan														
2 Wk Jan														
3 Wk Jan														
4 Wk Jan														
5 Wk Jan														
1 Wk Feb														

Year ( )	Name of Tester	Nuclear Substance Used	Counted Unit	Back-ground	1	2	3	4	5	6	7	8	9	10
2 Wk Feb														
3 Wk Feb														
4 Wk Feb														
5 Wk Feb														
1 Wk Mar														
2 Wk Mar														
3 Wk Mar														
4 Wk Mar														
5 Wk Mar														
1 Wk Apr														
2 Wk Apr														
3 Wk Apr														
4 Wk Apr														
5 Wk Apr														
1Wk May														
2 Wk May														
3 Wk May														
4 Wk May														

Year ( )	Name of Tester	Nuclear Substance Used	Counted Unit	Back-ground	1	2	3	4	5	6	7	8	9	10
5 Wk May														
1 Wk June														
2 Wk Jun														
3 Wk Jun														
4 Wk Jun														
5 Wk Jun														
1 Wk Jul														
2 Wk Jul														
3 Wk Jul														
4 Wk Jul														
5 Wk Jul														
1 Wk Aug														
2 Wk Aug														
3 Wk Aug														
4 Wk Aug														
5 Wk Aug														
1 Wk Sep														
2 Wk Sep														

Year ( )	Name of Tester	Nuclear Substance Used	Counted Unit	Back-ground	1	2	3	4	5	6	7	8	9	10
3 Wk Sep														
4 Wk Sep														
5 Wk Sep														
1 Wk Oct														
2 Wk Oct														
3 Wk Oct														
4 Wk Oct														
5 Wk Oct														
1 Wk Nov														
2 Wk Nov														
3 Wk Nov														
4 Wk Nov														
5 Wk Nov														
1 Wk Dec														
2 Wk Dec														
3 Wk Dec														
4 Wk Dec														
5 Wk Dec														

$$\text{CONTAMINATION LEVEL (Bq/cm2)} = \frac{S - B}{E \times A \times T \times F}$$

Where:
S = Sample count rate (cpm or cps)
B = Background count rate (cpm or cps)
E = Detector efficiency (e.g. if 50% efficiency, E = 0.50)
A = Area wiped (100 cm^2) or detector area in cm^2
T = 60 sec/min if count rate in cpm
T = 1 if count rate in cps
F = 0.1 (e.g. 10%) is collection factor for area wiped (indirect monitoring or wipe test)

Net count rate (cpm or cps) = Sample count rate (cpm or cps) – Background count rate (cpm or cps)
Detector efficiency = Net count rate (cpm) /Known activity (dpm)
1 microcurie (µCi) = 2.2 x 10^6 disintegrations per minute (dpm)
Detector efficiency = Net count rate (cps)/Known activity (dps)
1 Becquerel (Bq) = 1 disintegration per second (dps)
1 microcurie (µCi) = 37 kilobecquerel (kBq) = 37000 becquerel (Bq)

Non-fixed contamination in all areas, rooms or enclosures where unsealed nuclear substances are used or stored does not exceed 3 Bq/cm^2.

Problem:
You have taken a swipe for unsealed H-3 and S-35 contamination in your designated radiation room. The liquid scintillation counter print out shows a sample count rate of 940 cpm for the swipe of the fume hood in 100 cm^2. The minimum detector efficiency is 50% and the background count rate is 40 cpm. What is the contamination level in Bq/cm^2?

Solution:
$$\text{Contamination level } (Bq/cm^2) = \frac{940 \text{ cpm} - 40 \text{ cpm}}{0.5 \times 100 \text{ cm}^2 \times 60 \text{ sec/min} \times 0.1}$$

Therefore, the contamination level is 3.0 Bq/cm^2.

Also, if you know the contamination limit in Bq/cm^2 and the counter print out shows in cpm then you can calculate a net count rate in cpm equal to the known contamination limit using the contamination level formula above.

Problem: The contamination limit is 3 Bq/cm^2, 50% detector efficiency (as a conservative approach for most unsealed nuclear substances used), 100 cm^2 wiped area and 10% collection efficiency. What is the net count rate in cpm equal to 3 Bq/cm^2?

Solution:
Net count rate (cpm) = 3 Bq/cm^2 x 0.5 x 100 cm^2 x 60 sec/min x 0.1
Therefore, the net count rate equal to 3 Bq/cm^2 is 900 cpm.