

#2 + #3



United Nuclear Corporation
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Calculation 1

Accuracy Calculation for Standards as identified by the USNRC:

$$\frac{\text{Measured} - \text{Actual}}{\text{Actual}}$$

Calculation 2

Precision Calculation as identified by the USNRC:
Known as Percent difference:

$$\frac{\text{Duplicate Count \#1} - \text{Duplicate Count \#2}}{\text{Average (Duplicate \#1, Duplicate \#2)}}$$

Calculation 3

Data Counting error 2-sigma as defined by USEPA Standard Operating Procedure for Radon-222 Measurement Using Charcoal Canisters EPA 520/5-87-005 is calculated as follows:

@ 95% confidence,
Expressed in decimal percent, or multiply by 100 for %

$$2 \times \frac{\text{square root (Gross Counts} + \text{Background Counts)}}{\text{Gross Counts} - \text{Background Counts}}$$



**Supplement to Large Area Activated Charcoal Canisters October 7, 1996 Report
 Quality Assurance Calculations**

Calculation 1 - Standard Accuracy	
Description	Data
Equipment Efficiency - cpm/dpm	0.00896
dpm/pCi	2.22
Count Time - minutes	5
Background - gross counts	125
Background - cpm	25
Standard 1 - pCi/can, actual	18210
Standard 2 - pCi/can, actual	36420
Standard 1 - average gross counts, measured	1810
Standard 2 - average gross counts, measured	3591.7
Standard 1 - average gross cpm, measured	362
Standard 2 - average gross cpm, measured	718.34
Standard 1 - average net cpm, measured	337
Standard 2 - average net cpm, measured	693.34
Standard 1 - average pCi/can, measured	16952
Standard 2 - average pCi/can, measured	34876
Standard 1 - (Measure-Actual)/Actual, %	-6.91
Standard 2 - (Measured-Actual)/Actual, %	-4.24

Calculation 2 - Precision			
Description	Count Gross Counts	Duplicate Gross Counts	(Dup1-Dup2)/ Avg(Dup1&Dup2)
Duplicate 1 - 54353 - 4.5/4.4 pCi/m2s	7109	6967	2.02
Duplicate 2 - 54363 - <0.5/<0.5 pCi/m2s	457	459	-0.44
Duplicate 3 - 54373 - <0.5/<0.5 pCi/m2s	218	217	0.46
Duplicate 4 - 54383 - <0.5/<0.5 pCi/m2s	363	362	0.28
Duplicate 5 - 54393 - 2.9/2.9 pCi/m2s	4666	4641	0.54
Duplicate 6 - 54403 - 09./0.8 pCi/m2s	1390	1321	5.09
Duplicate 7 - 54413 - <0.5/<0.5 pCi/m2s	542	510	6.08
Duplicate 8 - 54423 - <0.5/<0.5 pCi/m2s	530	528	0.38
Duplicate 9 - 54433 - <0.5/<0.5 pCi/m2s	298	289	3.07
Duplicate 10 - 54443 - <0.5/<0.5 pCi/m2s	710	668	6.10
Duplicate 11 - 54453 - 6.4/6.5 pCi/m2s	4881	4962	-1.65
Duplicate 12 - 54463 - 0.7/0.7 pCi/m2s	528	508	3.86
Average - % Difference			2.16



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Calculation 3 - Data Counting Error		
Data Precision	Data	Precision, %
Background gross counts	125	
Count Time - minute	5	
54368 Data - 0.7 pCi/m2s, gross counts	1076	7.29
gross counts + background	1201	
gross counts - background	951	
54362 Data - 1.2 pCi/m2s, gross counts	1875	5.11
gross counts + background	2000	
gross counts - background	1750	
54388 Data - 5.0 pCi/m2s, gross counts	7975	2.29
gross counts + background	8100	
gross counts - background	7850	
54414 Data - 11.6 pCi/m2s, gross counts	16672	1.57
gross counts + background	16797	
gross counts - background	16547	
54416 Data - 16.4 pCi/m2s, gross counts	23614	1.41
gross counts + background	24815	
gross counts - background	22413	
54395 Data - 20.8 pCi/m2s, gross counts	33226	1.20
gross counts + background	35226	
gross counts - background	31226	
54415 Data - 47.1 pCi/m2s, gross counts	67719	0.92
gross counts + background	75819	
gross counts - background	59619	
54357 Data - 86.8 pCi/m2s, gross counts	137581	0.65
gross counts + background	154378	
gross counts - background	120784	