
Baseline Radiological Survey of the Buchanan Elementary School Property

Ted Rahon
CoPhysics Corporation

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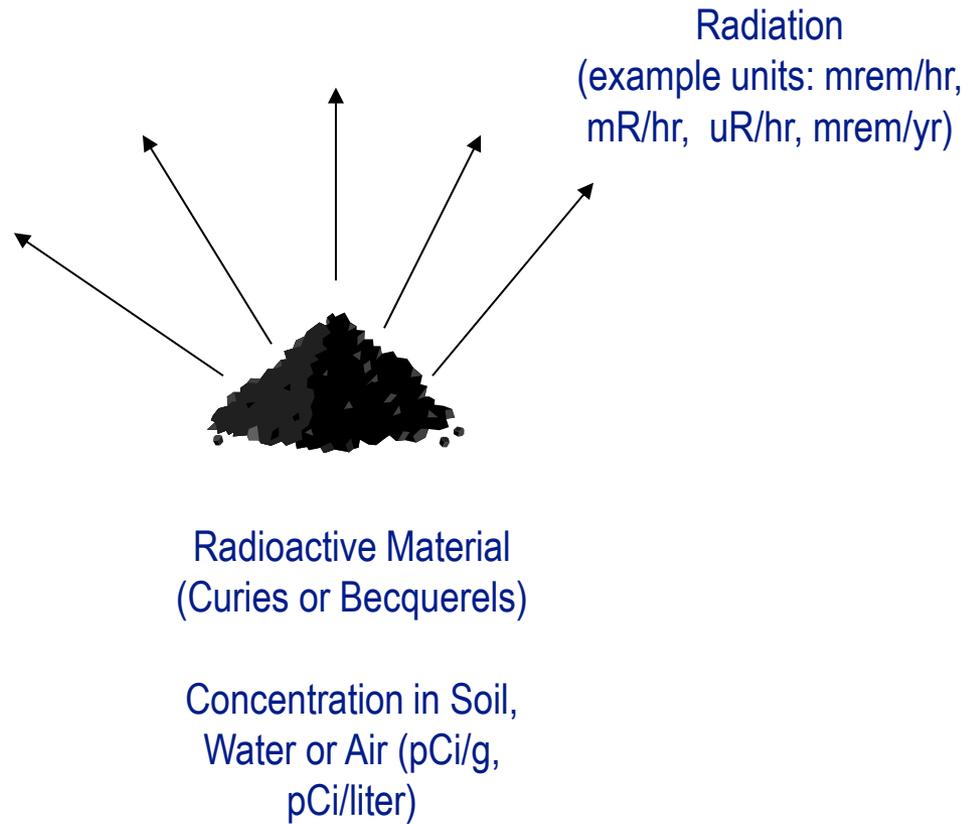
- small family run business, founded in 1987
- based in Orange Co., NY
- licensed by the NYS Dept. of Health to handle radioactive materials and provide radiological services

Theodore Rahon

- BS in Biophysics, Univ. of Pittsburgh
 - MS, PhD in Radiological Physics
NYU Institute for Environmental Medicine
 - Certified by the American Board of Health Physics
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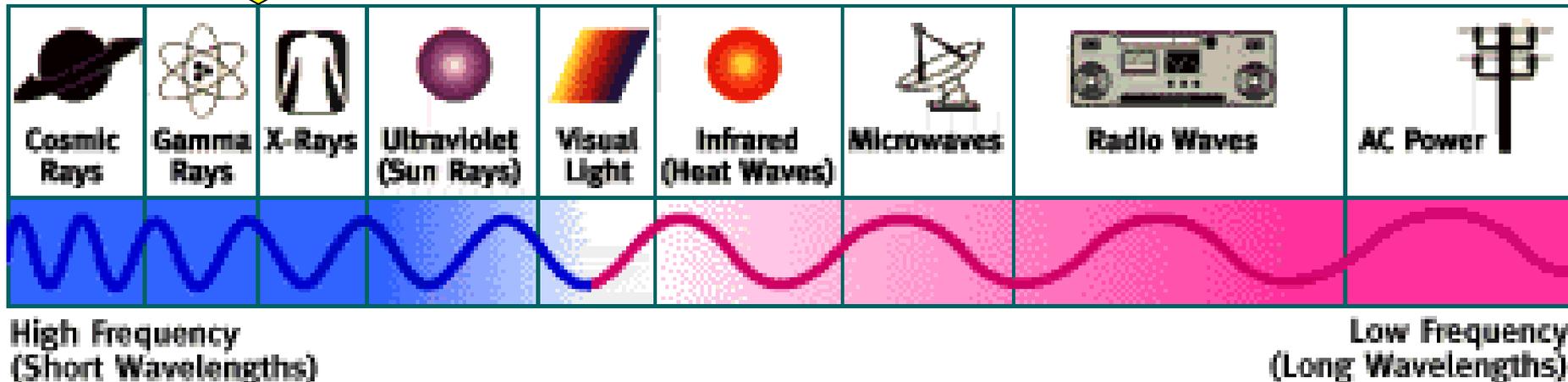
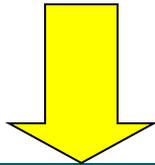


Radiation and Radioactivity



Ionizing Radiation

- Radiation with enough energy to cause ionizations.



Sources of Natural Background Radiation

- Cosmic radiation
- Terrestrial radiation
- Internal sources
- Radon (part of terrestrial)

Background gamma

radiation level – east coast US: 6 to 13 $\mu\text{R/hr}$



SPAC
Saratoga, NY

300 uR/hr

Internal Radiation Exposure

- Natural radioactivity from food and water sources, remaining in the body
 - Potassium 40 (K^{40})
 - Radium-226, Uranium-238
 - Most internal exposure comes from K^{40}
 - Total average internal dose = 25 mrem / yr
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Natural Background Radiation

Note: The National average annual Radiation dose to the general population is **100 mrem/yr** (includes internal and external sources)

Sources of Man-Made Radiation

- Natural Background (100 mrem / yr)
 - Medical radiation (54 mrem / yr)
 - Domestic water (5 mrem / yr)
 - Building materials (7 mrem / yr)
 - CRT television (5 mrem / yr)
 - NY to LA airline flight (5 mrem)
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Radiation Exposure

We are all exposed to small amounts of radiation every day, but our bodies have developed protection against such exposures. The main health objective is to reasonably minimize radiation exposures.



**THE
RADIUM
GIRLS**

Baseline Radiological Site Assessment

- Walkover Gamma Scan of Property
- Soil Sampling
- Building Interior gamma measurements
- Wipe tests for radioactivity in dusts



Walkover Gamma Scan

SitePad Gamma Data Collection System

GPS Unit

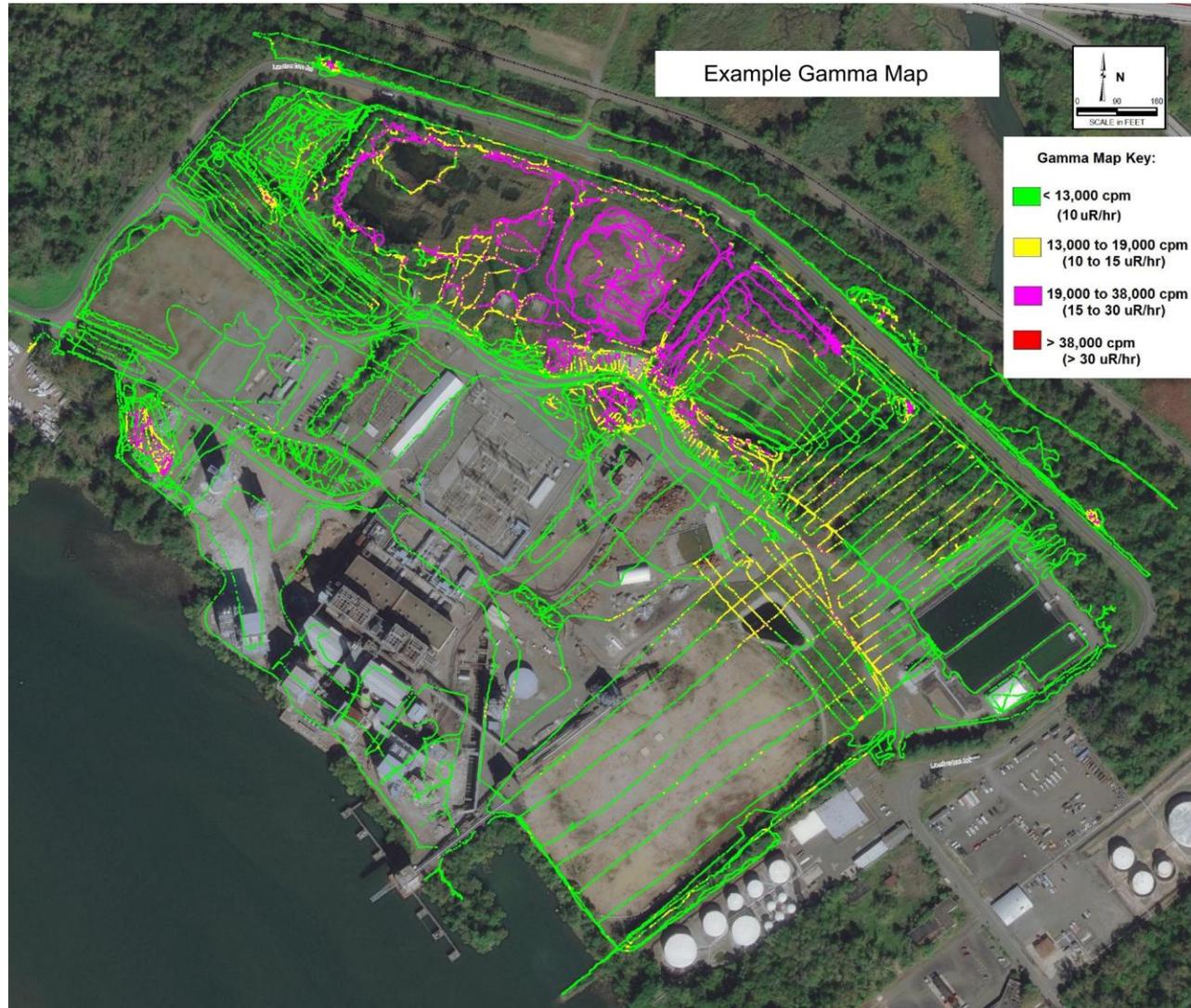
Tablet with SitePad

Rate meter scaler

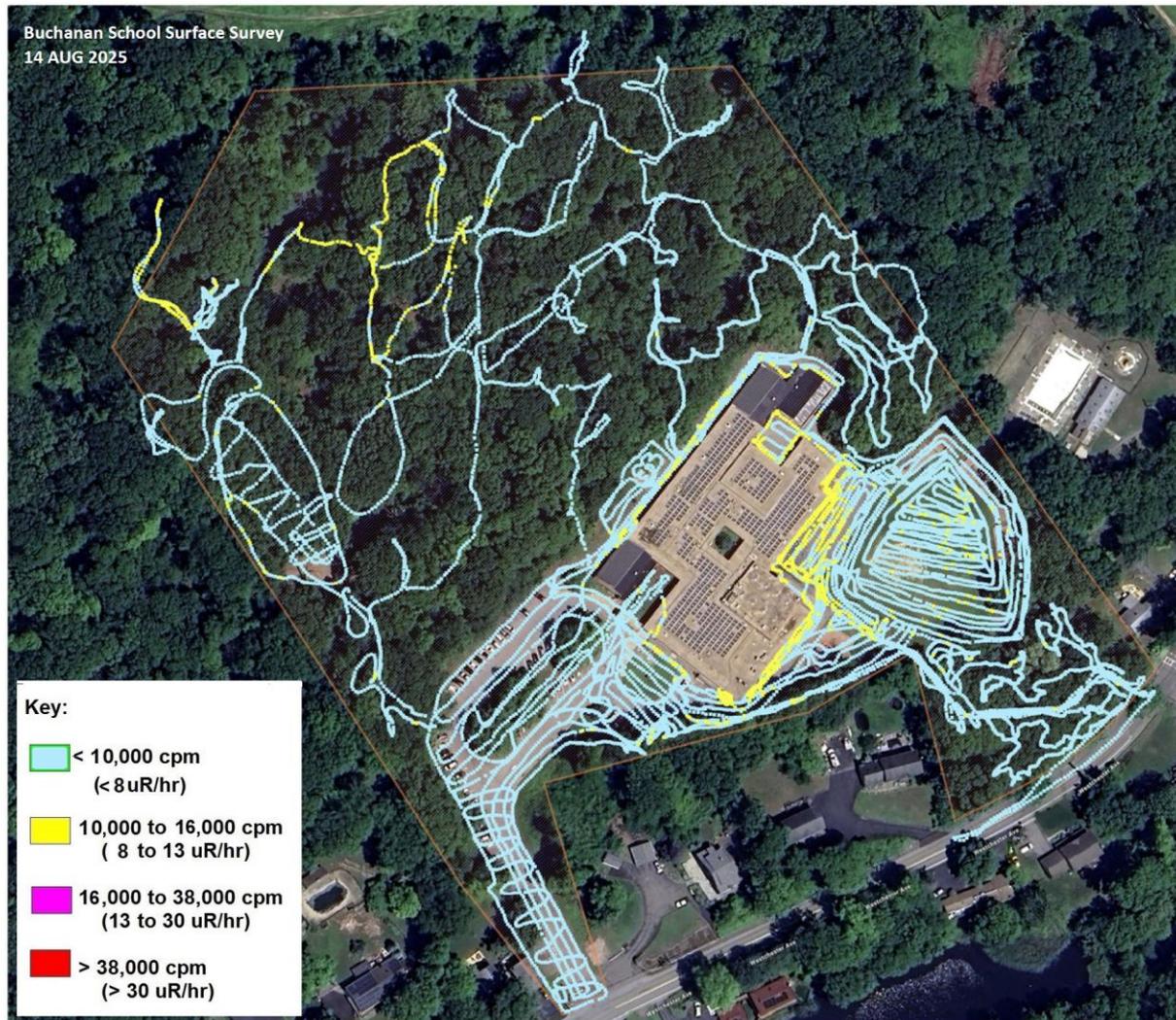
Gamma probe (NaI scintillator)



Example Gamma Map of a Contaminated Property



Gamma Map of Buchanan School Property



Soil Sample Locations



Soil Sample Results

Sample ID	Gamma Reading at Sample Loc	Man-made Radionuclides			Naturally-Occurring Radionuclides		
		Cs-137	Co-60	Eu-152	U-238, Ra-226 Series via Bi-214	Th-232 Series via Ac-228	K-40
	(uR/hr)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/g)
BES1	18	0.05 ± 0.04	<0.065	<0.126	0.64 ± 0.13	0.79 ± 0.25	16.8 ± 1.5
BES2	10	<0.062	<0.055	<0.113	0.47 ± 0.13	0.88 ± 0.23	16.5 ± 1.4
BES3	8	0.06 ± 0.04	<0.038	<0.081	0.34 ± 0.10	0.38 ± 0.16	10.2 ± 0.9
BES4	15	0.42 ± 0.09	<0.067	<0.142	0.68 ± 0.16	1.07 ± 0.30	11.9 ± 1.5
BES5	15	1.55 ± 0.22	<0.161	<0.248	0.30 ± 0.26	0.37 ± 0.42	8.6 ± 2.2
Normal East Coast Background	6 to 13	0.3 to 3	0	0	1.0 to 1.8	1.0 to 1.2	11 to 23

TABLE 3
INTERIOR GAMMA MEASUREMENTS AND
RADIOANALYTICAL RESULTS

Site: Buchanan, NY Elementary School

Type: Wipe Tests
Date Collected: 8/14/25
Date Analyzed: 8/16/25

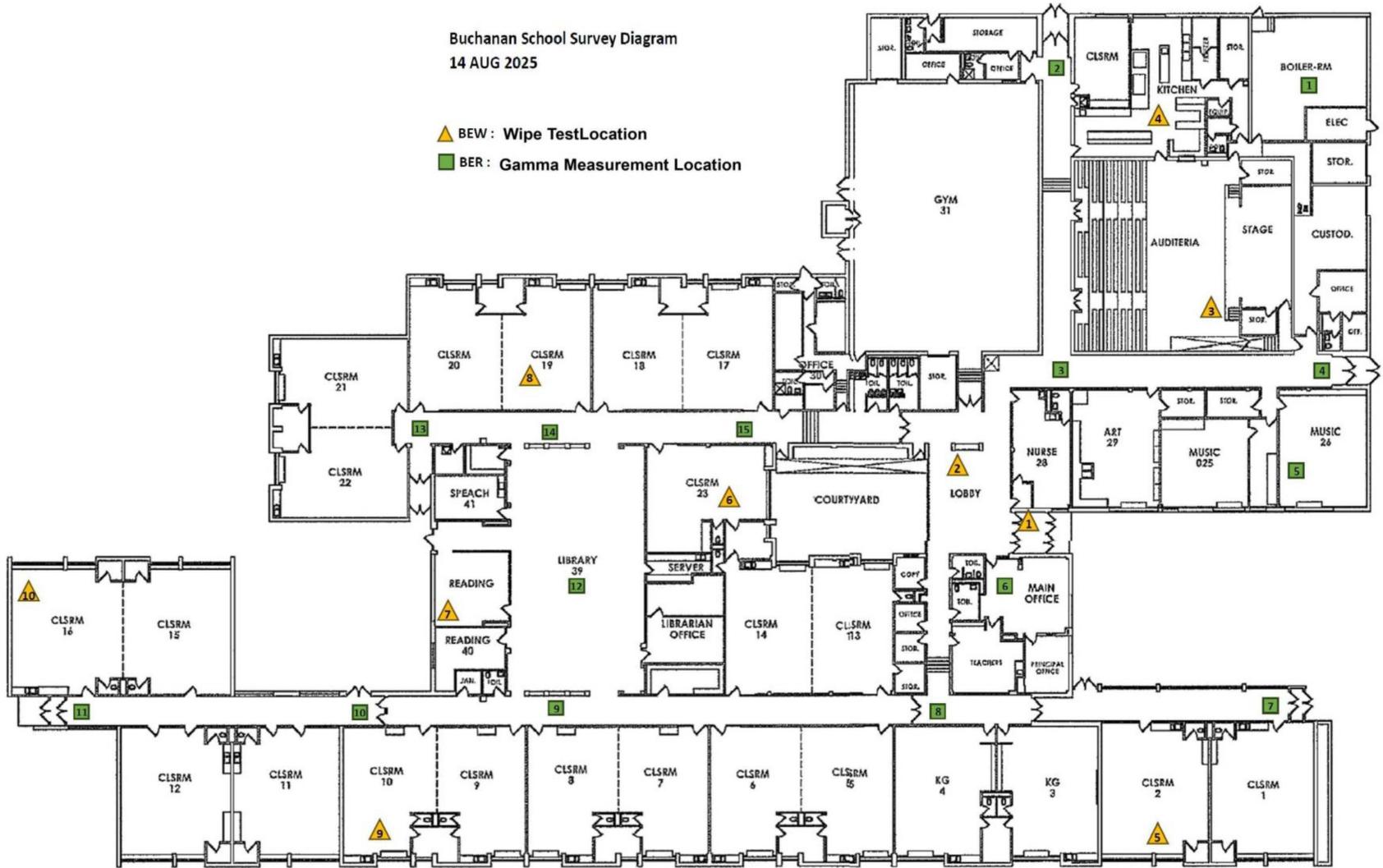
SAMPLE ID	DESCRIPTION	Wipe Test Results			Gamma
		Gross Alpha	Gross Beta	Tritium	Mesurement
		(dpm/100 sq.cm)	(dpm/100 sq.cm)	(dpm/100 sq.cm)	(uR/hr)
BEW1	Vestibule	0.5 ± 0.6	-2 ± 4	-3 ± 2	10
BEW2	Center of Front Lobby	-0.2 ± 0.3	7 ± 4	5 ± 6	9
BEW3	Auditorium by stage	0.1 ± 0.5	2 ± 4	4 ± 7	8
BEW4	Kitchen	1.2 ± 0.8	-1 ± 4	-1 ± 4	8
BEW5	Classroom 2	0.8 ± 0.7	-2 ± 4	-3 ± 2	8
BEW6	Classroom 23	1.2 ± 0.8	7 ± 4	7 ± 6	8
BEW7	Classroom 40	0.1 ± 0.4	0 ± 3	2 ± 4	7
BEW8	Classroom 19	0.8 ± 0.7	5 ± 4	5 ± 5	10
BEW9	Classroom 10	1.2 ± 0.8	4 ± 4	0 ± 4	8
BEW10	Classroom 16	0.1 ± 0.4	-2 ± 4	-3 ± 2	8
BER1	Boiler Room - Random Locations				8
BER2	Hallway - Random Locations				10
BER3	Hallway - Random Locations				8
BER4	Hallway - Random Locations				9
BER5	Music Room 26 - Random Locations				9
BER6	Main Office - Random Locations				8
BER7	Hallway - Random Locations				8
BER8	Hallway - Random Locations				6
BER9	Hallway - Random Locations				8
BER10	Hallway - Random Locations				9
BER11	Hallway - Random Locations				9
BER12	Library - Random Locations				7
BER13	Hallway - Random Locations				8
BER14	Hallway - Random Locations				9
BER15	Hallway - Random Locations				10
BER16	Courtyard - Random Locations				12

MDA's Minimum Detectable Activity 1.0 dpm 7 dpm 10 dpm

Method: pulse shape, liquid scintillation counting Instrument: Wallac Model 1415 LSC, Serial #4150043
Uncertainties are 1-sigma counting and quench correction errors.
Standards are traceable to the National Institute of Standards and Technology.

Buchanan School Survey Diagram
14 AUG 2025

- ▲ BEW : Wipe Test Location
- BER : Gamma Measurement Location



Conclusion

- Radiation and radioactivity levels in and around the Buchanon Elementary School Building are indicative of normal natural background. Two soil samples from the highly-vegetated northern section of the property showed a small amount of cesium-137 (0.42 and 1.55 pCi/g). These levels are of no health concern because they are far lower than the naturally-occurring radionuclides also in soil. We believe that the Cs-137 levels are due to normal residual levels in lichens and moss from worldwide fallout from atomic testing in the 1960's. The other results and readings from the rest of the property and building are unremarkable.
 - From a health standpoint, additional sampling is not necessary. However, statistically, to determine more accurate average radionuclide levels to which future results can be compared, additional sampling with a minimum of 30 samples would be needed for the present-day survey and then another 30 samples for the future comparison survey.
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Questions
