



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

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Project Title High Resolution Uranium Mapping of School Sites in the Palos Verdes Peninsula Unified School District, Palos Verdes, CA	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objectives of my study were to 1) produce a high resolution soil uranium map of a radon-prone school site since uranium is the ultimate source of radon, and 2) to investigate the correlation between building perimeter uranium concentration measurements and average indoor radon levels.</p> <p>Methods/Materials Equivalent uranium (eU) measurements were made at ninety positions at a radon-prone school site using a gamma-ray spectrometer, focusing primarily on the perimeters of the classroom buildings. Using a recent United States Geological Survey (USGS) aerial photograph of the school site, an accurate scale map of the school was produced. The positions and values of the eU measurements were then carefully transferred to the site map. Indoor radon measurements from past studies were analyzed from three separate data sets to produce average building indoor radon levels. The average perimeter values of soil uranium concentrations were then compared with average indoor radon levels of the school buildings to determine if any correlations existed.</p> <p>Results Soil eU concentrations ranged from 2.5 - 17.6 parts per million (ppm), with 44% of the measurements from areas surrounding the classroom buildings exceeding 10 ppm (typical soil averages are 1 - 2 ppm). Large and reproducible changes in surface eU concentrations were found to occur over distances as short as 20 ft. Even between two fields approximately 100 ft. apart, the area averages of eU concentrations differed significantly. Classroom radon concentrations recorded in past studies were correlated with the present surface measurements, demonstrating that building perimeter eU measurements can be a useful predictor for the occurrence of elevated indoor radon levels.</p> <p>Conclusions/Discussion For the first time, a high resolution site map of soil uranium concentrations was generated that revealed widely varying eU concentrations. Area averages of eU concentrations from two field areas approximately 100 feet apart were found to change significantly. In addition, building perimeter eU measurements were found to be a good predictor for the occurrence of elevated indoor radon levels. The present data suggest that gamma-ray spectrometry can be used to evaluate the potential of building lots to support elevated indoor radon prior to construction.</p>	
Summary Statement Gamma ray spectrometry was used to produce for the first time a fine scale equivalent uranium (eU) map of a radon-prone school site, and a strong correlation was discovered between building perimeter uranium concentrations and indoor radon.	
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