

**Statement of Michael E. Ketterer, PhD, Professor Emeritus, Chemistry and  
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It has been known for decades that soils near Rocky Flats are contaminated with elevated levels of plutonium, stemming from routine releases, negligent waste disposal practices, and episodic fires. It is important to recognize that plutonium originating from Rocky Flats can be found in two distinct forms: a) plutonium that is dispersed relatively uniformly throughout all the soil particles, and b) “hot particles” of essentially pure plutonium dioxide. To date, studies conducted by the Federal Government and others have focused on measuring the first, uniformly dispersed form, while largely ignoring the latter.

The present study performed a series of experiments specifically designed to detect small plutonium dioxide particles. Surface soil composites were collected from the Indiana Street corridor near the location of the former East Gate. The activities of  $^{239+240}\text{Pu}$  ranged from 0.9 to 2.7 picocuries per gram, which is grossly elevated compared to global background levels, but is in reasonable agreement with activities found by others in previous samplings of the area.

In this work, twelve individual 200 milligram portions of one of the soil samples were analyzed. The results revealed consistent activities among six of the twelve portions; however, six additional portions exhibited significantly higher activities, stemming from the presence of a plutonium dioxide particle in that specific 200 mg portion. The measured increase in activity has been used to calculate the mass of the plutonium dioxide particle, which can be related to its diameter. The study reveals the presence of six plutonium dioxide particles ranging from 0.8 to 2.6 microns in diameter. By comparison, a micron represents one-millionth of a meter, which is considerably smaller than the diameter of a human hair. Particles in this size range are referred to as respirable, indicating that they can be inhaled and lodged in lung tissue on a long-term basis. Plutonium dioxide particles contained within the lungs will release their alpha decay energy within a small volume of affected tissue, producing localized internal doses of radioactivity. A plutonium dioxide particle of 2.6 microns in diameter will generate tens of thousands of radioactive decay events per day.

These results concur with the Jefferson Parkway Public Highway Authority’s recent finding of an 8.8 micron diameter plutonium dioxide particle in one of JPPHA’s soil samples from the Indiana Street corridor. In both cases, a reported soil activity of less than 50 picocuries per gram  $^{239+240}\text{Pu}$  does not guarantee an absence of plutonium dioxide particles, and therefore, the 50 picocuries per gram soil remediation standard cannot be considered to preclude human inhalation of particles on the Rocky Flats National Wildlife Refuge and surrounding areas. It is imperative to investigate the presence or absence of Rocky Flats hot particles in soils, independently of a simplistic comparison of  $^{239+240}\text{Pu}$  activities vs. a specific remediation standard, in assessing the true risk represented by the possible presence of plutonium dioxide particles. The potential health effects, and risk of inhaling plutonium dioxide particles must be immediately assessed.