

Long-term Retention of Plutonium in the Respiratory Tract Compartments: Chemical Binding, Scar-tissue Retention, or Systemic Uptake?

D. Poudel¹, J.A. Klumpp¹, M. Avtandilashvili², S. Tolmachev²

¹*Los Alamos National Laboratory*; ²*United States Transuranium and Uranium Registries, Washington State University*

The Human Respiratory Tract Model provides some mechanisms to account for retention of inhaled plutonium that can be subject to little to no mechanical transport or absorption into the blood. One of these mechanisms is 'binding', which refers to a process by which a fraction (the 'bound fraction') of the dissolved material chemically binds to the tissue of the airway wall. Our earlier analyses showed that such chemical binding alone is 1) unable to explain post-mortem data on regional retention of Pu in the respiratory tract, and 2) inconsistent with some observations in the literature. A literature review points to the presence of – and a significant retention of – plutonium in the scar tissues of the respiratory tract. Accordingly, an alternate model with scar-tissue compartments was proposed which was able to explain the data. However, it is possible that other mechanisms may also be responsible for plutonium retention in the respiratory tract. One such mechanism may be systemic uptake. This presentation discusses post-mortem regional retention in the respiratory tract of an individual with a wound intake to draw inferences on how much plutonium, if any, the lungs uptake from the blood.

USTUR-0636-23A