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## **Am-241 Nuclear Safety and Environmental Interactions**

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### **ABSTRACT**

NASA's supply of radioisotopes for radioisotope heat units (RHU) and radioisotope thermoelectric generator (RTG) power sources is facing challenges due to shortages of Pu-238 for future missions. Am-241 is a possible replacement for Pu-238 since its stockpile from the nuclear weapons program has remained relatively intact. It is imperative that the safety of Am-241 and its interactions with the environment be assessed in order to certify its use in RHU and RTG units. The NEUP solicitation has stated that,

“..Applications are sought related to the possible use of Am-241 for heat sources for radioisotope power systems. Specifically, in the area of nuclear safety performance where much less is known about Am-241 versus Pu-238 with regard to interactions with the environment. There are several areas that are of particular interest: 1) investigation of release and transport mechanisms of Am-241 in the environment and understanding receptor pathways for dose assessments as part of nuclear risk assessments; and, 2) developing approaches and methodologies for nuclear risk assessment of space radioisotope power system applications.

The project will investigate the release and transport mechanisms of Am-241 through the examination of accident scenarios, and elucidate the pathways for dose assessment. The release and evolution of Am-241 aerosols in postulated accidents will be examined. We will elucidate their release, diffusion, convective transport, deposition, resuspension, coagulation among themselves as well with atmospheric particles mechanisms from the point of launch on the ground to the upper atmosphere (regions where an accident may occur during launch). These studies will be used in developing approaches and methodologies for nuclear risk assessment of radioisotope uses for space based power systems and Am-241 specifically. We will focus on the aspects of Am-241 as distinct from Pu-238. The research group has extensive experience in radon and progeny release, attachment to dust, dust facilitated transport, aerosol mechanics, the nuclear source term, the use of Am-241 in nuclear energy conversion, and health and medical physics which are all relevant to the proposed research.