**Jackson State University**
**Project Purpose**

Title: Risk Assessment and Risk Management of Nuclear Technology Through Large Scale Simulation and Modeling.

Our main goal in this project is to provide further enlightenment to communities, public, and scientific societies for the risk assessment and risk management of radioactive exposure through inhalation using state of the art multi-scale multi-physics computer simulation, *in silico*, methodologies. Linked to the main goal, our secondary goal will be to demonstrate a comprehensive *in silico* technology that can be used in many specific radioactive exposure problems such as medical applications, industrial processing, and fallouts from accidents, malicious incidents, and after military operations, trainings, or tests to mention a few. Our study will cover both public and occupational exposures and aim to fill a gap in understanding these kinds of exposures not possible, difficult, or expensive through experiments or measurements.

To achieve these goals, our objectives;
o In regard to public exposure, for macro level studies, we will integrate a publicly available regional and global atmospheric model (Weather Research and Forecasting, WRF) into our general-purpose high fidelity Computational Fluid Dynamics (CFD) model (CaMEL$_{CHH3}$) including transport of radioactive particulate matters to estimate cumulative long term street level radioactive exposure in urban environment.

o In regard to occupational exposure in microenvironments, we will model complete work environments such as building rooms and instruments or machines with human subjects exposed respiratory tracks, and lungs including alveolus to track fate of radioactive particulate deposition.

o To understand adverse effects of the both kinds of exposures on human health, we will integrate simulated exposures for longer time period such that a cumulative exposure over years can be estimated and may be linked to certain health outcomes.

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Total Amount Requested: $1,998,592.00