

Public Abstract

First Name:Sean

Middle Name:Joseph

Last Name:Branney

Adviser's First Name:Tushar

Adviser's Last Name:Ghosh

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SS 2010

Department:Nuclear Engineering

Degree:PhD

Title:THE ADSORPTION OF FISSION PRODUCTS ON VHTR STRUCTURAL MATERIALS

The Very High Temperature Reactor (VHTR) is being considered as a candidate for the next generation of nuclear reactors. There are several areas that require further study in VHTR reactor designs. One such area is the adsorption of fission products such as cesium and iodine on the reactor's structural materials, for example graphite and stainless steel. It is important to know how much of these fission products have adsorbed on various parts of the reactor both for the purposes of understanding the possible activity of the components during maintenance operations, and also to quantify potential releases of these fission products during accident scenarios. The adsorption of fission products on reactor materials has been studied in the past, but further data are required.

This project was undertaken in order to acquire some of these data. Several experimental systems were designed and built throughout the course of this project, with a final design using a specially designed cell to produce cesium vapor and a series of inconel columns containing graphite samples. Several analysis methods were used during the course of this study, including Gravimetry, Neutron Activation Analysis, Energy Dispersive Spectroscopy, and Inductively Coupled Plasma Mass Spectroscopy.

Some isotherm data has been generated and recommendations for future work have been formulated.

This data is essential for the safe design and operation of the next generation of nuclear plants.