TABLE OF CONTENTS

sensitive thermal conductivity is a much less prominent effect than would have been suggested from other technology experiences alone. In order to understand this, one needs to first appreciate the reasons why such pressure effects are so dramatic in fission and thermal insulation materials.

The modeling effort for this period was focused on the desorption process. The desorption process consists of a surface reaction and desorption of surface-bound tritium in the form of HTO, T_2O, HT, or T_2. Of concern are the order of the surface reaction and the energetics of the surface reaction and desorption step. In most of our previous work, desorption of tritium was considered to be first order in tritium due to the expected excess of hydrogen in the system. Equations for desorption which are second order in tritium were derived for situations where the hydrogen concentration M the breeder surface would be low and comparable to the expected tritium concentration. Expressions for tritium inventory were derived and calculations were performed to determine the grain radius regimes where desorption would be expected to be the rem controlling release process. In our previous work we have found evidence thet the desorption energetics change as a function of surface coverage. We believe that this is due to the presence of multiple sites for desorption of tritium from the ceramic. To support this view we haw analyzed constant-rem heating tritium release experiments from the literature to determine the number of desorption sites and to obtain estimates of the desorption activation energies. Estimates of activation energies for desorption of tritium from y O and Li_4SiO_4 were obtained.

Adsorption of $H_2O(g)$, dissolution of OH^-, and rates of evolution of $H_2O(g)$ ara *being* measured for *the* $LiAlO_2$-$H_2O(g)$ system. These thermodynamic and kinetic data for these processes relate to *the* issues of tritium retention and *release*, and, hence, to concerns about tritium inventory *in* ceramic *tritium breeder* materials. The *information will* enable *(1) comparison* of *candidate* breeder materials. *(2) calculation* of *operating* **conditions,** and *(3)* elucidation of *the* principles *underlying* the behavior of tritium *in breeder materials.*