

# SUPPORT FOR CONTRACTOR REQUEST

**CONTRACTOR:** Dr. Everett L. Shock

**RATE:**

**PERIOD OF PERFORMANCE:** March 1, 1999 to March 1, 2000

## **STATEMENT OF WORK:**

A review will be conducted on the aqueous geochemistry of actinides. A report will be prepared in collaboration with William M. Murphy on this subject. This review and the resulting report will be directly related to radionuclide mobilization and near-field transport at the proposed repository at Yucca Mountain. The data will be used in calculations for a set of near-field conditions. A preliminary outline of the report follows.

### **I. Introduction**

### **II. Uranium and Thorium Concentrations in Natural Waters**

- A. Generalities on Oxidation State, Speciation, Colloids, Sorption, and Rock Type
- B. Soil water
- C. Groundwater

### **III. Aqueous Concentrations of Natural and Fallout Transuranic Actinides**

### **IV. Experimental studies of aqueous speciation**

- A. Solubility studies
- B. Spectroscopic studies

### **V. Equation of State and Thermodynamic Properties of Ions**

### **VI. Thermodynamic Properties of Aqueous Complexes**

### **VII. Estimating Thermodynamic Properties of Aqueous Actinide Species**

### **VIII. Kinetics of Homogeneous Aqueous Reactions**

### **IX. Isotopic Fractionation and Radiolysis**

### **X. Conclusions and Recommendations for Future Work Schedules**

**ESTIMATED UTILIZATION:** 200 hours

## **PRIOR CONTRACTOR WORK EXPERIENCE WITH SWRI:**

Dr. Shock has worked for SwRI on U.S. NRC projects since March of 1998.