

## **SUPPORT FOR CONSULTANT REQUEST**

**CONSULTANT:** Dr. Chen Zhu

**RATE:** \_\_\_\_\_ per HC-

**PERIOD OF PERFORMANCE:** October 1, 2001 through September 30, 2002

**STATEMENT OF WORK:** Dr. Zhu will assist CNWRA technical staff in two areas of work.

**Task 1 – General assistance with review of geochemical and isotopic data from the Yucca Mountain region.**

Dr. Zhu's contributions to this activity may include the following: (1) reviews of new and existing geochemical data for the Yucca Mountain region; (2) reviews of DOE interpretations of geochemical data; (3) independent analyses of geochemical data from the Yucca Mountain region; (4) evaluations of conceptual models for unsaturated and saturated flow and transport in the Yucca Mountain region for consistency with available geochemical data. This task will support the Unsaturated and Saturated Flow under Isothermal Conditions Key Technical Issue and will be supervised by James Winterle. The estimated level of effort for this task is approximately 300 hours.

**Task 2 – Conduct advanced microscopic analyses of fine-grained surface coatings and matrix materials associated with samples of alluvium collected from Nye County Early Warning Drilling Project wells.**

Using samples of alluvium supplied by CNWRA, Dr. Zhu will analyze fine-grained components of the samples, especially any identified surface coatings, using various microscopic techniques as appropriate. Work will be conducted primarily at University of Pittsburgh facilities. In consultation with CNWRA investigators, Dr. Zhu will prepare samples as needed for each analytical technique utilized. Expected results of the analyses may include characterization of the chemical and mineralogical content of the fine-grained components. Depending on available time and promise of the analytical results, Dr. Zhu may also coordinate a visit and analysis session for appropriate CNWRA staff at the University of Pittsburgh facilities. This task will support the Radionuclide Transport Key Technical Issue and will be supervised by Paul Bertetti. The estimated level of effort for this task is approximately 100 hours.

**ESTIMATED UTILIZATION:** 400 hours.

**PRIOR CONTRACTOR WORK EXPERIENCE WITH SWRI:** Assisted with reviews of geochemical data during FY2000 and FY2001.

**PROGRAMMATIC NEED FOR CONTRACTOR WORK:** The CNWRA Operations Plan for the Repository Program for FY 2001 under Contract NRC-02-97-009 describes the review of DOE data and analyses as major activities of the USFIC KTI.

**LIST OF ELIGIBLE CONSULTANTS CONSIDERED:** Dr. Zhu is the sole source of expertise considered for this activity.

## **SUPPORT FOR CONSULTANT REQUEST**

**CONSULTANT:** Dr. Chen Zhu

**RATE:**

**PERIOD OF PERFORMANCE:** October 1, 1999 through September, 2000

**STATEMENT OF WORK:** The objective of this effort is to use geochemical and isotopic data to better constrain groundwater fluxes in the region of the Yucca Mountain site to improve our understanding of groundwater flow. Dr. Zhu's tasks will include review of site data provided to him by CNWRA staff and delineation of chemical reactions and groundwater mixing along flow paths. Methods may include inverse mass balance modeling, and use of 1D reactive transport modeling. No code development will be necessary as suitable codes are currently under CNWRA configuration control (e.g., NETPATH and PHREEQC). Modeling and analyses will be documented in accordance with CNWRA Quality Assurance Procedure QAP-001. Key findings or conclusions will be summarized in a final report to the CNWRA. It is expected this effort will be completed no later than September 1, 2000, unless otherwise requested by CNWRA staff.

**ESTIMATED UTILIZATION (hours):** 200

**PRIOR CONTRACTOR WORK EXPERIENCE WITH SWRI:** None

**PROGRAMMATIC NEED FOR CONTRACTOR WORK:** The CNWRA Operations Plan for the Repository Program for FY 2000 under Contract NRC-02-97-009 describes the development of a calibrated 3D site-scale SZ flow model as a major activity under the USFIC KTI. Site geochemical data will be used to constrain model boundary conditions and thereby limit the range of predicted flow paths from the proposed repository to regulatory compliance points.

**LIST OF ELIGIBLE CONSULTANTS CONSIDERED:** Dr. Zhu is the sole source of expertise considered for this activity.

**RATIONALE FOR SOLE/SINGLE SOURCE SELECTION:** Dr. Zhu is the only source identified who meets all of the following consultant requirements for this activity: (1) familiarity with the groundwater geochemistry in the vicinity of Yucca Mountain, (2) experience using geochemistry data and modeling to constrain groundwater fluxes across structural or hydrogeologic boundaries, and (3) no previous work related to disposal of radioactive waste at Yucca Mountain.

**RATIONALE FOR NOT USING SwRI RESOURCES:** The required expertise is not available at SwRI.

**PROJECT NUMBER:** 20-1402-861