

# CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

## MEMORANDUM

March 1, 1995

TO: Wesley C. Patrick

FROM: H. Lawrence McKague, *HLM*  
Manager - Geologic Setting

SUBJECT: Consulting Services for Dr. Randall Marrett

---

The following information is submitted in connection with this request for the subject consultant.

### RATIONAL FOR CONTRACT

Dr. Marrett has been selected to work as a consultant on the Regional Tectonics Research project with special emphasis on critical review of compiled tectonic data (Task 3), reconnaissance field work on neotectonics (Task 4), and regional tectonic modeling (Task 6). He is outstanding in the field of structural geology and tectonics and has received considerable international attention for his seminal work on fault scaling relationships. Marrett has extensive experience in kinematic analysis of fault populations, neotectonic studies of active faults, relationships between earthquakes and faults, and fluid flow through fractured media. Based on his publication record, research experience in structural geology and tectonics, his international reputation, and his current position as an Assistant Professor at The University of Texas at Austin it is clear that Dr. Marrett will provide the quality of technical input required by CNWRA. Dr. Marrett's background information, including COI documentation is attached.

### PROJECT NUMBERS:

20-5704-163  
20-5704-164  
20-5704-166  
20-5704-167

### DAYS/HOURS REQUIRED:

Approximately 120 hours of the consultants time will be required between March 1, 1995 and February 28, 1996. A Form E-11 is attached for your signature and conveyance, along with this memorandum, to the Personnel Department.

/ec  
(K:\HLM\CON)

# **SUPPORT FOR CONSULTANT/SUBCONTRACTOR REQUEST**

May 29, 1998

## **CONSULTANT/SUBCONTRACTOR:**

Dr. Randall Marrett

## **RATIONALE FOR USING AND PROGRAMMATIC IMPACT OF NOT USING CONSULTANT/SUBCONTRACTOR:**

Dr. Marrett is one of the country's leading experts on the use of fractals to study fault and fracture systems. Dr. Marrett supplies a capability to assess the distribution of strain across the faults and fracture system at Yucca Mountain. Without Dr. Marrett's participation, the assessment of strain in the Yucca Mountain area will be incomplete.

## **STATEMENT OF WORK:**

Dr. Marrett would attempt to determine how extension is partitioned among the range of extensional structures (large and small faults, fractures, and joints) at YM. The concept is based on power-law scaling relationships between the size and number of these discontinuities and between the lengths of the features and their cumulative displacement. Those relationships have already been worked out for YM (see for example Marrett, 1994 and Figure 4-1 of McKague et al., 1996). To address how the strain is partitioned at YM, we need to convert those relationships to the distribution of extension across a scan line parallel to the Wernicke et al. (1998) GPS line. On this line we could then show how extension is partitioned between various classes of structures (fractures, small aseismic faults, and larger seismic faults). We could do a similar evaluation using scaling and the historical earthquake record. These results should offer us some insights into how extension is accommodated by the structures.

## **LIST OF ELIGIBLE CONSULTANTS/SUBCONTRACTORS CONSIDERED:**

None.

## **RATIONALE FOR SOLE/SINGLE SOURCE SELECTION:**

Dr. Marrett has been a consultant to CNWRA in the past and is COI free. He is a leading structural geologist and has extensive experience in applying fractal to problems in structural geology. In addition, he is available in the short time frame in which we need him.

## **RATIONALE FOR NOT USING SwRI RESOURCES:**

No SwRI employee has the combined experience in fractals and structural geology that is required.

## **PROGRAMMATIC IMPACT ON CNWRA WORK:**

Without the analysis of strain across the faults and fracture systems in the YMR there will be a large uncertainty on the significance of the strain rates measured by Dr. Brian Wernicke and on the distribution of strain in the area.

## **SUPPORT FOR CONSULTANT/SUBCONTRACTOR REQUEST (cont'd)**

### **RATIONALE FOR RATE(S):**

Dr. Marrett is a recognized expert in the application of fractals to the study of faults and fractures. Dr. Marrett's rates are comparable with rates charged by other consultants with similar experience.

**Estimated duration/hours:** 30 days

**Estimated rate/hour:**

### **WORK BREAKDOWN STRUCTURE NUMBER(S):**

20-1402-471

/adm

(D:\McKague\CONMarrettR)