TRANSFER TECHNOLOGY TO NRC STAFF
ON THE ISSUE OF STRUCTURAL GEOLOGIC ANALYSIS
AS A REGULATORY REVIEW ANALYSIS

Dr. Steve McDuffie, of your staff, was briefed on the applications and capabilities of GeoSec, ARC/INFO, and PATRAN during his staff exchange at the Center for Nuclear Waste Regulatory Analyses (CNWRA) in San Antonio, TX.

The GeoSec code is used to produce balanced cross sections. This allows geologists to test the geologic cross sections and identify errors in either data or assumptions or both. This allows the identification of cross sections that may be unreliable. The CNWRA used this code in evaluating Robert Scott's Yucca Mountain cross sections (CNWRA Report 92-008) and the cross section developed for the Amargosa Valley seismic line (CNWRA Report 92-024). Dr. Alan Morris, a CNWRA consultant and recognized expert on the GeoSec, briefed Dr. McDuffie on the code's operation and application.

ARC/INFO is a geographic information system. The CNWRA is currently entering structural, geophysical, volcanological, and geochemical data into the ARC/INFO database. Dr. McDuffie was briefed on the data base by Kathy Spivey, a graduate student at the University of Texas-San Antonio. Ms. Spivey has been entering the volcanological data into the system and is most knowledgeable about data entry and retrieval.

PATRAN is a pre- and post-processing application that is used to design structural models for input into the ABAQUS finite element solver, and to display computed results. Dr. Kenneth Mahrer explained the capabilities and fundamental use of PATRAN. A large part of the session consisted of a general discussion of discrete element methods. In particular, Dr. Mahrer explained the distinction between finite element and finite difference methods, and types of problems appropriate for these methods. Other topics covered in the background discussion included properties, finite element types, and description of loads and boundary conditions. Dr. Mahrer also guided Dr. McDuffie through a hands-on interactive session on PATRAN. The pre-processing (model design) and post-processing (results and display) functions of PATRAN were demonstrated, and the distinction between PATRAN and ABAQUS, the finite element solver was explained. Demonstration of PATRAN functions included: i) creation of model geometry, ii) meshing the model using PAVER function, iii) verification and optimization of the mesh, and iv) development and demonstration of the application methods for selected load and boundary conditions. Dr. Mahrer explained procedures for submitting the PATRAN input deck to the ABAQUS solver, and discussed utilization of PATRAN for display of computational results.

Steve Young arranged and oversaw the briefing on the various codes. It should be noted that the briefings were of a general nature intended to introduce Dr. McDuffie to the uses and applications of the codes.