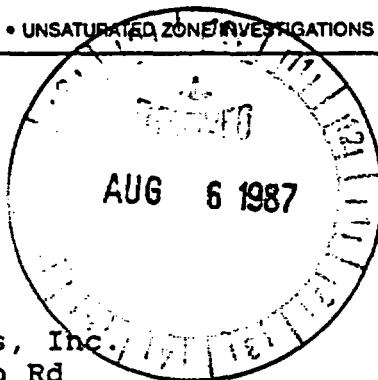




DANIEL B. STEPHENS & ASSOCIATES, INC.

CONSULTANTS IN GROUND-WATER HYDROLOGY

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •



August 4, 1987

Mr. Mark J. Logsdon
Project Manager
Nuclear Waste Consultants, Inc.
8341 So. Sangre de Cristo Rd
Littleton, CO 80127

Re: Trip Report, Modeling of Fluid Flow and Contaminant Transport
in Fractured or Granular Porous Media, Short Course, Holcomb
Research Institute, July 27-31, 1987.

Dear Mark:

Please find attached Daniel B. Stephens & Assoc.'s trip
report for the short course referenced. The purpose of the trip
was familiarization with analytical and numerical solutions for
ground-water flow and radionuclide transport in fractured and/or
granular porous media. The numerical code used in the short
course was TRAFRAP.

The short course was well organized. It seems that the
code TRAFRAP and the analytical solutions presented in the course
will be very valuable with regard to the performance objectives
discussed in 10 CFR 60. In addition, it appears that the code
TRAFRAP will be an economical alternative to SWIFT II.

Please contact me if you have any questions regarding this
trip report.

Very truly yours,
Daniel B. Stephens & Assoc., Inc.

Jeffrie D. Minier
Project Manager

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PDR WMRES EECNWC1
D-1021 PDR

TRIP REPORT

MODELING OF FLUID FLOW AND CONTAMINANT TRANSPORT IN FRACTURED OR GRANULAR POROUS MEDIA

Holcomb Research Institute
July 27-31, 1987

Holcomb Research Institute offered the short course "Modeling of Fluid Flow and Contaminant Transport in Fractured or Granular Porous Media" which was presented July 27-31, 1987. The short course was attended by J. Minier of Daniel B. Stephens & Assoc. (DBS). The purpose of the course was familiarization with analytical and numerical solutions for ground-water flow and radionuclide transport. The numerical code TRAFRAP was used during the course.

The short course consisted of two separate but complementary sections. The first section, presented by Dr. Ed Sudicky (University of Waterloo), reviewed fluid flow and contaminant migration processes and described conceptual representations of fractured-porous media. Dr. Sudicky also presented fundamental equations for flow and transport and discussed analytical solutions to the equations. The analytical solutions, many of which have been published in the scientific literature, were made available to course participants along with sample input and output. Practice sessions at the microcomputer laboratory allowed the course participants to become familiar with the use of the analytical solutions.

Because the analytical solutions are generally not appli-



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cable to conceptual models which contain complex spatial variations in material properties and boundary conditions, the use of numerical modeling techniques was discussed in the second section of the short course by Dr. Peter Huyakorn (HydroGeologic, Inc.). Dr. Huyakorn reviewed finite-element theory and application and presented a detailed description of the numerical code TRAFRAP. TRAFRAP is a two-dimensional finite-element code, developed by Dr. Huyakorn, for the simulation of fluid flow and multiple species contaminant transport in fractured and granular porous media under transient, saturated conditions. Code validation and example simulations were presented. Practice sessions on a mainframe computer allowed course participants to run the code TRAFRAP and become familiar with the data input format.

Course participants were provided with a course notebook, floppy diskettes containing analytical solutions presented in the first section of the course, and listings of the code TRAFRAP (mainframe version) and data output. The course notebook contained lecture notes, copies of viewgraphs used during both lectures, the user manual and documentation for TRAFRAP, and a comprehensive list of references related to fluid flow and contaminant transport in fractured or granular porous media. A magnetic tape containing the code TRAFRAP was available at additional cost. A PC version of TRAFRAP is presently not available.

