CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Professional Development: National Ground Water Association (NGWA) Short Course, "An Introduction to Ground Water"

DATE/PLACE: September 20–22, 2004; San Diego, California

AUTHOR: Deborah J. Waiting

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PERSONS PRESENT: Deborah J. Waiting

BACKGROUND AND PURPOSE OF TRIP:

I attended a three-day short course entitled, "An Introduction to Ground Water" offered by the National Ground Water Association. My attendance in this course, held at the Shelter Pointe Hotel & Marina in San Diego, California, was sponsored by the CNWRA Professional Development Program. The goal of the course was to "provide background hydrogeological knowledge and fundamental technical skills necessary to pursue more advanced topics in ground water." The fundamentals consisted of the steps to develop a general ground water study from the geologic setting to the analysis of a contaminant plume.

Dr. Dale Ralston and Dr. Gary Johnson were the course instructors. Both received degrees in Civil Engineering before receiving upper level degrees in hydrogeology. Dale taught at the University of Idaho for 25 years. He currently owns a hydrologic consulting business where he investigates subjects such as acid mine drainage and water supply development. Gary has 20 years of hydrogeologic experience and has been teaching at the University of Idaho for 6 years. His research has included surface and ground water interactions and ground water modeling.

Other participants in the course were primarily involved in remediation of ground water contamination. There were individuals from BP in Houston, ExxonMobil in Virginia, U.S. Borax in California, consulting firms working on military bases, and one who worked for an Indian Nation. A few were geologists, most were environmental professionals or engineers.

SUMMARY OF PERTINENT POINTS:

Day 1: The session covered the development of a hydrogeologic conceptual model, identification of aquifers and aquitards, field measurement and analysis of hydraulic head data, water level contour maps, and determining flow direction.

Day 2: Focus was on the general equations used to describe ground water flow, transmissivity, and storativity. Also, how these equations are used to predict ground water flow patterns and responses to pumping. We were introduced to the design and operation of

aquifer tests and the analysis of the test data sets, and curve matching techniques for unconfined, confined, leaky and bounded aquifers.

Day 3: We worked on data collection and analysis for water quality and how this data is used with geologic and hydraulic information to characterize ground water flow systems. Ground water contaminant problems were discussed along with contaminate chemistry and an overview of remediation technologies. We also were introduced to the basic concepts of numerical ground water flow modeling.

SUMMARY OF ACTIVITIES:

I arrived in San Diego the afternoon of September 19, 2004. Registration for the short course began at 7:30 a.m. the next morning. The lecture started at 8:00 a.m. and ended at 5:00 p.m. with an hour off for lunch. This schedule continued for September 21 and 22.

Each day's session included exercises that pertained to that days subject. On Day 2, we worked with a Microsoft Excel worksheet (supplied on a CD) that allowed us to input numbers for curve matching and observe the results on a connected graph. Day 3, each attendee received a copy of the text book, *Applied Hydrogeology* (4th ed.) by C.W. Fetter, Jr., which included a CD of the student version of AQTESOLV software by HydroSOLVE, Inc. The software is for the design and analysis of aquifer tests, (i.e., pumping tests, recovery tests). This software was installed on the attendee's laptop (those who did not bring a computer shared with those who did bring a computer). The class worked with the software most of the afternoon.

I departed San Diego the morning of September 23, arriving in San Antonio that afternoon.

CONCLUSIONS:

1. The instructors used porosity and permeability interchangeably.

2. The conceptual model should be simply designed to obtain results required to answer questions being asked.

3. Make sure the model results in the correct information to answer questions being asked.

PROBLEMS ENCOUNTERED:

On Day 2, when the individuals were going to use the Excel worksheet on their laptop, I could not gain access to the laptop I brought. I didn't know the password and after several tries, the computer locked me out. I called for the password, but the computer still had me locked out. I did not use the computer on this trip after all.

PENDING ACTIONS:

None

RECOMMENDATIONS:

I recommend that other employees that have not had much exposure to hydrogeology, other than water runs downhill, take this course. There was quite a lot of math, but the instructors did a good job of simplifying and explaining the equations and their use. I feel fairly confident that when I am working with one of the "Hydro" people, I will be able to understand where they are coming from.

SIGNATURES:

Deborah J. Waiting — 10/6/04

Deborah J. Waiting
Scientist

Date

CONCURRENCE:

Kevin J. Smart for H.L. McKague — 10/6/04

H. Lawrence McKague, Manager
Geology and Geophysics

Date

B.R. Sagar for B. Sagar — 10/6/2004

Budhi Sagar
Technical Director

Date