ENVIRONMENTAL/ENGINEERING GEOLOGISTS

HGS ENVIRONMENTAL/ENGINEERING COMMITTEE DINNER MEETING FEBRUARY 19, 1990

Time: 6:30 p.m. talk begins, come early enough to eat prior to the talk.
NO RESERVATIONS NECESSARY

Location: Wyatts Cafeteria, 10311 S. Post Oak
(located at West Bellfort and South Post Oak)

REGINA M. CAPUANO—Biographical Sketch

Dr. Capuano has recently taken a position as Assistant Professor in the Geosciences Department at the University of Houston, and will be teaching graduate courses in hydrogeology and hydrochemistry. She received her PhD and MS from the University of Arizona. Her current research includes a study of the degradation of hazardous compounds disposed by deep well injection funded by the Gulf Coast Hazardous Substance Research Center, and a study of gas solubilities as a control on diagenesis in geopressured systems funded by the Texas Advanced Research Program.

Prior to joining the University of Houston, Dr. Capuano was at the Bureau of Economic Geology, The University of Texas at Austin, where she studied hazardous waste degradation in subsurface aquifers, chemical changes during long-term flow testing of a geopressured-geothermal well, and flood prediction for hazardous waste disposal site selection. Her other experience includes a position at the University of Utah Research Institute in which she was responsible for developing exploration and production techniques for geothermal systems. This work involved the prediction of fluid-flow paths, tracer testing, identification of trace element zones in soils and subsurface samples, and calculations of fluid-mineral reactions to predict the significance of alteration halos as an exploration tool. Prior to her work in geothermal systems, she studied hydrologic problems relevant to solution mining and solution-mine site restoration.

SUBSURFACE DEGRADATION OF WASTES DISPOSED

More than half of all liquid hazardous waste is disposed by deep well injection. Little is known about the chemical compositions of these wastes or about the subsurface reactions that could degrade hazardous compounds within them. Texas waste streams, which constitute 80 percent of the industrial waste disposed of annually by deep well injection in the United States, are probably representative of such injection. Phenols, chlorinated organic, cyanide, nickel, nitriles, and ketones-aldehydes compose 92 to 95 percent of the toxic wastes disposed of annually in Texas.

Biodegration, if it occurs in deep injection aquifers, is probably the most effective degradation process because it results in nearly complete removal of a wide range of hazardous organic compounds. Degradation in the deep subsurface probably changes with distance from the well bore. Abiotic oxidation and hydrolysis are likely near the well bore, where solutions may be oxidized and have extremely low or high pH values, whereas anaerobic microbial activity probably dominates in an outer zone where toxic compounds are more dilute.

All compounds in the waste solution must be considered when waste degradation processes are predicted. For example, generally nonhazardous carboxylic acids which are present in 24 percent of the organic waste streams studied, are highly reactive, and their presence in solution significantly affects microbial, hydrolysis, and sorption reactions of hazardous compounds. By considering predicted subsurface reactions, waste-stream compositions can be altered to enhance degradation and discourage unfavorable reactions.