USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: GEOCHEMICAL AND MICROBIOLOGICAL INFLUENCES ON TERMINAL ELECTRON ACCEPTING PROCESSES AND ITS RELATION TO THE BIODEGRADATION OF POLLUTANTS IN THE SUBSURFACE: A STUDY OF AN AQUIFER CONTAMINATED BY LANDFILL LEACHATE

Duration: SEPTEMBER 1, 1997- AUGUST 31, 2000

Federal Funds Requested: $213,780

Non-Federal (matching) funds pledged: $427,560

Principal Investigators: Dr. Joseph M. Suflita University of Oklahoma,

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Congressional Districts: Oklahoma, Texas, and Colorado

Statement of Critical Regional or State Water Problems:

Landfilling is the most common method of disposal of municipal waste. The United States produces more than 150 million tons of solid waste each year, over 70 pert of which is disposed in landfills (Suflita et al., 1992). According to the U.S. Environme ntal Protection Agency, 5,276 landfills were operating in the United States in 1992 (U.S. Environmental Protection Agency, 1992). Many landfills, particularly older ones, are sited on alluvial deposits because the land has little economic value. Older lan dfills are generally unlined reflecting past disposal practices and have a tendency to leach organic compounds into the terrestrial subsurface. These compounds can pollute underlying aquifers and diminish the quality of precious ground water ~. Therefore , an increased understanding of the microbiological and geochemical processes controlling the migration of organic contaminants from the proposed landfill in Norman, OK is applicable to many sites across the State, the Region, and the United States in gen eral

Because of the heterogeneous nature of the wastes and variations in aquifer properties, landfill sites represent a challenging opportunity to try and understand the transport and fate of waste-derived contaminants. Results obtained for this

site and at numerous other landfill 1ocations indicate that a myriad of chemical substances are present in leachate which can contaminate underlying aquifers. The variability of toxicant migration in leachate plumes is likely due to the in--rive effect s of hydrological microbiological and geochemical processes. Our goal is to delineate, at least

at a known site, how these factor can best be ~ and how they in era t to influence the migration of model contaminants.

Statement of Results and Benefits:

The project is designed to provide information on the fate and transport of contain g substances that leach from landfills into subsurface environments; most notably ground water reserves. This information will be useful not only to the USGS, but also to other Federal, Sale, and Regional authorities who have the charge of avoiding or minimizing human exposure to contaminating substances. In addition, the finding will also benefit those parties (private and public) who desire to develop effective clea nup strategies for tainted environments and assist regulatory agencies in preventing further contamination.

The research will also develop and test that enable more effective and cost efficient means of characterizing an environment in order to assess the effect of landfill leachate components on ground water reserves. The safety of water supplies will also be enhance by the increase in information allowing for accurate and reliable predictions of the migration of leachate components in the subsurface. As noted above, landfilling is a common waste disposal option. The information generated during the pursuit of this proposal will be readily transferable to other landfill sites across the United S~. Thus, the inform will also be of benefit to individuals and agencies charged with setting environmental policies and perhaps those requiring new technology for th e remediation of contamination problems.