



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Recirculation of Leachate within the Landfill for the Leachate Treatment

Duration: August 1, 1997 - July 31, 1999

FY 1997 Federal Funds: \$31,460

FY 1997 Non-Federal Funds: \$63,726

Principal Investigators:

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Congressional District:

Statement of the Problems:

The enforcement of federal laws in Puerto Rico requires that new landfills collect leachate and that the leachate be treated. The existing operational landfills and the closed mature sites will have to devise a way to collect and treat as much leachate as possible in order to alleviate the groundwater contamination problem. Many landfill sites have been closed down because of inadequate management and operation. In Puerto Rico alone, about half of the 67 landfill sites had to be closed down. However, their leachate pollution problems still need to be solved [Johnston, 1995]. Leachate contamination of groundwater and the surface water near landfill sites is well documented in our Region. In Louisiana, there are 47 out of 93 landfill sites located in the proximity of wetlands and deepwater habitats [Hemdon *et al.*, 1990]. These sites have the potential to adversely affect sensitive ecosystems of these surface waters through the migration of contaminants from sanitary landfills. In Florida, ground-water quality of a 120-acre area encompassing an inactive landfill was assessed by installing and sampling 21 monitoring wells [Bemdt, 1993]. The statistical analysis of the collected data indicated that the ground-water quality parameters of the study site were significantly different from those of the background wells in the nearby area. In North Carolina, water-quality conditions at five municipal landfills were monitored and evaluated [Ferrell and Smith, 1995]. Samples were taken from monitoring wells and streams near the landfills. Effects of leachate generally were evident in small streams but not evident in large streams. The effect of leachate on ground-water quality was largest from wells adjacent to landfill cells.

The need for the evolution of leachate treatment technology is evident here in Puerto Rico as well as in the Southeastern Region. The leachate from the landfills causes serious pollution problems, not only to groundwater, but sometimes also to surface water as a non-point source of pollution. This research is in line with the principles of the Puerto Rico Water Research Priorities on pollution control of water bodies receiving wastewater discharges. This research also addresses the preservation of water quality as the top priority set by the Southeastern & Islands Region. Both the Environmental Quality Board and the Solid Wastes Management Agency of Puerto Rico, as well as any other government agencies in the Region concerned with the environmental quality, will be interested in its findings.

Results or Benefits to be Gained:

Most of the treatment processes for water and wastewater treatment may be used for leachate treatment. However, some of them, such as aerobic treatment for the reduction of high concentration of organics in the leachate, will be too expensive. Anaerobic treatment technology is most suitable for leachate treatment. The other leachate treatment technology is the recirculation of leachate over the landfill. This technology is attractive because it is simple and economical. Essentially, the landfill itself is used as a giant anaerobic reactor for the treatment of the leachate. We will use a landfill site in Puerto Rico to try out this technology to ascertain its efficiency and workability. We will monitor the increase of gas production and the reduction of pollutants in the leachate during the recirculation. The results of the study will help us gain insight into this process. The results will provide a prototype for the coming leachate treatment for the Southeastern & Islands Region.