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Radioactive Waste Burial Technology LS-20-1-8A

The progress for the first eight months of work under a subcontract with the University of Texas has been reported. The report provides an overview of the Phase I effort, describes the work performed, discusses findings, and indicates areas in which additional work is needed.

Although the focus of the investigation is low-level radioactive waste, the research is also intended to cover nonradioactive wastes in an effort to bring together knowledge from closely related fields. The study will also cover possible environmental effects from the buried wastes, although primary emphasis will be on studying means for retarding migration of pollutants from the burial sites.

The first phase of the project, funded from February through September 1977, involved acquisition of background information. This included a review of selected technical literature, visits to low-level radioactive waste burial sites, attendance at conferences, and various other activities. Subsequent phases of the project will include delineation of design parameters, measurement of design parameters, design, and assessment of cost-effectiveness of shallow land burial.

Areas of further work identified by the study based on visits and literature reviews of both radioactive and nonradioactive waste burial practices are summarized in the following paragraphs.

The major problem experienced at existing low-level radioactive waste burial sites has been accumulation of water in the trenches at some sites in humid areas and subsequent overflow of contaminated water from the trenches. The cause of this problem seems to be in large part inadequate

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technology for design of trench caps. It seems apparent that further work is needed to develop designs for caps that will: (1) reduce the infiltration of precipitation to tolerably small levels; (2) bridge over voids in the waste so that the material (usually soil) forming the cap does not settle into the void leaving a hole or crack in the cap; (3) deform without cracking as the underlying waste settles; (4) withstand many cycles of wetting and drying without cracking; (5) keep plant roots and burrowing animals out of the waste; and (6) resist erosion.

Another difficulty seems to be that there is little understanding of how quantitative predictions can be made of pollutant migration in partially-saturated soils. The problem has several subproblems, including measurement of soil properties and solution of the theory for cases of practical interest. Further research is needed in this area.

One of the more promising technologies for retarding the migration of buried pollutants is to place soil liners (with or without admixtures) along the sides and on the floors of trenches. Although a great deal of work is needed to develop reliable designs for soil liners to retard the movement of radioactive pollutants buried in trenches, even more work would probably be required for other types of synthetic liners or technologies such as encapsulation or chemical fixation. Also, the durability of soil as a liner material is less suspect than many synthetic compounds.

Another problem with disposal of low-level radioactive waste that deserves more work is the development of satisfactory siting criteria. Several investigators have proposed incomplete siting criteria, and some regulatory agencies are now working on the problem. However, due to the importance of this subject, we plan further work during subsequent phases of this project.