

Novel Composite Landfill Liners Phase1b

1. Project Objectives

The principal objective of this research is to extend the work done under the first phase of this project (Entrust registration number 987098.001) which seeks to develop high performance liner systems using mineral barriers.

In 1998 a research project began to investigate the use of industrial by-products in the construction of landfill liners. This project was supported by UK Waste Management Ltd. and MIRO under the Landfill Tax Credit Scheme. The project has been very successful in developing low cost, low permeability liners and is now reaching its concluding stages. The current proposal seeks to extend the project in scale and in scope, incorporating new materials identified during the previous phase and applying them to an operational cell in a licensed landfill site. In doing so, additional studies will be made to determine the transport properties of these low permeability materials and continued monitoring of the existing field experiments will continue. Simulation of the evolution of these barriers will be undertaken to increase the confidence with which their performance may be predicted and risks associated with their use assessed. The work involves the synergistic combination of mineral wastes to produce chemically stable, low permeability concrete for use in multi-layer (concrete and clay) liner systems. Individual objectives of the project are as follows:

- To design a large-scale trial of the novel cementitious barrier system and obtain approval for its construction.
- To evaluate further different waste materials for use in cementitious liners.
- To obtain additional results from the existing site trials.
- To measure diffusion and leaching rates in the candidate concrete mixes.
- To perform a detailed performance assessment of the composite barrier in support of (1) above.

2. Time scale

The project will operate for 24 months, beginning in July 2001, or as soon as possible thereafter.

The materials selection and testing programme will begin immediately and is anticipated to last for eighteen months. Continuous monitoring of existing field sites will be undertaken during the project. Development of performance assessment tools will take around one man-year, relying on experimental and field results generated throughout the project. The major task of designing a large-scale trial cell at an operational landfill site will continue throughout the life of the project, requiring considerable effort from each partner and drawing on the results and experience gained during this and the previous study.

3. Partners involved

- **Imperial College** Professor Alan Atkinson & Dr Mark Tyrer, Dept Materials.
- **Coventry University** Drs Peter Claisse and Esmail Ganjian, School of Science and Environment.
- **MIRO** Mr Alan Gibbon (Research co-ordinator) MIRO members will continue to provide co-funding for the project along with considerable technical advice as primary waste producers
- **PSD Associates** Mr Sam Dewsnap will continue to provide technical and legislative support in the area of landfill operation, waste classification, handling and transport
- **NPL** Mr Hugh Davies and colleagues at the National Physical Laboratory will be subcontracted to undertake part of the thermodynamic modelling supporting performance assessment. The value of the subcontract (£20k) would be doubled by a DTI "STUDIO" grant available to NPL