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THE USE OF LIME IN THE DESIGN OF
LANDFILLS FOR WASTE DISPOSAL

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ABSTRACT: Lime and products containing lime have been widely employed in landfills. Examples of the use of lime in caps, wastes and liners are presented. Lime can provide a valuable chemical barrier to the transport of specific contaminants. Lime-pozzolan cements can be used to improve handling of wastes and decrease waste compaction. Lime-soil mixtures can be employed as impermeable, chemically-reactive liners.

Well documented demonstration projects are required to obtain data needed for the acceptance of lime-augmented landfill designs. Where waste containing lime are employed, standards should be presented as to the chemical characteristics of waste that make them acceptable.

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Introduction. - Lime (calcium hydroxide) and blended lime materials have long had a role in waste disposal because they can be inexpensively used to neutralize acidity and control the pH of waste materials [1-2]. Additionally lime can react with finely-divided, siliceous materials to produce cements that bond together particulate waste to improve handling or assist in stabilizing potentially toxic compounds by surrounding them with an inert calcium silicate complex. Unslaked lime or quicklime can be used to remove water from semisolid wastes and improve their handling characteristics.

The purpose of this report is to review and evaluate applications of lime in landfill designs as they are reported in the technical and engineering literature and to discuss how lime products and lime/waste blends can be most advantageously used in solid waste burial. Lime is a family of products that can be best employed when the engineering design of a disposal area takes advantage of the different properties of various lime products and lime blends to produce the physical and chemical conditions that favor waste containment.

Types of Lime - Many discussions on the use of lime in waste disposal treat all lime products as a single material or differentiate only between quicklime and hydrated lime, or discuss waste materials containing lime as if they were lime products. Many lime products and by-products behave differently and it is important to make distinctions in the type of material used. Table 1 lists the major products, by-products and wastes employed in waste treatment and summarizes their properties. Many of the by-products and waste products are poorly defined and the use of these materials in place of lime often requires the by-products be analysed on a batch-by-batch basis to assure that enough lime is available to produce the neutralization or cementation that is desired.

Types of Wastes. - Current regulations recognize two levels of land disposal operations; those for hazardous wastes and those for non-hazardous waste [3]. The hazardous wastes are defined as those wastes:

- 1) derived from an industrial process known to produce toxic or hazardous residues,
- 2) containing a substance that is classed as acutely toxic, or
- 3) deemed to be toxic on the basis of testing that demonstrates the waste exhibits some hazardous characteristic such as toxicity, reactivity or corrosivity.