Application of paper making industry wastes in construction materials

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Abstract

The continuous generation of industrial waste and the environmental problems it causes and on the other hand, the increasing refusal of communities to have landfills, as well as the increased pressure from environmental agencies to require proper waste management, make it necessary to focus on alternative rational cost methods. Most researches in the area of solid waste management has centered on the conventional alternatives of landfilling, burning or incineration, and land application. The discussion includes some paper industry waste management alternatives including several which have recently received considerable attention and considers grit, dregs, ash, and fiber. So in this paper the application of such wastes in construction materials such as brick, ceramic, cement clinker, bituminous mixes and etc., whose properties and composition permit the incorporation of these elements in their manufacture was investigated, and also at the end the advantages and disadvantages of some methods were discussed.

Keywords: paper industry, waste management, construction materials.

1. INTRODUCTION

Four main processes are involved in pulp and paper industry, namely the chemical pulping (Kraft process), mechanical and chemical-mechanical pulping, recycled fibre processing and paper-making related processes [1]. The raw materials are received as logs directly from the forest or as by-product chips from some other wood processing industries like sawmills and recovered fibres (see the flow diagram [1] of the production of wastes during paper manufacture in figure 1) [2]. Until recently, most municipal and industrial waste has been disposed of in landfills. However, the increasing refusal of communities to have landfills nearby, as well as the increased pressure from environmental agencies to require proper waste management is creating the need for alternative final disposal consistent with environmental needs at a rational cost [3]. As early as the 1940s, forest product companies, researchers, entrepreneurs, and knowledgeable individuals have sought to identify alternatives for the management of paper industry solid wastes. These efforts have resulted in a considerable volume of research and actual experience related to the efficacy of a wide variety of solid waste management techniques. Some of these techniques have proven to be viable, environmentally safe waste management alternatives. Most research in the area of solid waste management has centered on the conventional alternatives of landfilling, burning or incineration, and land application. The pulp and paper industry has conducted or sponsored most of the research. The viability of alternative management strategies primarily depend upon four factors: Technical feasibility, cost, Available markets, Potential liability. The relative significance of these factors varies depending on mill type, mill location, waste type, and company business strategy [4]. The share of residues disposed of in landfills has constantly decreased in Europe in recent years as shown in Figure 2, in favour of the use as secondary raw material in other industries and other applications (e.g. soil improvers, road construction, land reconstruction applications and for co-combustion in heat or power generating plants) [5].