

Solidification/Stabilization of Heavy Metal Contaminated Soil/Sediment Treated With Clinoptilolite and Geosta

Nicholas Hytiris¹, Theodora-Dafni Stavraka², Panagiotis Fotis³, Abdelkrim Bennabi⁴, Rabah Hamzaoui⁵

^{1, 2, 3}Glasgow Caledonian University

School of Engineering & Built Environment (SEBE), Glasgow G4 0BA, United Kingdom

N.Hytiris@gcu.ac.uk;TSTAVR200@CALEDONIAN.AC.UK; Panagiotis.Fotis@gcu.uk

^{2, 4, 5}Université Paris-Est, Institut de Recherche en Constructibilité, ESTP,

28 avenue du Président Wilson, 94234 Cachan, France

tstavraka@estp-paris.eu; abennabi@estp-paris.eu; rhamzaoui@estp-paris.eu

Extended Abstract

Stabilization/solidification (S/S) is one of the major methods in treating hazardous wastes prior to land disposal and also an effective technique for reducing the leachability of contaminants in soils like heavy metals. Entrapment of wastes that expresses hazardous characteristics within a cementitious matrix (solidification) and binding of contaminants (organic or inorganic) of a hazardous stream into a stable insoluble form (stabilization) are the mechanisms that best describe the principle behind solidification and stabilization (S/S) treatment.

Treatment with Ordinary Portland Cement (OPC), in different combinations with Geosta (commercial stabilizer) was carried out in order to reduce the leachability of nickel and improve the mechanical properties of the soil. Although OPC treatment is the most commonly used method, treatment with lime is interesting low cost solution. Subsequently to the treatment with Geosta, zinc and copper contaminated sediments were treated with natural zeolite (clinoptilolite) and lime. Zeolites are a class of alkaline porous aluminosilicates with permanent negative charges on their surfaces and as a result they are natural cation exchangers and appropriate to remove toxic cations. High energy ball milling of clinoptilolite was also performed in order to modify the structure and properties of natural zeolite and study their effect on sediment treatment.