# Biodegradation of Chlorinated Aromatic Compounds in Soils Using a Large Volume Heated Pile

***Raymond Sambrotto*** (sambrott@ldeo.columbia.edu) (Columbia University, Palisades, NY, USA)
Averil Rance (arance@cleanearth.com) (Clean Earth, Hatsboro, PA, USA)
Hector Sanchez (hsanchez@cleanearth.com) (Clean Earth, Kearny, NJ, USA)

**Background/Objectives.** Chlorinated organic compounds such as polychlorinated biphenyls (PCBs) and chlorobenzenes are industrial chemicals widely distributed in soils and sediments. They have a variety of negative environmental and human health impacts and contamination by various Arochlors remains an issue long after they have ceased to be produced. We describe the results of the first large-scale pilot studies to assess the efficacy of a new bacterial approach to the degradation of chlorinated aromatics in environmental matrixes. Although rapid degradation rates of chlorinated aromatics were shown in prior laboratory scale tests with the thermophilic bacteria used here, the approach has not been evaluated at commercial scale. The objective was to determine degradation rates of the contaminants in a pilot study that simulated commercial scale activities.

**Approach/Activities.** Soils contaminated with PCBs and polyaromatic hydrocarbons (PAHs) from abandoned industrial sites in the northeastern US were used. Separate experimental piles were constructed to test a range of contaminant levels from low (Arochlor 1254 <50 ppm, PAH < 100 ppm) to high (Arochlor 1254 > 500 ppm, PAH > 1000 ppm). A slurry containing the active thermophilic bacteria, along with appropriate growth media and a flocculant were mixed into the soils while the piles were being constructed. The piles were heated to 150°F and kept moist. Oxygen supply to the soil was maintained throughout the experiment. Triplicate soil samples were taken from each pile periodically over a 3-week period and analyzed for PCB Arochlors using EPA Method 8082 to assess the first order rates of degradation.

**Results/Lessons Learned.** Results of this first, pilot scale test of a thermophilic bacterial approach to the bioremediation of chlorinated aromatics are presented. We will report on the changes in PCB and chlorobenzene levels over a 3-week measurement period. We will use a first order rate model to track the concentration changes through time and estimate the time necessary to reduce contaminant levels to below TSCA-level and eventually to a range that is suitable for on-site re-use. Additional details on the changes in PCB homolog profiles also will be presented, as will the aims and design for commercial-scale, on site implementation of this approach.