

# SUSTAINABLE TREATMENT OF RECALCITRANT COMPOUNDS – A CASE STUDY

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**Overview.** Successful mass reduction of recalcitrant compounds using a sustainable composting technique. This trial involved the treatment of industrial waste through microbial degradation to inform environmental clean-up works undertaken at a complex and diverse chemical manufacturing plant.

**Background/Objectives.** The objective of the trial was to reduce concentrations of contaminants by nutrient enhanced biological degradation as an alternative to traditional energy intensive treatment technologies. Following the closure of a major hazardous chemical manufacturing site, sludge from decommissioned effluent treatment plant remained onsite and contained within a number of banded geo-textile bags (geo-bags). Over time liquid has drained from the geo-bags, leaving the residual industrial waste material that requires treatment/disposal in accordance with State regulatory requirements. The total volume of the pile at the commencement of the trial was 300 m<sup>3</sup> and the estimated mass of contaminant prior to treatment was 9,486 kg comprising 99% TRH C<sub>10</sub>-C<sub>40</sub>.

**Approach/Activities.** To investigate composting of the sludge as a sustainable treatment alternative, the waste was mixed with cereal straw, composted and amended with nutrients using an excavator and a bucket grinder to mix materials. Watering of the pile was undertaken regularly to maintain moisture content, and additional nutrients were added when observed to deplete. Other indicators of microbial activity were monitored throughout, including land fill gases, temperature and presence of hydrocarbon utilising bacteria. In addition, laboratory analysis was undertaken to assess degradation profile.

**Results/Lessons Learned.** Over the 5-month period, contamination degradation was in the order of 2,800 kg (30%). Given the low impact and cost of the treatment in comparison to traditional methods, this was considered a positive environmental and commercial outcome. At the completion of the trial, parameters indicative of microbial activity were still evident, indicating further potential for degradation. A major challenge of the trial was to achieve greater sample heterogeneity (smaller sludge lumps) to increase efficacy of mass estimations and treatment times. This project offers a sustainable approach to treating recalcitrant compounds which can provide commercial benefits to clients and assurance of environmental achievement to the community.

## Speaker Biography

Samuel is a graduate at WSP with experience in the collection of soil and groundwater data for environmental assessment and remediation. He has been involved in the implementation of various active treatment trials undertaken to inform site specific clean-up actions, as well as large-scale remedial works.