Case Studies Using Apollo Greenzyme™ Technology

Client:	Superfund Cleanup site contracted to Seven-Seven Inc.
Operator:	Seven-Seven Inc.
Location:	Grand Junction, Colorado (Operator based in Ohio).
Time:	March 1995
Problems:	To cleanup an aged lagoon bottom sediments listed as EPA Superfund site. The contaminated sediments (AHD sludge) look highly viscous, similar to molten asphalt in appearance. Typical sample analysis shows about *40+* % aged petroleum hydrocarbon, including about *20* ppm of PCB, about *50 %* water and sediments, plus various amounts of heavy metals such as 1800 ppm lead, etc.
Solutions	A bench top feasibility study was carried out in Houston during March 1995. In order to lower the viscosity of the AHD sludge sample, a light end hydrocarbon, such as hexane, was added to the original AHD sample in a volume ratio of 1: 2, with a slight mixing process to create a wet paste and to reduce viscosity. Apollo Greenzyme™ *AG-280* (3% solution) was added to the treated AHD sample in volume ratio of 3 : 1. By using a strong and thorough mixing process, the whole biological reaction was completed in less than *20* seconds of time, resulting in three distinct layers as follows: Bottom Layer: Cleaned and polished solid sediments Middle Layer: A clean and brownish colored Greenzyme solution. Top Layer : A black colored and non-viscous hydrocarbon solution These three distinct layers can be separated easily from each other using a simple centrifuge for solid-liquid separation, and Apollo oil-water separator for hydrocarbon and Apollo Greenzyme™ recovery. The recovered hydrocarbon oil can be sold as fuel oil, and the recovered Apollo Greenzyme™ solution can be reused again for further treatment of the AHD sludge, since it does not degrade nor deteriorate.
Results:	This study was a complete success. The laboratory analysis shows the complete recovery of both hydrocarbon oil and Apollo Greenzyme ™ solution, as well as cleaned solid sediment, which meets the legal requirements for land bury permits, rather than the untreated AHD, which is classified as hazardous on the EPA Superfund list.