



Bioremediation Project Experience

Historical Project Experience

A majority of the initial projects undertaken by SSWM involved wastewater treatment. SSWM assisted many of the wastewater treatment plants in southern California and Mexico to improve the quality of their treated sewage discharge. While developing various microbial strains, however, several varieties were found that performed well on hydrocarbons and various projects were completed to demonstrate the effectiveness of bioremediation at sites impacted by petroleum releases. A brief description of selected historical projects that SSWM and *U.S. Microbics* has with bioremediation projects is as follows:

Oil Field Sump Remediation – During 1969, SSWM completed a cleanup of an oil field sump for Getty Oil Company in the Cat Canyon/Santa Maria Valley area of Santa Barbara County, California. Early forms of SSWM’s microbial blends were applied to an oil sump containing 3,700 barrels of very heavy, tar-like crude that was hard enough to support the weight of a man. Approximately 50 pounds of dried bacterial cultures were added to the sump and within months, 2,000 barrels of the crude were completely degraded, and the remaining 1,700 barrels were of a low enough viscosity to be pumped and refined. Following treatment, the field sump was closed and converted for agricultural purposes.

Oil Field Waste Contaminated Soils Cleanup – Severe rainstorms in the spring of 1969 caused flooding in the Cat Canyon oil field near Santa Maria, California. Several dykes, impounding oil field waste in large sumps, ruptured and heavy tar-like oil was carried into drainage channels and toward the Sisquoc River. Temporary dams were constructed and several treatment alternatives were attempted including removal by vacuum trucks, incineration, and burial by mechanical tilling. The material was too viscous to pump, would not support combustion, and tilling did not remove the problem.

Finally, SSWM was selected to add microbes to one of the retention ponds and four inoculations totaling 75 pounds of dried bacteria were performed over 15 days. After 62 days of treatment, the total volume of hydrocarbon consumed by the bacteria cultures equaled 55,566 gallons. The land was eventually restored to pasture land and the stream was restored to its original condition.

Gasoline Contaminated Soil Cleanup – Bioremediation was conducted on 850 cubic yards of soil contaminated by gasoline and possibly oils. The soil originally had an average TPH concentration of approximately 6,500 mg/kg, with some samples containing TPH concentrations of more than 33,000 mg/kg. At the end of the project, average concentrations were reduced to less than 500 mg/kg.

Coal Tar Remediation – The gas division of a company in Clearwater, Florida, had approximately 610,000 gallons of coal tars left over from gas production. Treating the coal tars using bioaugmentation resulted in a reduction in the total volume to 80,000 gallons after eight months. The remaining hydrocarbons were found to be chemically similar to Number 2 road tar of economic value. More importantly, it was no longer classified as hazardous waste. Other significant property changes are summarized in the table.

	Initial	Treated	Reduction
Volume (gallons)	610,000	80,000	87%
COD (mg/kg)	3,750,000	1,100,000	71%
Flashpoint (°C)	85	> 100	n/a
Phenol (mg/l)	1,660	125	92%
Oil & Grease (mg/l)	286,900	5,788	98%

In a similar project, residues from a pilot coal conversion facility had been collected in ponds and posed a significant disposal problem. Again, using bioaugmentation, BOD₅’s were reduced from 4,595 mg/l to 6 mg/l and phenols were reduced from 30 mg/l to 0.07 mg/l.

Cold Weather Phenol Remediation – Bioremediation was used to treat phenols at a superfund site in the northwest. Phenol concentrations of 516 mg/kg were reduced to 262 mg/kg after 40 days when the project was shut down due to cold weather. In the spring, the soil was tested again prior to resuming treatment and the phenol concentrations had been reduced to less than 100 mg/kg. The compounds present included not only straight chain phenols, but roughly 40 percent were various substituted phenols including nitro, chloro, and alkyl phenols.