Application of Gold Crew
For
Bioremediation in a Biocell

On February 28, 2002, Enviro Clean Services arrived on location to perform general environmental "housekeeping" clean up at numerous locations within a CO_2 plant in the Oklahoma panhandle. The various locations around the facility had experienced generally minor contamination by various types of hydrocarbon (i.e. condensate…).

One location of particular concern was in the vicinity of a pump located at the surface directly above an underground sump tank. The sump tank is located immediately southeast of the main control room. Additionally there were widespread areas of oil saturated soil and rock surrounding many of the CO_2 pumps, engine rooms, tanks and other equipment.

Utilizing a backhoe, small excavator, shovels, picks and other hand held tools, the oily soil and rock throughout the plant were excavated and moved to a biocell that was built inside of the south property line, south of the large flare tower. As the oily soil was moved to the biocell, it was spread in 12-inch lifts. The excavated areas were then backfilled with clean rock. The buried sump tank is 4' in diameter and 20' long. The top of the tank is approximately 8' below ground surface (bgs). A malfunction had occurred with the overhead pump and an undetermined amount of condensate had spilled at the surface and much of it soaked into the soil above the tank. Excavation of the soil above the tank began by utilizing visual and olfactory senses to determine where the contaminated soil might end. This excavation alone covered an area approximately 12-15' wide, 20' long and 5' deep.

All excavated soil was moved to the biocell and spread in 12" lifts. On March 1, 2002, samples were pulled from the East, West and South walls at 3' bgs and 5' bgs and on the east, west and south floor of the excavation (See Sample Analysis Report dated 3/5/02). Based upon the Oklahoma Corporation Commission Remediation Index Table, the site is classified as a Category II site. With this characterization, both the east and west walls remained above regulatory limits for closure.

On March 11, 2002, Enviro Clean returned to the site and expanded the excavation to approximately 25 to 28' wide and 5' deep. The soil at 5' had little to no odor with the exception of soil in the southeast quarter of the excavation. A safety meeting was held on location and the decision was made to dig deeper than 5' bgs in the SE corner to attempt to determine depth of contamination.

Workers were no longer allowed to enter the excavation. Utilizing an extend-a-hoe, soil was removed to a depth of 9' bgs. At that depth, a more granular, silty soil was encountered with a very strong hydrocarbon odor in it. The hole was deepened to a depth of 12' bgs and excavated soils still showed a strong hydrocarbon odor. The extend-a-hoe was moved to the west side of the excavation. Although the soil 5' bgs on the west side had no odor, a hole was dug to 9' bgs and the same silty soil was discovered with a strong hydrocarbon odor.

All excavated soil was moved to the biocell and spread to a depth of approximately 12 inches with an ultimate dimension of approximately 100'x150', or a calculated 555 cubic yards of material. No initial samples were pulled from the biocell itself and it was determined to use the analytical from the "sump" excavation as a base analytical starting point. The soil that had come from around the CO_2 pumps, engine rooms, etc. was oil saturated, dark in color, with very low VOC's. The soil that originated from the excavation over the sump tank was lighter in color with very strong VOC odor. After thoroughly tilling all soils deposited in the biocell, the cell was subsequently treated with 1000 gallons of 3% Gold Crew solution utilizing a trailer mounted pump and mixing tank. The biocell was then left to undergo natural bioremediation of the hydrocarbon contamination similar to a landfarming application.

On March 27,
2002 Enviro Clean returned to the site and four composite samples were pulled from the biocell area. Each sample was composed of five grab samples taken from a single quadrant of the biocell.

The five grab samples were then thoroughly mixed, resulting in one composite sample for that quadrant. The four composite samples were sent for analysis of TPH-DRO, TPH-GRO and BTEX. Analysis (Sample Analysis Report dated 4/3/02) showed all samples to be non-detect for BTEX, one of the four showed 200 mg/kg for TPH-DRO while the other three were non-detect. Also one of the four showed 16 mg/kg for TPH-GRO while the other three were non-detect.

- Sample analysis for most all soil in the biocell showed non-detect for TPH DRO, TPH-GRO and BTEX and all soil was substantially below Category II closure levels.

On April 16 , 2002, Enviro Clean returned to the site. Final spreading of gravel into all excavated areas around the plant was completed and soil from the biocell was hauled to the sump excavation and packed into the hole utilizing packers and moisture from water hoses. After all soil was moved from the biocell the berms were smoothed back across the site. Final compaction at the sump excavation was completed and gravel was spread and smoothed across the surface. The generators field representative walked the site and approved the job's completion.