

CONDENSATE RELEASE AND REMEDIATION SOUTHWEST LOUISIANA, USA

The following is a text report of a topical application of Gold Crew for the remediation of a release of condensate (35-40 gravity crude oil) in the State of Louisiana, USA. The product was applied as a synthetic biosurfactant to initiate and enhance the biodegradation of the hydrocarbon contaminant. No additional microbial inoculants were used. The process relied on the biostimulation of indigenous hydrocarbon degrading organisms.

On January 3, 2002, 20 bbls of condensate were accidentally released from the North High Island System Accumulation tank in Cameron Parish, Louisiana. The condensate flowed down a small drainage ditch to the north and northeast, remaining inside of the gas compression facility. Sample analysis indicated that the condensate did not penetrate into the soil deeper than 5 inches below ground

surface (bgs). The highest initial analytical readings came from sample #004 where the product had pooled and soaked into the ground. At that location, TPH DRO (Diesel Range Organics) was 1700 mg/kg, TPH GRO (Gas Range Organics) was 210 mg/kg and Benzene was 0.4 mg/kg.



Enviro Clean Services generated a work plan to include the bioremediation of the condensate via an in-situ topical application of Gold Crew. The workplan was submitted to the unit operator and the Louisiana Department of Environmental Quality for review and approval prior to startup. The impacted area to be treated was approximately 6,250 sq ft with an average depth of treatment of 6 inches. Approximately 115 cubic yards of soil required treatment. After receiving approval for the work plan the project was initiated on February 1, 2002. The soil was thoroughly rototilled to an approximate depth of 6 inches bgs and treated with 500 gallons of 3% solution of Gold Crew. The application rate was calculated to be approximately 4.35 gallons of 3% solution per cubic yard treated. The site was then left to undergo natural biodegradation of the contaminant with no further site work performed until May 15, 2002.

Observations made during the treatment were significant.

1) Before and during the active phase of the project while the soil was being tilled, a strong odor of hydrocarbon was evident due to the presence of the condensate in and on the soil of the project site. Upon application of the biosurfactant solution to the impacted areas, the strong hydrocarbon odor disappeared. This was attributed to the ability of the biosurfactant to effectively shroud the hydrocarbon in the aqueous phase and distribute it within the pore space of the soil. This effectively reduces or eliminates VOC release. No actual vapor monitoring took place, however the observable difference was plainly apparent to site personnel.

2) Having had experience with applying waterbased additives to hydrocarbon impacted soil, the site personnel noticed that the assimilation of the Gold Crew solution into the soil matrix was very rapid and even. Typically, applying water to hydrophobic soils (due to hydrocarbon contamination) causes puddling and ponding due to the restricted access to the soil pore space. This was attributed to the reduction of surface tension with the addition of the biosurfactant. The surface tension of a 3% GC-165 solution is approximately 28 dynes as opposed to plain water at 72 dynes.

On May 15, 2002 a series of seven grab samples were pulled to monitor the effectiveness of the treatment process. These individual grab samples were pulled from across the site at depths ranging from surface to 5 inches bgs. All samples except for number 019 showed non detect for TPH-DRO, TPH-GRO and BTEX. Sample 019, which was from the same location as 004, was non detect for TPH-GRO and BTEX and showed 162 mg/kg for TPH-DRO. Based upon these results and a risk based assessment, the treatment was considered effective and the file was considered closed. The site has achieved a "no further action required" status.