

TITLE: *In situ treatment of soil contaminated with petroleum and surfactant using hydrogen peroxide.*

AUTHOR: Caryna Januário Correr

ABSTRACT

The process of washing soil with surfactant substances was combined with chemical oxidation with hydrogen peroxide, aimed at in situ remediation of clay soil contaminated with hydrocarbons from petroleum. The efficacy of washing process was evaluated based on removal of polyaromatic hydrocarbons, and also the comparison among physicals and chemicals parameters of both contaminated and non-contaminated (reference) soils from the same region, following quality criteria established by CETESB. On average, the contaminated soil had 41% of moisture and non-contaminated had 21%. The measures of pH indicated that the contaminated soil appears to be slightly more acidic (pH = 3.9) than reference soil (pH = 4.2). The percentage of OM was 3.27% in reference soil and 7.56% in the contaminated soil. The granulometric analysis indicated the predominance of clay soil for both reference and contained samples. The analysis by fluorescence indicated the presence of aromatic constituents of petroleum in the ground. In washing the soil was used surfactant SDS (dodecyl or sodium lauryl sulfate) and LESS (dodecyl sulfate or sodium lauryl ether), at concentrations 25g / L, being LESS least efficient in providing aromatic constituents for the petroleum. The efficiency of hydrogen peroxide (Hyprox 500), after the washing process, was linked to the availability of aromatic petroleum. The high rainfall values also contributed to the pollutant mobility and soil remediation. The indene (1,2,3-cd) pyrene was detected in the area under soil remediation, at concentration above the threshold of intervention of soil to agricultural activities. Benzo(ghi)perylene was persistent in the environment, whatever the treatment of contaminated soil, and its concentration in soil were above the limit of prevention. Benzo (a) pyrene was also presented in the soil, in terms of prevention not only in the place where substances were used surfactants in washing the soil. The pH values monitored in situ in the soil solution (up to 30 cm in depth) in the area under remediation from February through November 2007 (pH 4.5 to 5.8) were indicative of the recovery of the environment, probably due to the remediation of contaminated soil. The pH values found in this same period, the Arroyo Saldanha upstream (pH 6.2 to 6.8) and downstream (pH 6.3 to 6.9) in the area of remediation meet the quality standard for freshwater. The high OD concentration at Arroyo

Saldanha in the downstream area of remediation may be due to the treatment of the soil, especially the application of hydrogen peroxide, and the high level of rainfall (7.1 mm) in the region. The concentration of total phenols and surfactant substances in the samples collected in the capillary fringe soil remediation and at the Arroyo Saldanha near the area of remediation were below the limit allowed on the standard for water quality.

Keywords: washing of soil, fluorescence, detergents, petroleum, hydrogen peroxide.