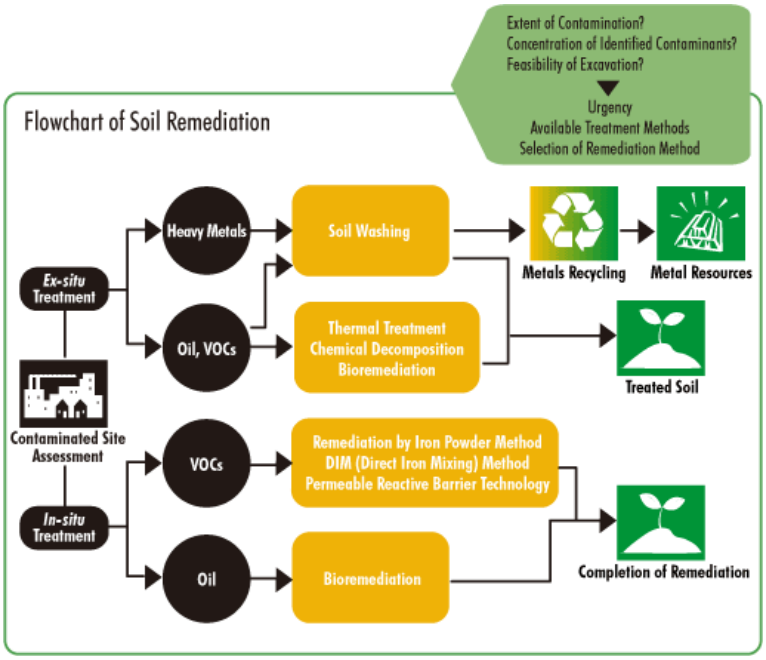
IN-SITU CHEMICAL OXIDATION AND BIOREMEDIATION

Hydrocarbon contamination of soil and groundwater systems decay naturally in the environment due to natural processes. This is referred to as natural attenuation. However, in some circumstances this process may be slow and remediation may be required.

GCS has achieved positive results using chemical oxidation in the fractured aquifer environment in South Africa. Chemical oxidation has been successfully applied to areas where the contamination is relatively confined and where there is limited free product. This is especially relevant to rehabilitation of contamination from Underground Storage Tanks in the petrochemical industry.

The methodology consists of a detailed site characterisation in order to delineate the location and extent of the hydrocarbon plume. This involves the calculation of the quantities of contaminated soil and groundwater. In addition, soil and aquifer characteristics are determined in order to establish the inter-connectedness of the aquifer, and soil water properties.



The methodology then entails a grid-type injection system comprising a number of strategically installed injection and recovery wells. The oxidant is slowly injected into wells directly up-gradient of the contamination plume.

The oxidant migrates along the hydraulic gradient through the contaminated area towards the receptor. The boreholes installed down-gradient are pumped with low flow pumps to increase the hydraulic gradient. The chemical that is used consists of a peroxide-based oxidant with an inhibitor to ensure longevity in the aquifer. A sulphate-based oxidant is also injected. The advantage of using peroxide is that it releases oxygen during the process, enhancing aerobic degradation of the remaining hydrocarbons.

Nutrients are also added to enhance the natural bioremediation of hydrocarbons. The enhanced oxidation during the chemical injection stimulates bacterial growth and enhances the growth of bacteria.

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