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EMERGING PROCESSES FOR SOIL AND GROUNDWATER CLEANUP - POTENTIAL BENEFITS AND RISKS

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Abstract

The cleanup of environmental pollution involves a variety of techniques, ranging from simple biological processes to advanced engineering technologies. Cleanup activities may also address a wide range of contaminants. Technologies to remediate contaminated soil fall into two principal clean-up approaches: *in-situ* (which is always done onsite), or *ex-situ* (which can be done on- or off-site). *In-situ* treatment deals with contamination without removing material from the ground, while *ex-situ* treatment requires the removal of contaminated soil for treatment or landfilling.

Selecting and/or designing the right clean-up approach require skill and innovation. Most contaminated sites contain a complex cocktail of contaminants as well as unique site features (geology, hydrology etc). As such, tailored approaches and technologies are required on a site-by-site basis, as determined through a site characterization and assessment. Other factors involved in technology selection for a particular site include the end goal for clean-up (i.e.: how clean the site is required to be), risk, stakeholder concerns, technological feasibility, available budget etc.

The work evidences that excellence in R&D and technology development could be attained by the development of processes to deal more effectively and economically with certain toxic contaminants such as heavy metals, VOCs and *in-situ* treatment of PCBs, associated with optimization of technologies *in-situ* under field remediation conditions and requirements, improving capacity and speed, and reducing costs.

Taking into consideration this complex domain of environmental engineering and management, new and growing technologies based on natural, physical, chemical and/or biological processes to break down, stabilize, or accumulate pollutants are scrutinized. However, it is evidenced that, with any new technology, come concerns over its misuse and possible negative environmental and health effects. Also, the important barriers to the adoption of new environmental technologies, the confidence of the user in the data about cost and performance of the technology are emphasized.

Key words: contamination, remediation, risk, site characterization, strategy
