Application of World Advanced Remediation Technologies in China

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Background/Objectives. China remediation market has developed for a decade, but it is still at emerging stage. “Soil Contamination Prevention and Treatment Action Plan” was promulgated in 2016, and “Soil Contamination Prevention and Treatment Law”, a counterpart of CERCLA in the US, is to be promulgated in 2018. This is expected to be a milestone and will surely lead to significant growth of remediation market in China. Remediation of brownfield sites in China is more challenging because of more complex and heavier contamination, challenging lithology and short time limit. Hence, it calls for world advanced technologies and localized application. In situ thermal desorption (ISTD) for VOCs/SVOCs heavily contaminated sites and stabilization for heavy metal sites have been widely applied and accepted in China nowadays.

Approach/Activities. ISTD with thermal conduction heating (TCH) are upmost technology for challenging sites, i.e., steel mills, coking plants, pesticides and manufactured gas plants (MGP), etc. It can work for all soil types including clay, and be applied in situ or in pile. Ever since a successful pilot (with gas thermal remediation (GTR) technology) completed in Suzhou, China in 2013, several decent scale ISTD projects have been conducted in China, including:
Case Study #1 GTR was used for a hot spot at a site in Zhejiang province, COCs are fenitrothion (up to 158 mg/kg) and benzo(a)pyrene (up to 1.01 mg/kg), TTZ: 1227 ?, 0- 7.5 m bgs, target temperature 200 ?, heating period 60 days.
Case Study #2 GTR was used to remediate contaminated soil and groundwater with PAHs, BETX, and TPH at a MGP site in Guangdong province. TTZ: 2940 ?, 0-16 m bgs, target temperature 100-200 ?, heating period 80 days.

Main Contaminant	Maximum value(mg/kg)	RGs (mg/kg)	
		0-8m	8-16m
Benzene	860.0	0.64	3.64
Naphthalene	6180	50	50
benzo (a)pyrene	244	0.2	-
TPH <C16	16310	230	-

Case Study #3 Smoldering technology was introduced to China and for the first time tested at an oil field site in Taiwan to treat oil sludge where TPHs concentration is up to 30,000 mg/kg.
Case Study #4 MetaFix™ heavy metal stabilization reagent was used to successfully complete remediation of a historical chromium (Cr) residue stockpile site in Yunnan province. Scale: 51K m^3, average Cr(VI) concentration in soil was 1,400 mg/kg, RG 0.91 mg/kg, which is the first time ever RG for a Cr(VI) site was set below 1 mg/kg in China.

Results/Lessons Learned. Site background, laboratory and field data, implementation process, lessons learned, and how we educated and influenced the China remediation market, how we worked with western industry-leading companies and landed their advanced technologies in China will be presented.