

**REMEDATION PROGRAM FOR SLUDGE PITS ASSOCIATED WITH OIL & GAS INDUSTRY IN
KUWAIT: RESOLVING TECHNICAL CONCERNS DURING PREPARATORY PHASE**

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Sludge pits originate from the need to dispose of excess crude during shutdowns and work-over operations associated with gathering centers and well-heads. Sludge pits range in size from approximately 8000 m² to 75000 m² and in depth of 1 to 5 m. It was assessed that 33 sludge pits exist mainly associated with upstream onshore oil sector in Kuwait. The Conceptual Clean-up Program for Sludge pits involves 3-phase separation viz. oil recovery, water discharge and sludge for treatment. However it was quickly realized that host of technical issues are to be dealt prior kick-starting the actual Clean-up. This paper highlights the issues that were to be resolved before undertaking the implementation of clean-up activities. The first & foremost is to obtain the Unexploded Ordnance Removal certificates of the identified sludge pits. This assumes importance as the residual unexploded ordnance is perceived to exist still in Kuwait post invasion. The Second concern is to get the clearance from the regulator of Environment for the set remediation program. Since the clean-up involves excavation, oil recovery, thermal or bio-treatment of sludge through mobilization of heavy equipment, it requires undertaking an Environmental Impact Assessment study and submitting it to authorities to seek clearance. The third critical concern is to determine representative characterization of pits to get an idea about extent of current contamination and potential for oil recovery by processing weathered crude. The fourth issue was to decide on final clean-up levels as the standards are not prescribed in local/national regulations of Kuwait. Furthermore, this issue has a serious implication because the end levels of clean-up would determine the financial outlay of the project. The final concern is to ensure that there are no radiological risks through presence of NORM (Naturally Occurring Radioactive Materials) as the sludge pits are loaded with mud cuttings associated with drilling operations. Resolving these technical interfaces are considered key to effective remediation management program using proven methodology and best practices.

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