Applying FDEM, ERT and GPR to Investigate the USTs at a Soil Contaminated Site

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ABSTRACT
This study applied Frequency Domain Electromagnetic (FDEM), Electrical Resistivity Tomography (ERT) and Ground Penetrating Radar (GPR) to verify the integrity of the underground storage tanks (USTs) and the existence of laden sludge. Due to the lack of records, it could only be inferred by the aerial photographs that USTs had once been located at the site. Because the UST integrity and sludge distribution determined the funds and time for the remediation work, an urgent need for the remediation team was indicated. In addition, we further determined the effectiveness of remediation to ensure no contaminants remained at the site. In general, the GPR survey was effective at locating shallowly buried objects. However, due to the highly conductive nature of the heavy-metal laden sludge, the GPR signals were attenuated severely. Thus, the first attempt to use GPR in the pre-remediation investigation did not achieve the desired results and other methods were deployed. The existence of the UST and the sludge within were confirmed by ERT and the UST shape was mapped by FDEM. The principal remediation scheme was soil replacement by replacing the contaminated soil with clean silt. Based on the distinctive property differences of the contaminated soil and the clean silt, the completion of the remediation was confirmed by the differences between pre-remediation and post-remediation in GPR, ERT and FDEM results.

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