A Case Study of Combining Geophysics Prospecting Techniques to a Soil Contaminated Site

WANG, Tzu-pin[1]* ; CHEN, Chien-chih[1] ; DONG, Tien-hsing[4] ; CHEN, Yi-chieh[3] ; LIU, Hsin-chang[2] ; LIN, Chih-ping[5] ; HUNG, Hao-chun[6] ; HO, Ching-jen[6]

[1]Dep. of Earth Sciences and Graduate Institute of Geophysics, National Central University, Taiwan, [2]Disaster Reduction Research Center, Chien Hsin University of Science and Technology, Taiwan, [3]Geophysical Technology and Engineering Co.,Ltd. R.O.C, [4]Apollo Technology Co.,Ltd. R.O.C., [5]D.P.W.E. National Chiao Tung University, Taiwan, [6]Environmental Protection Administration, Taiwan

This study utilizes a combination methods of Electrical Reisitivity Tomography (ERT), Ground Penetrating Radar (GPR), and Horizontal Loop Electromagnetic (HLEM) to examine a heavy-metal contaminated site before and after the remediation. It was a processed sludge tacking site of a smelting plant. The sludge is homogeneous red, and the main pollutants are chromium, arsenic and lead. The plant has been closed for more than twenty years. At the time when it was shut down, instead of removing the stacked sludge and underground structures (tank), the site was leveled directly and planted with lawns. Now, it is difficult to know the distribution of the sludge, the depth of its cover, and the correct location of the underground structures.

The pre-remediation investigation conducted with the application of geophysical prospecting techniques found that the HLEM could efficiently define the distribution of sludge efficiently, and ERT could be used to detect the thickness of the sludge and the location of the underground structures, but GPR results failed to meet expectations which may due to a significant attenuation of electromagnetic energy caused by the nature of the sludge. The post-remediation examination shows obvious different morphologies of the site than it was before the remediation. The results can be used to assess the effectiveness of remediation, and to check if any sludge remains.

Keywords: ERT, GPR, EM, pollution