

Soil and Groundwater Investigation and Remediation for Illegal Dumped Sites

1、Introduction

Waste control in Taiwan started in 1974. In the beginning, the laws and regulations were adopted from United States of America. With the rapid industrial growth and limited knowledge of environmental protection, a considerable amount of illegal dumped occurred at that time. For examples, hazardous waste in drums caused one injury and one death in Dashu Shiang Village of Kaohsiung County; massive, unidentified, drummed wastes were found dumped at Shiangtan located in Xinpi Shiang Village of Pingtung County; mercury sludge were discarded by Formosa Plastic Corp. in Cambodia; and illegal chemical wastes were dumped by waste treatment facilities like Yuntai Co. and Shengli Chemical Co.

With the promulgation of revised waste management regulations, illegal dumped occurrences have decreased over the years. However, the damages incurred in the past have made an impact on our environment and health. Now, these waste clearance issues have resurfaced after the "Soil and Groundwater Pollution Remediation Act" was promulgated.

2、Objectives

Due to the complex types of dumped wastes and lack of pollution-prevention equipments, the potential of soil and groundwater contaminations of illegal dumped sites are high. Moreover, some of these sites are located close to agricultural, fishing, and pastoral areas, and have been used for these purposes, too.

With soil and groundwater contaminations found in many illegal dumped sites, they have been announced as control sites. Since 2009, Taiwan EPA had been conducting "Soil and Groundwater Investigation for Illegal Dumped Sites" in order to evaluate the pollution of these sites. We expect to compile a formal list of illegal dumped sites and set up a risk ranking system at the end of the investigations. These systematically evaluated results are keys to develop the pollution management strategies in the future, including the de-listed mechanism and waste clearance of illegal dumped sites.

3、Results

The methods of evaluation for illegal dumped sites in Taiwan were adopted from Hazard Ranking System of USEPA. But this system had been modified to meet our needs and specifications. All illegal dumped sites are divided into 4 classes depending on the risk of each site. Class-A sites are those that need to clean up the hazardous wastes as soon as possible, and then next Class, and so on.

According to the "Soil and Groundwater Investigation for Illegal Dumping Sites" (EPA, 2009), there are 175 illegal dumped sites, including 17 Class-A sites, and 158 Class C and D sites. The hazardous wastes of all 17 Class-A sites are already cleaned up in present. However, 4 of these 17 sites will remain as control or remediation sites due the exceeding contamination levels found on these sites, including Ren-Ho Village site, Hong-Sha Mountain site, Da-Ding fodder factory site, and Chih-Shan Temple site.

The risks of the 158 Class C and D sites are low, requiring only constant patrolling and monitoring by local EPBs to prevent future dumping at these sites. But, in recent years, soil and groundwater contamination have been found at some of these Class C and D sites, such as Jing-Yu Metal Factory in East District in Taichung City, GuoTai Plastic Maoli Factory in Maoli County, site at Wukung Road, Alley 961 in Wuri Township, Taichung County, site at No. 148-2 Xingdong Village, Houbi Township, Tainan County, etc... Hence Taiwan EPA collected relevant information and reviewed all investigations of the illegal dumped sites, and built a database to analyze this information. The plan was to assess and rank the risks of contaminations at these sites for further investigation and evaluation.

The investigations of first 15 sites were done. Soil and/or groundwater contaminations were found in 10 out of these 15 sites. While these Class C and D sites were initially ranked with lower risks, some of them show that they are still in high potential risks of soil and groundwater contaminations. Therefore, we should continuously conduct the investigation of all sites. These sites should be patrolled and monitored routinely to manage the sites effectively. We could further investigate the source of contamination to determine the linkage between source and dumping sites. All the management and cleanup should be designed and executed in accordance to "Soil and Groundwater Pollution Remediation Act", "Waste Disposal Act", and other related governmental regulations.

4、Prospect

In the future, the management of illegal dumped sites is planned as follows:

First, we plan to finish the investigations of all illegal dumping sites in 4 years. This would help us to understand the current polluted conditions of all sites. We would also conduct active investigations to trace more illegal dumped sites and to keep them posted to prevent further illegal dump.

Second, we would consolidate a monitoring and control strategy plan for soil, groundwater, and wastes to build the principles for management and remediation strategies.

Third, we would compile a National Priority List (NPL) and draft related strategies. These strategies would help us in preventing media contamination and lowering public health risk.

NPL will include, on the list, those contaminated illegal dumped sites which responsible parties cannot be clearly identified. The remediation priority of sites in NPL is evaluated by: the concentrations of pollutants; land-use; and risk.

