

Development and future needs of soil and groundwater remediation industry in KOREA

Soil and Groundwater Pollution

The major issues of soil pollution in Korea include abandoned mining sites, industrial complexes, Korean military units, metal smelters, and livestock burial grounds.

1) Closed Mining Sites

In Korea, there are 1,276 abandoned mining sites (936 metal mine and 340 coal mines in 2019), and its management has been supervised by three Ministries. The Ministry of Environment (MOE) investigates soil pollution, the Ministry of Trade, Industry and Energy (MOTIE) conducts mine reclamation project, and the Ministry of Agriculture and Food Affairs (MAFRA) takes charge of land improvement projects for contaminated farmland.

2) Industrial Complexes

At industrial complexes located in 530 different places in Korea, soil and groundwater are vulnerable to contamination by heavy metals and chemicals. The MOE evaluated status of pollution of 12 industrial complexes from 2004 to 2008, and it was found out that 8.2% of them did not meet the standard. It is difficult to trace source of contamination in industrial complexes, and it is costly and time-consuming to prevent and clean up the pollutants that are largely diffused.

3) Metal Smelters

Janghang Smelter in Chungnam Province and Bonghwa Seokpo Smelter in Gyeongbuk Province are representative areas polluted by metal smelters in Korea. Janghang Smelter refined gold and silver for more than 50 years from 1936 to 1989, and the surrounding area was severely polluted with heavy metals such as arsenic and nickel. In 2007, the MOE launched environmental investigation nearby the Janghang Smelter in July 2009 at the request of local residents, and carried out land purchases (within 1.5km radius), relocation measures for residents, and clean-up projects which cost approximately 200 billion KRW.

At Bonghwa Seokpo Smelters, sulphur and nitrogen oxides emitted from zinc smelting processes from 1970 have permeated into the soil as well as the air, and heavy metals such as arsenic, zinc, and cadmium have been discharged into wastewater and contaminated not only nearby forests but also agricultural products.

4) Burial Sites

Since 2010, there have been more than 6,000 burial sites created for livestock with foot-and-mouth disease and avian influenza. Currently, there are around 1,200 sites remaining under management except for burial sites that have been fully managed for three years as planned. Livestock burial has

been always a big social issue whenever it occurs due to concerns about health threat from soil and groundwater contaminated by leachate spillage, viruses and antibiotics. However, it is complicated to manage completely as it occurs repeatedly in large-scale and it is hard to develop technologies for large-scale annihilation in a short period of time.

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In Korea, soil remediation business was legalized in 2005, and after leakage test became mandatory since 2006, the number of soil and groundwater remediation companies has been increased dramatically. However, the number is gradually decreasing ever since 2012 due to limited size of the soil and groundwater remediation market. Korea has relatively lenient environmental regulations and low excess rate of pollution standard. This has resulted constraint on expansion of soil and groundwater market. National soil pollution investigation and legal soil contamination investigation have been actively implemented but the quantity of soil for investigation is small.

Environmental technologies of soil and groundwater are commonly divided into five areas; 1) investigation, 2) remediation of heavy metals, 3) remediation of oil and organic chemicals, 4) remediation of non-biodegradable and combined pollutant, and 5) management in Korea. Remediation of oil and organic chemicals and of heavy metals make 50% and 25% of the total market respectively. This indicates that Korea has been focused on remediation more than prevention, management or monitoring.

According to the MOE, soil and groundwater industry is regarded as a market with low growth potential due to uncertainty of environmental regulations and insufficient number of regulated substances. In contrast, water industry draws attention of the public and investors as well as PMs, radon, and humidifier detergent industries. Soil and groundwater experts claim that there is a need to collaborate with other environmental fields and to change perspectives to expand the market.