

Summary

To have the current situation of soil and groundwater quality in Taichung, in addition to implementing the regular soil and groundwater monitoring, emergency investigation, underground storage tank soil gas investigate, Taichung City Government Environmental Protection Bureau (hereinafter referred to as EPB) also carry out contaminated site completion verification, monitoring wells maintenance management, educational promotion activities. AECOM Taiwan Corporation (hereinafter referred to as Project Team) was contracted to perform "2015 Soil and Groundwater Pollution Investigation and Verification Project in Taichung City " (hereinafter referred to as the Project). Project results are summarized as below.

Investigation of of High Pollution Potential Areas, Agricultural Land and Suspected Sources Nearby Area

Based on results of year 2013 and 2014 Soil and Groundwater Pollution Investigation and Verification Project, this year the selected farmlands which exceeded Soil Pollution Monitoring Standards conducted regular monitoring in accordance with Article 6 of the Act. A total of 96 lots were investigated, 150 soil samples collected. There are 3 farmland lots exceed Soil Pollution Control Standards, which are J296 and J330 lots at Dali district, that nickel detected 208 mg/kg and 216 mg/kg respectively; DS001 lot at Dajia district with zinc detected 609 mg/kg. All soil samples at Houli district were lower than Control Standards this year, but higher than Monitoring Standards. It is recommended to continue monitor agricultural lands that exceed Monitoring Standards

Results of sediment quality monitoring indicated that potential of sediment contamination by heavy metals were high. The highest pollution potential in sediment were nickel and zinc, followed by chromium and copper at Dali district; The highest pollution potential in sediment in Houli district was ; and Dajia district had nickel, followed by zinc. EPB has issued a letter with sediment monitoring results to Taichung Irrigation Association, regularly dredge irrigation ditches and tracking the dredged sediment are required.

In addition, farmland irrigation ditch water quality monitoring was performed this year at two additional locations this year. Based on results of continuous monitoring from April to November, in the morning of 0:00 ~ 3:00 AM, frequency of Dali district irrigation ditch's conductivity exceeding background values was increased, this result indicated that there was a suspected discharge at the upstream, therefore the conductivity increased. In addition, this year phase I of

Environmental Site Assessment and water quality investigation were also performed at seven high pollution potential factories located at Dali agricultural land upstream. Several places which wastewater was overflowed and accumulated near wastewater treatment facilities at Tai-X and Ho-X factories have a potential of soil and groundwater contamination. It is suggested to conduct a follow-up investigation next year.

Investigation at Potential Groundwater Contamination Area

Groundwater sampling in 164 monitoring wells were performed this year. The results indicated groundwater at Tanzi Export Processing Zone and its surrounding area, Gou-Zheng sites at Dali area, large tank farm of Taichung harbor, Taichung Industrial Park, AIDC, Wang Tian plant of Sinon corporation, Sanko company, Yung Zip chemistry, Chinese Global Oil, Taiwan You-Li Gas Station exceeded Control Standards, It is recommendations to conduct a continuous investigation at these high groundwater pollution potential area.

Groundwater flow direction is complicated in The Prime Oil Chemical Service Corporation (POCS) in Taichung harbor. Time-frequency analysis technology through continuous observation and automatic water level gauge were applied this year to understand that tidal-influenced monitoring wells, groundwater flow direction is from west to east during high tide; groundwater flow direction is from the northwest to the southeast during low tide. POCS groundwater VC contamination was verified by the installation of monitoring wells and groundwater sampling.

Groundwater monitoring of wet and dry season in Gou-Zheng sites of Dali area indicated that the sudden rise of the Cr concentrations. Except several factories located at 221 Lane were performing remediation work, southwest of 221 Lane area the use of groundwater was limited currently. It is suggested to continue monitor the groundwater and integrate groundwater remediation works among factories.

Groundwater monitoring results indicated groundwater Cr concentration at Taichung Industrial Park southeast area exceeded Control Standards. Residential wells inventory outside the area were performed and groundwater quality investigation results show the residential wells was not contaminated. The verified polluter Ruey Chang company has submitted a groundwater control plan, but the plan was only dealing with the contamination inside their plant. Since there were other chlorinated contaminations in Taichung Industrial Park, it is suggested to conduct an investigation project in the future.



Monitoring Wells Maintenance Management

In the first and second half year, visual inspection and well internal inspection were performed for 134 and 199 monitoring wells respectively. There were 20 wells exterior maintenance completed, 9 wells body facility repaired, 37 wells condition assessed, 19 wells completions re-performed, foreign matter in 2 wells removed , five wells abandoned and two wells installed.

Site Verification

Verification of remediation completion for five site were performed this year, including Nanshih 1984 lot number, Heping Dist, BL162 military site, May Sheng Industrial, Pearl Musical Instrument, Ho Jong company. All sites passed the verification except heavy metals at Ho Jong company site still exceeded Control Standards.

Review of Underground Storage Tank Inspection

There are 313 underground storage tanks declared in January and May respectively, 312 declared in September. The review was completed the next month. The reporting rate and review rate was 100%. Grading of pollution potential underground storage tanks was performed. There are five classified as the first level , and five in the second level, 37 in the third level, 1 in the fourth level, 251 in the fifth level. There were 14 not rated. Based on grading results, there were 26 high pollution potential underground storage tanks conducted inspection. and There 31 soil gas samples collected and sent for GC analysis. GC signal values in Whale World Jen-May Gas Station, Changping Road Gas Station, Datun Gas Station, the Rei Gong Gas Station, the Dong Da Gas Station were high. According to soil gas measurement for benzene, MTBE in Rei Gong and Dong Da Gas Stations, recommendation to EPA for inclusion of inspection list.

Emergency Responses

There were 7 soil and groundwater emergency investigation, comprising of Situn District I-Ning High School reserved land, the Houli Junior High School north side farmland, Waipu District Butze farmland, Dajia district Mong Chuan farmland , Gang Sheng asphalt company farmland, Taiping Industrial Zone and oil pollution assessment in Wuchi main ditch ,total NTD 419,753 of work was executed.

Other Achievements

A workshop on underground storage tank regulations was conducted. A workshop on environmental regulations and 30 campus outreach activities were

also conducted. The number of participants met the contract requirements. It was recognized by participants for the concept of activities, satisfaction survey results was high, continuously conduct these activities was also recommended. Another 4 EPB internal trainings and one international forum on "chlorine-contaminated sites remediation" were conducted. The purpose of experiences exchange among domestic and foreign experts, environmental authorities was achieved.

Potential groundwater contamination grading and mapping by unit of village were also completed in Tanzi, Dajia, Houli, Dali districts this year. There were 3 areas rated as red light in Tanzi district (Tanzi Export Processing Zone), 1 area rated as red light in Dajia district (Dajia Youth Industrial Park), 4 areas rated as red light in Dali district (Gou-Zheng sites). EPB has requested above-mentioned areas in to improve the effectiveness of contamination improvements to avoid contamination spreading, and established the warning network for offsite groundwater quality monitoring, and conducted promotion of groundwater use safety. There was 1 area rated as deep yellow light in Dajia district (Ding Deng), it was recommended to conduct the inventory of residential wells and investigate groundwater in this village.

In the area of technology development, environmental forensic technology to assist environmental site investigation in the Wuchi main drainage channel oil spill incident were applied. The forensic fingerprint (including bio-indicators, PAHs distribution) to clarify the source of oil were performed. The use of chlorine stable isotope to confirm the contamination at Tanshow Junior High School was from Tanzi Export Processing Zone. Stable isotope technique was applied to describe chromium contamination relevance among different locations in Gou-Zheng area of Dali district. In the future, this achievement provides guides for the selection of environmental forensic on different types of environmental contamination.