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Study on disaster controlling for water contamination of severe Cr-contaminated sites on Jialing River

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Abstract

A severe Cr-contaminated site was left after the demolition of a Chemical plant. Based on the preliminary monitoring results and related literature data, this paper studied how to prevent and control the possible contamination from the site to Jialing River effectively, which is building an intercept contamination dam in the side of the contaminated site along Jialing River and constructing leachate collection system in the site. This is the antifouling effect: in the same stratum of the same elevation, the Cr⁶⁺ content inside the intercept contamination dam (soil: 144.8mg/kg~827.4mg/kg, leaching solution: 7.3mg/L~55.1mg/L) is higher than that of the outside (soil: 10.4mg/kg~64.9 mg/kg, leaching solution: 0.27mg/L~0.63mg/L); Water level of monitoring hole inside the dam is higher than that of the outside; the water level difference is 3.26m to 5.39m. The disaster controlling for the site provides security for the later contamination remediation and the river environment protection.

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1. Introduction

With the rapid development of economical society, a mass of industrial wastes and agricultural wastes and domestic wastes are drained into river, which make the river be contaminated. At the same time, with the rapid urbanization, a

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lot of solid contamination has been found out at the moved sites of industrial enterprises. Those original contaminated lands used for industry, storage, domestic wastes and others, often have not been managed and remedied effectively, which makes contamination spread and transfer to the surrounding water and contaminated it¹⁻⁶.

Jialing River is the maximum area of tributaries of Yangtze River. With comparison of “China Water Resources Bulletin” and water quality monitoring data, water quality of Jialing River has decreased to different degrees during 2000 and 2010. Industrial and domestic waste water and trash, pesticide and fertilizer, soil erosion are the main contaminant sources. In order to protect Jialing River and ensure water supply of cities along the river, it is extremely urgent to control the water contamination of Jialing River. In protecting river and controlling contamination disasters, we often focus on the treatment for discharged sewage and the supervision and administration for outfall^{7,8}, but it is easy to neglect that the groundwater and underground leachate may contaminate river. Based on this point, after choosing a severe Cr contaminated site (called S block below) next to Jialing River as the research object, this paper studies how to control the water contamination disaster the site on Jialing River effectively mainly from the seepage control perspective.

2. Introduction of Severe Cr-contaminated Site

S block used to be a chemical factory; it is high in the west and low in the east generally with Jialing River at its east side and hilly area at its west side. S block contains 3 main regions: original administrative area, original production workshop and original landfill area, shown in Fig.1. Cr compound is the chemical factory’s major production. Because of lacking awareness of harmfulness of the Cr residue in the early period, the Cr residues were directly pulled up in low-lying of S block without disposed. S block locates at the backwater zone of the Three Gorges reservoir, and its Cr contaminated formation has been extended to underneath of Jialing River perennial water level. Under the influence of underground Cr residues, a considerable amount of Cr^{6+} leachate has flown into Jialing River through the water-bearing formation every year, which contaminated the river. Now the amount of Cr^{6+} dissolving out from the buried Cr residue and contaminated solid are about several dozen milligram per liter, even as much as several hundred milligram per liter, which is far beyond the requirement of “Integrated wastewater discharge standard”(GB8978-1996) (less than 0.5 mg/L). According to the sampling and monitoring results in early period, we showed distribution of Cr contamination of S block in Fig.2.

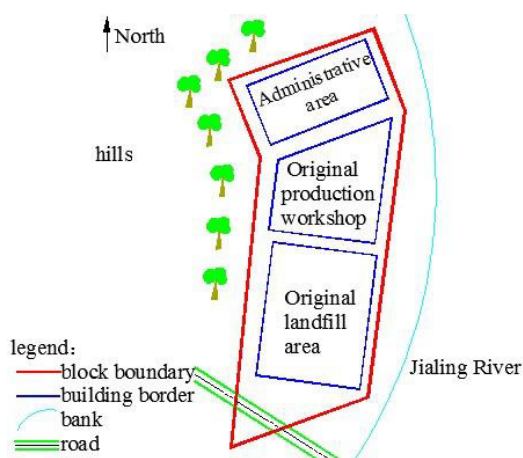


Fig.1 Sketch of S Block

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