Handling of soil contamination with naturally occurring heavy metals (Research period: FY 2015–2017)

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1. Introduction

Road construction sometimes discovers soil and rocks contaminated with naturally occurring heavy metals. These contaminations occur in soil up to a diameter of 2 mm, which is regulated under the Soil Contamination Countermeasures Act, rocks larger than 2 mm that are not regulated under the Act, and soil mixed with waste. Effective ways to deal with soil mixed with waste are now in demand.

The objective of this study is to share effective and efficient ways to deal with soil contamination in current road construction projects.

2. Investigation of conditions to deal with soil contamination

Conditions to deal with soil contamination found in national road construction projects were investigated from FY 2015 to FY 2017, and hearings were conducted when needed.

3. Scale of soil contamination and trends of disposal cost

The analysis of 57 cases of soil contamination in which the disposal cost per cubic meter was available (figure 1) found that the cost of common ways to dispose of contaminated soil was approximately from 1 to 100,000 yen per cubic meter. Based on the relationship between the amount of contaminated soil and the disposal cost, high-cost cases, such as 100,000 yen per cubic meter (road A and road B in figure 1) are ones with the disposal of soil mixed with waste. The cost per cubic meter probably increased because the soil must be separated from waste, which then must be sorted before disposal. Meanwhile, very low-cost cases, such as 150 yen per cubic meter, included ones in which enough space was provided as a temporary soil storage area for soil excavated from a tunnel, and most of the soil was reused near the construction site (road C in figure 1)

4. Method to dispose of rocks and risk communication

Contaminated rocks larger than 2 mm that are not categorized as soil under the Soil Contamination Countermeasures Act are large, and the elution of heavy metals from them is relatively slow. Therefore, effective measures, such as the example shown in figure 2, can be conducted after assessing the effect of heavy metals leaching out of the rock on groundwater.

Meanwhile, it is important to properly notify local residents of the risk of contamination to gain their understanding on the disposal of contaminated soil before actual disposal. Thus, the authors selected good examples of risk communication and analyzed factors for successfully gaining the understanding of local residents.

5. Application of findings

The authors are going to organize the findings of these investigations, prepare guidelines on the disposal of soil contamination in road construction projects, and apply the knowledge to various activities.

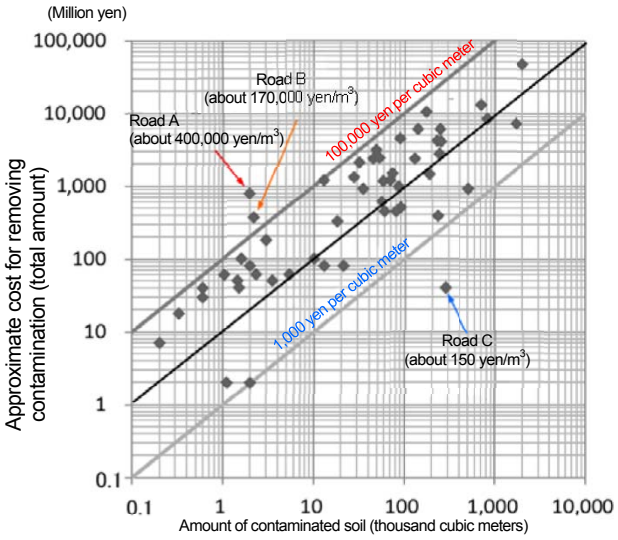

Figure 1: The relationship between the amount of contaminated soil and disposal cost

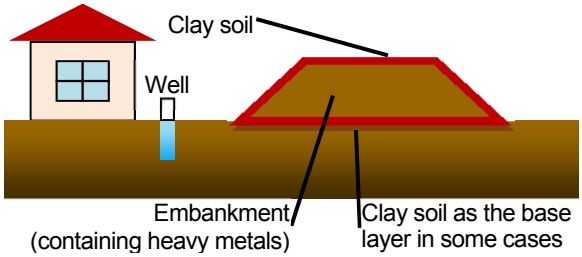

Figure 2: The concept of a way to use clay soil as water blocking material

☞For detailed information

1) Nodoka Oshiro, Yuki Mitsutani, Ryuji Inoue. Soil contamination encountered in road construction projects and the investigation of current measures to deal with the contamination. *Civil Engineering Technology Reference*. Pp. 8-11, November 2017