Study on strengthening the ability to respond to disasters and accidents

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[Abstract]

Key Words: Chemical substance abundance, Information sharing, Environmental monitoring, Environmental restoration technology

In this theme, we developed methods for estimating the amount of residual chemical substances potentially present in disaster- and accident-prone areas. We studied the information sharing system between the environmental, fire, and other departments in charge of disaster prevention to develop monitoring and removal technologies for residual chemical substances from the environment for a long duration after the advent of a disaster or accident. Three sub-themes were set for achieving these objectives.

In sub-theme 1, we developed a method for estimating the abundance of chemical substances based on published data such as PRTR data, which are foundational for disasters and accident response. We built an information infrastructure database for the location and properties of chemical substances, consequently developing a map display function using the geographic information system (GIS). In addition, we examined the manner in which these information infrastructures could be shared in the aftermath of a disaster with both the environmental departments and various organizations, such as the fire and disaster prevention departments, within and outside the region to build a cooperative system.

In sub-theme 2, we developed sampling and survey methods that enabled efficient, comprehensive, and low-cost implementation of the medium- to long-term monitoring of residual substances and identification of the scope of post-disaster countermeasures. In addition, since there was potential for fresh contamination via secondary products resulting from fire or chemical reactions occurring at the disaster site, we developed a comprehensive data analysis method that captured a wider scope of residual substances, such as impurities and reaction products.

In sub-theme 3, we comprehensively investigated the countermeasure technologies for removing existing chemical substances (purification and restoration technologies). The information on residual substances was systematically organized based on various factors, such as applicable substances, contaminated environments, scale, cost, energy consumption, and environmental impact. Consequently, a database of potentially applicable technologies was established. In addition, based on the results of other themes and subthemes, we examined a treatment method for chemical substances that need to be prioritized, using high-efficiency residual chemical removal technology (Versatile Constructed Wetland system) with low-cost and -environmental impact.

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