Abstract

[Project Information]

Project Title :	Chemical Risk Governance Including Normal, Disaster and Accidental Situation
Project Number :	JPMEERF20231M03
Project Period (FY) :	2023-2024
Principal Investigator :	Tokai Akihiro
(PI ORCID) :	ORCID0000-0001-2345-6789
Principal Institution :	Osaka University 2-1 Yamadaoka, Suita, Osaka, JAPAN Tel: +81668797676 E-mail: tokai@see.eng.osaka-u.ac.jp
Cooperated by :	Kyoto University, The University of Kitakyushu
Keywords :	Risk assessment, disaster accident, risk governance, scenario analysis

[Abstract]

In this project two topics were tackled to complement current chemical risk management in Japan.

Firstly, natural disaster triggered technological accidents are of concern, however, there are few case study from the wide range of risk assessment and management. Due to the main scope of chemical risk assessment of management are for normal conditions, there are not good findings how to cope with these problems from the view point of risk management. In this research project, we tackled seven type of case studies and built scenario-based evaluation methodology and carried out case studies employing real sites in Japan. The types of case study were inland epicenter earthquake, global climate change, abandoned mine effluent, land slide disaster, Nankai megathrust earthquake, pollution recovery period, and guided options for Natech. Risk evaluation methodology was based on normal method but triggered events were assumed and parameterized base on former relevant guidelines. It consists of scenario for external force, initial event, ripple effect, expansion of damage. Hereafter we assumed most worst realistic parameter conditions based on the past relevant documents and carry out quantitative analysis. Results shows the comparative difference between norma and accidental case and the difference between with and without options, then we could extract findings of the effectiveness of options. However, because of data availability, the resolutions of risk were different from each case studies. In this sense, relevant data management systems are of important from the view point of Natech risk assessment and management. Here we showed that the developed methodology was applicable for various type of case studies and clarified the short-term risk level for each case study. We need to continue this long-range research project for secure national risk management governance in this densely habituated technological society,

because not a few high functioned chemicals are installed in industrial civil systems. Potentially, all can't escape from these risks.

Secondly, export products are one of the possible routes for the transboundary movement of chemical substances from Japan but are not included in the scope of the PRTR system in Japan. Scholars performed stock flow and exposure analyses and evaluated the substitution of chemicals with safer substances. However, all these works were conducted in Japan, and no quantitative study has considered the risks derived from chemicals in export products from the country. To fill such gap, this study quantitatively assessed the human health risk derived from the chemical substances contained in export products from Japan to the importing country and to verify the effectiveness of risk reduction measures, including substance substitution. Target countries were selected by characterizing Japan's export partner countries. Human health risks were then estimated using Trade Statistics of Japan, cumulative Weibull distribution function, emission factors, and the USE tox model. The main finding was that the greatest risk reduction was achieved when substance substitution was conducted and the importation of used products containing controlled substances was regulated in the importing country.

Thus, we suggest that these will be one of the methods that support the revised guidance of chemical risk management co-management by ministry of environment and ministry of economy trade and industry, JAPAN. (325)

[References]

This research was performed by the Environment Research and Technology Development Fund (JPMEERF20231M03) of the Environmental Restoration and Conservation Agency provided by Ministry of the Environment of Japan.