

Case Study of the Controversy on Feasibility of Geological Disposal in Japan: Analysis of Interaction and Gap between Science and Engineering

*Kohta Juraku¹

1. Department of Humanities, Social and Health Sciences, School of Engineering, Tokyo Denki University

The Japanese government announced the “Nationwide Map of Scientific Features for Geological Disposal” (hereafter, “the map”) on July 28, 2017. It is a kind of geological screening map, which shows the geographical distribution of scientific features required to meet the technical criteria on the map of Japan. Japanese government and Nuclear Waste Management Organization (NUMO) emphasize that the map does never point out the “most suitable areas,” nor do they invite any municipalities and prefectures to take part in the siting process of HLW geological disposal facility. The publication of the map is to be considered as a confirmation of the current governmental policy, which designate the geological disposal as the method of final disposal of HLW in Japan, is unchanged.

However, feasibility of geological disposal of HLW in Japan, where is geo-scientifically active, has been a focus of scientific and technical controversies. After the 3.11 complex disaster of mega-quake, tsunami and nuclear accident, even more questions have been raised not only by scientists and other technical experts, but also by stakeholders and citizen in general. The Science Council of Japan (SCJ), the Japanese academy, also published a series of reports which recommend the governments make fundamental review and reform of HLW management policy based on their deep concern on the scientific uncertainty and/or incertitude on the nature of geological formation of Japan. By looking at such a situation, we often tend to consider the HLW feasibility controversy as a dispute between the experts who take conservative stance on safety/risk concerns and the other group of experts who believe the feasibility of technical countermeasures against such concerns.

This paper would like to challenge that illustration of controversy shared as a popular story. The author of this paper discussed the interaction and gap between science and engineering centering on design basis ground motion for nuclear power plants for regulatory review from the perspectives of science and technology studies. Science (scientists) and engineering (engineers) could collaborate each other, but could have tension between them at the same time, because they have different mission and purpose: science (scientists) define their mission as knowledge production itself, while engineering (engineers) have to solve the problem and show the solution for their clients. The author pointed out that this delicate relationship and differences have effects on the practical policy discussion centering on nuclear risk governance.

In this paper, he tries to apply this perspective on the case of HLW geological disposal safety/risk controversy. For example, on the effect of engineering measures, engineers understand that it is a combination of their efforts and external conditions to reduce risk under the tolerance level, but scientists tend to think the best pair of maximum anti-disaster engineering measures and the preferable external condition could result in the least risk for us. Geological disposal is an exceptional engineering concept in terms of particular combination of engineered artifacts and the nature of geological formation (i.e. so-called “multiple barrier” concept with “artificial barriers” and “natural barriers”). In this particular context, we could observe the interaction of different senses of natural scientific perspective

and engineering' s one. Also, the meaning and implication of the word “isolation” could be understood differently by proponents and critics of HLW geological disposal.

These deep-rooted differences could be amplified through complex interactions in risk governance mechanism and could lead serious miscommunication among them. It could result in the unacceptable social dysfunction centering on the issue of HLW management, which is one of the never negligible risk agenda in our society.

In this presentation, this paper will take the examples of confronting arguments to analyze the differences of missions and presumptions, not to determine the correctness of their statements. By this analysis, the author tries to make better organizing of controversy, to encourage more fruitful and constructive dialogue and discussion among relevant experts.

Keywords: Geological Disposal, High-level Radioactive Waste, Natural Science and Engineering, Risk