

2-2 Characterization of Potential Changes in Geological and Disposal Environment Caused by Natural Phenomena

— Development of Evaluation Procedure for HLW Disposal System Perturbation Scenarios —

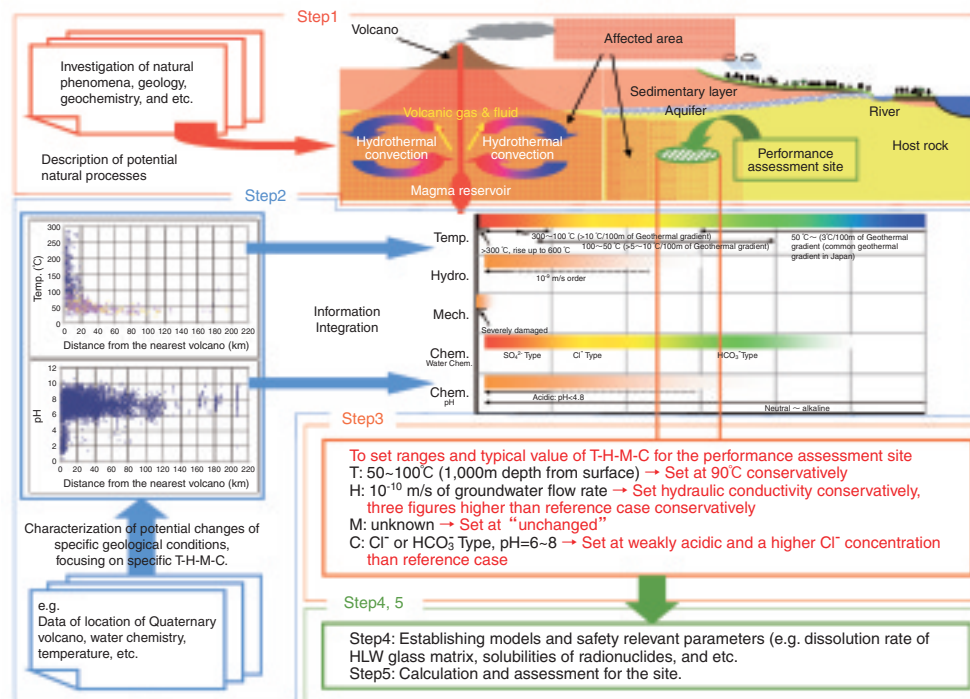


Fig.2-7 Illustration of evaluation procedure of the potential impact of natural phenomena (e.g. Volcanism)

We have developed a formal evaluation method to assess the potential impact of natural phenomena (earthquakes and fault movement, volcanism, uplift, subsidence and erosion, and climatic and sea-level changes) on a HLW Disposal System.

In the "H12" project, JNC developed generic and conservative initial perturbation scenarios, by which to examine other perturbation scenarios. As results of the development of the H12 perturbation scenarios, two points were highlighted for consideration in subsequent work: for improvement of the scenarios, from the viewpoints of reality, transparency, traceability, consistency, and avoiding extreme overconservatism.

Building on this initial work, we have developed a new procedure for creating such perturbation scenarios based on further studies of the characteristics of these natural perturbation phenomena in Japan. The approach to effectively creating the perturbation is divided into five steps (Fig.2-7):

Step 1: Description of potential natural processes and their impacts on the geological environment.

Step 2: Characterization of potential changes of geological environment in terms of T-H-M-C (Thermal – Hydrological –

Mechanical – Chemical) processes. The focus is on determining specific T-H-M-C parameters that influence geological barrier performance, utilizing the input from Step 1.

Step 3: Classification of potential influences, based on similarity of T-H-M-C perturbations. This leads to development of perturbation scenarios to serve as a basis for consequence analysis.

Step 4: Establishing models and parameters for performance assessment.

Step 5: Calculation and assessment.

This study focuses on identifying key T-H-M-C processes associated with perturbations in Step 2. This framework has the advantage that it reliably maintains traceability during the scenario construction processes, facilitating the production and structuring of suitable records. In this framework, scenario development work proceeds in a stepwise manner, to ensure clear identification of the impact of processes associated with these phenomena on a HLW disposal system. Output is organized to create credible scenarios with required transparency, consistency, traceability and adequate conservatism.

Reference

Kawamura, M. et al., Study on Evaluation Method for Potential Impacts of "Natural Phenomena" on a HLW Disposal System, Proceedings of East Asia Forum on Radioactive Waste Management Conference, Taiwan, 2006, p.350-367.