

## **Results of the Peer Review**

# **Siting Process Requirements and Criteria for Scientifically Preferable Areas for Geological Disposal of High Level Waste in Japan**

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**Chair of the International Review Team**

**May 30, 2016**

## NEA Peer Review

- A systematic assessment to assist the requesting country to adopt best practices, to improve established policies and to conform to safety principles;
- The assessment is not meant to approve or disapprove the aspects being examined but only to identify improvements;
- Care is specifically taken in order not to unduly interfere any national decisions.

## Objectives – *as per Terms of Reference*

- The objective of this peer review is to provide an independent review of the siting process for a HLW geological disposal facility in Japan;
- The review will assess the sufficiency and credibility of the current Japanese siting process based on the national and international legislation and guidelines;
- International best practice and good strategies of other national programmes will also be taken into consideration in this review.

## International Review Team

- to provide an independent review. Review results are the views of the experts, not of their affiliated institutes
- consists of four (4) external experts and two (2) NEA staff. The IRT has the following areas of competence:
  - Expert knowledge for developing geological repositories in crystalline and sedimentary rock formations;
  - Expert knowledge for developing national siting processes for radioactive waste.

Reviewer	Organization		Reviewer	Organization
Dr. Stéphane BRASSINNES	Clay Expert Ondraf / Niras, Belgium		Dr. James RUBENSTONE	Volcanologist NRC, USA
Prof. Olivier FABBRI	Structural geologist University of Besancon France		Mr. Timo SEPPÄLÄ	Siting Expert Saanio & Riekkola Oy, Finland
Dr. Gloria KWONG	NEA Secretariat		Dr. Michael SIEMANN	IRT Chair NEA Secretariat

## Schedule

- May 24: Visit to the Mizunami URL. Met with JAEA to learn about R&D activities of crystalline rocks in supporting repository development;
- May 25: Meeting with METI, NUMO and the Geological Disposal Technology Working Group to further discuss the site screening criteria and their application in future site selections;
- May 26-29: IRT closed door meetings;
- May 30: Presentation of results;
- August 2016: NEA Publication of review results.

## Basic concept of geological disposal in Japan

The Japanese geological disposal concept of HLW has the following features:

- The use of multiple engineered barriers (e.g. glass matrix, overpack, buffer, etc) to ensure the failure of one barrier does not jeopardize the containment of radioactivity;
- Only host rocks that exhibit favourable geothermal, chemical, mechanical and hydrological environment to maintain the stability and performance of the disposal system 10,000s years will be selected;
- A repository will be located in areas where there are no known disturbances (caused by natural events) or valuable resources (e.g. coal, oil) to prevent future inadvertent human intrusion.

## Site Selection Process

- The Final Disposal Act specified 3 steps in the site selection process:
  - Literature survey
  - Preliminary investigation stage; and
  - Detailed investigation stage.
  
- In 2015, the Cabinet introduced a nationwide scientific screening process using criteria developed by the Advisory Committee for Natural Resources & Energy.

## Some Examples of the Findings



## Assessments of the Basic Concept & the Siting Process

### **Acknowledgements:**

- The stepwise site selection process is consistent with international practices;
- Ensuring an informed and willing hosting community is consistent with international strategies and meets ethical standards;
- The reference design of a geological disposal system enables the behavior of the repository (over the time periods of interest) to be evaluated.

### **Advisory points:**

- Use clear definitions and terminologies in specifying screening criteria;
- Initiate dialogues between policy makers, regulator, implementer and the public as early as possible, maintain open communications.

## Safety of constructing and operating radioactive waste management facilities

### **Requirement:**

- Safe construction and operation of the surface and subsurface facilities should be considered in siting.

### **Acknowledgements:**

- A high-level reference design and operations plan is used in developing criteria.
- Appropriate regulations, codes, standard and operating experience for similar facilities are considered.

### **Advisory point:**

- Subsurface operations could be considered in addition to surface operations.

## Safety of transportation

### **Requirement:**

- Safety and nuclear security of transportations stipulated by the law and by international standards

### **Acknowledgements:**

- The overall description of transportation methods is comprehensive and the initial optimization of transportation by sea and land is appropriate.
- Considerations have been based on the aspects of minimizing public exposure to radiation and to secure the integrity of the waste packages in regard to nuclear safety.

### **Advisory point:**

- Consideration of near repository transportation can provide flexibility in screening.

## Project Feasibility & Other Considerations

### Requirement:

- The project feasibility aspects have been organized in two categories that are considered relevant when defining preferable areas: “ease of survey after the preliminary investigation phase” and “ease of geological environment evaluation”

### Acknowledgements:

- The feasibility aspects should be taken into account when selecting a site for preliminary investigations.
- As stated in the Interim Summary, it is not appropriate to set exact criteria for nationwide screening at this stage.

### Advisory point:

- The criteria of “ease of geological environment evaluation” could be better explained to improve understanding. The IRT recommends clarification in this regard.

## Summary Conclusions

- The stepwise site selection process as currently specified in the Final Disposal Act and the newly added nationwide scientific screening process are consistent with international practice.
- The METI's current approach to ensure an informed and willing host in each step of the site selection process is consistent with the internationally accepted geological disposal strategy.
- Maintaining open dialogue and interaction between policy maker, regulator, implementer, and the public is considered to be important. The dialogue should be initiated in the early phase and communications should continue throughout the siting process.