

Development of Deep Borehole Seismic Observation System for Nuclear Safety

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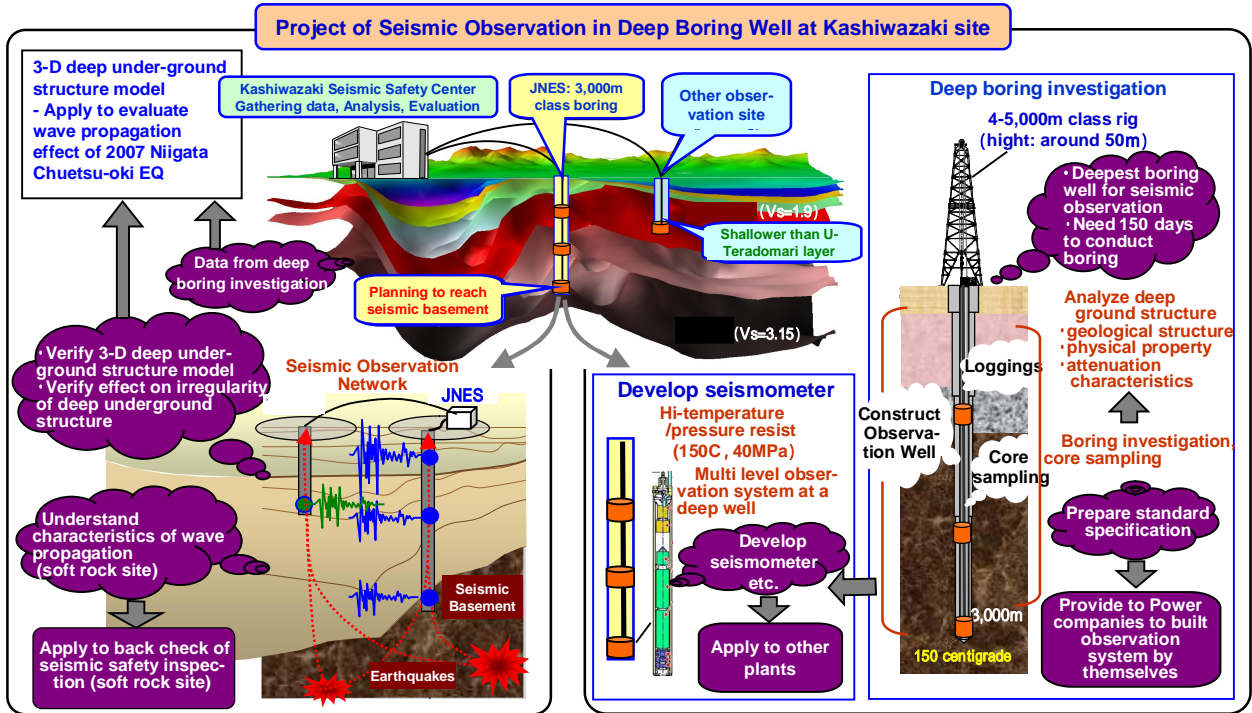
It is an important subject to model underground structure from the depth of seismic basement to foundations for evaluating design basis earthquake ground motion of nuclear facilities. By the knowledge obtained from the 2007 Niigata Chuetsu-oki earthquake, attenuation characteristics of underground from seismic basement to foundations of facilities is realized to affect amplitude levels and frequency characteristics of input ground motion of facilities significantly. To estimate attenuation characteristics of underground, identification technique of attenuation characteristics by analyzing data derived from geophysical surveys and vertical seismic array observation is generally adapted. Since the attenuation characteristics of underground are estimated only from observed data of shallow underground, identified results may have large uncertainty. For this reason, the appropriateness of used evaluation techniques as well as used models is also difficult to verify at the present.

The major purpose of our project is to establish evaluation method of attenuation characteristics in underground at nuclear facility site and observe enough deep underground data to verify. In the project, we conduct 3,000m deep boring survey to reach seismic basement in Kashiwazaki area where Kashiwazaki-Kariwa Nuclear Power Plant is located. We also conduct attenuation (Q value) observation by using PS borehole logging and observe seismic ground motion at multi-level depth to analyze attenuation characteristics and verify adaptability of existing evaluation method.

In addition to these, we are also planning to conduct evaluation of 3 dimensional structure irregularity effect based on existing 3 dimensional underground models and analyze source characteristics such as f-max.

We will report about a summary of the whole project on deep boring survey, expected ground structure around the site, current status of development on the observation system to be installed in deep borehole.

Outline of the project at Kashiwazaki site



Site of deep boring and seismic observation at Kashiwazaki

Boring site: at the ground of Niigata Institute of Technology

Reasons for selecting this site:

- (1) Nature of deep underground structure is similar to that of the Kashiwazaki NPP site.
 - ⇒ The trend of upper surface of seismic basement inclined from the anticline axis toward the sea is similar so that the seismic propagation properties observed might be verified.
- (2) Relatively shallow depth (around 3,000m) is expected to reach the seismic basement.
 - ⇒ Detailed data for all sedimentary layers in the Kashiwazaki area is expected to get.
- (3) Good conditions for setting boring equipments
 - ⇒ Sufficient area is available for drilling work.

