A Study on Volcanic Hazard for Nuclear Power Plant

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Japan Nuclear Regulation Authority (NRA) developed new regulatory requirements for Nuclear Power Plant (NPP) after Fukushima Dai-ichi accident. Evaluation of volcanic hazard for NPP was added in the new regulatory requirements. Evaluation guide for volcanic hazard of NPP was issued in 2013, based on existing guidelines (SSG-21, JEAG, etc.). Now, review of application for permit for the modification of establishment of nuclear facilities has been carried out using the guide. In Japan, most of nuclear facilities are located more than 50km away from volcanos. However, there are some volcanos that caused the very large caldera forming eruptions in the past. Although the frequencies of these eruptions are very low taking into account the plant lives of the nuclear facilities, if these volcanos reactivate, nuclear facilities would suffer serious consequences. In order to reduce uncertainty of evaluation for these volcanic activities, S/NRA/R started a research project on large caldera volcano from 2014. There are three key issues in this project as follows: - Volcanic activity evaluation of dormant volcanos for a long-term - Evaluation of current activity for caldera volcano - Monitoring method of caldera volcano As the first approach for resolving these issues, estimations of magma locations for some caldera volcanos in the past caldera eruptions are carried out based on the geological and petrological survey. Secondly, a simulation model assuming a viscoelastic crust is created for estimating the relationship between magma chamber condition and crustal movement. As a result of the simulation that takes into account the depth of magma chamber in the past eruption, it is difficult to capture the crustal movement in the cases where the magma accumulation time is 50 to 100 times larger than the time of viscoelastic relaxation. This paper will present the details of this research program and results.