

Development of hydrologic characterization technology of fault zones: field validation of methodology

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The Nuclear Waste Management Organization of Japan (NUMO) will select a site for HLW and TRU waste repository through the three-staged program, namely, the Literature Surveys, the Preliminary Investigations and the Detailed Investigations. Areas that are susceptible to natural hazards such as volcanism, faulting and significant uplift/erosion will be eliminated at first. Then, sites that have more favorable geological environment will be selected with respect to the repository design and long-term safety after closure. It is internationally acknowledged that hydrologic features of faults are of special concern in the above respects. It is highly likely from the experiences of site characterization worldwide that one could encounter numerous faults in an area of one hundred square kilometer assumed for the Preliminary Investigations. Efficient and practical investigation programs, and reliable models/parameters for the repository design and safety analysis are important aspects for implementers. A comprehensive methodology including strategies and procedures for characterizing such faults should thus be prepared prior to the actual investigations. Surveys on the results of site characterization in the world indicate potential relevance of geological features of faults such as host lithology, geometry, slip direction, internal structure and alteration to the fault hydrology. Therefore, NUMO, in collaboration with Lawrence Berkeley National Laboratory (LBNL), started a 5-year project in 2007 involving field investigations to develop a comprehensive methodology for hydrologic characterization of faults, with emphasis on the relationship between geological and hydrologic features of faults. A series of field investigations including ground geophysics, geological mapping, trench surveys, borehole investigations, hydrochemical analyses and hydrologic monitoring have been carried out on the Wildcat Fault that runs along the Berkeley Hills, California. The project will be completed by the end of this year to compile all the results into a comprehensive methodology.

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