Role of geochronology of seismic fault in geological disposal of high-level radioactive waste

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The spent fuel from nuclear power generation is chemically processed at a fuel reprocessing plant for use as new fuel. After reprocessing spent fuel and recovery of the uranium and plutonium, the resultant high-level radioactive liquid waste is mixed with raw materials used to make glass. The vitrified waste is encapsulated in stainless steel containers and placed into temporary storage for 30 to 50 years to cool. It will subsequently be placed in a deep underground, geological disposal repository, at a depth of at least 300 m. This outline of geological disposal is defined by the Specified Radioactive Waste Final Disposal Act. The concept of geological disposal in Japan is based on a multi-barrier system which combines an isolating geological environment with an engineered barrier system. A final repository site will be selected via a stepwise process as follows; selection of preliminary investigation areas (PIAs), selection of detailed investigation areas (DIAs) and selection of a repository site. Although the Japanese islands are located within one of the world's most tectonically active areas, a suitable site will be selected by avoiding significant negative geological events, such as faulting and volcanism. Recent advances in tectonic geomorphology and exploration geophysics have made it possible to detect concealed active faults with no surface expression. However, these methods cannot be applied to judging whether faults encountered in borehole and shaft in the stage of detailed investigation are active or not. Therefore, in terms of dating of thermal events due to fault movements and reconstructing uplifting/denudation process of hanging walls associated with reverse fault system, thermochronological approach may provide information on fault activity.