



## **The Contribution of Paleoseismology to Seismic Hazard Assessment in Site Evaluation for Nuclear Installations**

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In the framework of site evaluation/re-evaluation procedures for nuclear power plants (NPP), paleoseismology plays an essential role not only for Fault Displacement Hazard Assessment (FDHA) but also for Seismic Hazard Assessment (SHA).

The relevance of paleoseismology is recommended in the reference IAEA Safety Guide (IAEA SSG-9) and has been dramatically confirmed in recent time especially after the accident at the Fukushima Daiichi NPP caused by the disastrous great Tohoku earthquake and tsunami occurred on 11 March 2011.

After this event, the IAEA International Seismic Safety Center promoted a technical document aimed at encouraging and supporting Member States, especially from newcomer countries, to include paleoseismic investigations into the geologic database, highlighting the value of earthquake geology studies and paleoseismology for nuclear safety and providing standard methodologies to perform such investigations.

In detail, paleoseismic investigations in the context of site evaluation of nuclear installations have the following main objectives: i) identification of seismogenic structures based on the recognition of effects of past earthquakes in the regional area; ii) improvement of the completeness of earthquake catalogs, through the identification and dating of ancient moderate to large earthquakes, whose trace has been preserved in the geologic records; iii) estimation of the maximum seismic potential associated with an identified seismogenic structure/source, typically on the basis of the amount of displacement per event (evaluable in paleoseismic trenches), as well as of the geomorphic and stratigraphic features interpretable as the cumulative effect of repeated large seismic events (concept of “seismic landscape”); iv) rough calibration of probabilistic seismic hazard assessment (PSHA), by using the recurrence interval of large earthquakes detectable by paleoseismic investigations, and providing a “reality check” based on direct observations of earthquake environmental effects.

The detailed guidelines and practical tools presented in this document will be very helpful in the areas of seismic hazard evaluation of nuclear installations and the information will be of great importance in support of post Fukushima Daiichi NPP hazard assessments. The document has been developed by several experts from academic and research institutes as well as from regulatory bodies. It will be published by IAEA in 2015.