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Author Raymond Munier			Date 2012-02-27	
Reviewed by Allan Hedin			Reviewed date 2012-02-29	
Approved by Helene Åhsberg			Approved date 2012-02-29	

SKB's response to additional NEA IRT question regarding seismicity

In an e-mail forwarded from SSM, dated 23 February 2012, the NEA IRT has put the following additional question to SKB as part of the on-going review of the safety assessment SR-Site:

“We would ask why SKB never refers to paleoseismic investigations in TR-10-48, and why SKB considers the magnitude-frequency relationships derived from 100-1000 year records as sufficient.”

SKB gives the following response to the two parts of the question.

Part 1; Paleoseismic investigations

In TR-10-48, p. 88, we refer to Lagerbäck and Sundh (2008) which summarizes the current understanding on paleoseismic events in Sweden. Other relevant references quoted in TR-10-48 are: Bäckblom and Stanfors (1989), Stanfors and Ericsson (1993), Muir Wood (1993) and Munier and Hökmark (2004). The latter references reflect SKB's early ambitions to prioritize research on paleoseismicity. Paleoseismicity is still a prioritized area of research within SKB as reflected in the R&D programme (SKB, 2010).

Part 2; Magnitude-frequency relationships

The Gutenberg-Richter (G-R) relation used in SR-Site was constrained to fit the largest paleoseismic event detected in Sweden, the M8.2 Pärvie fault (Arvidsson, 1996). For longer assessment periods, as discussed in TR-11-01 p. 468, we extrapolated the GR-relations derived from instrumental records (Bödvarsson et al., 2006) and predicted, using proper area normalization etc., about 40 earthquakes of M7 or larger during a glacial cycle. As this number is on a par with the number of unequivocally determined, glacially induced faults that have been mapped in Sweden, we concluded that the frequency-magnitude relations derived by Bödvarsson et al. (2006) could be used for long term assessment. Note, however, that we also made use of estimates that did not rely upon instrumental records (e.g., Fenton et al., 2006) and propagated a range of frequency estimates to cover the uncertainty space (data in Table 10-14 in TR-11-01 propagated to Table 10-20). In the compliance demonstration, only the frequency data in (Bödvarsson et al., 2006) were used for the initial 1,000 years after closure, whereas the frequency data yielding the highest mean number of failed canisters was used for the one million year period, as discussed on p. 480 of TR-11-01.

References

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Svensk Kärnbränslehantering AB

Swedish Nuclear Fuel and Waste Management Co
PO Box 250, SE-101 24 Stockholm
Visiting address Blekholmstorget 30
Phone +46-8-459 84 00 Fax +46-8-579 386 10
www.skb.se
556175-2014 Seat Stockholm

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