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**Ämne:** VB: Letter to SSMs International Expert-group for the Monday-Friday hearing and follow-up  
**Datum:** 15 december 2011 08.31.10 CET  
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**Skickat:** den 10 december 2011 14:02  
**Till:** Registrator; Dverstorp, Björn  
**Ämne:** Letter to SSMs International Expert-group for the Monday-Friday hearing and follow-up

Letter to SSMs International Expert-group for the Monday-Friday hearing and follow-up  
best wishes  
Nils-Axel Mörner

### Till SSM:s Internationella Expertgranskningsgrupp

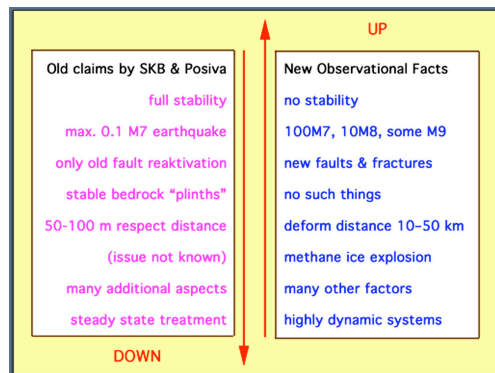
## Geological, Geodynamic & Paleoseismic considerations

The KBS-3 method proposed for the storage of high-level nuclear waste in the bedrock under "safe" conditions for a minimum time of 100,000 years was proposed and in the 1970s and coined in 1983.

The basic assumption for this was an old concept of an exceptional bedrock stability of the Fennoscandian Shield, and it was firmly stated that this was the basic requirement for the method proposed.

Today, in the light of modern achievements in geology, geodynamics and Paleoseismology, this stability concept fundamentally revised.

Therefore, one must talk about a paradigm shift, or an "conceptual fault" as illustrated in the below picture (from *Detta Eviga Avfall*, Mörner, PQR-kultur, 2009).



#### (1) The Earthquake scenario

#### (2) The "respect distance"

SKB claims that the canister can be placed as close as 50-100 m from regional fault-lines and fracture zones. SKB claims that this is the safe "respect distance" they can rely on.

Observational facts violate this proposal in most sites investigated. At the 10,430 BP event in the Stockholm region, a 6-8 m lateral fault was formed 1 km from the primary fault. At the 9663 BP event, strongly fractured bedrock is recorded (some 100 sites) at least up to 40 km from the epicentre.

This implies that there is not bedrock volumes enough for a KBS-3 repository.

#### (3) New faults

SKB claims that all of the postglacial faults are reactivated pre-existing faults.

Reactivation is an important factor, especially when it concerns the deglacial faults, but there are several observations of new fault both in Sweden and Finland.

#### (4) Explosive methane venting tectonics

SKB and Posiva do not consider this factor. Our group have documented and described this novel factor where methane hydrate in the bedrock is explosively transformed into methane gas. This is recorded geochemically in the varved sediments. It is also recorded as violent bedrock tectonization when the ice

SKB (and Posiva) limit their analyses to data from seismology and a few historical events, and make predictions for 100,000 years.

Modern Paleoseismology provides a totally different picture, however. This applies both to magnitudes (up to  $M > 8$ ) and frequency (7 events in 102 varve years).

At present 59 events are recorded, 17 of those were linked to significant tsunami events (of up to 20 m wave height).

Over a time period of 100,000 years, this implies a totally different seismic environment than that proposed by SKB. The difference in energy release is in the order of  $10^{12}$ , which seems to invalidate the proposed "safety" of the KBS-3 concept.

explosively is transformed into gas. The last event occurred as late as 2000 BP, and it set up a 20 m high tsunami wave.

This factor seems to invalidate all talk about a safe deposition of high-level waste according to the KBS-3 concept.

Finally, because these modern findings have been extensively documented and presented in peer-reviewed scientific articles in well-known international journals, and because they all are fundamental for the risk assessment of the proposed KBS-3 repository at Forsmark, they have to be considered by SKB as well as SSM and "kärnavfallsrådet".

*Nils-Axel Mörner, December 10, 2011*