

Large-scale installations in vulnerable and sensitive sea areas surrounded by many different countries

Generic questions:

- whether it is justified to use the criteria and thresholds worked out for open ocean and/or less sensitive areas (that can tolerate much larger pressure);
- whether it is justified to split an extremely complex system of interacting factors into separate analysis of its counterparts;
- whether it is acceptable to divide the analysis of impacts affecting many countries simultaneously into a series of bilateral consultations.

Key problems in the Baltic Sea basin (for any large-scale installation on seabed)

(1) Incomplete (partially classified until today) information on dumped conventional and toxic munitions, war toxins, and mercury.

*Probably the largest individual risk component in terms of **consequences** (although apparently small in terms of the probability of occurrence) for the Baltic Sea in general (with substantial remote effect to all coastal states) form leakage of chemical weapons and war toxins, and damaging of dumped mercury containers resulting from massive explosion of dumped mines or pipeline installation works.*

(2) Re-mobilization of hazardous substances from the deeper layers of the seabed

The pipeline is planned to cross sea areas, where certain layers of bottom sediments are highly polluted (e.g. eastern part of the Gulf of Finland). The construction and the later presence of the pipeline will inevitably lead to the release of certain amounts of extremely toxic substances from these seabed layers into the water column.

(3) Cumulative and long-term impacts

The multitude of potential adverse factors and the long-term commission time (~50 years) may give rise to various cumulative and long-term adverse impacts (for example, remobilization and hydrodynamic re-distribution of contaminants in the Gulf of Finland and their bio-accumulation in natural processes in Finnish, Russian and Estonian EEZ-s over long time).

Particular concerns with respect to the current version of the assessment of transboundary environmental impacts of Nord Stream (Espoo report)

(1) The hydrodynamic model used for reconstruction the flow fields in the Gulf of Finland is not applicable for this basin. Even suggestions given by Finnish scientists with respect to the model parameters (MERI, 2006) have been ignored. In situ information on near-bottom flows (incl. those created by breaking internal waves) that control spreading of sediments and released substances is still missing.

- (2) Highly controversial information about the horizontal and vertical distribution of toxic substances in the upper-layer of bottom sediments of the Gulf of Finland, and the actual impact of their release on the ecosystem, food web, and human health.
- (3) Extremely large differences (up to 10,000 times) in risk estimates for ship traffic; probably because of the following issues: (a) major ship lane and the pipeline almost overlap over several hundred of km; (b) the typical number of people on board is quite large in the Gulf of Finland because of large share of passenger traffic.

Large uncertainties in estimates of these issues substantially affect

- (i) the accuracy of estimates of the release of adverse substances (incl. nutrients) from potentially contaminated sediments into water column both in installation and operational phases,
- (ii) the accuracy of estimates of the concentrations of toxic substances in the food web,
- (iii) the accuracy of estimates of the probability of mechanical damage to the pipeline in operational phase and its structural failure,
- (iv) with subsequent increase in the uncertainties of the estimates of the risks connected with gas leaks, including risks for human lives.

Based on presentation of Tarmo Soomere (co-author Ivar Puura) to the Estonian Parliament 27.10.2009 and on Communication from Estonian Academy of Sciences 29.04.2009