

Contamination of fjords by urban run-off

Arne Pettersen, Gerard Cornelissen, Espen Eek and Gijs D. Breedveld

Norwegian Geotechnical Institute, P.O. Box 3930 Ullevaal Stadion, 0806 Oslo, Norway

E-mail: ap@ngi.no

In Norway serious contamination of marine sediments has been found in fjords and coastal areas. The Ministry of the Environment has identified the abatement of contaminated coastal, fjord and harbour sediments as a top priority for the coming years. Studies have been performed to develop remediation plans for highly contaminated fjords. To significantly reduce environmental risk, remediation involves large areas and consequently high costs. An important part of these studies has been to characterise active sources still contributing to the contamination of the fjord sediments.

Many active industrial point sources have been strongly reduced or eliminated the last decennia. Despite this improvement contaminant levels in sediments and marine biota have not be reduced to a similar extend. This might indicate that diffuse sources are an important source of contaminants. In the present study the contribution of run-off from urban areas to the contaminant load in fjords has been characterised.

As a result of the large seasonal variation in the run-off from paved urban areas, sampling and quantification is challenging. A time integrated sampling method has been developed using the "sedimentary record" of particles deposited in the urban drainage system. This method has been applied in studies in the towns of Drammen, Porsgrunn and Oslo (Bjørsvika). The results shown a considerable variation in the levels of contaminants found in the various towns. High levels of organotin compounds were found practically in all samples, whereas PCB, DDT, PAH and heavy metal levels showed a stronger local variation. The studies clearly emphasize the need for local source identification before remediation plans are put into force. Source quantification makes it possible to determine the level of improvement which can be achieved by remediation given the present active sources of contamination.