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Impact of urban stormwater on sediment quality in an enclosed bay of the Lule River, northern Sweden

RALF RENTZ^{★1}, ANDERS WIDERLUND¹, MARIA VIKLANDER² AND BJÖRN ÖHLANDER¹

¹ Department of Chemical Engineering and Geosciences, Luleå tekniska universitet, 971 87 Luleå;

*correspondence: ralren@ltu.se

² Department of Civil, Mining and Environmental, Engineering Luleå tekniska universitet, 971 87 Luleå; marvik@ltu.se

Sediment samples and porewater of an enclosed bay (*Skutviken*) affected by stormwater discharge near the centre of Luleå, northern Sweden, were analyzed for major and trace elements and 16 polycyclic aromatic hydrocarbons (PAHs), and compared to a reference site and local till. Among the studied metals, Cd, Cu, Pb and Zn were enriched at *Skutviken*. The use of trace metal ratios provided indications of pollutant sources for the sediment. Also, the PAH content was enriched, in particular for phenanthrene, anthracene, fluoranthene and pyrene, which are regarded as common constituents in stormwater. Pb-210 dating was used to determine historical changes in metal and PAH fixation in the sediment. The bay *Skutviken* was enclosed by the construction of a road bank in 1962. The enclosure led to reduced water circulation in the bay, which promoted the occurrence of anoxic conditions with sulphate reduction within the bay. As a consequence of these conditions, metals are trapped in the sediments as sulphides.

This study suggests that enclosed bays with restricted water circulation may be efficient traps for urban pollutants. In areas with postglacial rebound, where such bays are common, enclosure may have an important impact on water and sediment qualities.

Due to the postglacial uplift, presently water covered sediments may rise above the groundwater level in the future. These sediments may then become a secondary pollution source if metal sulphides are oxidized.