

# **Use of TXRF and Convectional Energy Dispersive X-ray Fluorescence Analysis (EDXRF) to determine trace metal concentrations in waters of Nakivubo Channel and Lake Victoria**

## **Abstract:**

To understand better the pollution levels in the waters of the Nakivubo Channel and Lake Victoria, the concentrations of manganese (Mn), iron (Fe), cobalt (Co), copper (Cu), zinc (Zn) and lead (Pb) were determined using convectional Energy Dispersive X-ray Fluorescence Analysis (EDXRF) and Total X-ray Fluorescence (TXRF) analysis. Particulate deposits were analysed for trace metals with a convectional EDXRF spectrometer. Extracted dissolved metals contents were analysed with Total Reflection X-Ray Fluorescence. The analyses indicated higher copper concentrations in the filtrate samples collected at the rivermouths and inshore stations than on the particulate matter. Samples from battery manufacturing industry-1 indicated copper concentrations in the filtrate exceeding the National Environmental management Authority (NEMA) drinking water standard of  $1.0 \text{ mg L}^{-1}$ . Free zinc concentrations were measured for almost all the sampling sites, but at concentrations below the  $3 \text{ mg L}^{-1}$  NEMA standard. High concentrations of iron in the labile form measured at the lake shores were above NEMA drinking water standards of  $0.3\text{--}3.5 \text{ mg L}^{-1}$  in 2006, except for the April 2006 Murchison Bay rivermouth, and for low manganese concentrations in the lake waters. The iron and manganese concentrations on the particulate matter at the upstream end of the Channel, but were lower in the lake waters. Effluents from soap manufacturing industries exhibited elevated total iron concentrations, ranging from  $19.038 \pm 0.190$  to  $63.129 \pm 6.248 \text{ mg L}^{-1}$  throughout the 2-year study period. The manganese concentrations were the highest for the battery manufacturing industry-2 site in April 2006. The total iron and manganese concentrations were generally higher upstream along the Nakivubo Channel than in the lake waters. Cobalt and lead concentrations were below detection limits for most of the sampling sites. Generally, most metal concentrations along the Nakivubo Channel exceeded acceptable limits, illustrating the need for mitigation measures.