X-RAY FLUORESCENCE ANALYSIS OF METAL CONTAMINATION IN THE NORTH RIVER DRAINAGE BASIN

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The North River Drainage Basin is largely contained within the coastal Massachusetts towns of Salem and Peabody, approximately 15 miles north of Boston. The basin is a significant source of freshwater entering into Salem Sound which is heavily used as a recreational area by the local population. Waste water from tanneries and other industries have been known to be emptied into the North River for over 200 years. This waste water could remain a health risk for humans and animals that come into contact with sediments containing heavy metals derived from the waste products. To assess the potential for health hazards associated with heavy metal contaminants, sediments within the drainage basin were analyzed with a portable workstation x-ray fluorescence analyzer. The metals of interest in this study include As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, and Zn. In general, portable x-ray fluorescence is an efficient way to screen areas that may contain harmful concentrations of these metals. Preliminary results of this study indicate concentrations of some of the metals in excess known to cause adverse effects to 10-50% of the biological population within the sediments and may pose a health risk to humans. The specifications of the portable x-ray fluorescence spectrometer used in this study, the data collection techniques, results of the sediment analysis, and the distribution of heavy metals in the drainage basin will be presented.