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BIOACCUMULATION MONITORING -- A KEY COMPONENT OF A  
MULTI-DISCIPLINARY MONITORING PROGRAM

M.J. Peterson  
G.R. Southworth

Environmental Sciences Division  
Oak Ridge National Laboratory\*  
P.O. Box 2008  
Oak Ridge, Tennessee 37831-6036

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1. Author list: Peterson, M. J. and Southworth, G. R.
2. Key Words: Bioaccumulation; Contamination; Trends; Biomonitoring.
3. Presenting author and affiliation: Mark J. Peterson, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
4. Author to contact (we suggest that this be the presenting author)  
M. J. Peterson PO Box 2008, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6036.  
Phone number (865)576-3461  
FAX number (865)576-3989  
E-mail address petersonmj@ornl.gov
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**Bioaccumulation monitoring – A key component of a multi-disciplinary monitoring program.**

Mark J. Peterson\* and George R. Southworth. Oak Ridge National Laboratory, Oak Ridge, Tennessee. Bioaccumulation monitoring has been an important component of a long-term, multifaceted monitoring program that was designed to evaluate the ecological condition of streams negatively affected by various U.S. Department of Energy facilities. Bioaccumulation monitoring provides an assessment of contaminant exposure to biota that may be a more direct measure of ecological and human health risks than aqueous chemical measurements alone (which may require more extensive modeling or extrapolation to assess risks). For example, monitoring of game fish for polychlorinated biphenyls (PCBs) can provide a more accurate, time-averaged measure of exposure than does water sampling because significant PCB accumulation can occur in fish even though aqueous PCB concentrations are below routine detection limits. Long-term trending of contaminant concentrations in biota is also of value in addressing monitoring goals. In some aquatic systems, water quality has been shown to improve over time, as measured by aqueous sampling and ecological community metrics, yet bioaccumulation and/or bioavailability increased. One of the most striking examples in this monitoring program involved the reduction of fly ash discharges to a quarry that resulted in decreased selenium concentrations in water and fish and improvement in benthic macroinvertebrate and fish community measures. Mercury concentrations in fish increased dramatically over that same time period, despite the fact that aqueous mercury concentrations were typical of uncontaminated waters. Without bioaccumulation monitoring, recovery, in this case, could have been overstated and the relative risks and benefits of the changes not accurately determined. Bioaccumulation monitoring, conducted in conjunction with aqueous sampling and instream community measures, is an important task for any comprehensive biomonitoring program.