

# INDUSTRIAL WASTEWATER TREATMENT WETLANDS

## Reducing copper concentrations below NPDES limits

The Pennsylvania Department of Environmental Protection (DEP) required a copper tubing manufacturer to treat its discharge of cooling tower blowdown and storm water due to exceedances of the facility's NPDES permit limits for copper. By conducting a detailed evaluation of the facility's water discharges, Liberty Environmental, Inc. staff determined the cause of the permit limit exceedances, and designed and implemented the most feasible alternative. Based on the effectiveness, cost, and maintenance characteristics, the selected alternative was a constructed wetland which uses phytotechnology to remove copper from wastewater and storm water. The constructed wetland was designed as a gravity-fed and self-maintaining system, which is unlike traditional treatment systems that require operation and maintenance of pumps, filters, and other mechanical equipment, as well as usage of chemical additives, which require significant ongoing expenditures for materials, labor and energy.

A wetland removes metals from water through four mechanisms – adsorption, absorption, ion exchange, and precipitation caused by microbial oxidation and reduction. Bacteria, precipitating metals as hydroxides and sulfides catalyze oxidation and reduction reactions. Ion exchange, adsorption and absorption occur as dissolved and precipitated metals contact the peat and wetland vegetation. Wastewater treatment wetlands that are designed for contaminant removal are capable of providing highly efficient biochemical and physical removal of contaminants associated with dissolved and suspended metals in the wastewater stream.

Through this low maintenance and cost-effective technology, the manufacturer has achieved an 85% reduction in copper concentrations in the wastewater during the first 3 months of operation. Also, maximum copper concentrations have been reduced by 90%. No exceedances of the facility's NPDES limits have occurred since the start-up of the treatment wetland.



Project Startup



Basin Excavation



Construction Oversight



Geotextile Installation



Liner Installation



Cover Soils & Planting



Inlet Structure



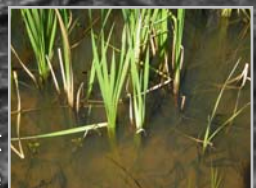
Basin Startup



System Oversight



Plants Established



Project Complete



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