

# Mass Balance Studies of Volatile Chlorinated Hydrocarbon Phytoremediation

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In field-scale mass balance studies of poplar remediation of carbon tetrachloride (CT), more than 95% of the mass of CT was degraded with all of the CT chlorine accountable as chloride ion accumulation in the soil. Atmospheric loss of CT through leaf transpiration and trunk diffusion was insignificant. These findings are consistent with previously reported uptake and degradation of trichloroethylene (TCE) by poplar. Poplar phytoremediation of CT and TCE results in little decrease in aqueous concentration, since water is taken up at about the same rate as the chlorinated compounds. From this result we predict that phytoirrigation – the application of pumped contaminated groundwater to planted systems – will result in concentrations of the pollutants at the bottom of the root zone that are higher than permitted regulatory levels. Such plantations will be susceptible to loss of contaminants during rainfall events, possibly resulting in pollution of uncontaminated soil. Greenhouse studies of pollutant profiles in the media beneath poplar trees that were surface irrigated with TCE and CT confirmed that regulatory concentrations of these pollutants were not achieved in the root zone of the poplar; rather concentrations fell by less than 50%.

*Key words:* Carbon Tetrachloride, Groundwater, Trichloroethylene, Remediation