**Rosemary Carroll**

Evaluating the Impacts of Uncertainty in Geomorphic Channel Changes on Predicting Mercury Transport and Fate it the Carson River System, Nevada

John J. Warwick, Ph.D., Environmental Engineering, Executive Director, Desert Research Institute, Division of Hydrologic Sciences, 2215 Raggio Parkway, Reno, NV 89512, Tel: 775-673-7379, Email: John.Warwick@dri.edu
Rosemary Carroll, M.S., Hydrology, Research Scientist, Desert Research Institute, Division of Hydrologic Sciences, 2215 Raggio Parkway, Reno, NV 89512

The Carson River is one of the most mercury contaminated fluvial systems in North America . Most of its mercury is affiliated with channel bank material and floodplain deposits, with the movement of mercury through this system being highly dependent on bank erosion and sediment transport processes. Mercury transport is simulated using three computer models: RIVMOD, WASP5, and MERC4. Model improvements include the addition of a bank package that accounts for flow history. The rates at which river stages are rising or falling will, in turn, impart time-dependant and vertically variable MeHg concentrations within the channel banks along the Carson River. Also, Lahontan Reservoir's geomorphic characteristics have been refined along with the explicit tracking of a temporally and spatially varying colloidal fraction. The augmented and refined modeling approach results in more accurate and realistic simulation of mercury transport and fate. An extensive uncertainty analysis, involving characterizing the co-variance of two calibration parameters used to define bank erosion and overbank deposition, will define the degree of expected variation in model predictions relative to limitations posed by available field data.

**Manweet Waria**

Field-Scale Cleanup of a Pesticide-Contaminated Soil with a Combined Chemical-Biological Approach

Manmeet Waria, School of Natural Resources, 255 Keim Hall, University of Nebraska-Lincoln, Nebraska-68583, Tel: 402-560-8854, Fax: 402-472-7904, Email: mwaria1@bigred.unl.edu
Tunlawit Satapanajaru, Kasetsart University , Bangkok , Thailand 10900, Tel: 662-942-8036
Steve D Comfort, School of Natural Resources, 255 Keim Hall, University of Nebraska-Lincoln, Nebraska-68583, Tel: 402-472-1502, Fax: 402-472-7904

A former agrichemical dealership in North Platte , NE was suspected of having contaminated soil from multiple work-related spills. Dealership property was grid sampled and found to contain high concentrations of atrazine (>300 mg/kg) and cyanazine (>500 mg/kg). The top 60-cm of soil was removed, placed in windrows, and thoroughly mixed with a mechanical high-speed mixer. Mixing homogenized the contaminated soil and lowered pesticide concentrations via dilution. Laboratory investigations were then initiated to determine optimum treatments for pesticide destruction. Using zerovalent iron (Fe0) as a chemical reductant along with ferrous sulfate (FeSO4·7H2O), we observed greater than 70% destruction of both pesticides within 14 d. We also evaluated emulsified soybean oil (EOS® concentrate 598B42) as a carbon source to stimulate biodegradation and found it was also effective in degrading atrazine and cyanazine (~75%). Combining soybean oil with the chemical amendments resulted in higher destruction efficiencies (80-85 %) and reduced the percentage of FeSO4 needed. Field treatments were applied (2.5 % Fe0 + 1% FeSO4·7H20 and Oil) to ~360 yd3 of contaminated soil, water was added (0.30 kg water kg-1 soil) and soil windrows were covered with clear plastic to reduce loss of soil moisture. Temporal sampling through 60 days showed destruction of 75 to 80% for both atrazine and cyanazine. These results provide evidence that both chemical and biological approaches can be used for on-site, field-scale treatment of pesticide-contaminated soil. Investigation of pesticide degradation products are ongoing and will also be presented.

**Na Wei**

Anaerobic MTBE and TBA Biodegradation under Different Terminal Electron Accepting Processes

Na Wei, University of Illinois - Urbana Champaign, Dept of Civil and Environmental Engineering, NCEL 205 N. Mathews, Urbana, IL, 61801, Tel: 217-333-8121, Email: nawei2@uiuc.edu
Kevin T. Finneran, Assistant Professor, University of Illinois - Urbana Champaign, Dept of Civil and Environmental Engineering, NCEL 205 N. Mathews, Urbana, IL, 61801, Tel: 217-333-1514, Fax: 217-333-6967, Email: finneran@uiuc.edu

The fuel oxygenate methyl tert-butyl ether (MTBE) is a prevalent groundwater contaminant, and its key degradation intermediate tert-butyl alcohol (TBA) often accumulates in subsurface environments. Although studies have reported potential for aerobic microbial degradation of MTBE and TBA, in situ conditions within proximity of source areas are typically anaerobic, and moreover, oxygen introduced artificially can be consumed quickly by chemical oxidation of Fe (II) and sulfides. Source area bioremediation strategies must encompass anaerobic conditions from nitrate reduction, Fe (III) reduction, sulfate reduction to methanogenesis, as these processes shift from higher to lower redox processes. This research has investigated the mechanisms and kinetics of MTBE and TBA biodegradation under shifting anaerobic conditions.

Microcosm experiments were initiated using petroleum contaminated sediment, river sediment, and anaerobic digester sludge. Radiolabeled (14C) and non-radiolabeled MTBE and TBA were amended to different incubations to quantify MTBE/TBA biodegradation. Different electron acceptor amendments and electron shuttling amendments were added to identify the MTBE degradation (and potential TBA accumulation) dynamics as conditions shift from one dominant process to another. To date the microcosms are in acclimation stage with up to 5% recovery of [U -14C ]-MTBE or [U -14C ]-TBA as 14CO2. Data suggest that fumarate and electron shuttles increase the extent of MTBE biodegradation; however, TBA degradation is slower than corresponding MTBE incubations. Sulfate increases the rate of MTBE and TBA biodegradation, but is very dependent on the starting material. Liquid enrichments with petroleum contaminated sediment degraded MTBE and TBA in less than one month under nitrate reducing, Fe (III) reducing, sulfate reducing and fumerate reducing conditions. These liquid enrichments may provide a model, anaerobic microbial culture for investigating basic cellular processes related to anaerobic MTBE and TBA biodegradation – currently, no such anaerobic culture has been reported. These data suggest that anaerobic MTBE/TBA biodegradation is influenced by shifting electron accepting processes, and the effects of these geochemical factors on MTBE/TBA degradation continue to be investigated.