EPA Science Forum 2003
Partnering to Protect Human Health and the Environment

Unique Chemistry Solutions to Regional Issues

Moving Science into Action

U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Environmental Sciences Division, Las Vegas, Nevada

Introduction

Many of ORD's research projects relate to broad scientific themes, such as biological and chemical indicators or computational toxicology. Others are discreet studies resulting from requests by clients or contacts with collaborators (in a number of scientific disciplines). This poster presents a montage of recent "grass roots" research efforts that the Environmental Chemistry Branch (ECB) at NERL-Las Vegas has conducted in response to real-world analytical chemistry problems of the Regions, the States, and Tribal authorities.

A Tale of Two Rivers

A six mile stretch of a beautiful South Carolina river became sick. State of South Carolina officials needed confirmation that an organotin factory might be responsible.

Water and fish are collected. Using state-of-the art methodologies organotins are detected in all samples. Data is provided to State of South Carolina and Region 4.

Case goes to court – three company employees plead guilty, they are sentenced, the factory is shut down and fines are levied to help pay toward cleanup costs.

What Do Dietary Surveys of Alaskan Tribes, Inspection of Fish for NOAA, and Hair-Collection in Washington State All Have in Common? *Mercury*

Tribal authorities, the State of Alaska, and National Institute of Environmental Health Sciences (NIEHS) requested help for mercury dietary studies. Study under way to look at mercury content in indigenous food sources (fish, seagoing mammals) using a recently developed method that can determine mercury directly in solid matrices.

NOAA's National Seafood Inspection Laboratory in Mississippi requested help to determine mercury levels in Gulf of Mexico fish. Measurement-validation reports and technical advice were provided.

Collaborations with Washington State and Region 10 to assess the mercury exposure to an Asian-American community in the Puget Sound area. Hair-collection and analysis protocols, study-design suggestions, and data are being provided for risk assessments.

What? Your Frogs Are Disappearing!

Millions of tons of pesticides are used in the San Joaquin Valley of California every year. How much is transported by winds into the nearby southern Sierra Nevada? Could this be a cause for the disappearance of the mountain yellow-legged frog in much of the area?

ECB, working closely with EPA Biologists, is conducting a comprehensive survey to help Region 9, the National Park Service, and the State of California understand the impact of pesticide contamination in the alpine lakes of the southern Sierra Nevada mountains. This data will better help our clients decide if steps need to be taken to protect these sensitive ecosystems.

ICE-man Cometh

Region 2/State of New Jersey – Increased incidence of childhood cancers at Toms River, NJ. Help requested – ICE applied – identifications of unknown contaminants reported to State of New Jersey – toxicological tests are now under way.

Region 3 – Bad smelling water in nearby town. A tar-like substance is removed from a nearby site and sent to the laboratory - ICE applied – identification made – tar-like substance linked to bad smelling water - source is found for chemical contaminants.

Region 4 – Well water samples from nearby town are contaminated with unknown contaminants – increasing illness – ICE applied – identifications made – risk assessments under way.

Region 9 – Superfund site needs cleanup – ICE applied – identifications made – Potentially Responsible Parties (PRPs) can be traced and levied to pay for cleanups.

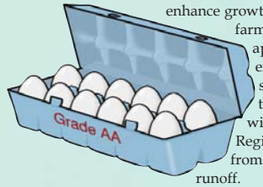
Ion Composition Elucidation - ICE

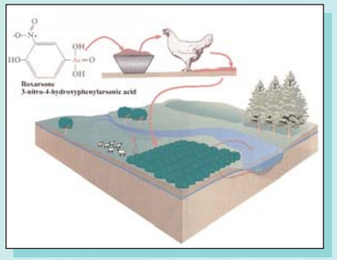
ICE is a newly developed high resolution mass spectrometric software technique that often allows the identification of unknown chemical contaminants under non-ideal circumstances.

http://www.epa.gov/nerlesd1/chemistry/ice/about.htm

This Isn't Your Mother's Henny Penny Fairy Tale

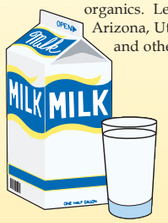
Region 3 – Delmarva Peninsula – More chickens (and poultry farms) than people. Many dietary arsenical feed additives are fed to chickens to enhance growth. Runoff from farm waste ponds and application of chicken manure leads to stream contamination. ECB teams with USGS to assist Region 3 evaluate risk from factory-farm runoff.





What Are You Drinking in Your Milk?

Region 2 requests assistance in identifying whether vinyl chloride (known human carcinogen) is present in milk samples. A ECB-unique patented process (vacuum distillation) is applied to detecting volatile organics. Leads to wider survey of milk from Nevada, Arizona, Utah, and California for the fuel additive MTBE and other volatile organics.



Protecting Your Environment With Environmental Forensic Chemistry

ECB expertise: mass spectrometry, computational toxicology, separation techniques, sample preparation and cleanup techniques, ground-water migration, ICE, high resolution mass spectrometry, mercury methodologies, inorganic methodologies, organic methodologies, vacuum distillation, volatile organic methodologies, mass spectrometry, organotin speciation, PPCPs,† arsenic speciation, gas chromatography/mass spectrometry, unique MS sample introduction techniques, mass spectral interpretation.

†*http://www.epa.gov/nerlesd1/chemistry/pharma/*

Notice

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