

# DEPARTMENT OF ENERGY 10<sup>TH</sup> ANNUAL BUSINESS CONFERENCE

Remediation Technologies and Environmental Management of Groundwater Contaminants

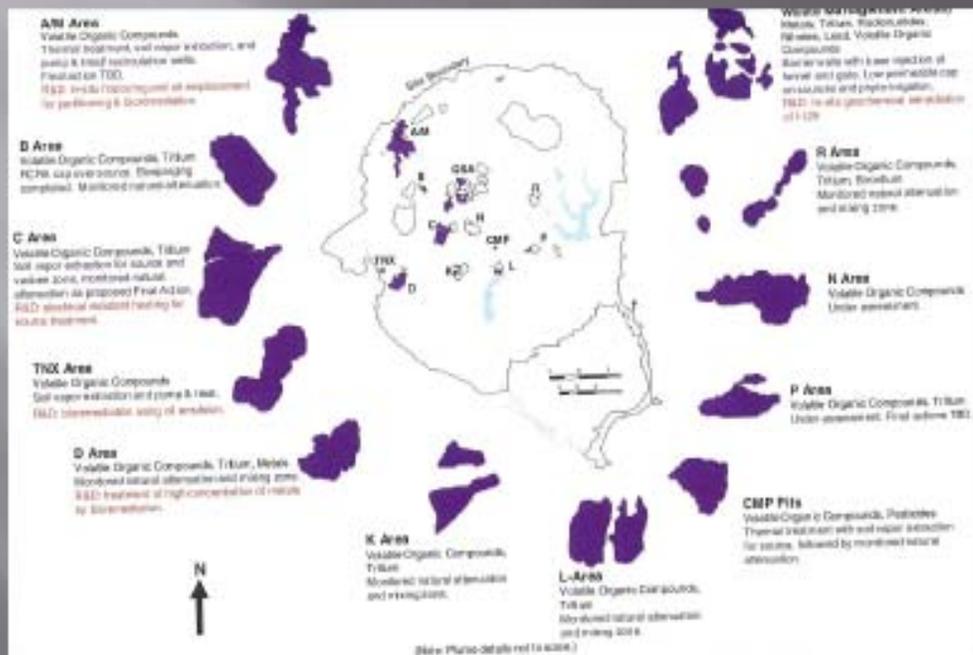
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## Bioremediation of Metals in Coal Pile Runoff at SRS D Area



# Use of pH and Redox as a Bioremediation Strategy

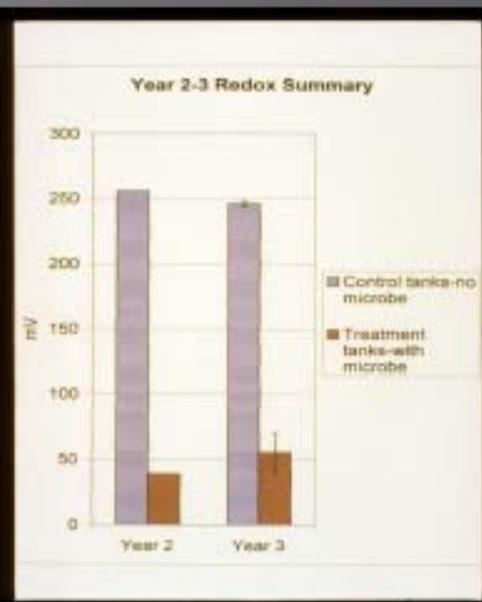
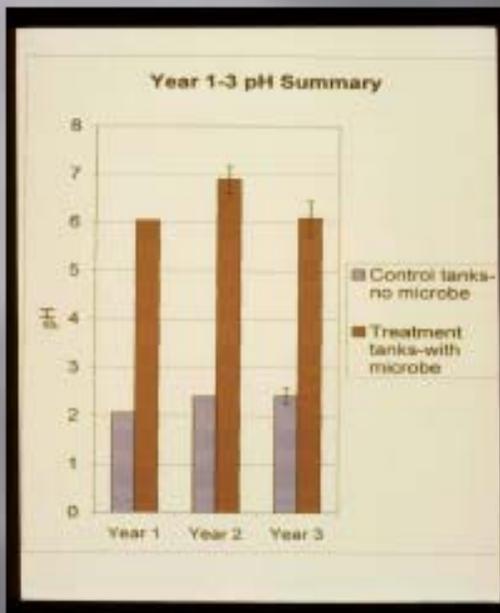


Waste Site - D-Area Coal Pile Run Off Basin

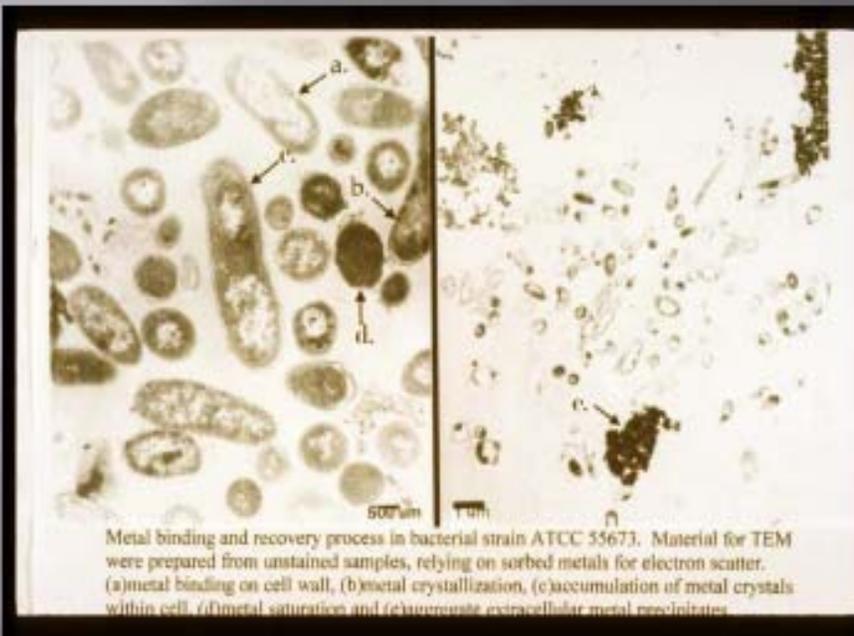


Demonstration Site at SRS Per Pond

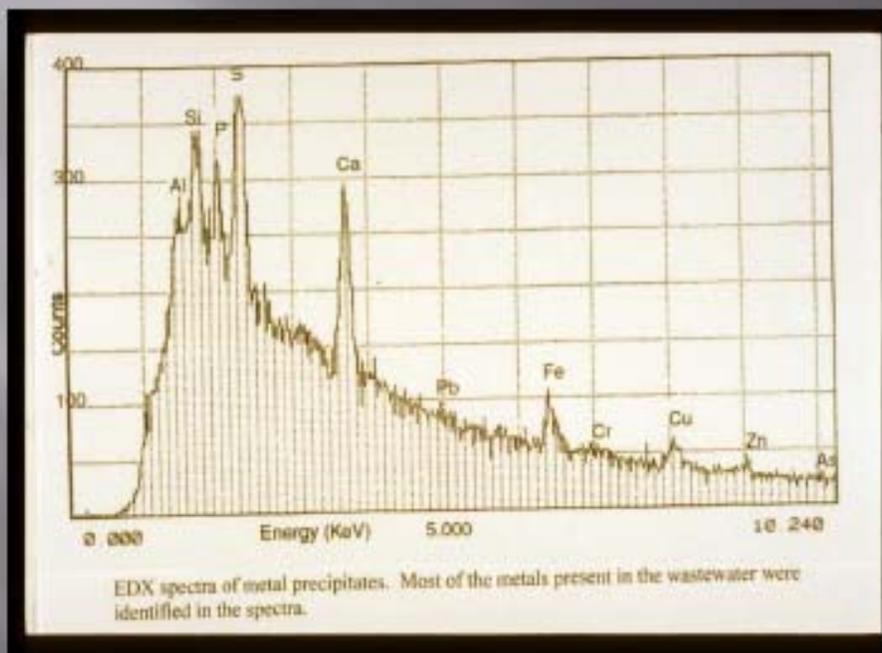
## Three-Year Summary Results



## Mechanisms of Metal Precipitation by a Metal-Resistant Bacterium



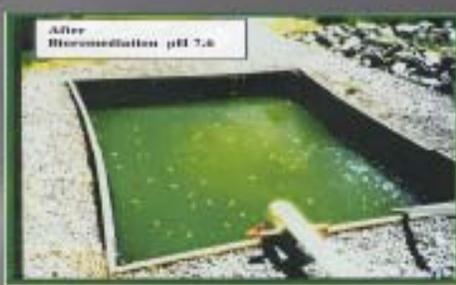
## EDX Analysis of Metal Precipitates



# Bioremediation of Metals in Acid Mine Drainage



# Restoration of an Acid Mine Drainage and Precipitation of Metals



# Sequential Anaerobic-Aerobic Degradation of Munitions Waste

Figure 1

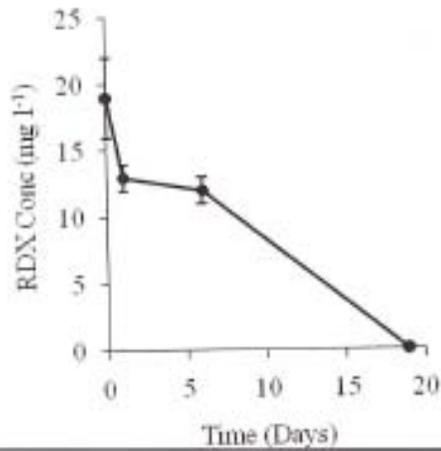
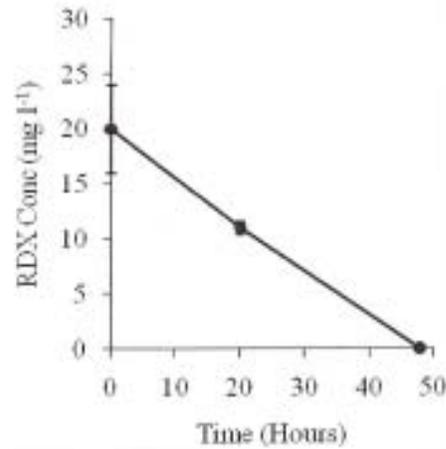
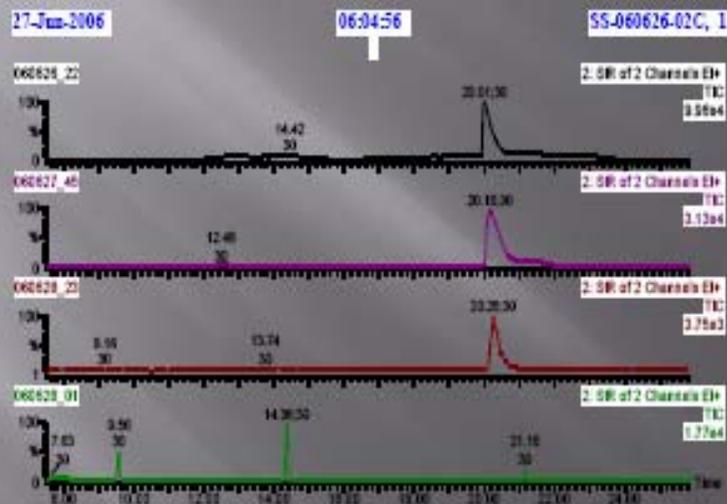


Figure 2



# Mass Spectra of RDX Degradation



# Protein Expressions and RDX Degradation

Figure 3

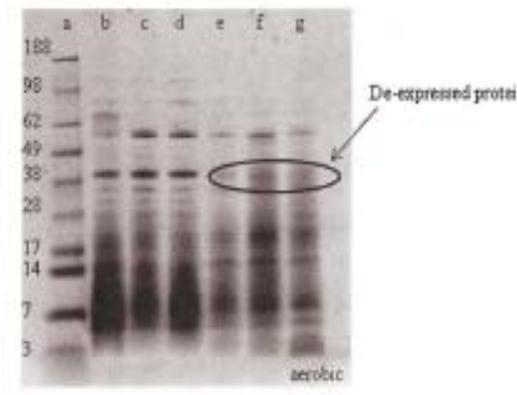
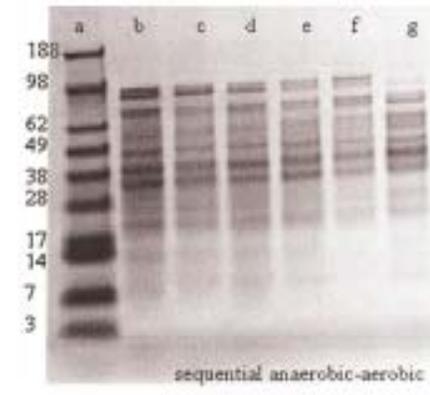
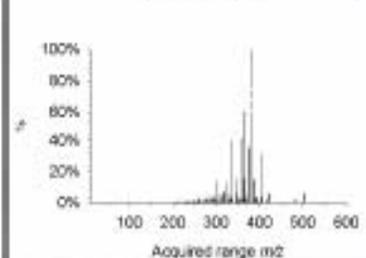
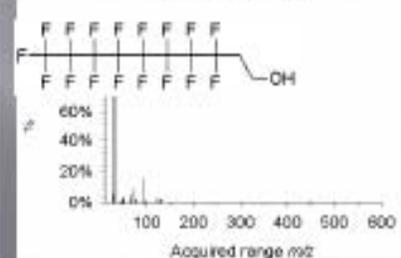
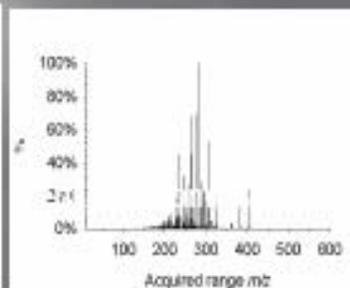
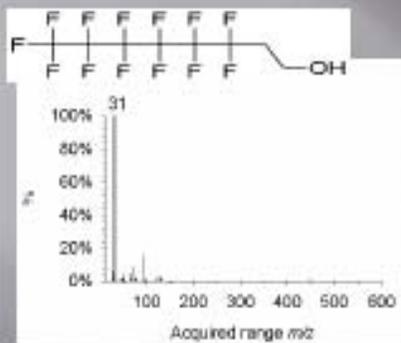


Figure 4



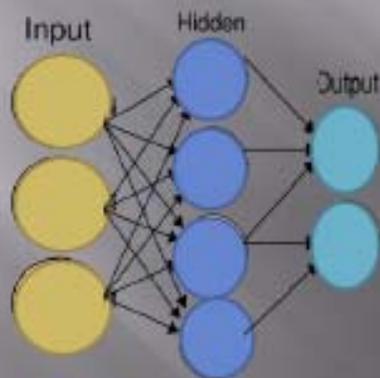
## Bioremediation of Emerging Groundwater Contaminants Perfluorotelomer Alcohols



Solid-Phase  
Microextraction  
Approach

SPME-GC-MSMS

# ARTIFICIAL NEURAL NETWORK OPTIMIZATION FOR MODELING ENVIRONMENTAL PROCESSES



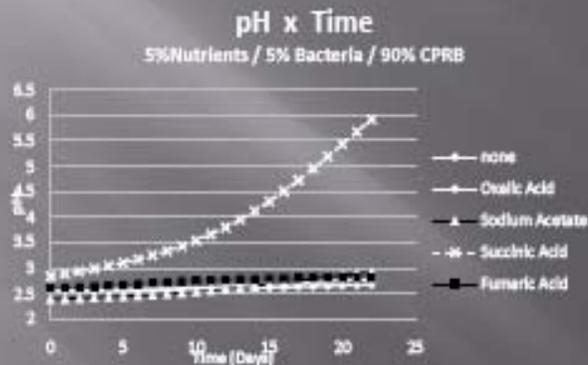
The approach is based on a concept modeled off of the biological neural system where the group of neurons symbolize the hidden nodes in a NN.

This is because signals or inputs are received by the neuron or node and the summation of the signals create a weighted value that will correspond to a specific output.

## A Brief Overview of the Neural Network



# Predicting outcome of Metals Remediation



## Summary

### Research capabilities

Environmental management and remediation of groundwater and wastewater contaminants

- Contaminants include metals, VOCs, radionuclides, and munitions wastes
- Protein expressions and analysis of biochemical pathways of contaminants
- Neural Networks for predicting environmental systems

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### Students

Juandalyn Coffen, Erin Jackson, Danielle Doss  
Samantha Houston & Bianca Coley

Research Associate Dr. Yassin Jeilani

Post Doc-Dr. Gustavo Menezes

## Pertinent References

- ▣ Ibeanusi V, and E. Wilde (1998), Bioremediation of Coal Pile Run off Waters Using an Integrated Microbial Ecosystem. *Biotechnology Letters*, Vol 20:1077-1080. Publishers: Chapman and Hall, UK
- ▣ Ibeanusi, V., P. Donna, and M. Thompson (2003), Removal and Recovery of Metals from a Coal Pile Run off, *Environmental Monitoring and Assessment*, 80:35-44. Kluwer Academic Publishers. Printed in the Netherlands
- ▣ Victor Ibeanusi\*, Yassin Jeilani, Samantha Houston, Danielle Doss, and Bianca Coley (2009) **Sequential Anaerobic-Aerobic Degradation of Munitions Waste** , *Biotechnology Letters*, Springer Science
- ▣ Yasin A. Jeilani, and Victor M. Ibeanusi (2008), Tandem Mass Spectrometric Fragmentation of Phthalate Esters Using Precursor Ion Scans . Submitted to the *Journal of Mass Spectrometry*