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Principal, Bioremediation and Bioprocess Consulting (BBC) • President INOTEC INC.
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AREAS OF EXPERTISE

- Biological Process & Bioremediation Develop.
 - Bioreactor / In Situ Treatments
- Process Evaluation & Optimization
- Wastewater, ARD & Site Evaluations
- Permitting / Risk Assessment / Contingency Plans

EDUCATION

- Ph.D. Molecular / Environmental Microbiology, Utah State Univ., Logan, UT
- M.S. Microbiology / Civil & Environ. Eng., Utah State Univ., Logan, UT
- B.S. Cell Biology / Biochemistry, Univ. of Utah, Salt Lake City, UT

PROFESSIONAL OVERVIEW

2009 – Present – President and founder of *INOTEC* Inc. - Salt Lake City, UT
2003 – Present. Research Professor – Metallurgical Eng., University of Utah,
1995 – Present. Research Professor – Microbiology, Weber State Univ., Ogden, UT
2003 – Present. Principal, *BBC*, Park City, UT
2005 – Present. Dir., Modified/Activated Carbons Technology Center, University of Utah, SLC, UT
1993 – 2004. Research Professor – Civil & Environ. Eng., University of Utah, Salt Lake City, UT
1997 – 2001. Adjunct Professor - Civil & Environ. Eng., Utah State Univ., Logan, UT
1996 – 2003. President/Founder & VP-R&D, Applied Biosciences Corp., Salt Lake City, UT
1996 – 2003. Dir., Center for Bioremediation, WSU, Ogden, UT
1991 – 1996. Biotechnology Director, U.S. Bureau of Mines, Salt Lake Research Center, SLC, UT
1984 – 1991. Program Manager/Analyst, Joint Operational Test and Information Directorate (Joint Chiefs of Staff), Dugway Proving Ground (DPG), UT
1979 – 1984. Program Manager, Aerobiology / Biotechnology, Life Sci. Div. (MT-L), DPG, UT

BACKGROUND

Education and training in microbial isolation, characterization, evaluations, and microbial environmental interactions. Dr. Adams' career represents a good balance between microbiology, engineering, chemistry, and microbial process/ bioremediation development and program management. Research focuses on molecular and environmental aspects of microbiology; developing new microbial characterization methods and bioprocesses and biotreatment methods; understanding microbial persistence and function in water, soil, and atmospheric environments; and enhancing microbial survival, growth, and metabolic activity in diverse environments. Environmental research examines relationships between microbial function, metabolism, and treatment system engineering and design to optimize microbial transformations of various organics and metals including Se, As, Hg, Cr, Cd, Zn, Hg, etc., inorganics (cyanide and nitrate) and mitigation of acid drainage.

Professional experience covers expert witness on microbial and environmental processes; development and application of new biological processes and treatment systems for water, sediment, and atmospheric environments; development of environmental treatment and contingency plans; and investigation of microbes and microbial processes in diverse environments. Recent areas of focus include microbial and microbial population interactions and characterization, microbial transformation of petroleum hydrocarbons, metals, and nitrate from water and soils found mining settings. Bioprocesses and bioremediations have been applied in mining environmental settings ranging from hot arid to cold wet environments and in treatment of river and lake sediments. Treatments have effectively removed both low level contaminants and contaminants present at very high concentrations in both low and high volume settings.

REPRESENTATIVE EXPERIENCE

Bioprocess - Development / Application / Optimization

- Author of innovative water treatment technology patents for organics, metals, and inorganics (nitrates)
- Designed and implemented full-scale biotreatments/bioremediations at sites in Montana, South Dakota, Colorado, Utah, Texas, Nevada, Canada & South America to remove metals and inorganics (nitrates)
- Reworked designs for numerous biological processes and bioremediations for better performance - US, Canada, South and Central America, UK, and Europe
- Designed and tested numerous pilot-scale and bench-scale process/remediation evaluation projects for petroleum hydrocarbons, metals, and inorganics (nitrates and cyanide) in waters, sediments, and soils
- Work with mining companies, industry, and state agencies to develop new biotreatment technologies or applications, implement existing technologies for wastewaters and other environments, improve treatment technology and technology expectation understanding, and develop site remediation plans

- Evaluation and/or implementation of treatment technologies have included full-scale in situ and ex situ bioremediation/biotreatment processes for nitrate, cyanide, arsenic, selenium, mercury chromium, cadmium, zinc, etc.;
 - Example companies include: Spectrum Engineering, Wharf Resources, Barrick Gold, Union 76, Goldcorp, Placer Dome, AngloGold, Kennecott, Newmont, & Kinross.
- Direct University and industry research and technology improvement programs needed to implement innovative bioprocesses for nitrate, cyanide, selenium, arsenic, mercury, sulfate, general metal removal, and organic degradations

Management / Consulting

- Founder of INOTEC INC., Bioremediation and Bioprocess Consulting, Applied Biosciences Corp., Center for Bioremediation, Weber State Univ., and the Modified and Activated Carbons Technology Center, Univ. of Utah
- Work with mining companies to assure proper management, maintenance, and monitoring of bioprocesses and bioremediations
 - Developed permitting requirements, contingency plans, ex situ biotreatment, and in situ biotreatment at mines in South Dakota, Montana, and Canada and numerous project evaluations in North and South America
- Directed the national US Bureau of Mines biotechnology program
 - USBM representative for research coordination with the National Biological Service
 - Developed/Managed environmental research programs that coordinate industry needs with federal agency programs to supplement industry research and treatment technology implementation
- US Army representative coordinating international biotechnology research and development for the US military
 - Program Manager for Navy and Marine projects providing biological and chemical testing
 - Project Manager for the development of a maximum containment laboratory

PRESENTATIONS / PUBLICATIONS (representative examples)

- Five patents in the environmental microbiology area
- ISB Team, D.J. Adams, B. Farris, and D. Vlassopoulos. 2006. A Systematic Approach to In Situ Bioremediation. CEP February.
- Adams, D. J., 2005. Invited presentation, Acid Mine Drainage Treatment and Control. ICARD Meetings, Elko, NV.
- Adams, D. Jack, Ximena Diaz, Jan D. Miller, and Terrence Chatwin. 2005. Arsenic Removal from Contaminated Waters. International TMS Meetings, San Francisco, CA.
- Adams, D. Jack, Phil Pennington, Virginia T. McLemore, G. Ward Wilson, Samuel Tachie-Menson, Luiza Aline F. Gutierrez, Rodney Shields, and Steven Lockwood. 2005. The Role of Microorganisms in Acid Rock Drainage (ARD). Presentation/Publication at the SME Conference, Salt Lake City, UT.
- Adams, D. Jack and Phil Pennington. 2005. Selenium and Arsenic Removal from Mining Wastewaters. Presentation/Publication at the SME Conference, Salt Lake City, UT.
- Adams, D. J. and T. Hruska. 2004. In Situ Denitrification: Wharf Mine Site. South Dakota Depart. of Environment and Natural Resources Environment and Ground Water Quality Conference. March 17-18, Pierre, SD.
- Shaw, S., J. Adams and T. Osborne. 2002. Geochemical Evolution & Consequent Water Management Changes for Solutions from a Spent Ore Heap Leach Pad, Landusky Mine, Montana. Presented/Published at the EPA Sponsored Hardrock Mining. Westminster, CO. May 7-9,
- Tenny, R. and D.J. Adams. 2001. Arsenic In Mine Effluent Reduced By Combining Chemical and Biological Treatments. Water & Environment Technology & Environmental Science & Engineering.
- Adams, D.J., J. Van Komen, and T. M. Pickett. 2001. Biological Cyanide Degradation. Presented/Published at the TMS Cyanide Symposium. New Orleans. February
- Adams, D.J. and T.M. Pickett, 1998. Constructed Wetlands: Are They a Solution for Treatment of Metal Contaminated Waters? Presented at Wetlands Symposium, Salt Lake City, Nov.
- Adams, D. J. and D. N. Esplin. 1994. Sediment Bioremediation. National Park Service Annual Chicago Rivers Coordination and Planning Meeting. Chicago Botanic Garden, Glencoe, Illinois, March.

EXAMPLE TREATMENT IMPLEMENTATIONS

Full Scale Biotreatment Facility (Nitrate, Arsenic, & Other Metals)

Site characterization followed by process implementation using on-site tanks, ponds, and spent ore heaps. The mining company had tried several available conventional biological technologies without success. Designed and implemented innovative bioprocesses designed to remove nitrate, arsenic, and selenium from process and wastewaters to meet discharge requirements at treatment rates of up to 130 gpm.

Full Mine Site In Situ Denitrification

Approximately 125 million tons of spent ore in spent ore depositories. Nitrate levels in the spent ore and other site areas ranges from ~40 mg/L to 300 mg/L. Developed mitigation plans to reduce groundwater nitrate levels, including a series of pump back wells, full scale denitrification and selenium removal facility. Implementation and contingency plans were developed and coordinated with regional EPA and stage agencies. A combination of metal stabilizing and denitrifying microbes used in the treatment facility were used as a continuous inoculum supplemented with nutrients for the depository and valley alluvial materials. Treatments since 2002 have significantly reduced nitrate levels in all areas.