

E.7 The Centre for Environmental Research in Minerals,  
Metals and Materials at UBC

*Judita Balcita and John Meech*

University of British Columbia  
Department of Mining and Mineral Process Engineering

### CERM3 Facilities

**Environmental Quality Lab**

- analytical support and research into assay protocols.

**Bioremediation and Reclamation Lab**

- biological solutions for environmental problems.

**Environmental Technology Lab**

- new processes to reduce energy, material use and pollution.

**Mine Health and Safety Lab**

- improvements in the working environment.

**Mine Automation/Environmental Simulation Lab**

- integration of mining and processing; remote-mining.

### Research Leaders in CERM3

**Director of CERM3** - John A. Meech, MMPE

**Head of EQL** - Les Lavkulich, Soil Sciences

**Co-Heads of BRL** - Curtis Suttle, Earth & Ocean Sciences and Microbiology  
- Susan Baldwin, Chemical and Biological Engineering

**Head of ETL** - David Dreisinger  
Metals and Materials Engineering

**Head of MHSL** - Kay Teschke  
Health Care and Epidemiology

**Head of MAESL** - Malcolm Scoble, Mining and Mineral Process Engineering

### Other Researchers in CERM3

Greg Baiden (Inco)

David Dixon (MMAT)

Scott Dunbar (MMPE)

Ken Hall (Civil)

Jason Hart (Nautilus)

Janusz Laskowski (MMPE)

Peter Lawrence (Elec)

Bill Mohns (Microbiology)

Tom Pederson (EOS)

Les Smith (EOS)

Marcello Veiga (MMPE)

Bill Cullen (Chem)

Sheldon Duff (CHBE)

Allan Hall (MMPE)

Robert Hall (MMPE)

Bern Klein (MMPE)

Greg Lawrence (Civil)

Mike Lipsett (Syncrude)

Rimas Pakalnis (MMPE)

George Poling (Rescan)

Des Tromans (MMAT)

Ward Wilson (MMPE)

### CERM3's Strategic Goals

•Reduction in Energy Use

•Reduction in Waste Production and Material Use

•Reduction in Environmental Pollution

•Improvements in the Quality of Life

•System Integration within the Mining Industry

### Current CERM3 Projects Underway

- Reducing Energy Use in Comminution (NSERC, CFI)
- Mechanical Activation of Fine Particles (NSERC)
- Isolation of a Bacteriophage for *T. ferrooxidans* (NSERC)
- Mercury Pollution at Yanachoca Mine, Peru (Newmont)
- Large-scale Simulation of the Mine & Mill (Syncrude, Inco)
- Designing the 1000-Year Plug (Goldcorp, Placer Dome)
- Earth Worms as Bio-indicators (NSERC)
- Selenium Contamination from Coal Waste (Fording)
- Codeposition of Tailings and Waste Rock (Placer Dome)

### CERM3 Projects Being Planned

- Reclamation of Heap Leach Dumps During Extraction (Dixon, Meech, Dreisinger, Kiehn)
- Passive Biological Systems for Heavy Metal Pollution (Baldwin, Duff, Lawrence, K. Hall, Veiga)
- Innovative Hoisting Systems - Magnetic Levitation (Meech, Scoble, Dunbar)
- Intelligent Systems for Underground Support (Pakalnis, Meech, Dunbar)
- Recycling Infrastructure Requirements in B.C. (Meech, Lavkulich, Scoble, Dunbar)
- Sustainability Practices in Local Communities (Scoble, Veiga, McAlister)

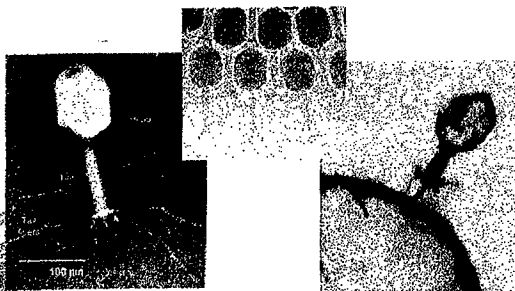
### CERM3 Projects Being Planned

- Design Aspects of Subaqueous Tailings Disposal (Pederson, Poling, Smith, Wilson, Meech)
- Arsenic Mitigation Requirements at Yellowknife (Cullen, Baldwin, Veiga, Duff, G. Lawrence)
- Sampling and Analytical Protocols for Mine Materials (Lavkulich, Veiga, Baldwin, K. Hall)
- Telerobotics for Underground and Open Pit Mining (R. Hall, Scobie, Dunbar, P. Lawrence)
- Occupational Health and Safety Issues in U/G Mining (Pakalnis, Teschke, A. Hall)
- Environmental Risk Assessment (quantifying/qualifying risk) (Meech, Veiga, Dunbar, Lavkulich)

### Bacteriophage - a potential solution for ARD



### Bacteriophage - a potential solution for ARD

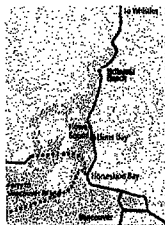


T4 bacteriophage for E. Coli

### UBC - Britannia Mine Collaboration

- for over 26 years, > 9000 tonnes of heavy metals have spewed into Howe Sound with no one assuming responsibility to correct the problem
- UBC has a need for a research facility to conduct testwork into the design of bulkheads to seal tunnels
- by placing this laboratory at the 2200 level portal of Britannia Mine, two synergistic events occur:
  - UBC installs its research lab at a full-scale field site
  - Britannia Mine closure plan moves nearer to fulfilment

### Location of Britannia Mine

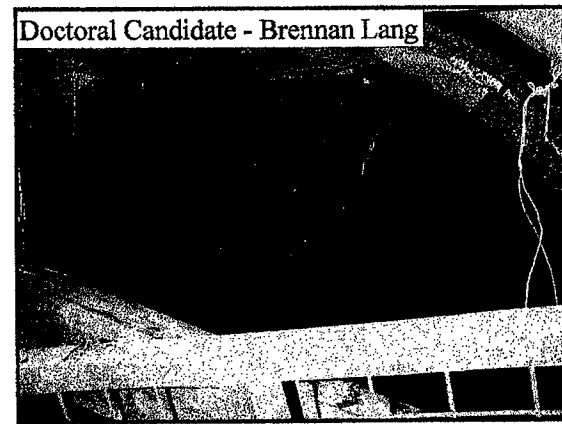
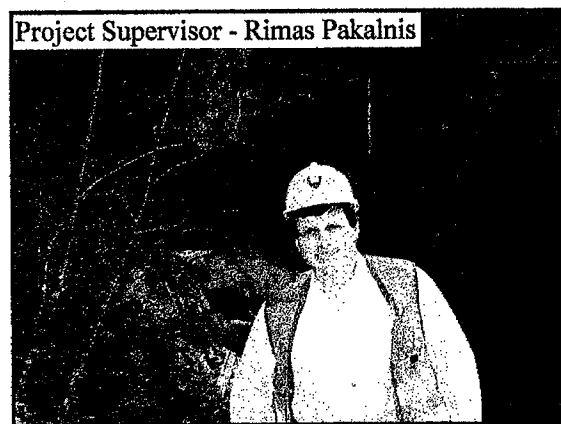
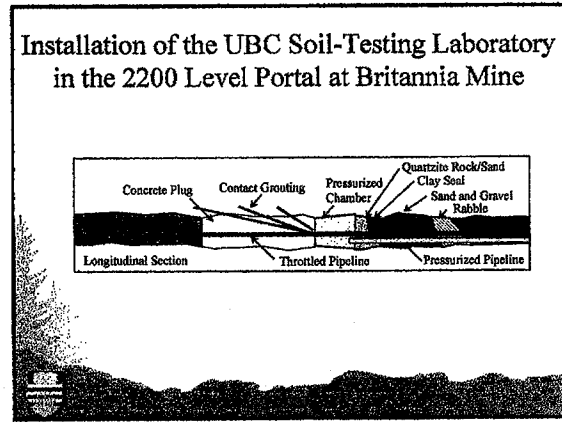
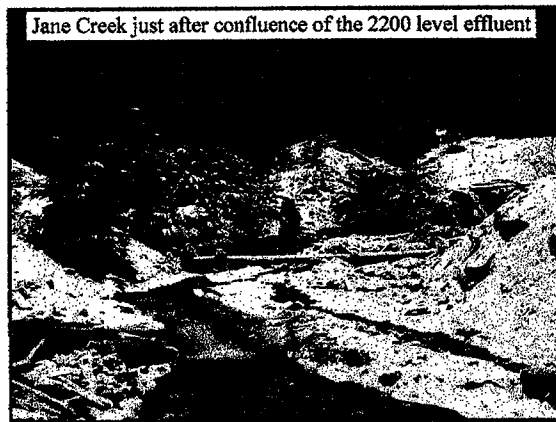
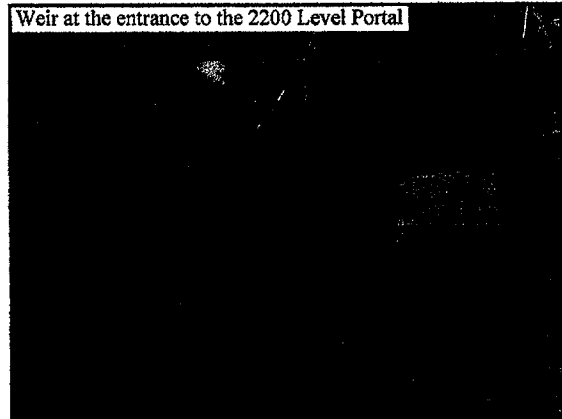
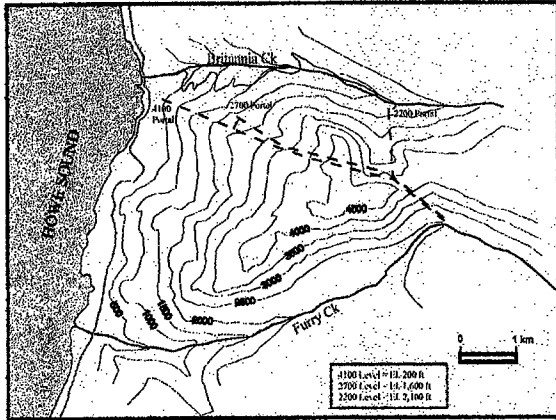


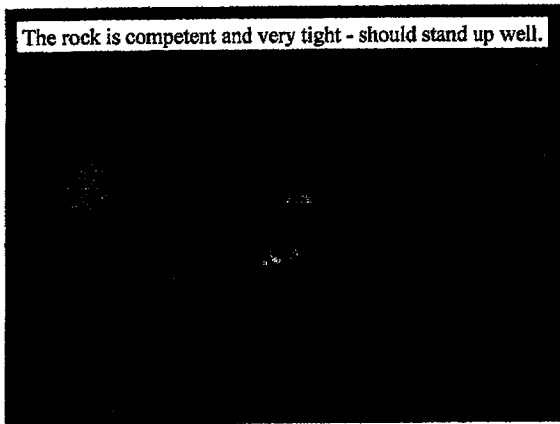
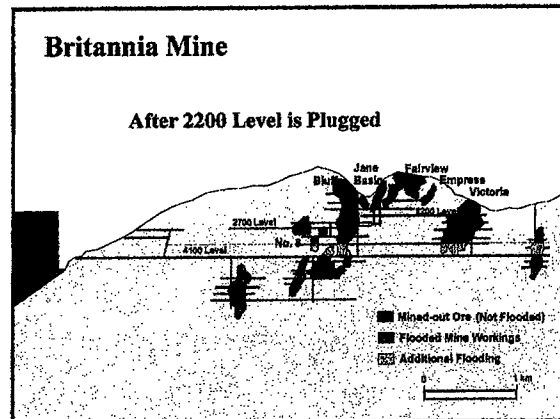
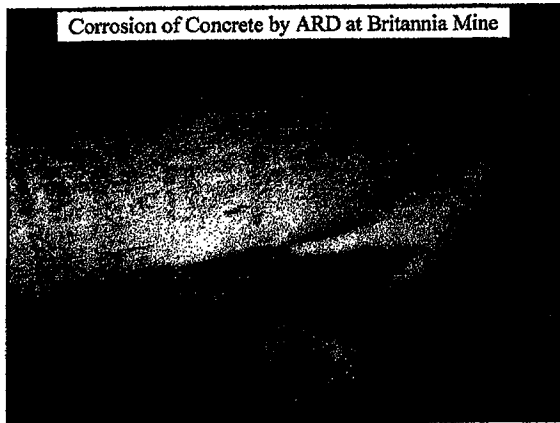
### Problems at Britannia Technical

- ARD from mine portals impacts Britannia Creek and Howe Sound - total flowrate averages ~500 m<sup>3</sup>/hr.
- ARD from open pits and waste dumps enters the mine workings
- Reclamation of open pits and waste dumps is necessary

### Political/Financial

- Copper Beach Estates Ltd. is in receivership
- Previous owners are not taking responsibility for the site
- Government has issued numerous clean-up orders since 1981
- meeting of Potentially Responsible Parties on Nov. 30, 2000





**Capacity to Produce Solutions!**

**UBC-MMPE has**

- close collaboration with industry
- considerable industrial experience
- reputation to deliver practical targeted solutions
- best university research facilities in North America

**CERM3 will**

- build off this strong base
- develop cooperative links with other experts at UBC
- direct efforts towards environmental issues and solutions

**Future Mining Engineering graduates must become the Environmentalists of the 21<sup>st</sup> Century**

**CERM3 Corporate Membership Benefits**

- access to top-quality research into environmental problems of significance to your company
- participation in the direction of CERM3's research
- participation in the annual meeting of the TAC
- ability to second employee(s) to work at CERM3 with office space/UBC campus access
- ability to "buy-in" to intellectual property rights to the outcome of research conducted at CERM3


**Annual Activities of CERM3**

- monthly research activity meetings (feedback/revision)
- annual review meeting of the TAC (priority setting)
- annual Technical Conference (technology transfer)
- annual public exhibition of research (public relations)

Let's Get Mining into a Positive Position in Society

grinding liberates the ore then the ore is crushed


Flotation and/or leaching extracts the values



It begins with an open pit

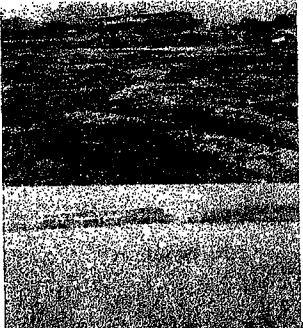
Let's Get Mining into a Positive Position in Society

and here is the reward - gold bullion!




Let's Get Mining into a Positive Position in Society

and here is the second reward - changing this mess.....




into this reclaimed land!

Let's Show Mining is High-Tech Stuff




Process Control Room at Carlin, Nevada

Let's Show our Concern for the Environment



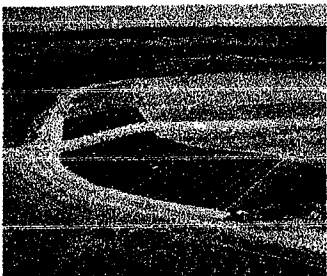
Installing a Heap Leach Liner

Let's Show we can Operate in Sensitive Regions




Waste Dump Reclamation at Igarape Bahia, Carajas, Para State, Brazil in Amazon


Let's Show we can Repair Problems of the Past 37 of 39




**Rio Algom's Reclamation Operation  
at the former Poirier Mine Tailing Dam**



Let's Show we can Leave a Mine Site in a Pristine State 38 of 39




**BHP's Beenup  
Titanium Minerals  
mine at closure in  
early 1999  
- W. Australia**

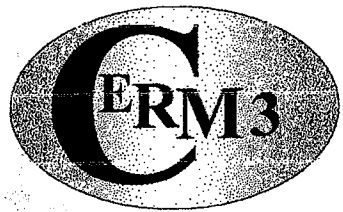


**BHP's Beenup  
Titanium Minerals  
mine after final  
revegetation and  
reclamation**

**Mine Site Reclamation and Closure**



The Centre for Environmental Research  
in Minerals, Metals and Materials 39 of 39



**- providing sustainable research for the Mining industry.....**

