

Hydrogeochemical and Isotopic Investigation of the Mine Water in the 1B Mine Pool of the Sydney Coal Field, Nova Scotia, Canada


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Introduction

- The Sydney Mine Coal Field
 - Abandoned after mining operations ceased due to poor economics
 - Set in motion the flooding of the mine workings
 - Monitor the quality of the water that was being discharged
- 1B Mine Pool:
 - System of interconnected mine workings, tunnels and boreholes classified on the basis of mine plans and water level data (JWEL, 1993)
 - Geology of the study area, particularly the stratigraphy and mineralogy, has major implications for the mine water chemistry

Geological Setting



- Sydney Basin
 - Early to late carboniferous
 - Sedimentary rocks
- Sydney Mines Formation
 - Principal coal resources
 - Key coal seams (1B Mine Pool): Emery, Phalen, Harbour, Hub seams.
 - Ten interconnected mines: No. 1A, No. 13, No. 2, No. 5, No. 10, No. 20, No. 24, No. 26.

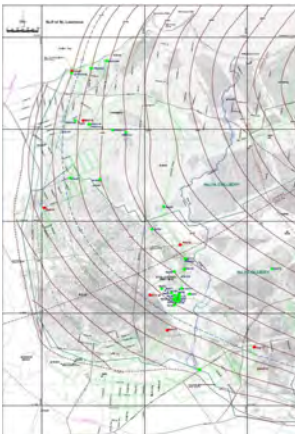
Site Location



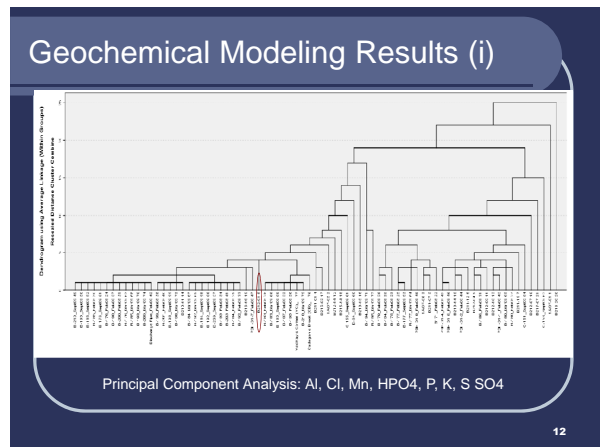
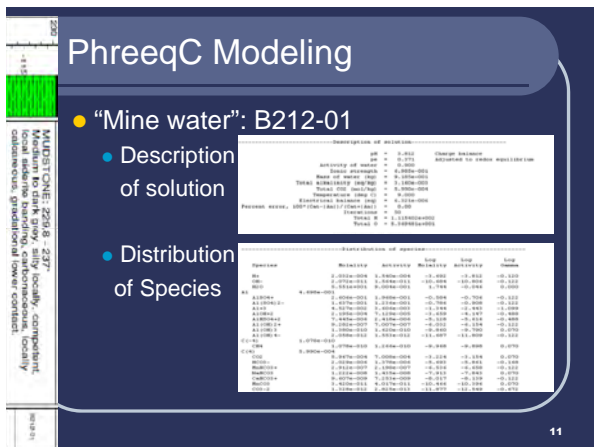
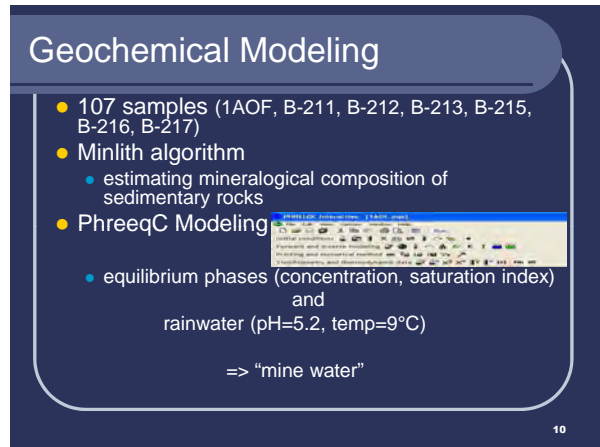
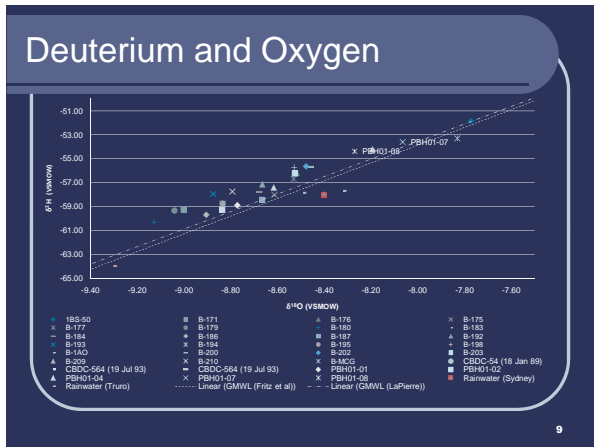
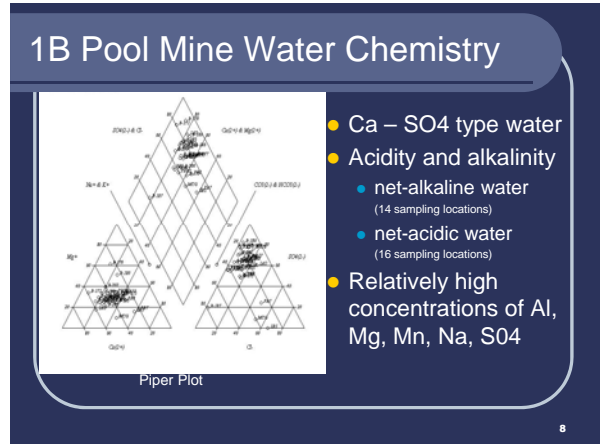
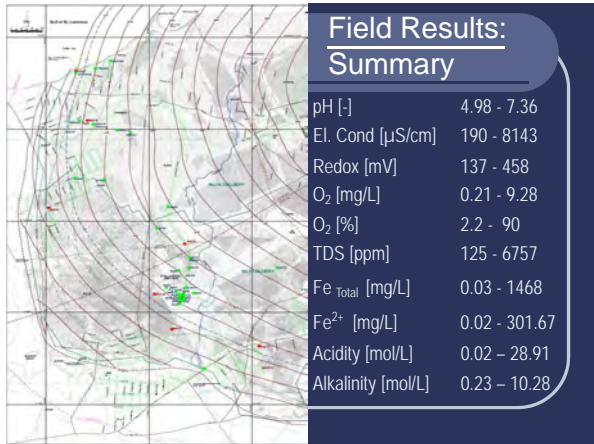
Objectives

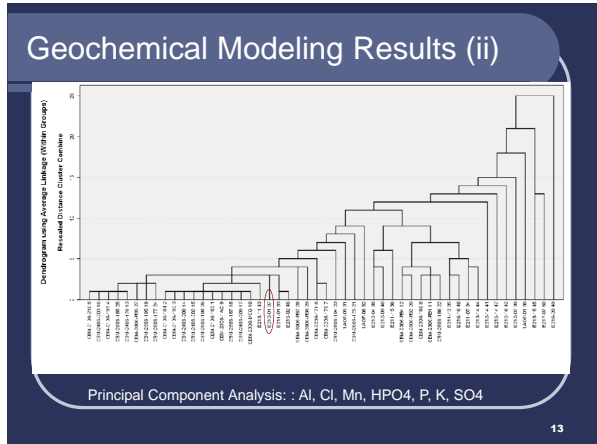
- Regional variation within the 1B Mine Pool
- Origin: Strata contributes largely to this effect
- Residence time
- Seawater intrusion

Sampling



- Lab Analysis
 - Trace Elements + REE
 - Major Ions
 - Sr (⁸⁷Sr/⁸⁶Sr) Isotopes
 - Sulfur (³⁴S) Isotopes
 - ²H Isotopes
 - ¹⁸O Isotopes
 - CFCs
 - Tritium (³H)
- Field Parameters
 - pH, Electrical Conductivity, Temperature, TDS, Redox potential
 - Ferrous Iron and Total Iron
 - Oxygen Content
 - Acid and Base capacity





13

- ### Work in progress
- Re-evaluate the geochemical model
 - Effect of dilution
 - Interaction with water from overlying strata
 - Analyze data from sampling program
 - Residence time - Sulphur isotopes, Tritium and CFCs
 - Sr isotopes - seawater influence

14

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15

Thank you!!!