

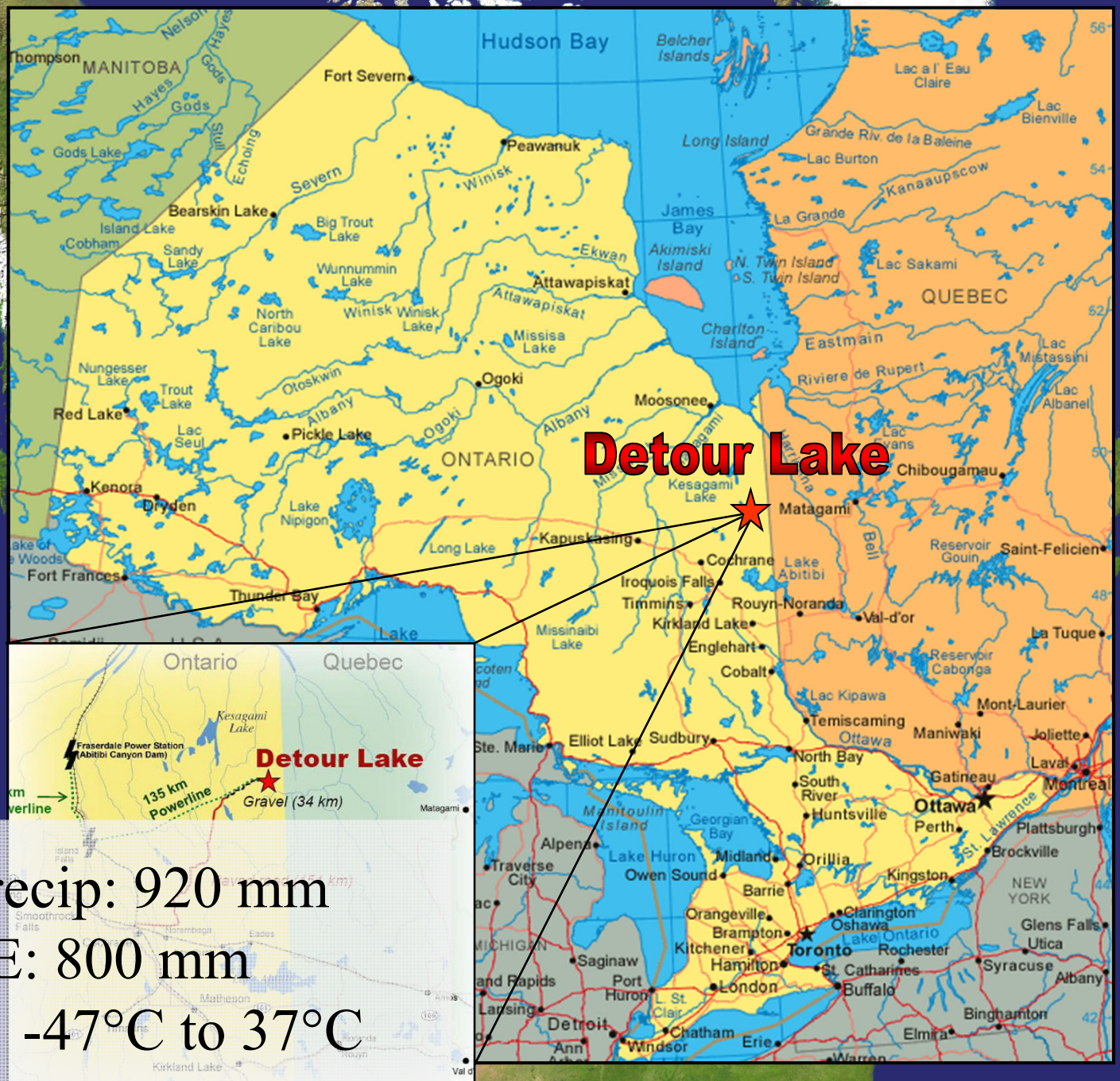


A 2011 Update for the Single-layer Desulphurized Tailings Cover Completed in 1999 at Detour Gold

By

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- Annual precip: 920 mm
- Annual PE: 800 mm
- Air temp: -47°C to 37°C

Site History

- Detour Lake Gold Mine: 1983 - 1999
- Open pit operation
- TMA: 15 million tonnes over 300 ha
- Remediation: Water cover + Desulphurised tailings cover
- Mine will start operating again in 2012
- New mine life: 21 years



Sulphidic Tailings

- Dominant mineral: Pyrite
- Near neutral pH
- Sulphide content: 1% to 2.5%
- NNP: -5 to -75 (kg CaCO_3 equivalent per ton material)
- Heterogeneity - interbedded layers

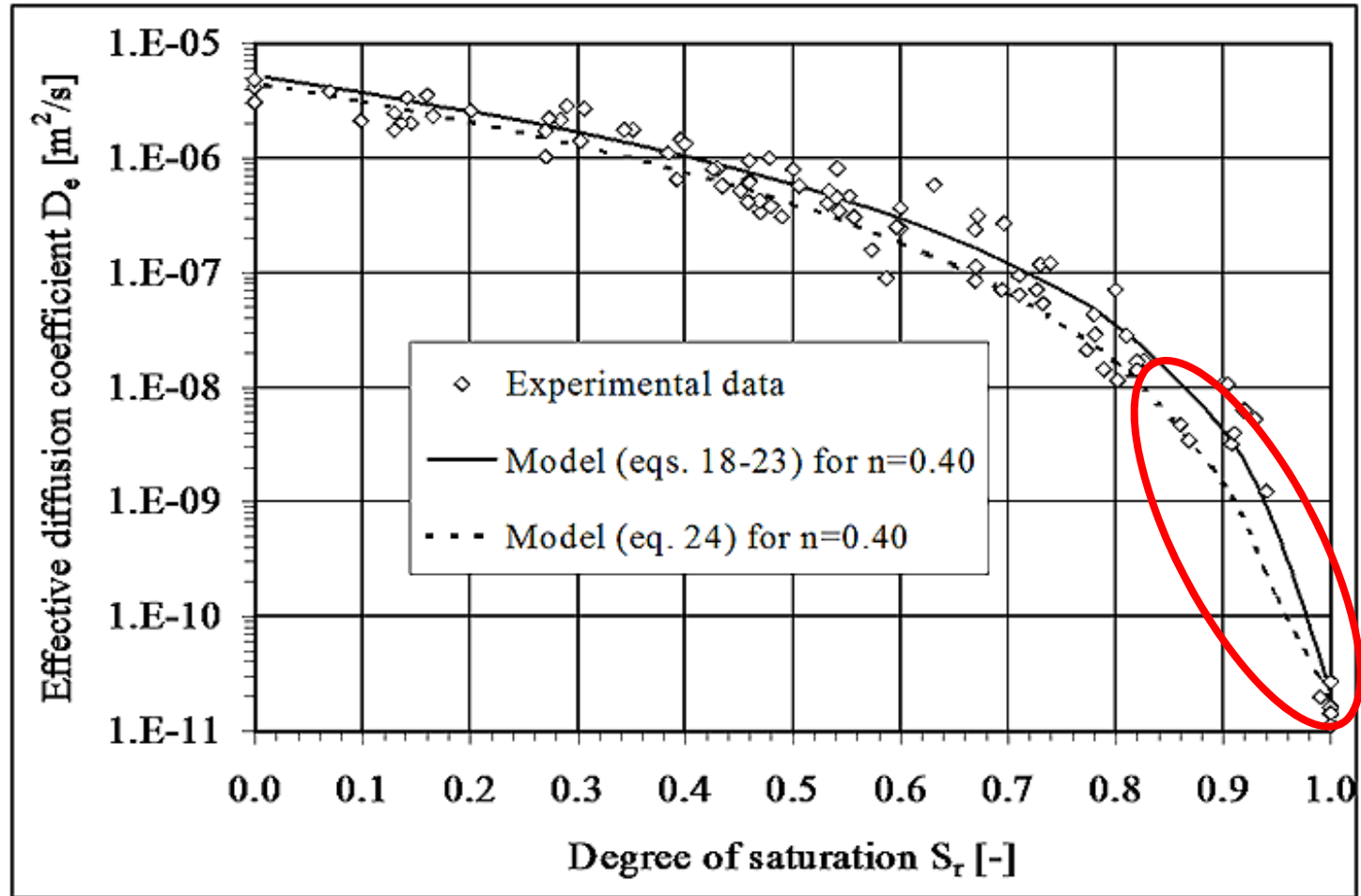


Desulphurised Tailings Cover

- 1.0 m - 1.5 m thickness
- Sulphides <1%
- Constructed by end-pipe discharge
- Objective: reduce oxygen entry
 - High water saturation (> 85%)
 - Oxygen consumption by residual sulphide minerals

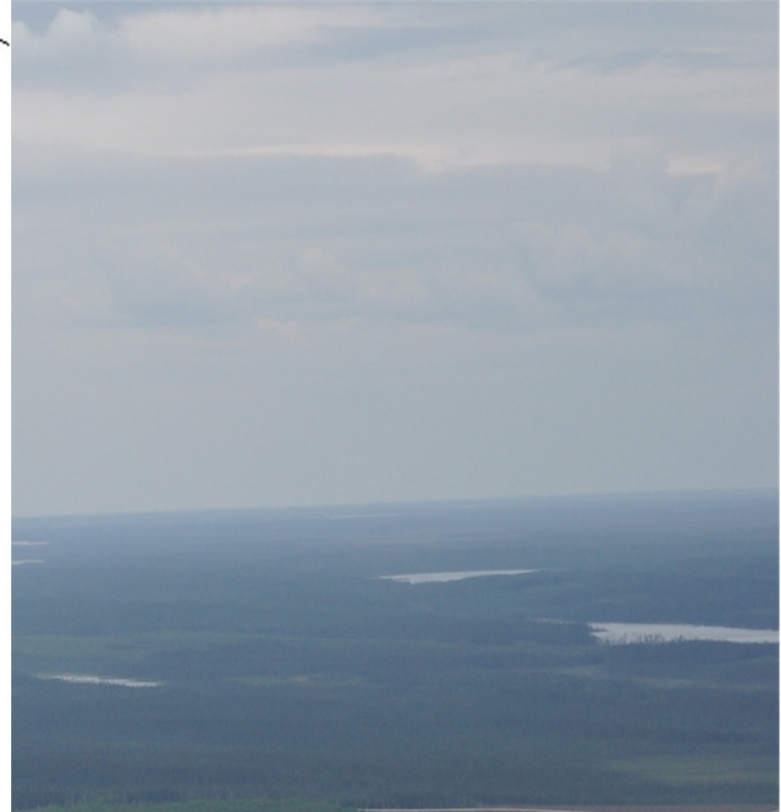
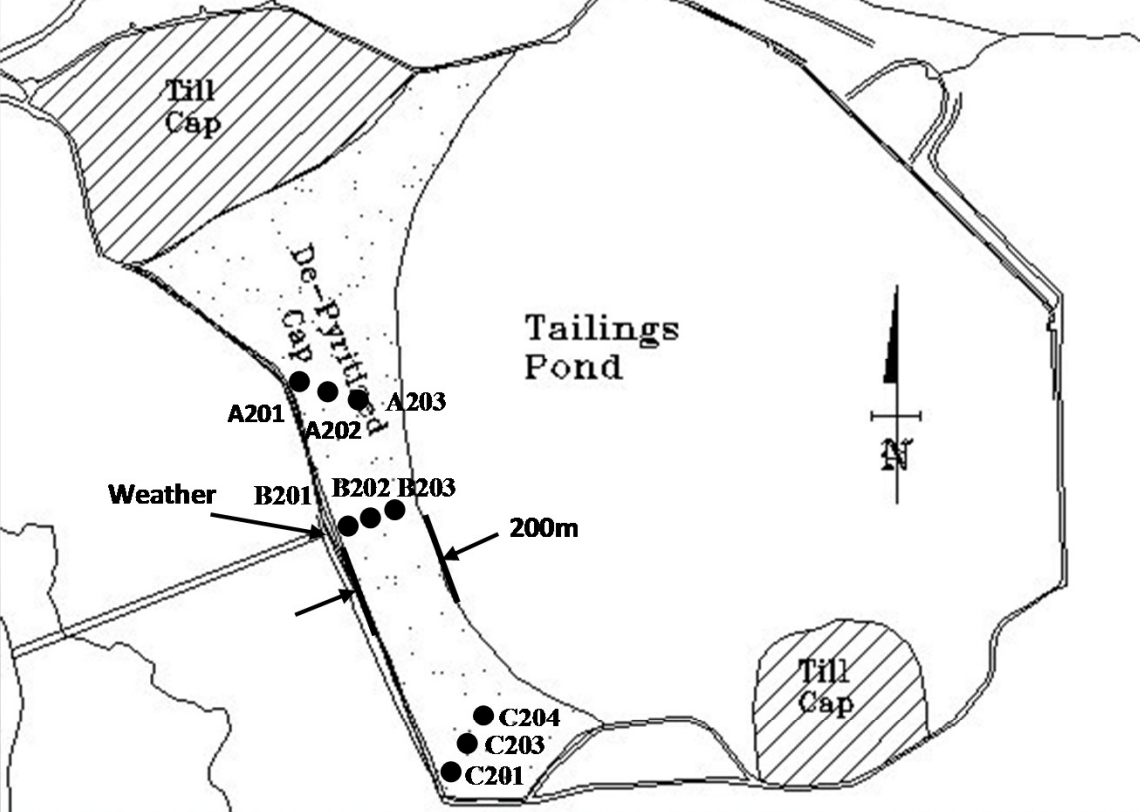


Diffusion vs. Saturation

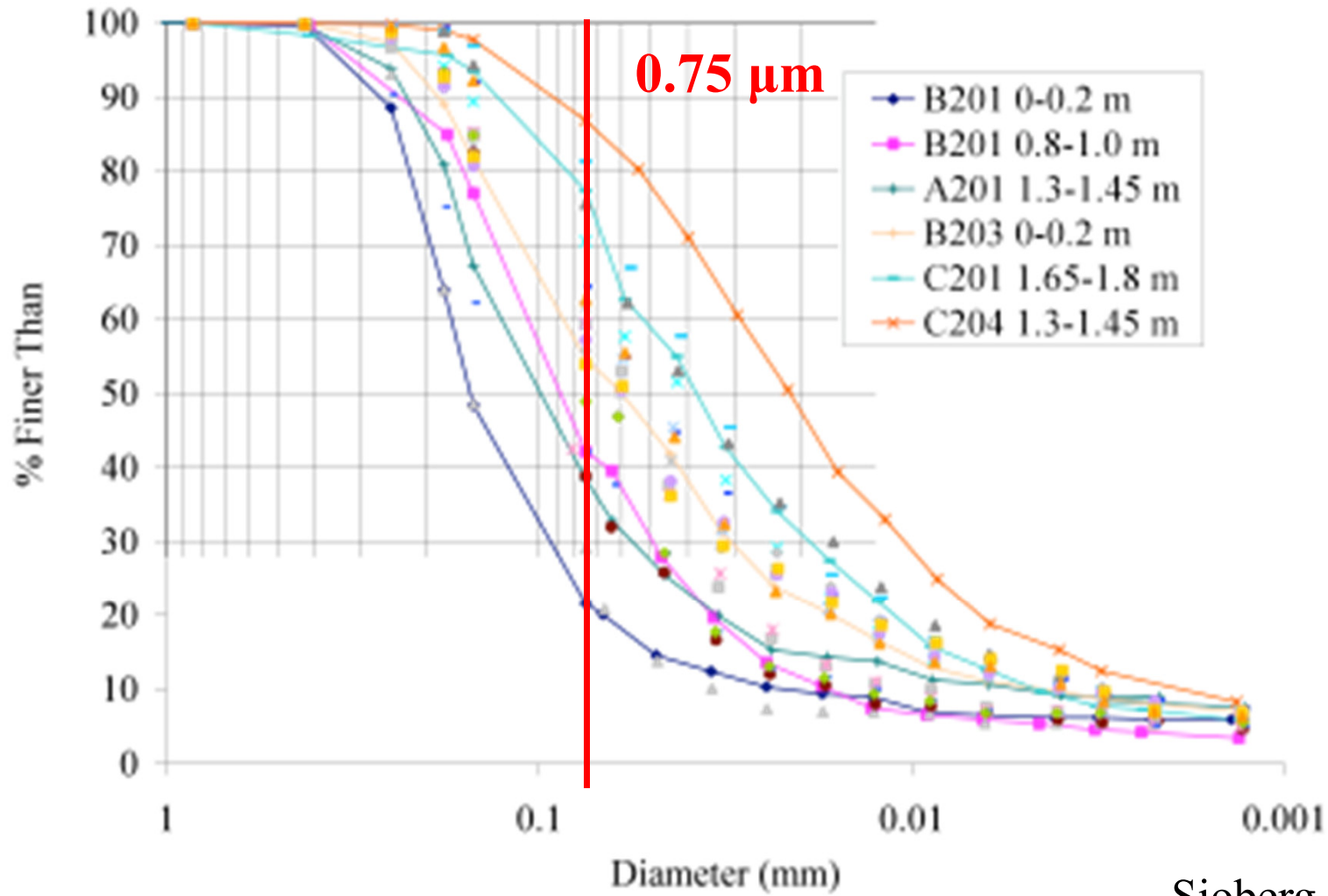


(Aubertin, 2005)





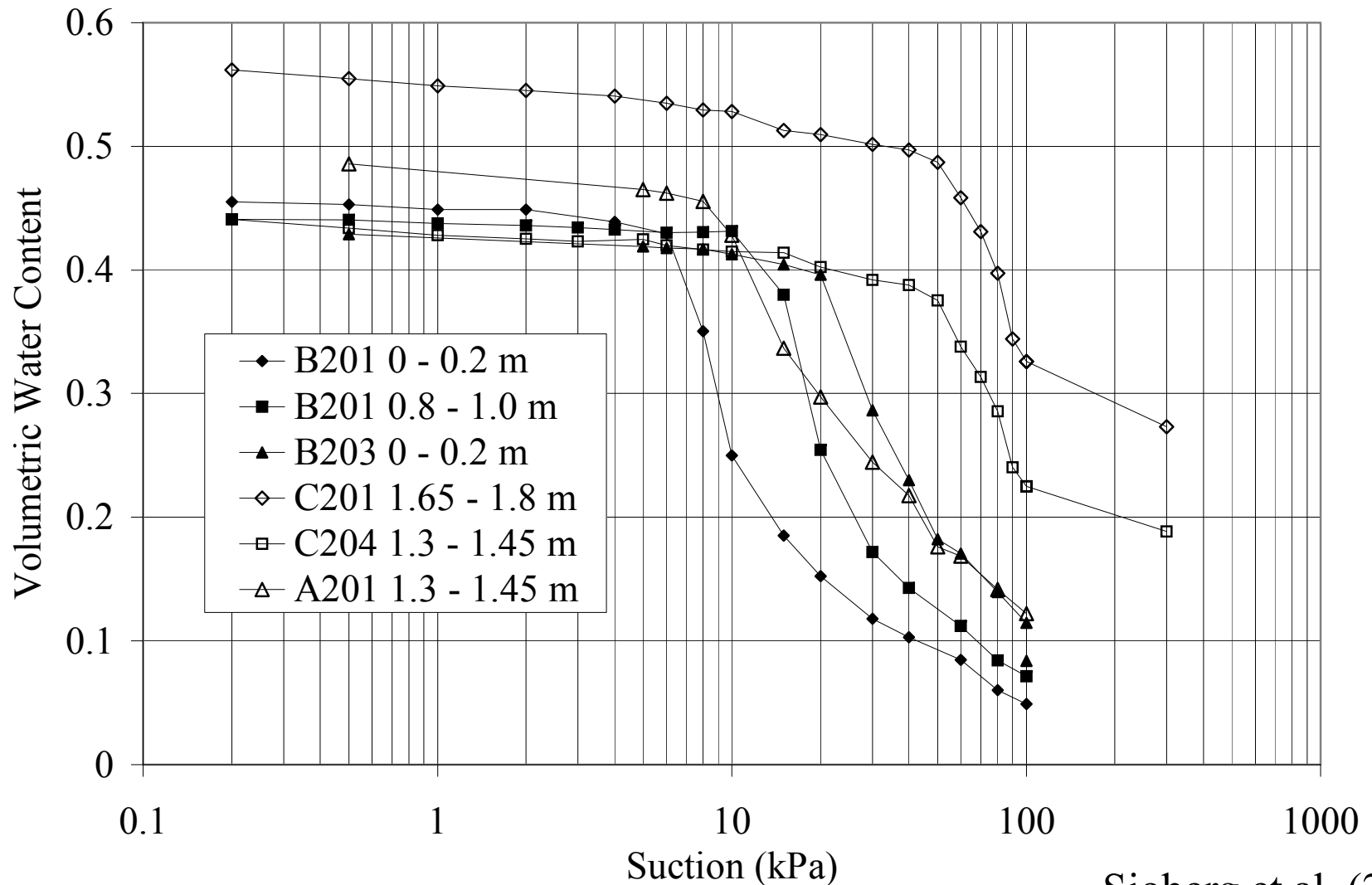
Grain Size Distributions



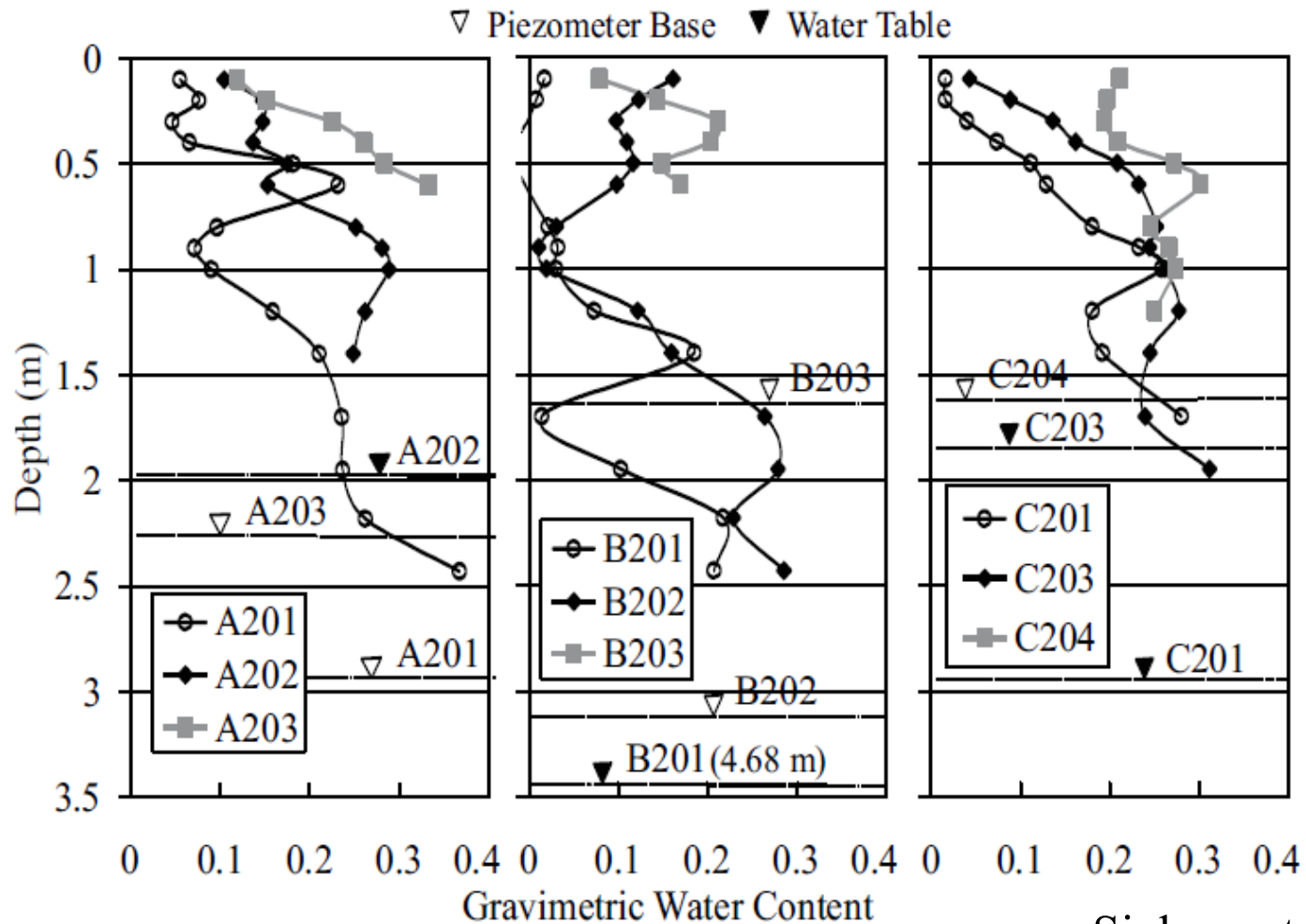
Sjoberg et al. (2003)



Soil-Water Characteristic Curves



Moisture Contents

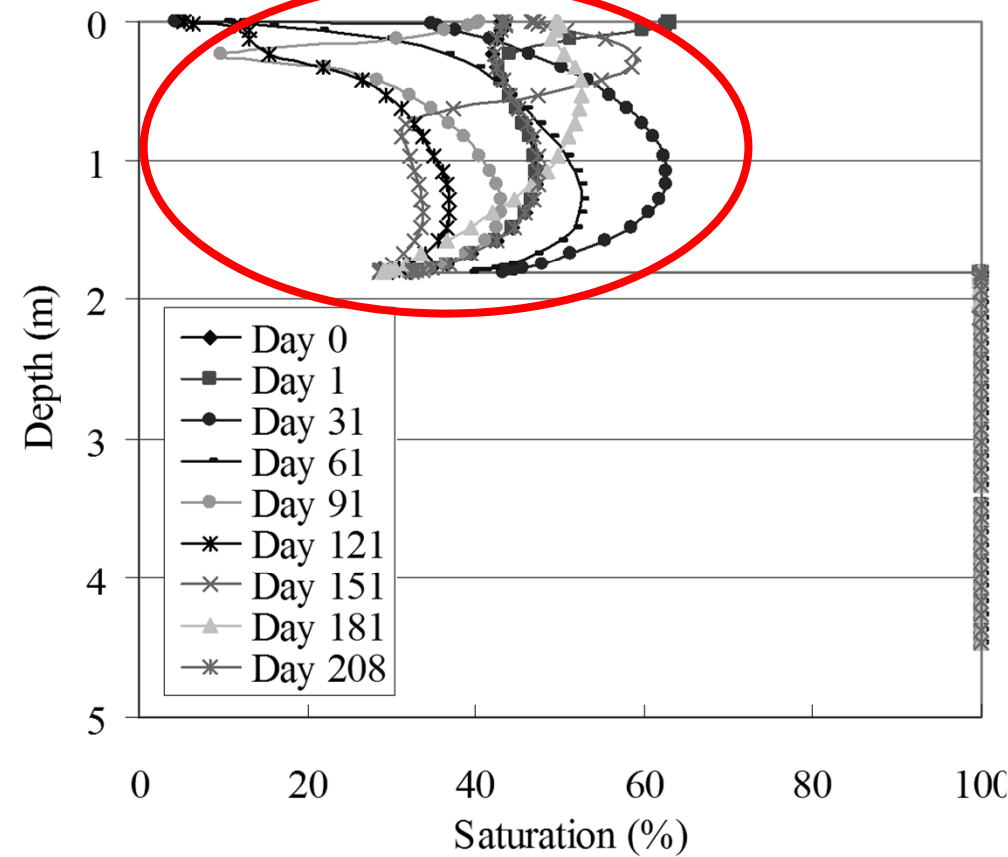


Sjoberg et al. (2003)

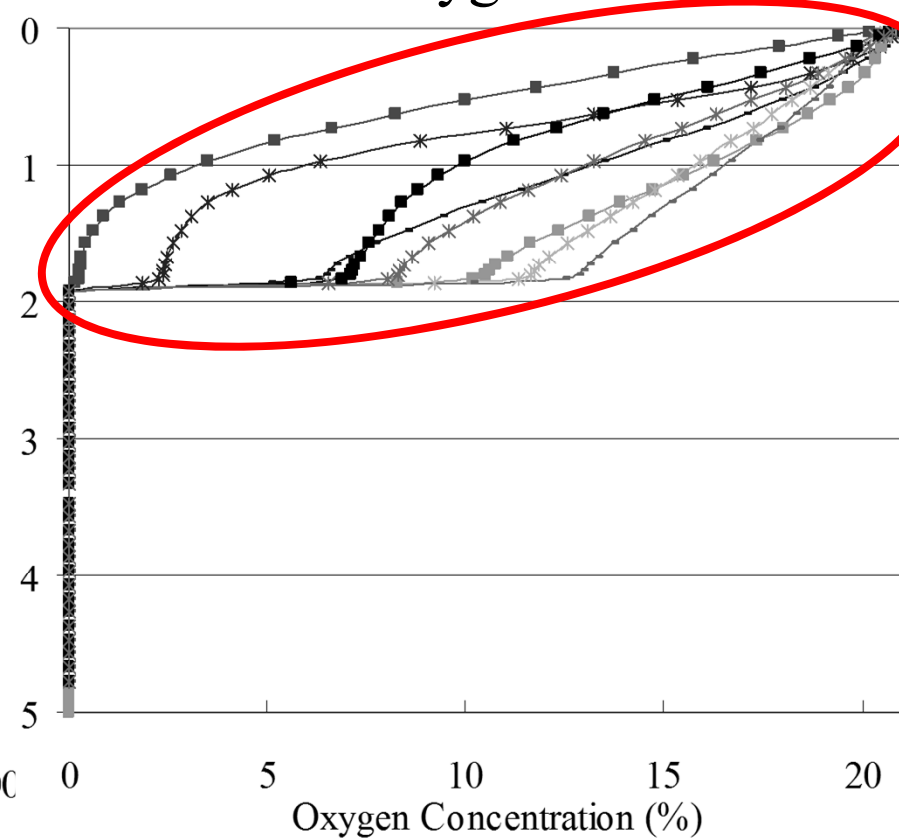


Predictive Numerical Model

Saturation Profile



Oxygen Profile



Sjoberg et al. (2003)

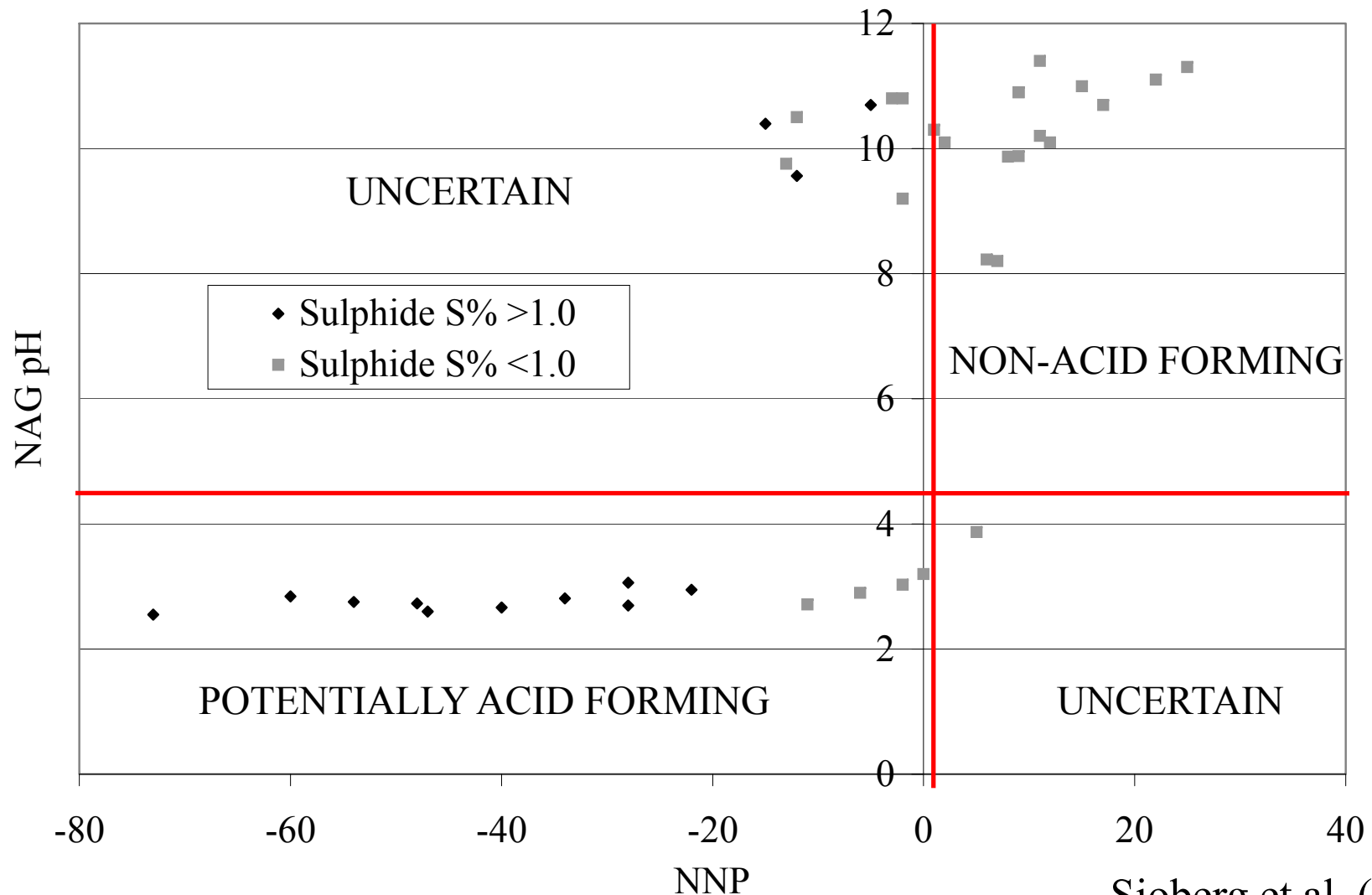


Saturation Degree Assessment

- 5 boreholes $> 85\%$ saturation
- 4 boreholes $< 85\%$ saturation
- Some potential exists for oxygen diffusion through the cover



Initial NAG pH vs NNP Results



Sjoberg et al. (2003)



Early Conclusions

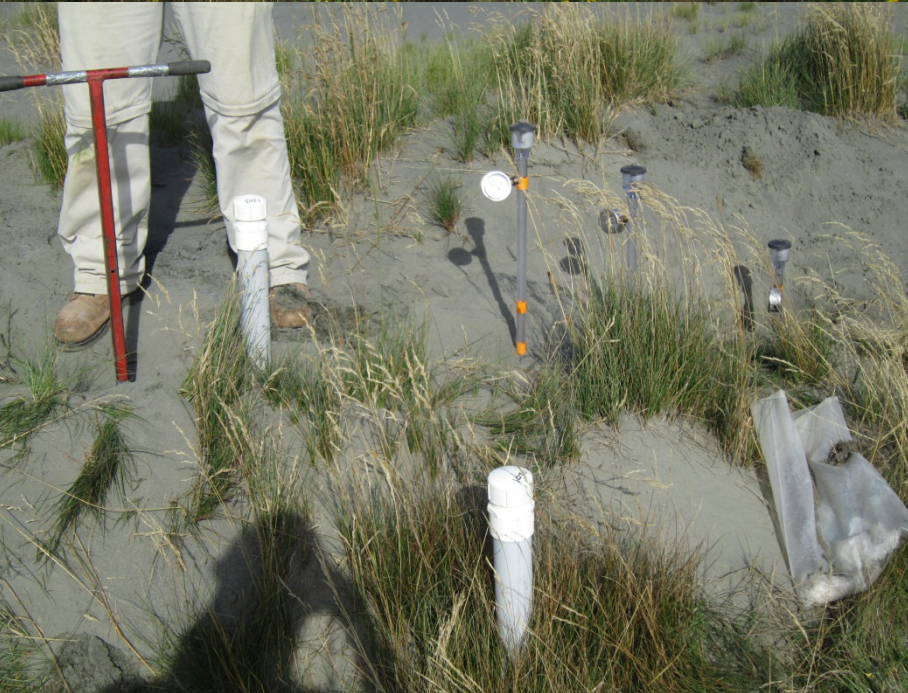
- Numerical simulations - desulphurised cover reduces oxygen fluxes to less than 2 moles/m²/yr.
- ABA testing - cover materials were reduced in sulphur, have oxygen consumption potential - unlikely to produce acidity



2011 Update

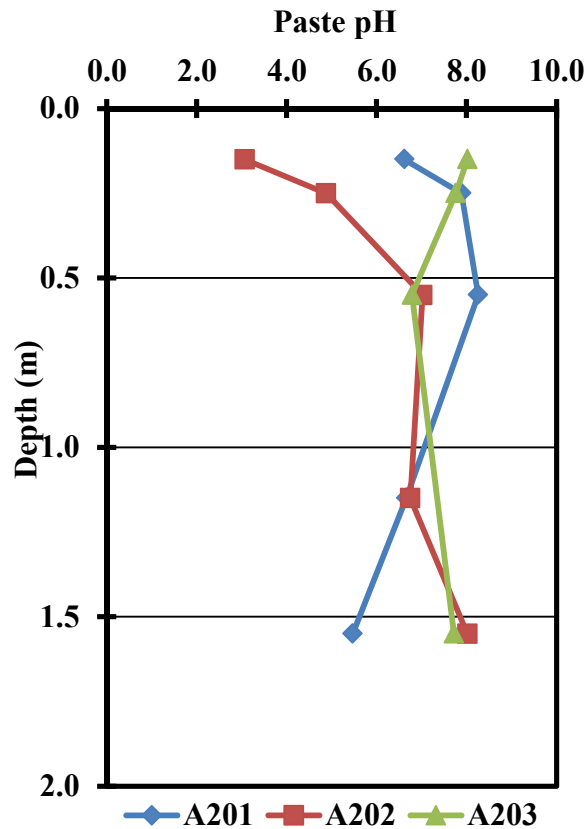




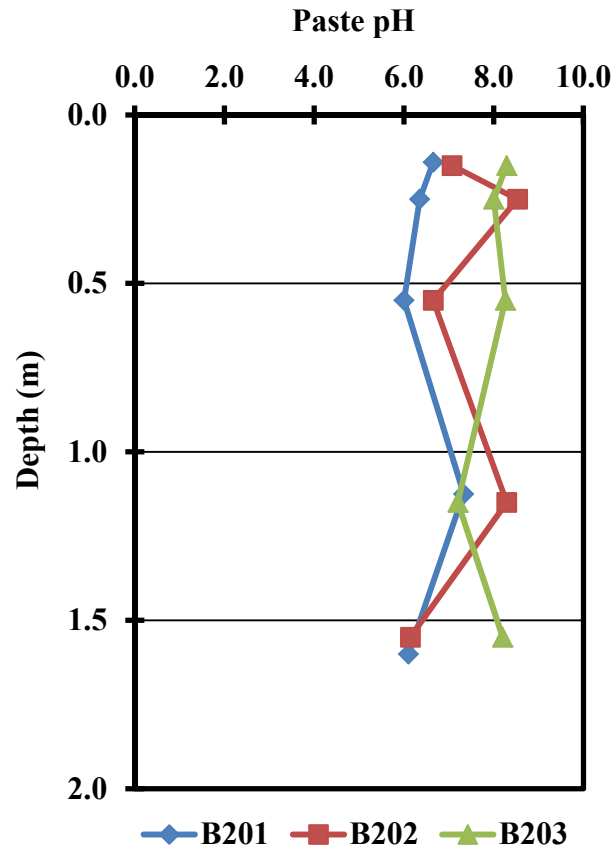


Paste pH Test Results

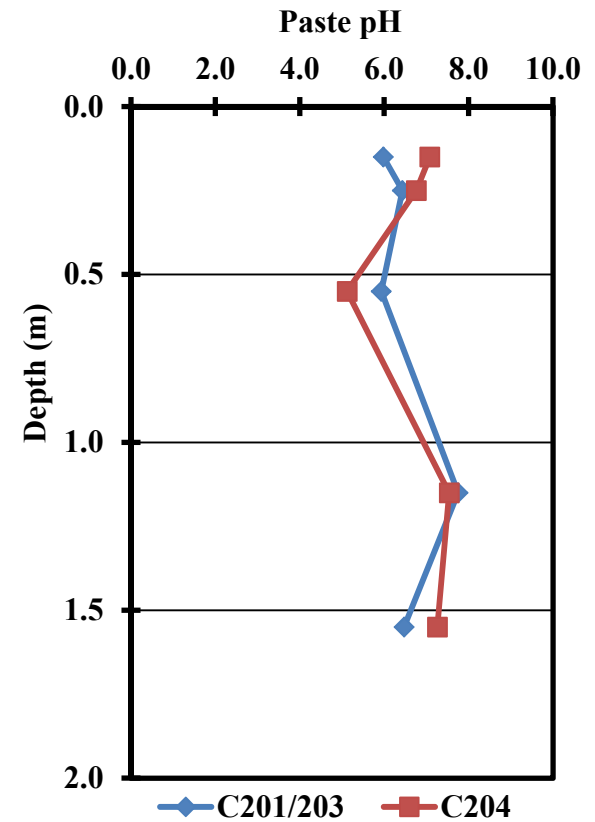
X-Section A



X-Section B



X-Section C

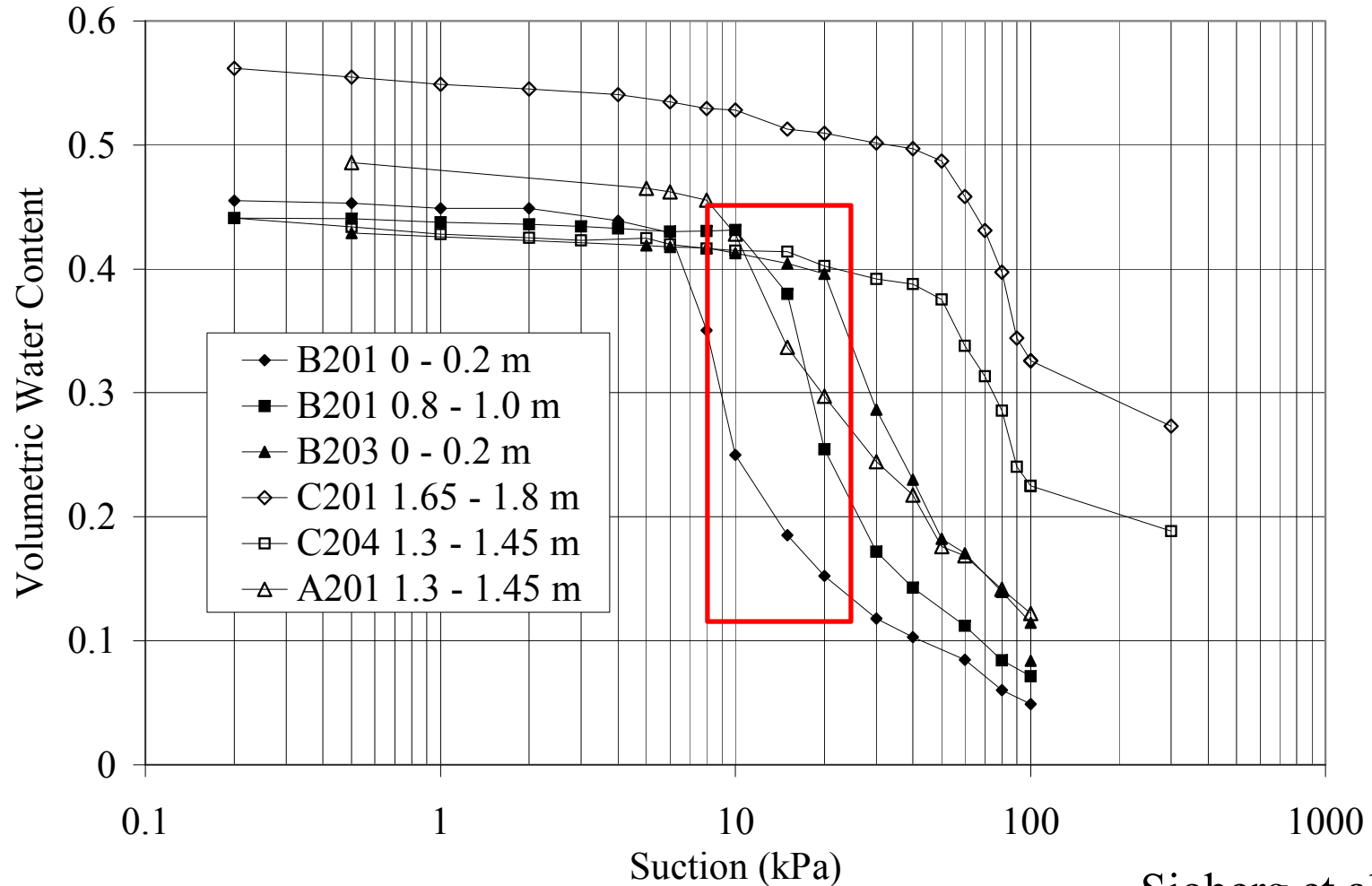


2011 Study Results

- Paste pH samples – most were neutral range
- After 10 years – cover does not show an oxidized profile
- Evidence to date indicates satisfactory performance
- Suction values – 5 kPa to 30 kPa



Soil Suction Results



Sjoberg et al. (2003)

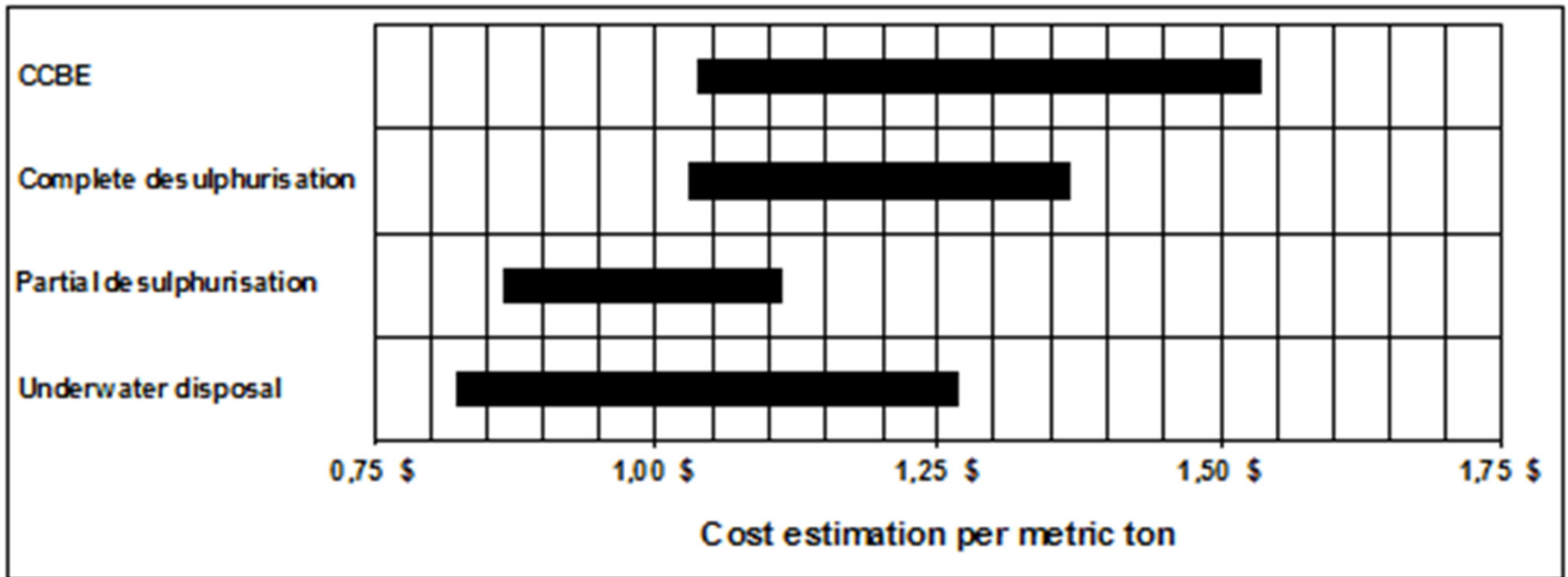


Future Considerations

- >85% saturation – non-segregated tailings
- EOP slurry discharged tailings appears to have performed well without thickening
- Valid alternative for using waste for remediation of tailings
- Less risk associated with desulphurized covers



Cost of Partial Desulphurization



(Bussiere and Wilson, 2006)



Summary and Conclusions

- Desulphurized Covers on Tailings – has met expectations
- Paste pH data supports that the cover has not gone acid
- Further chemical analysis will provide better metric of performance

