

HARDY AND KIDD ACID DRAINAGE AND METAL LEACHING HISTORIES: CONTRASTS AND COMPARISONS

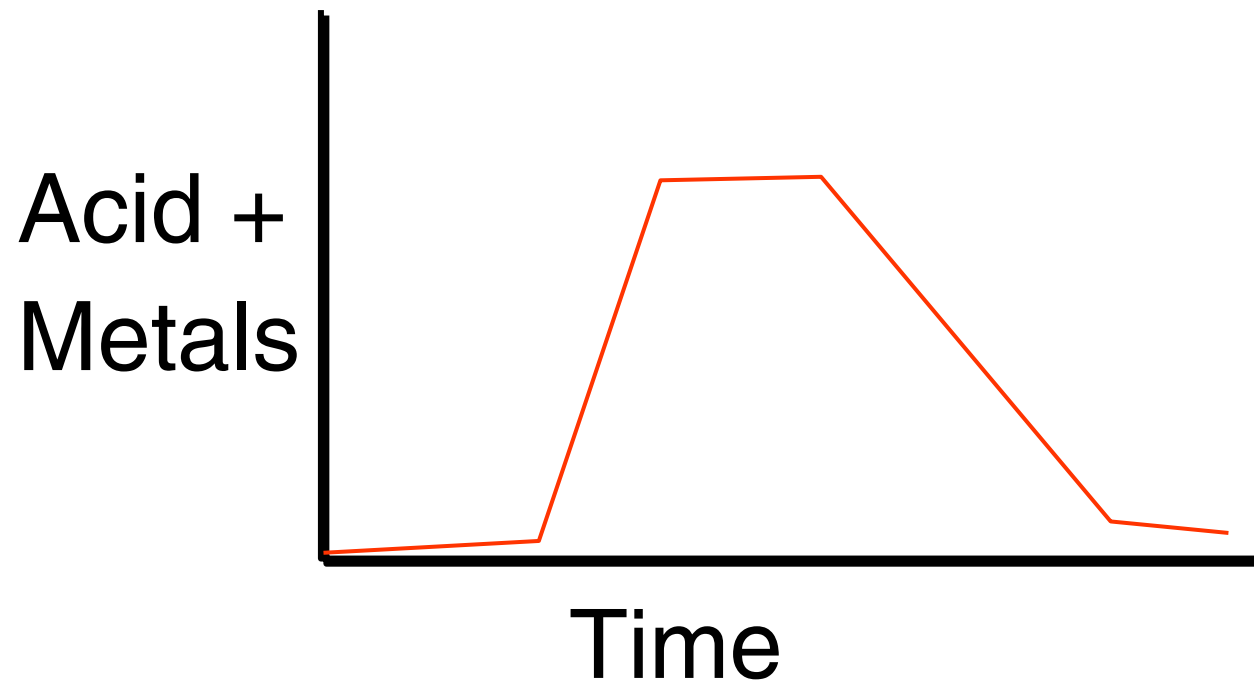
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Stantec Consulting Ltd.

10th Annual BC ML/ARD Workshop
Vancouver, December 2-3, 2003

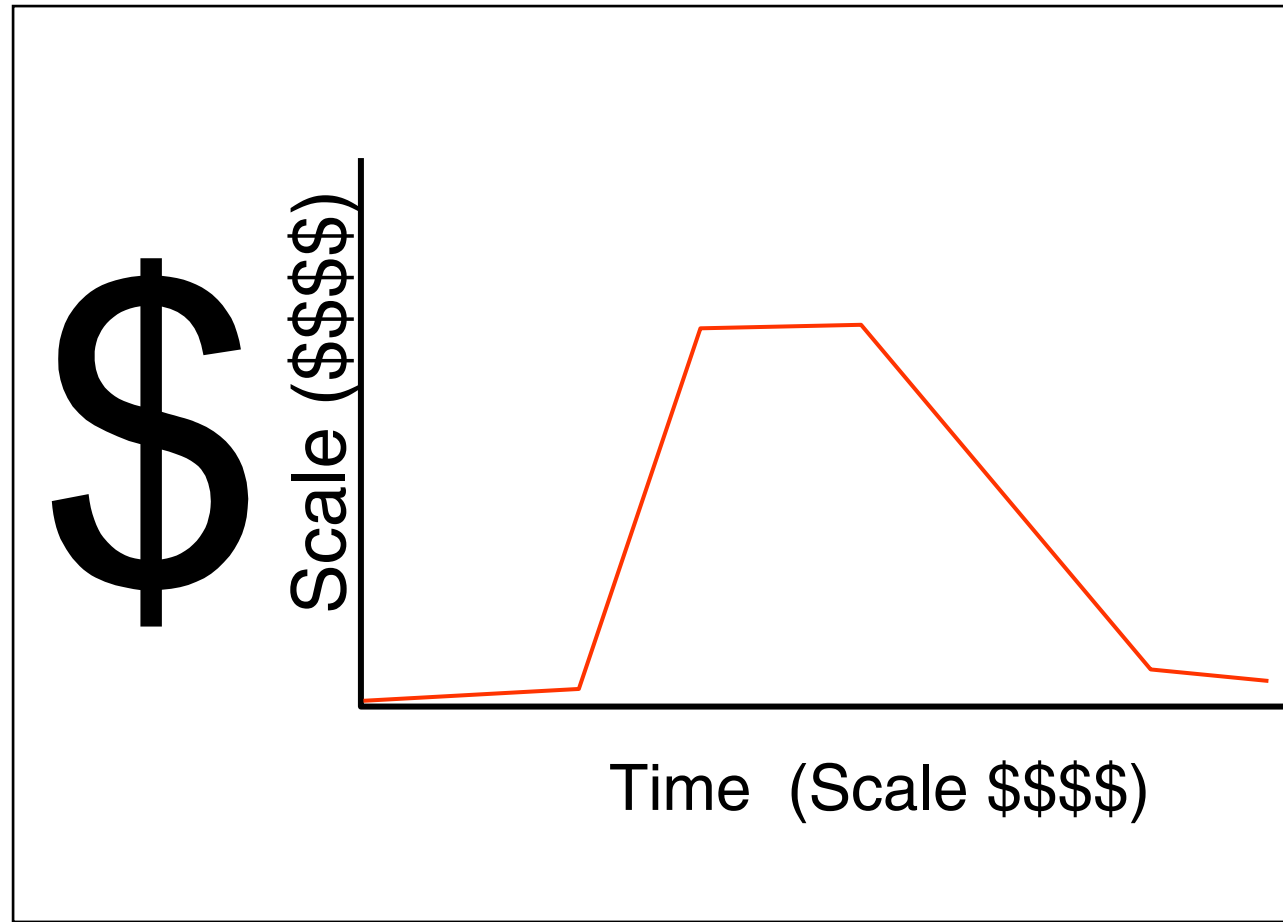
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“THE” ARD / Metal Leaching MODEL



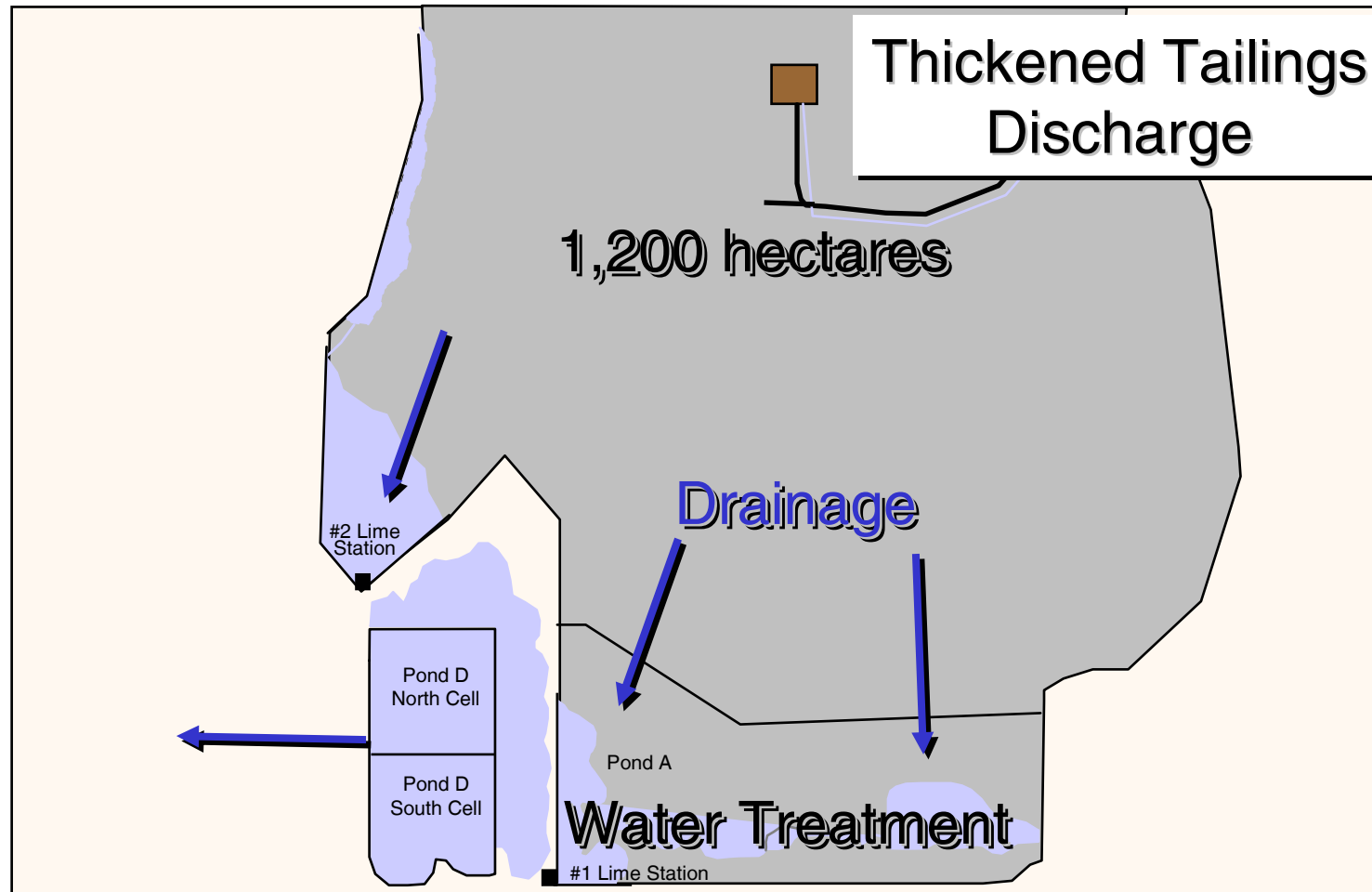
“THE” ARD / Metal Leaching MODEL



Kidd Tailings and the Hardy Mine Site

- Kidd Tailings
 - Active
 - Zinc, Copper
 - High Sulphide
 - Treatment ongoing
- Hardy Mine Site
 - Inactive Since 1972
 - Nickel, copper
 - High Sulphide
 - No Treatment

Kidd Tailings (South Section)

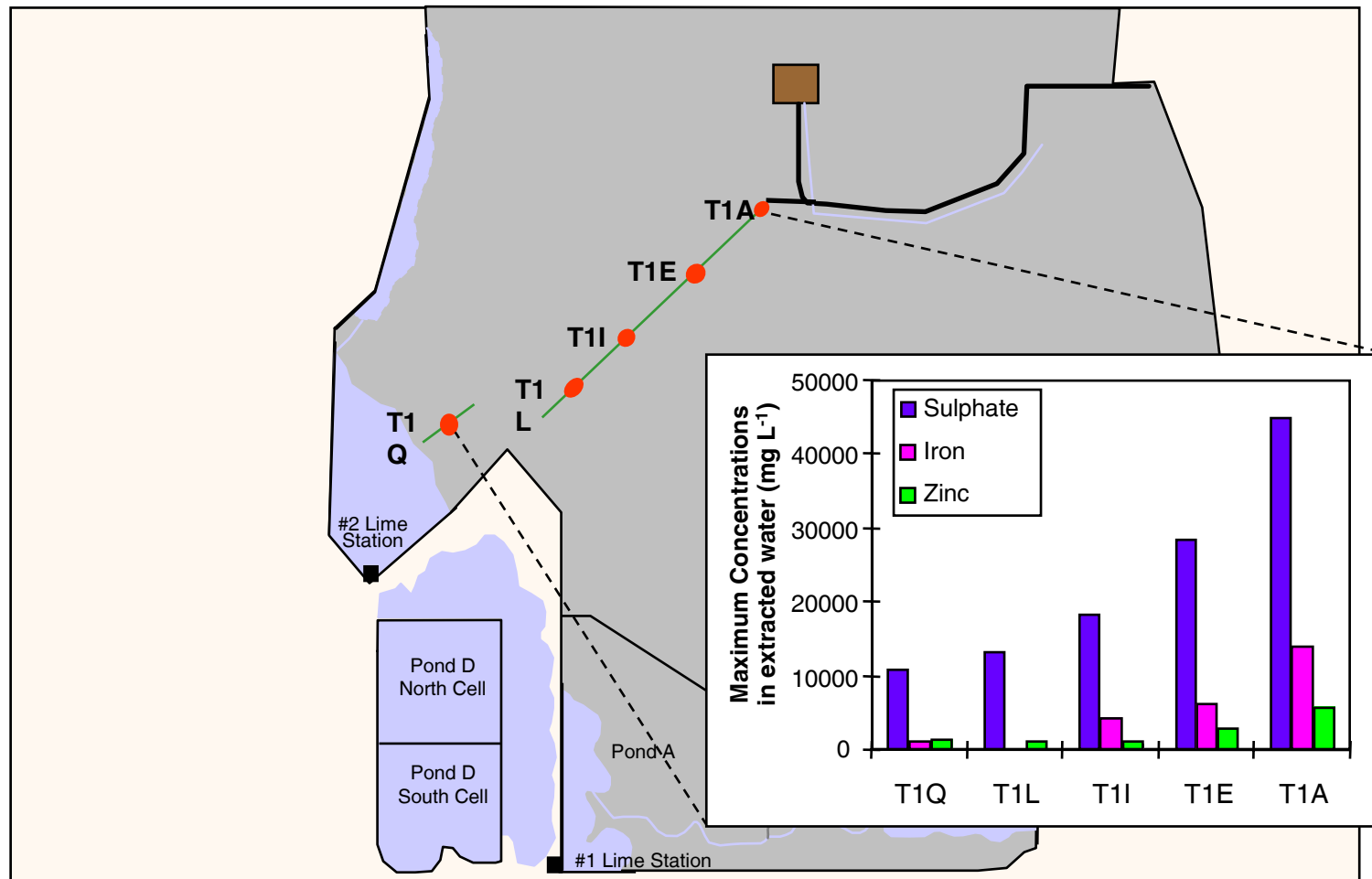


Older Oxidized Tailings in Foreground – Freshly Deposited Tailings in Background

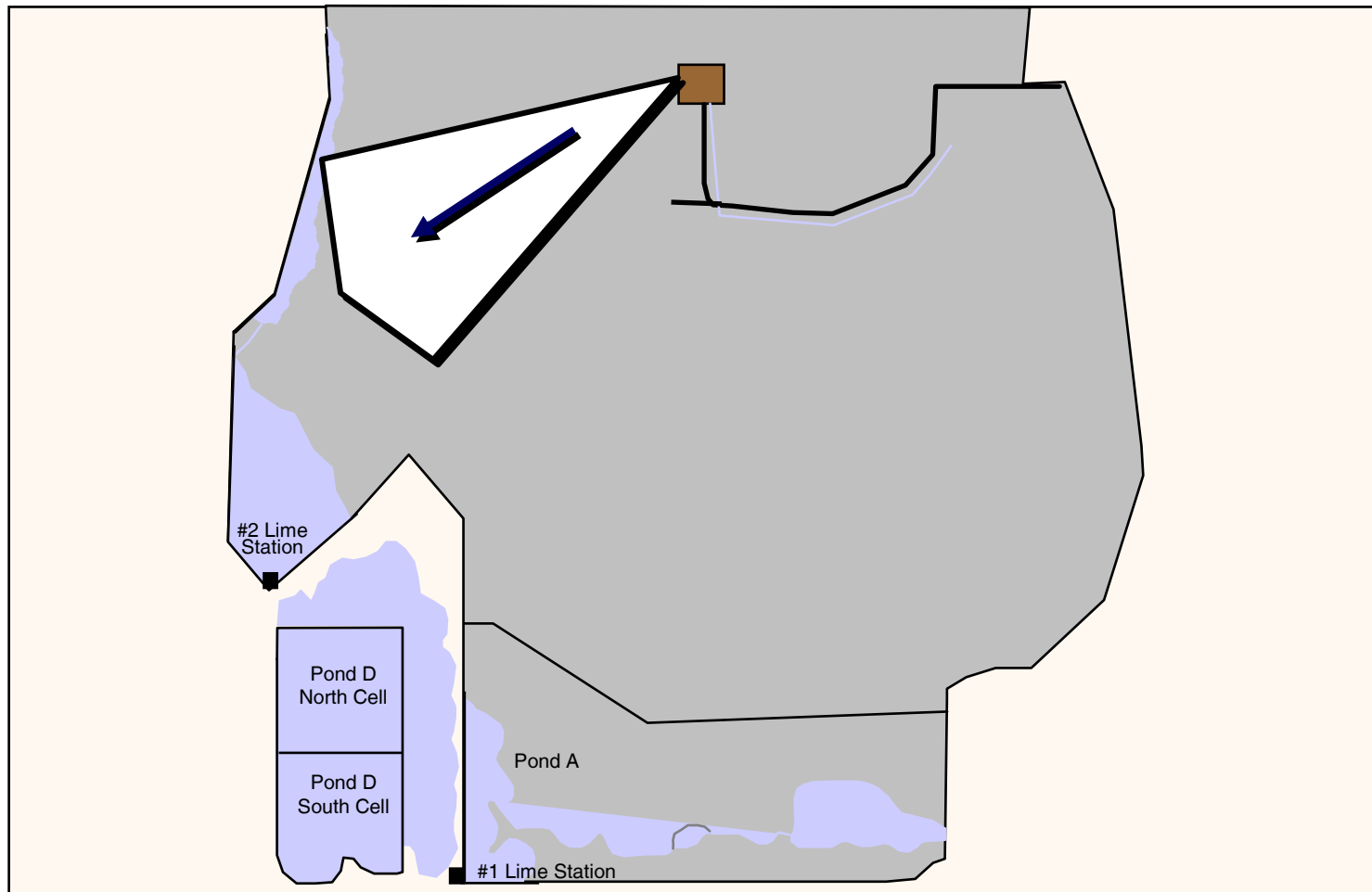


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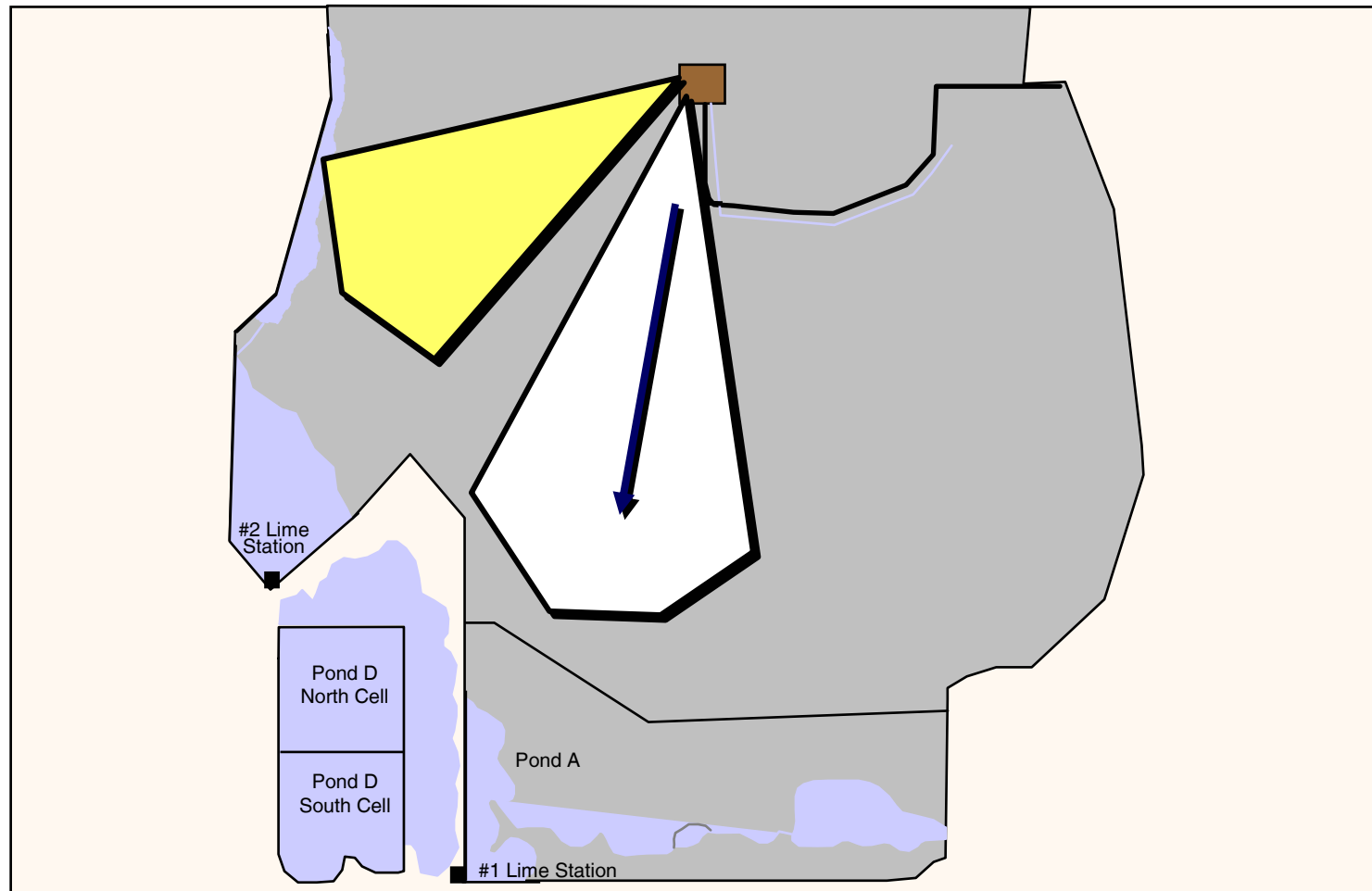
Spatial Trends of Dissolved Sulphate, Iron and Zinc in Pore Water (top 50 cm)



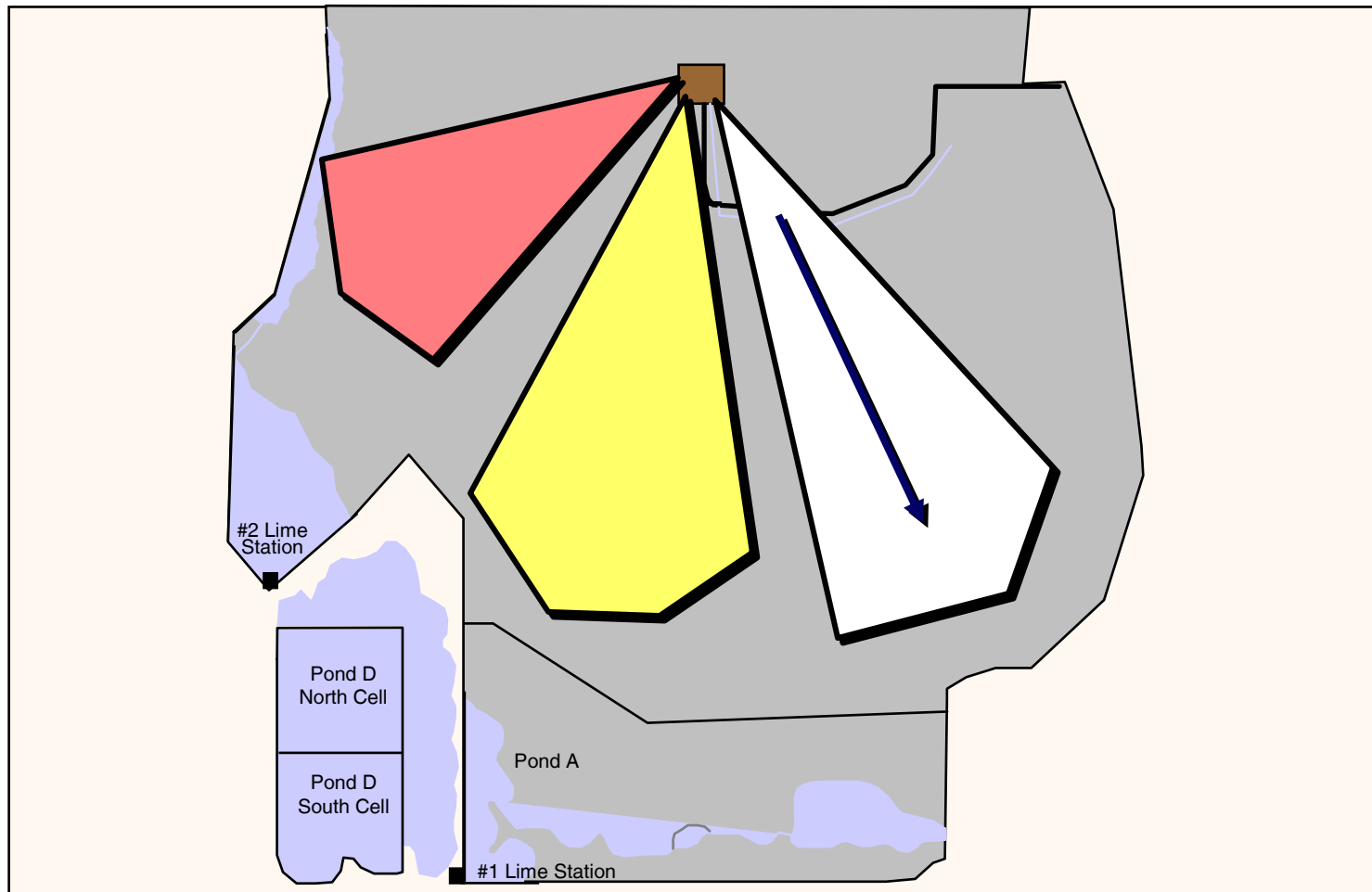
Tailings Deposition



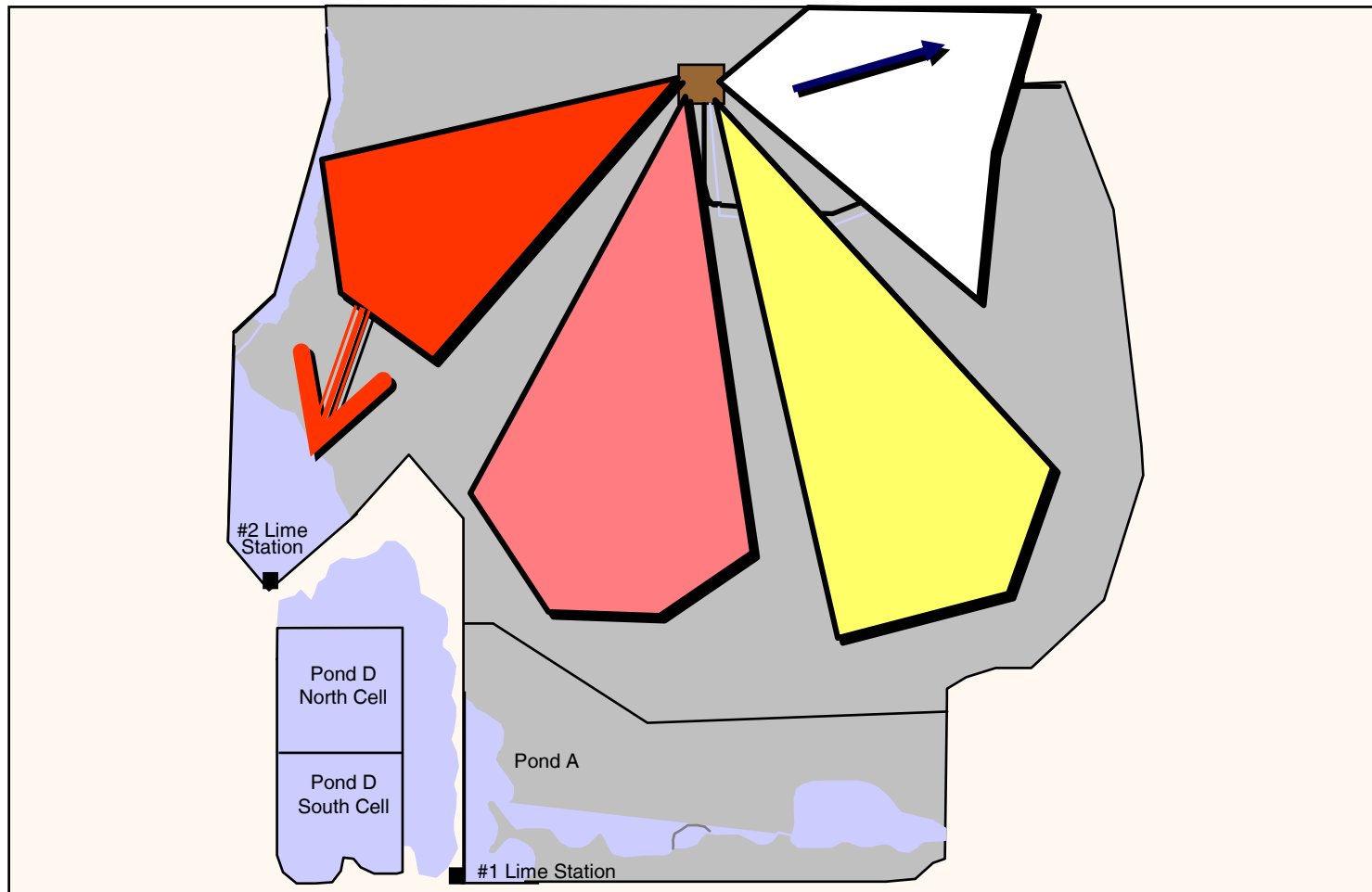
Tailings Deposition



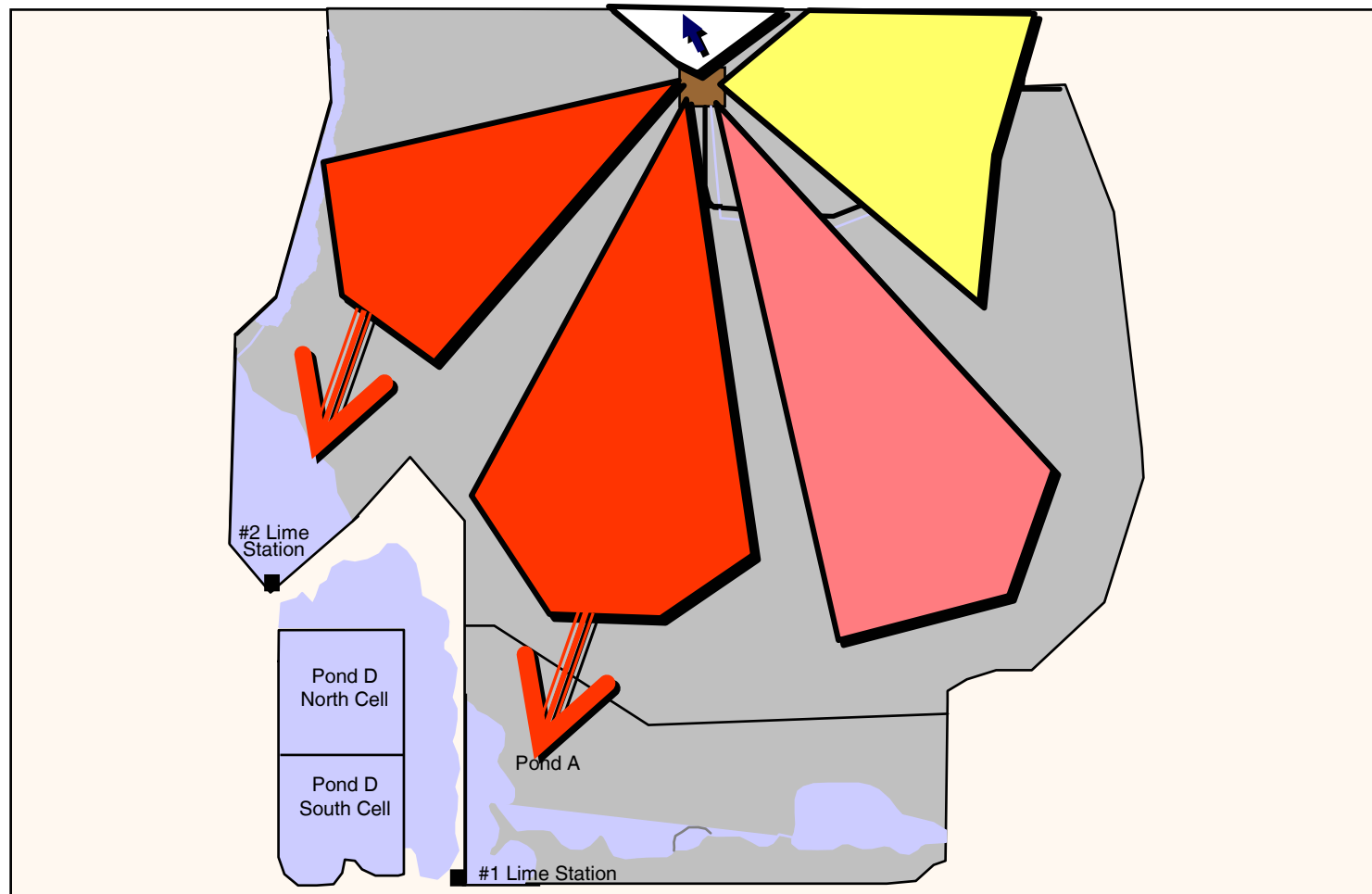
Tailings Deposition



Tailings Deposition

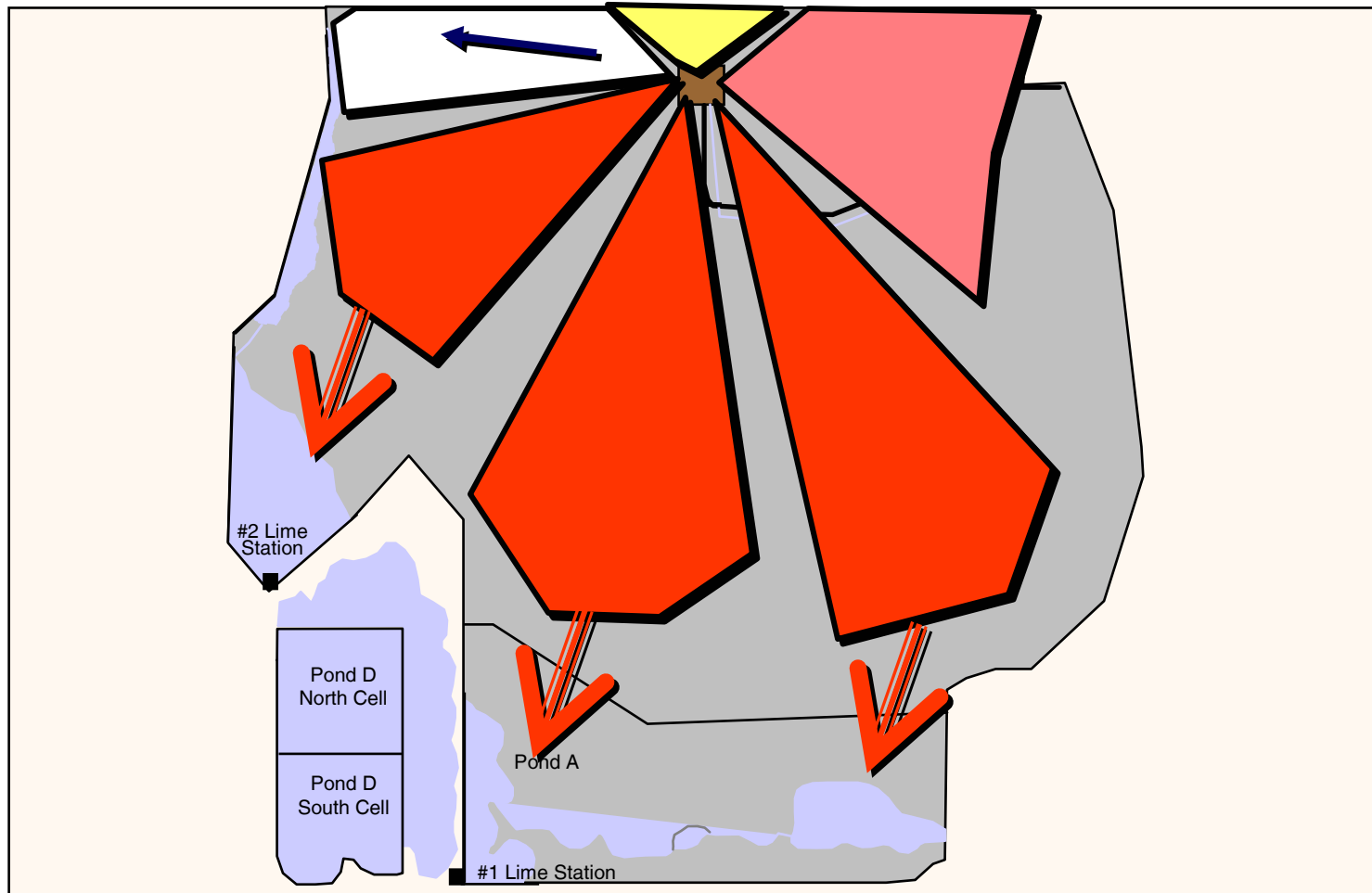


Tailings Deposition



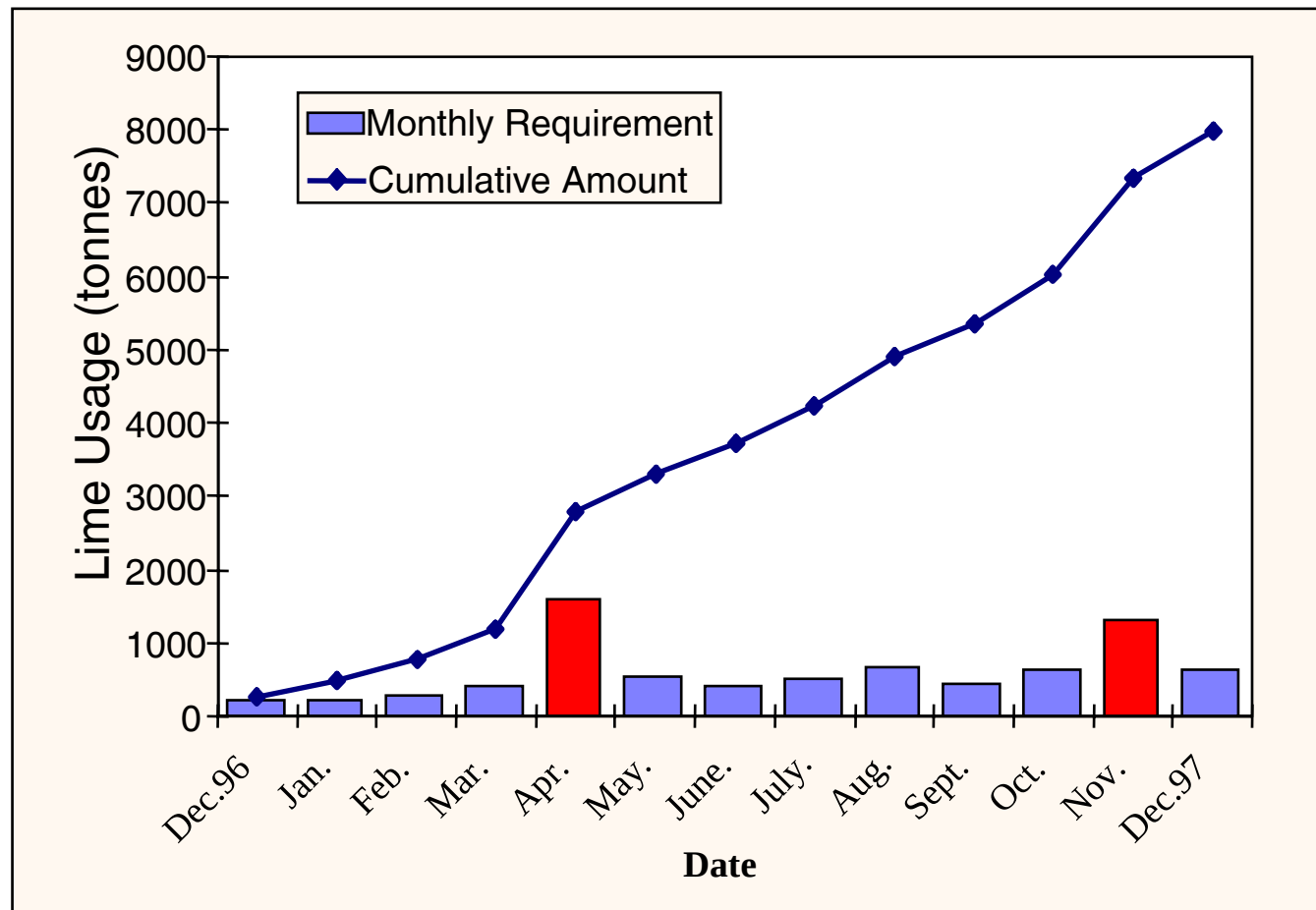
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Tailings Deposition



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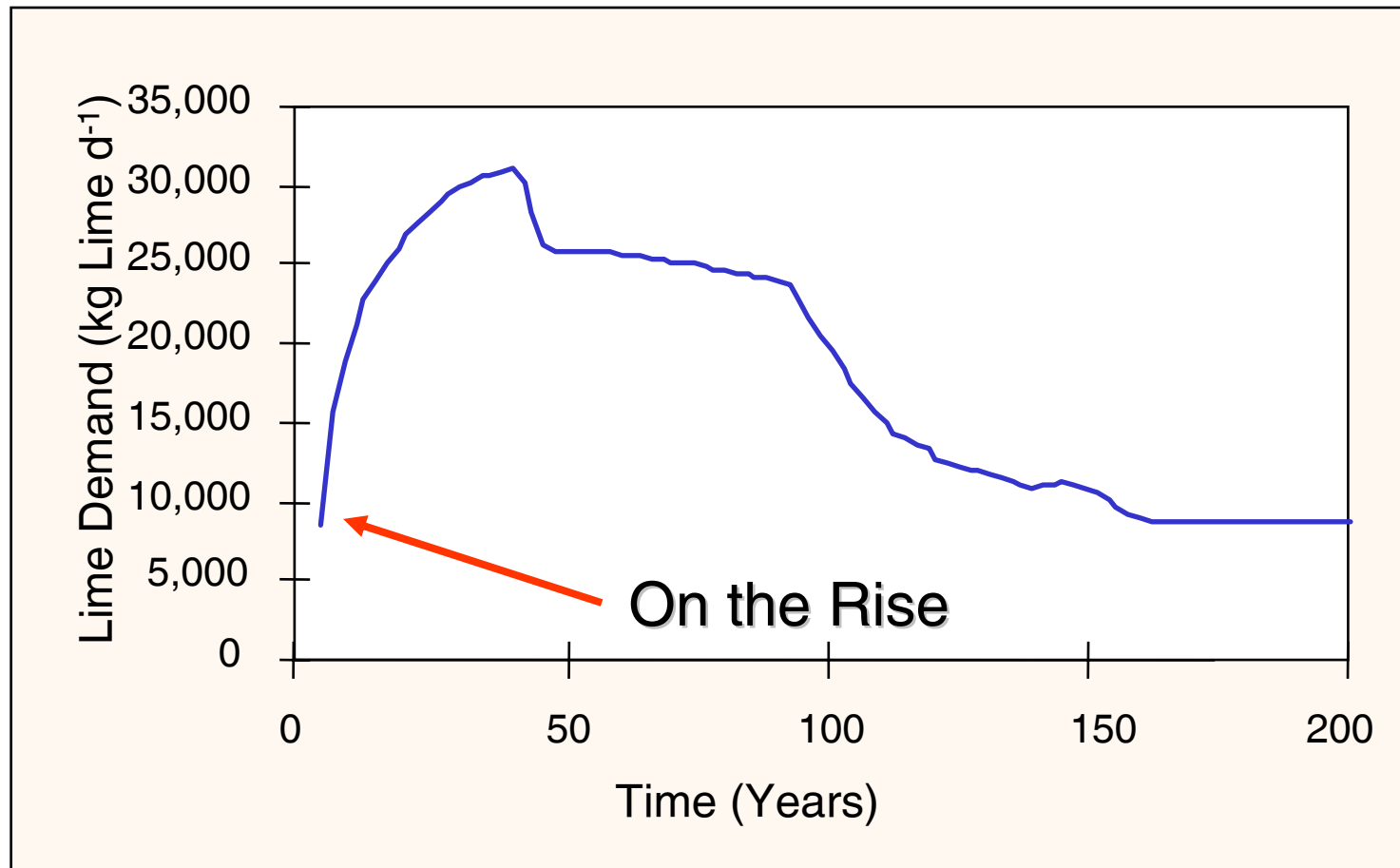
Lime Usage



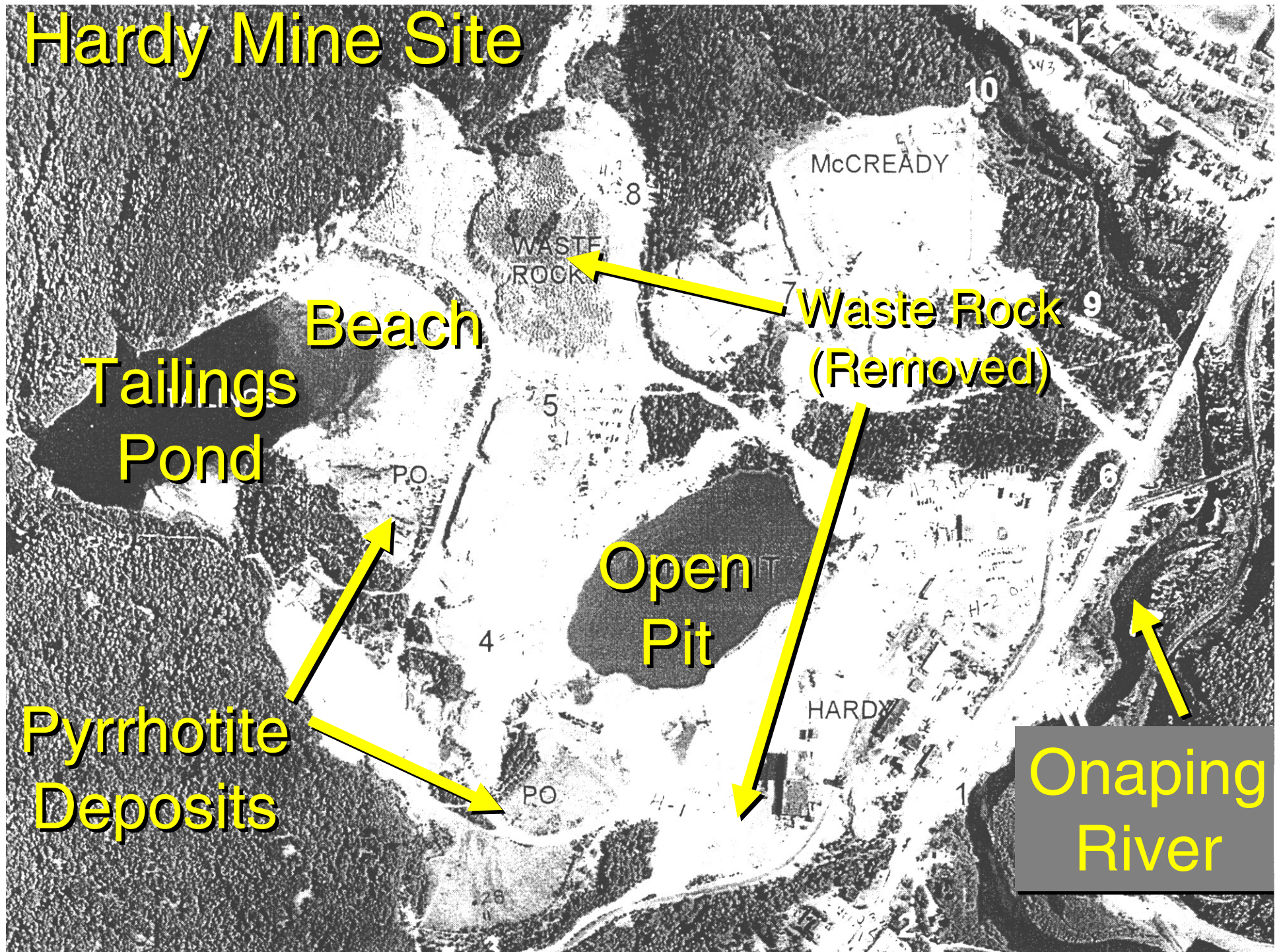
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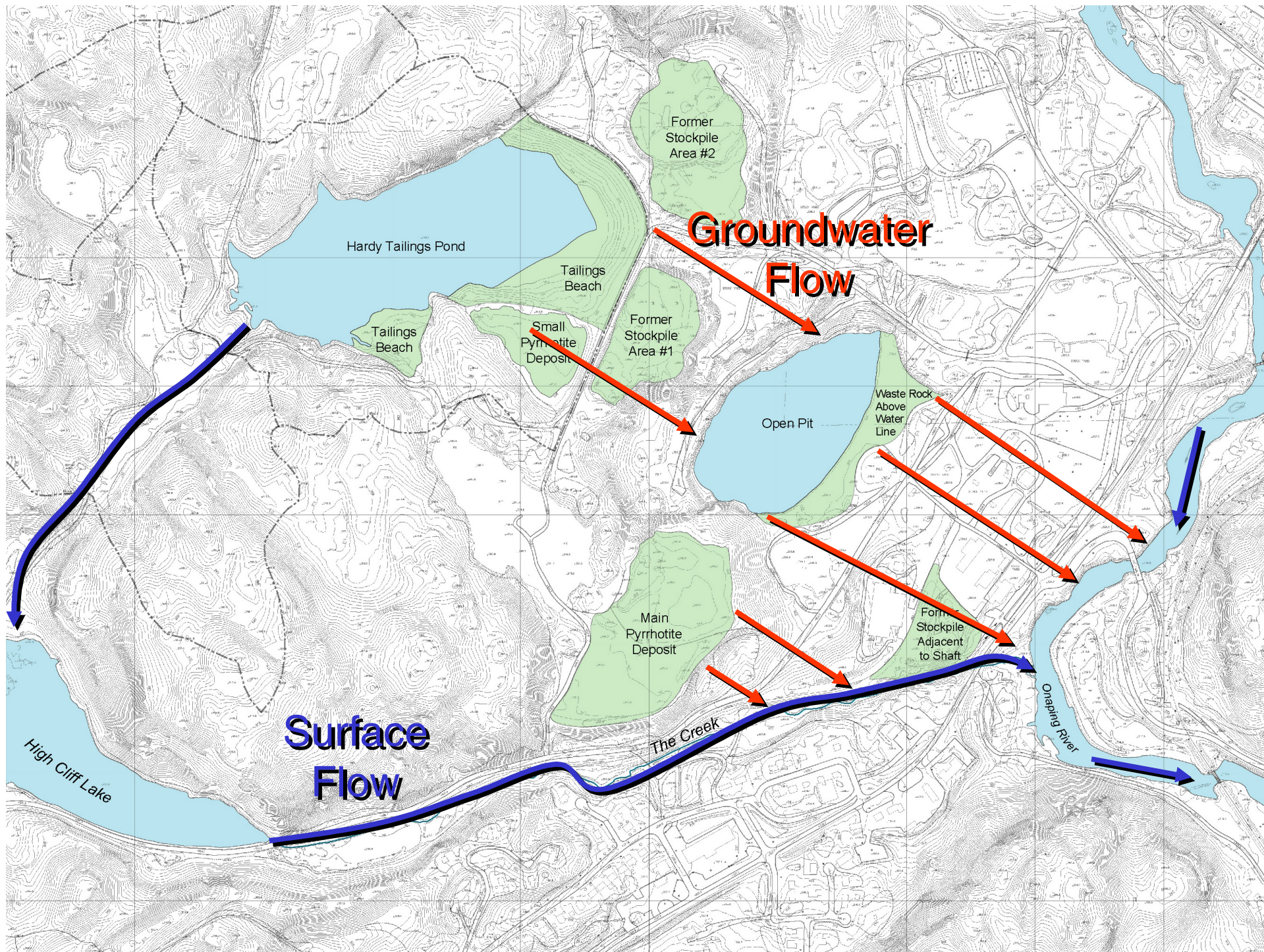
Calculated Lime Demand at Treatment Plant

(Assuming No Mitigative Action on Tailings)

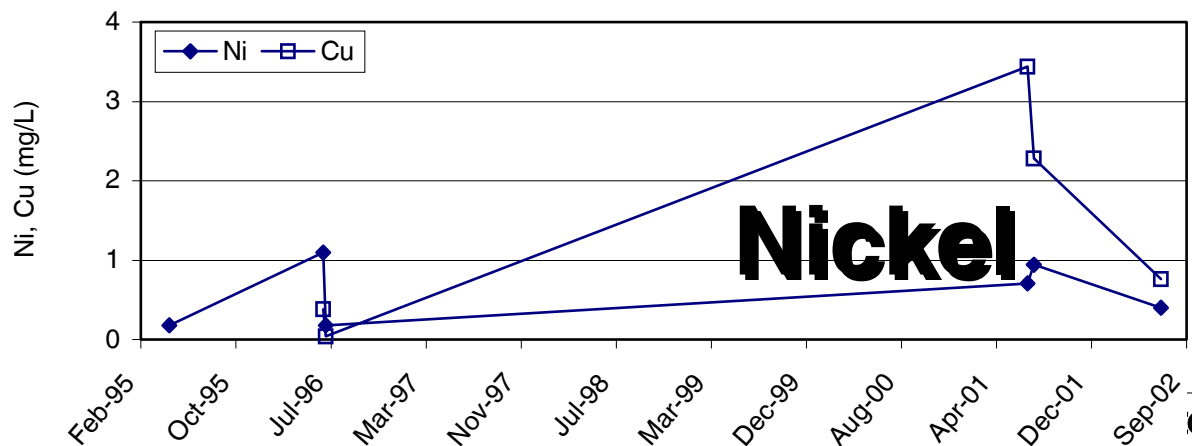
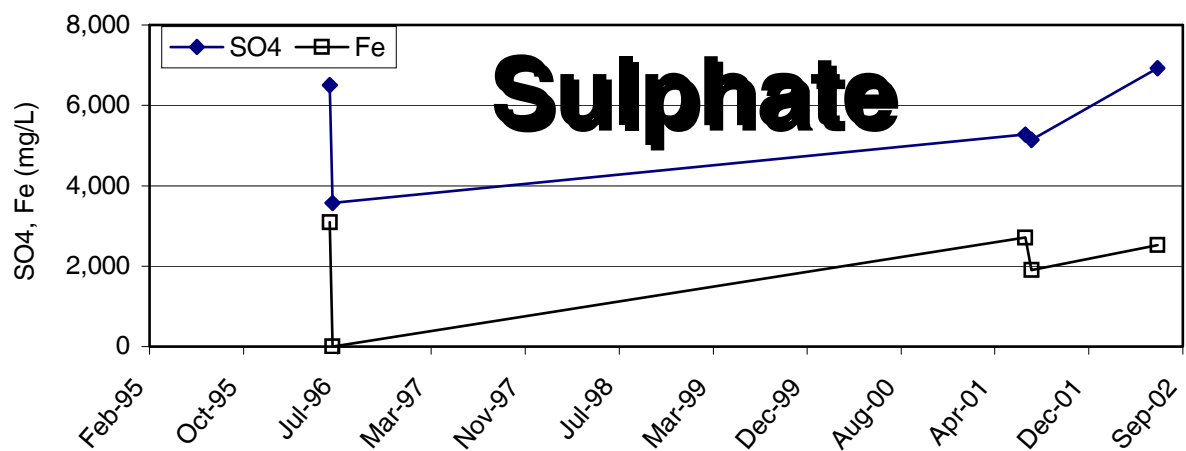
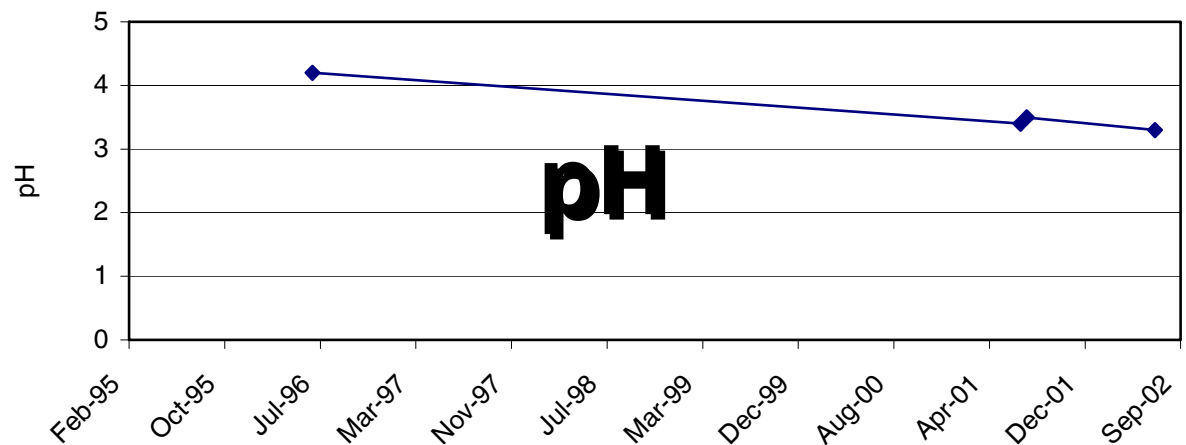


Hardy Mine Site



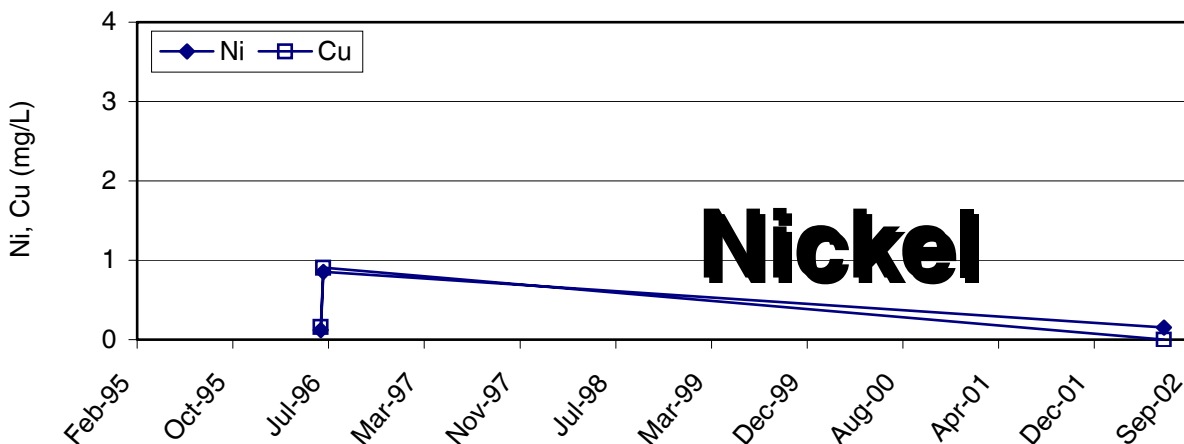
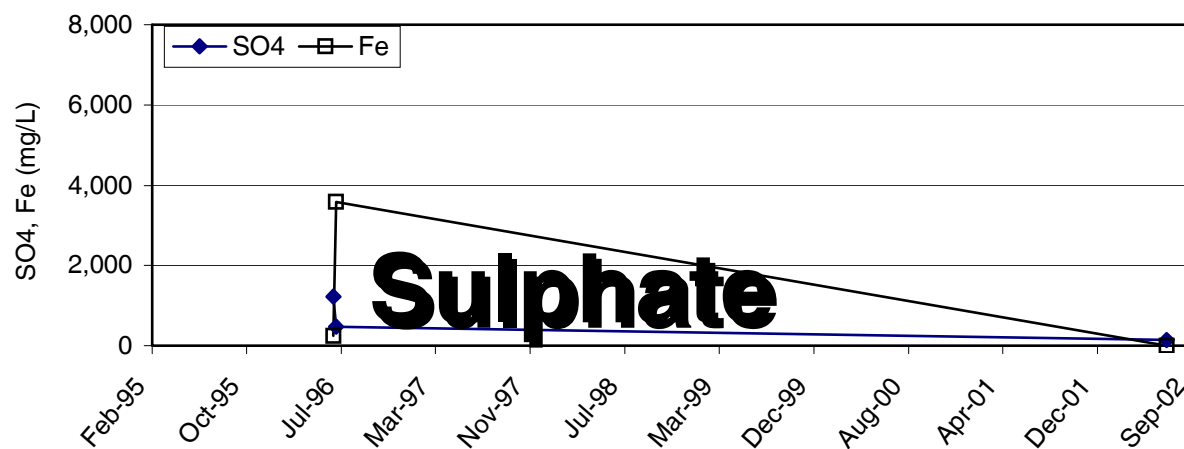
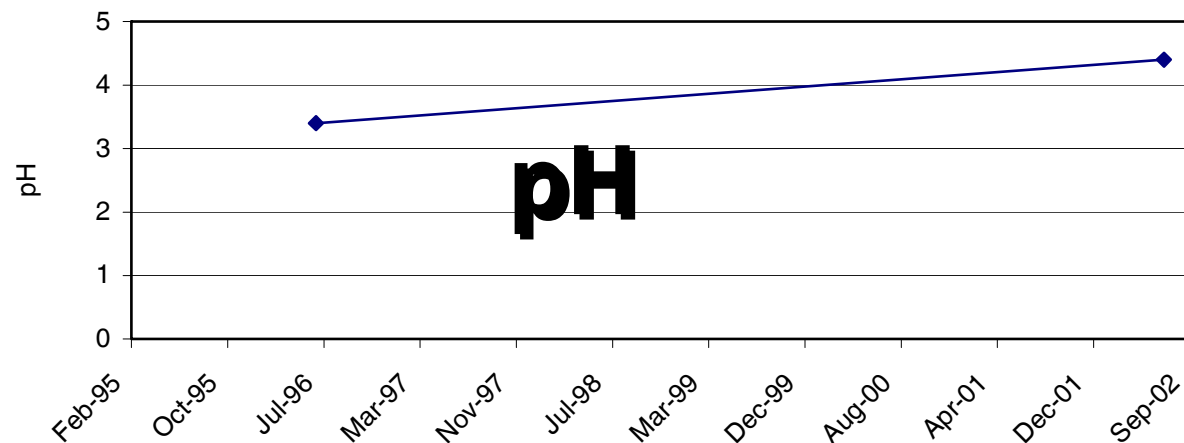


Groudwater Below the Large Pyrrhotite Stockpile

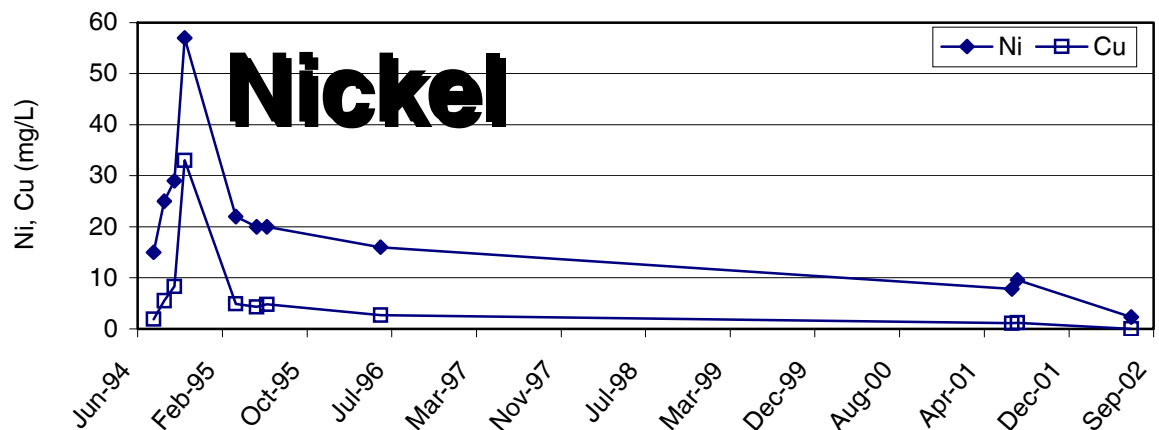
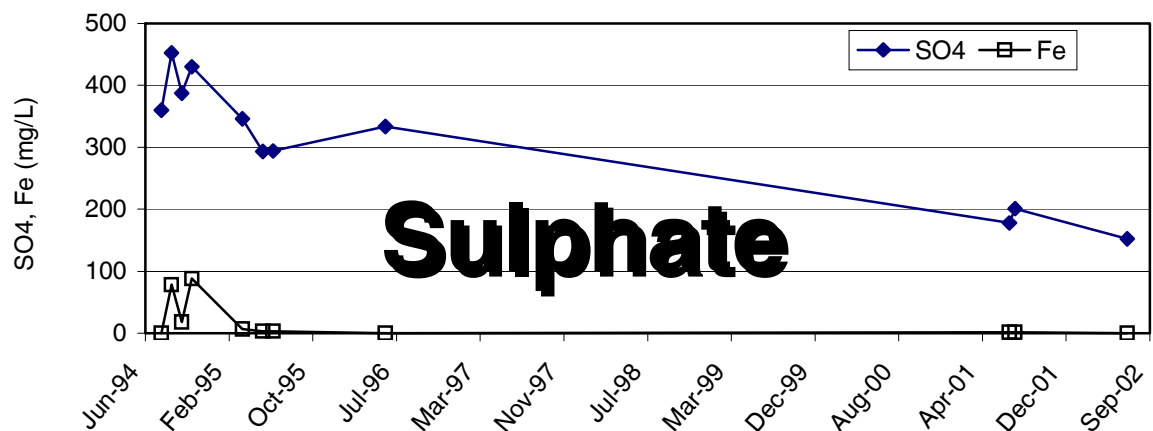
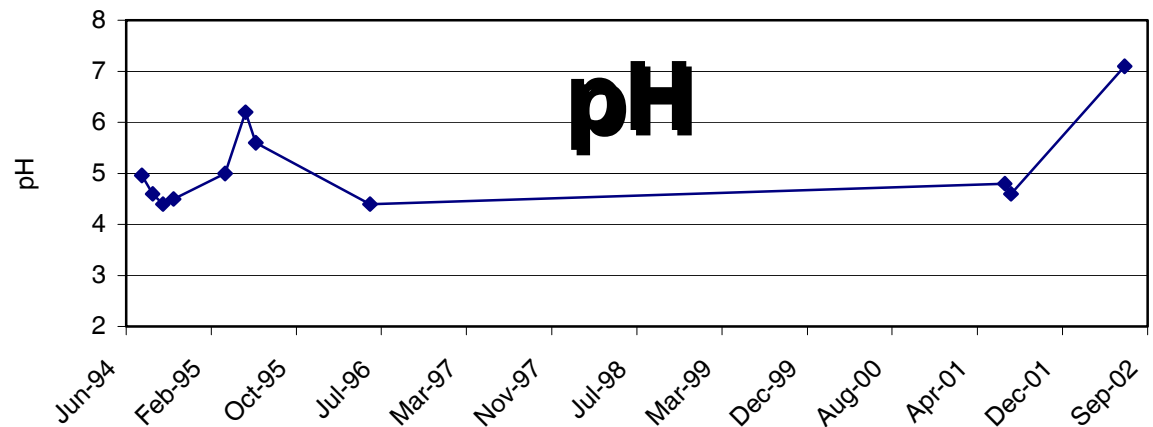


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Groudwater Below the Small Pyrrhotite Stockpile

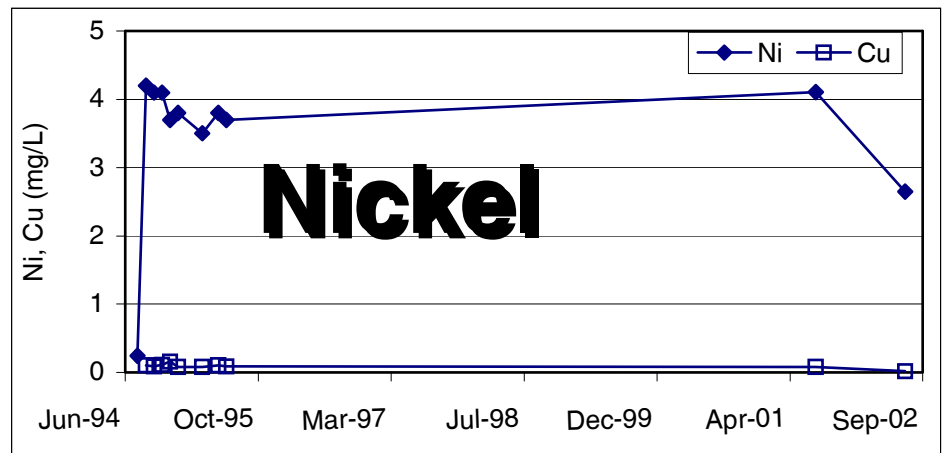
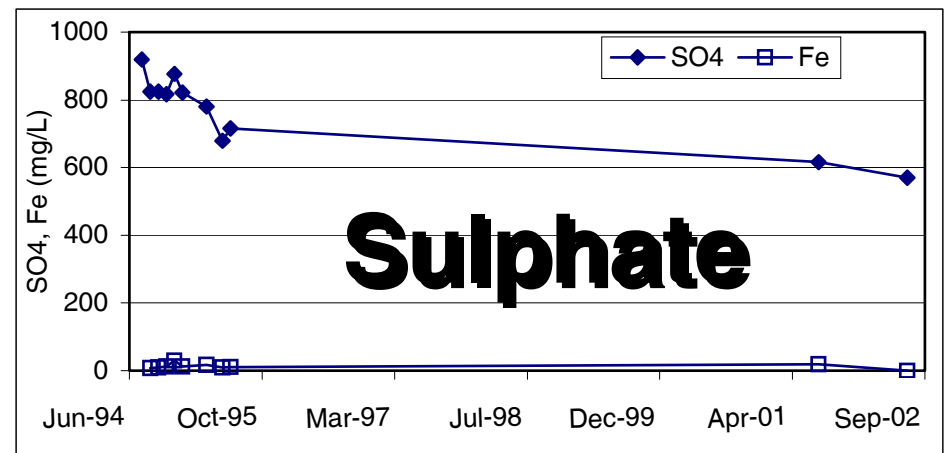
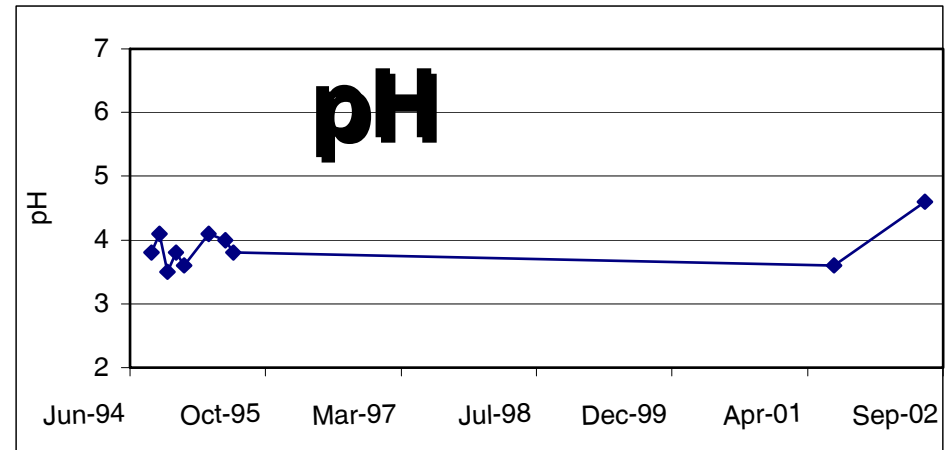


Groundwater below the Former Waste Rock Stockpile Down Gradient of the Open Pit



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Groundwater below the Former Waste Rock Stockpile Down Gradient of the Tailings Beach



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Estimated Loadings from ALL Sources

Constituent	Maximum Estimated Load From Hardy (kg/day)	Measured Load in Onaping River (kg/day)
Sulphate	1,100	26,000
Nickel	1.4	22

Concluding Remarks

- **Kidd**

- Increased loadings during operation unexpected
- Unique challenges being managed by selective tailings placement and progressive reclamation
- Closure plan includes cover to reduce exposure and loadings
- Conditions expected to alter dramatically after closure – but mat require indefinite treatment

- **Hardy**

- Loadings generally diminishing after 30 years
- Limited reclamation required
- Groundwater pathways have provided natural mitigation
- Complex mine site with surprisingly small impacts