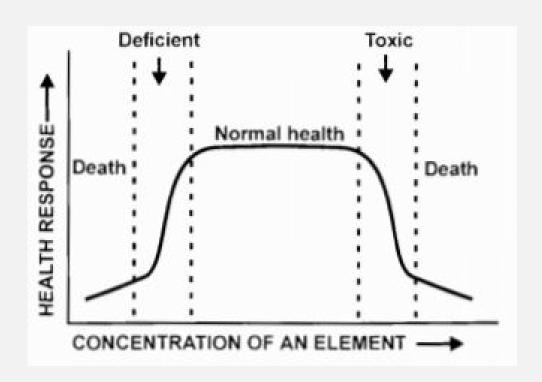
EXTRACTING VALUE FROM MINE WASTE

Andrew Harley

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"This is the scientific philosophy that I have evolved for myself through watching my cows at grass. Grass reveals with dazzling clarity a truth that must never be forgotten: The soil must be kept in good health if the animal is to remain in good health. The same is true of Man. Soil science is the foundation of protective medicine, the medicine of tomorrow."

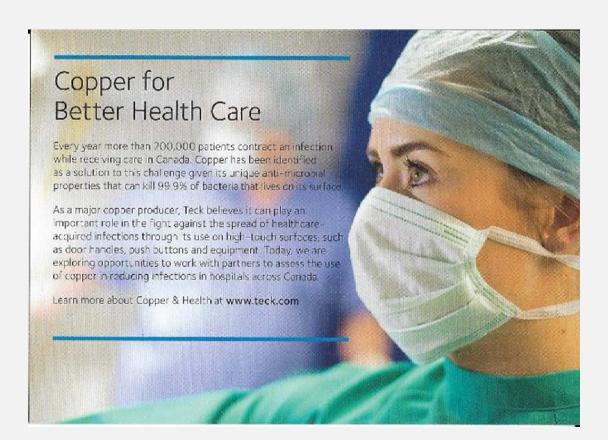
Andre Voisin, 1959 Soil, Grass and Cancer

Image: Death and the Ploughman, The Dance of Death, Hans
Holbein (1497-1543)

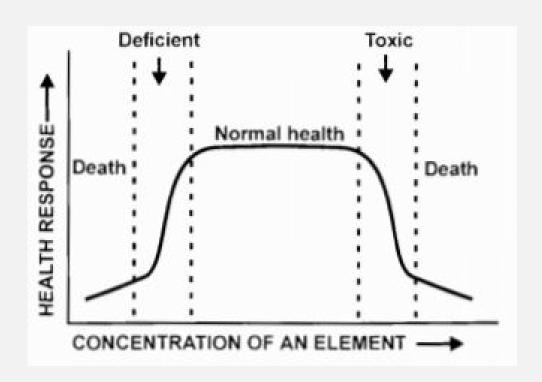










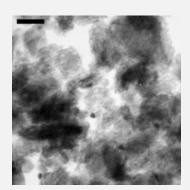


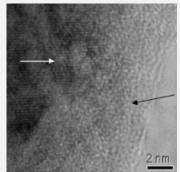


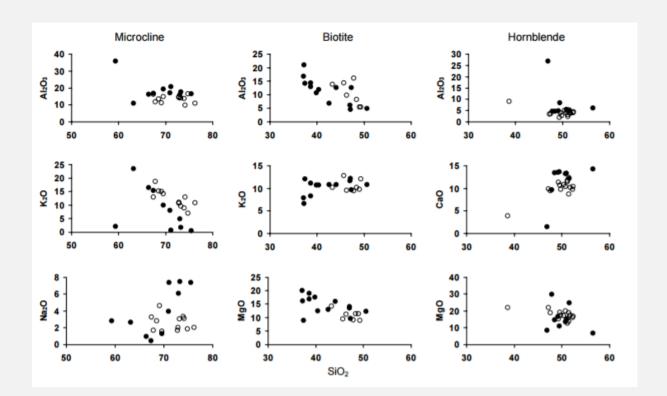














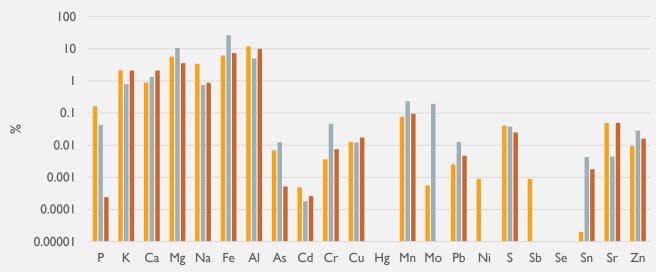
BIOMINING

- Improved rates of metal recovery
- Reduced capital cost
- Robust technology
- Self managing process
- Environmentally friendly
- Low operator skills

- Applicable over wide feedstock concentration
- Appropriate to recovering wide range of metals and stabilizing toxic elements
- Variety of scales and easy scaling
- Short lead time from design to construction to operation
- Low maintenance requirements

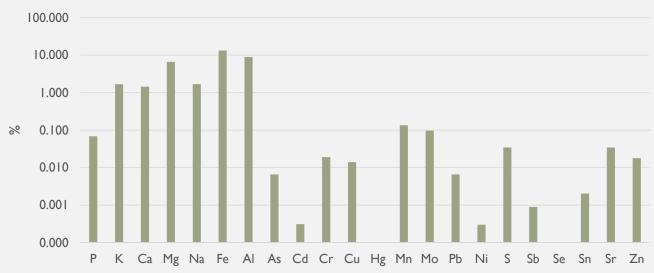


FEEDSTOCK CHEMISTRY





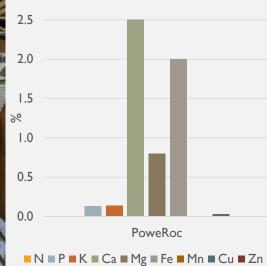
FEEDSTOCK CHEMISTRY





SLURRY LEACHING STEP – SOLID EXTRACTION





SLURRY LEACHING STEP – LIQUID EXTRACTION

AU RECOVERY

Source	Oz/ton	Recovery
Tailings (CA)	0.237	58%
Waste rock (NV)	0.327	66%
Waste rock (OR)	0.343	62%

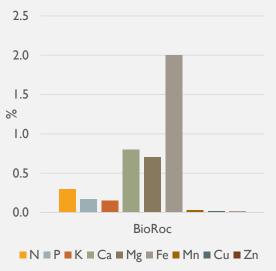
HG RECOVERY

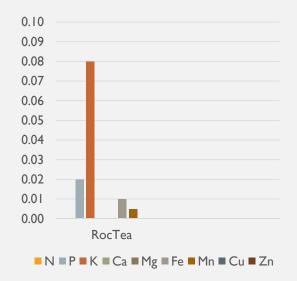
Tailings (NV)		
Total Hg	783 mg/kg	
Leachable Hg	125.3 mg/L	
Diluted Hg	37.2 mg/L	
Polymer Resin Recovery	69%	































FOR THE ENGINEERS

- Production Costs:
 - \$400/oz Au
- Revenue
 - Metal recovery
 - Fertilizers
- Intangibles
 - Social license
 - Liability removal

- Known Unknowns
 - Recovered metal fate
 - Regulatory compliance
 - Legalities
 - Good Samaritan



