

Successful Reclamation and Closure to Guide Candidate Site Selection

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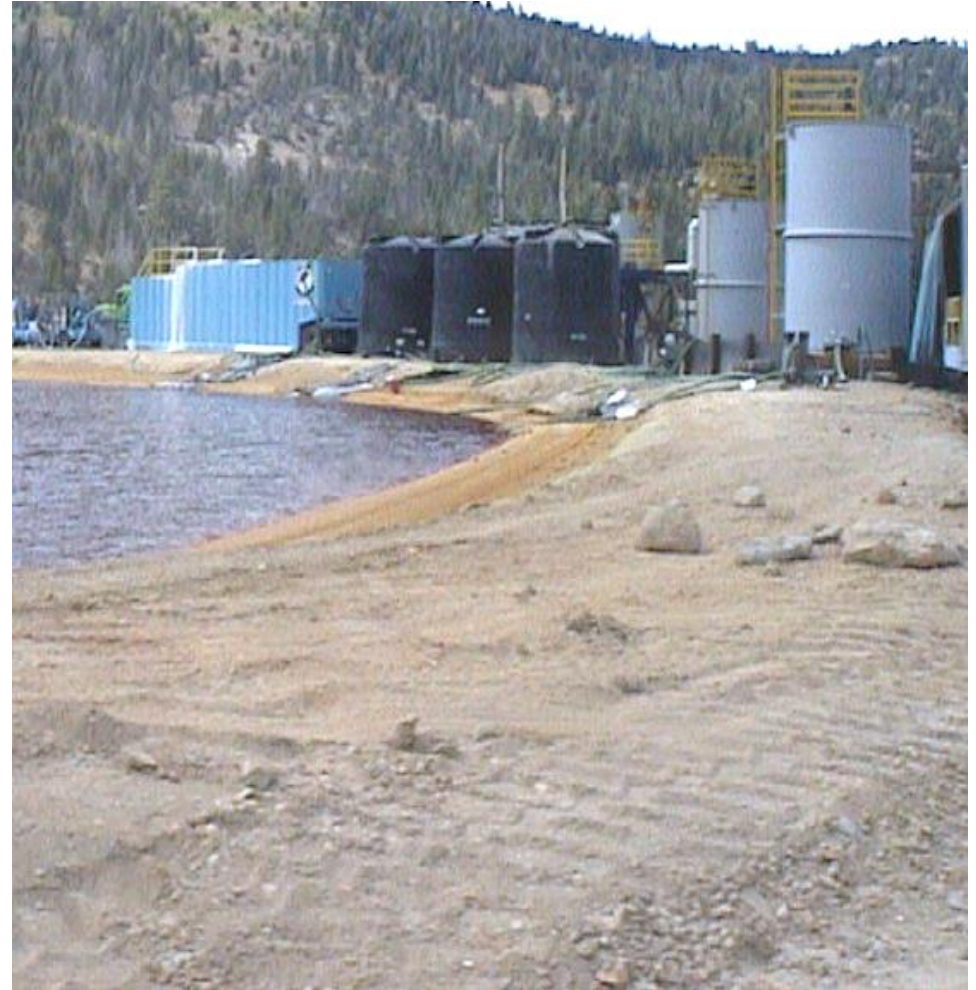
HISTORY OF MINE CLOSURE

What we've learned from our failures and successes

Mine closure

Mine closure is a complex process

- Technically challenging
- Multi-disciplinary
- Site-specific
- Risk-based
- Multiple stakeholders
- Land use planning
- Complex regulations/standards

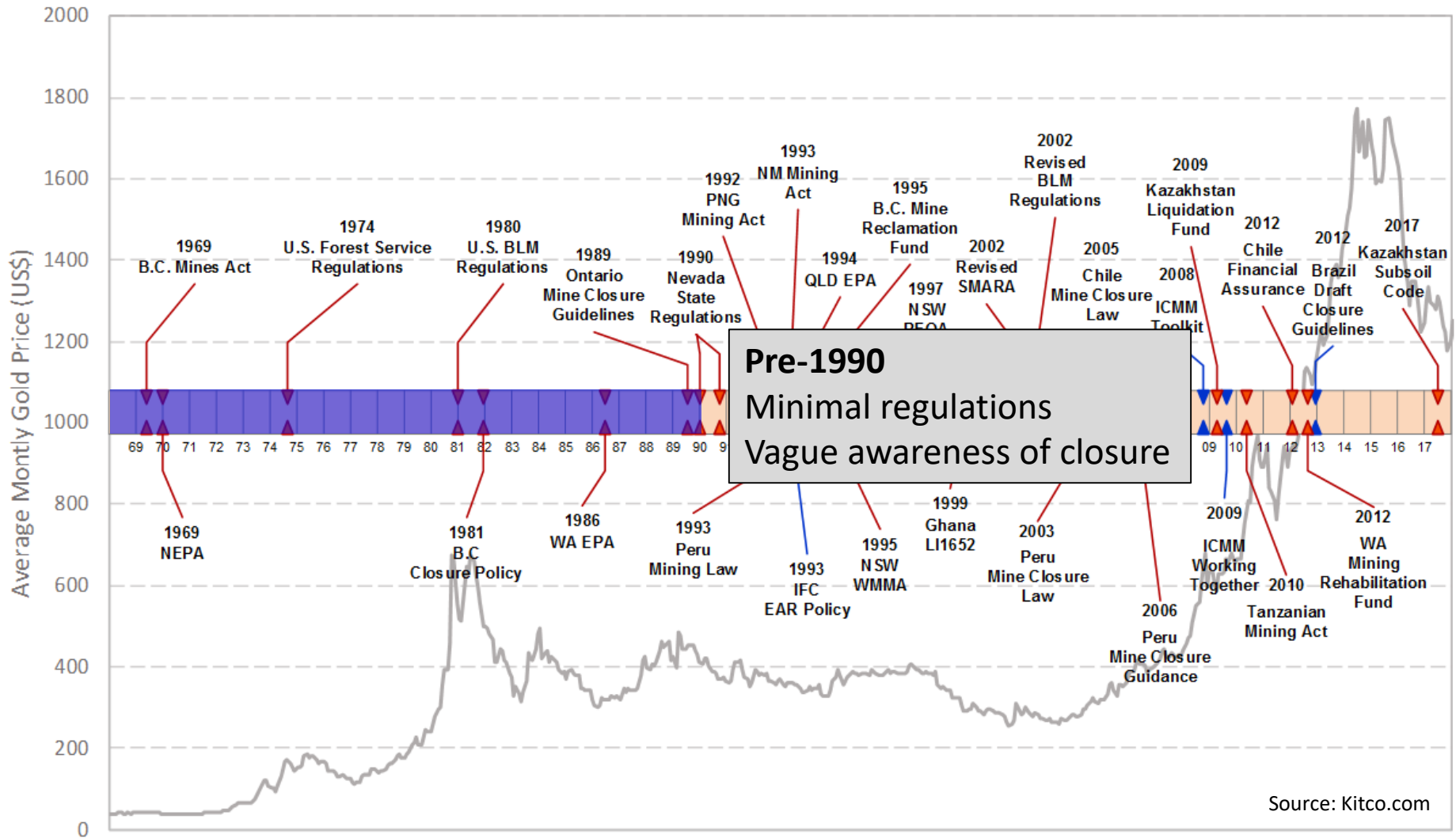


Closure experience

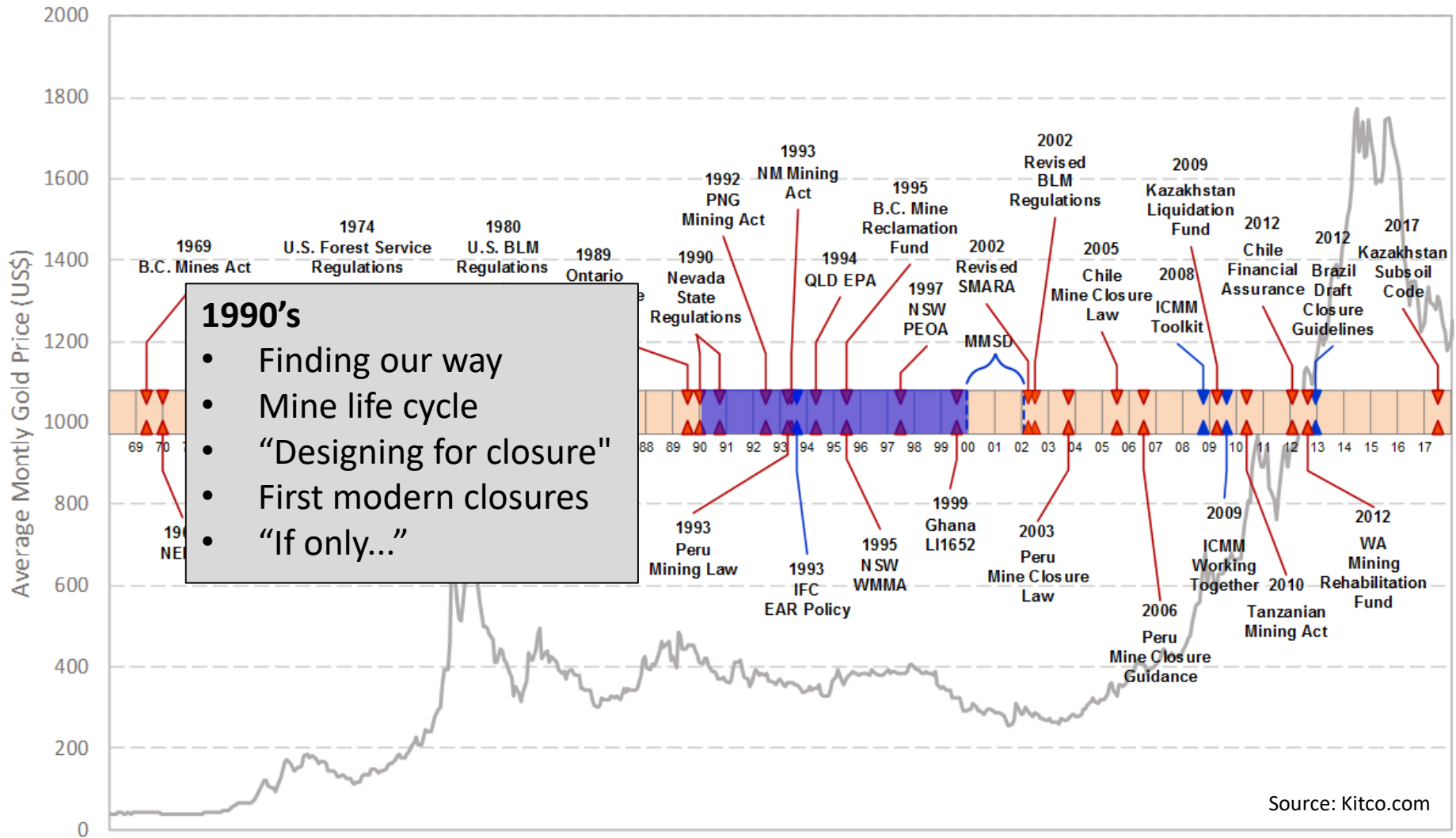
- Industry and agencies have more than 30 years of closure experience
 - Operating mines
 - Bankruptcies
 - AML sites
- Plenty of successes (and failures) drive constant change in technologies, approaches and regulatory requirements
- Successful partnerships between industry and agencies



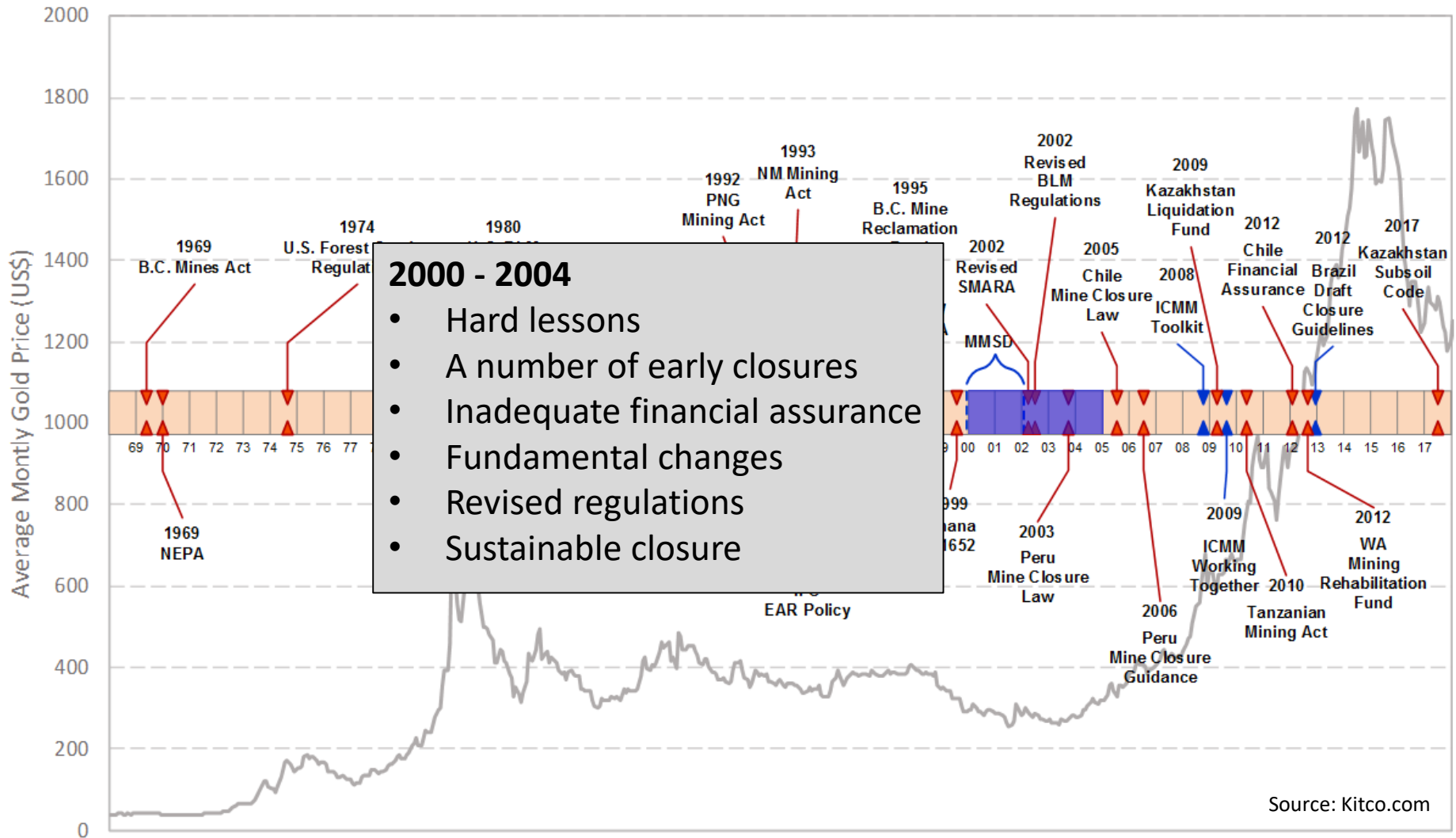
Mine closure history



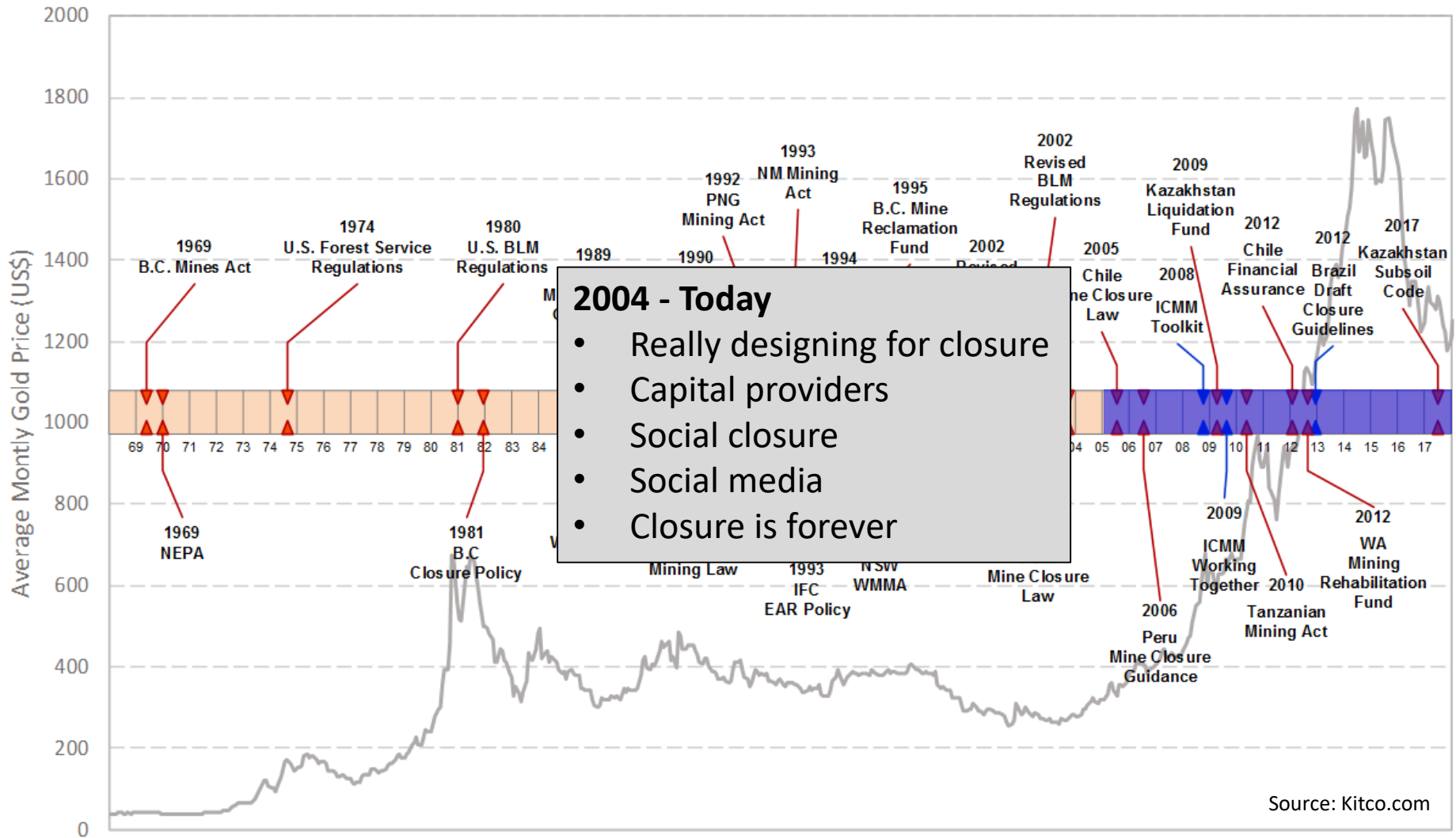
Mine closure history



Mine closure history



Mine closure history



Source: Kitco.com

Lessons learned

- Every site is different, every closure plan is different
- Large gap between theory and implementation of closure
- Closure approaches should be risk-based
- Regulations and standards need to be reviewed/updated regularly





MINE CLOSURE VS. AML CLEANUP

Closure vs. AML Cleanup

Closure

- Operator exists
- Permitted facility
- Available closure plan
- Regulatory performance standards
- Financial assurance

Modern bankruptcy

- No responsible party
- Permitted facility
- Available closure plan
- Regulatory performance standards
- Financial assurance

AML

- No responsible party
- Unpermitted facility
- Flexible performance standards?
- No funds available

Types of AML issues

MINERAL POLICY CENTER'S BURDEN OF GILT REPORT CHARACTERIZATION OF U.S. ABANDONED MINES^a

CATEGORY	ASSUMED NUMBER OF SITES	PERCENT OF TOTAL SITES
Reclaimed and/or Benign	194,500	34.8
Landscape Disturbance	231,900	41.6
Safety Hazard	116,300	20.9
Surface Water Contamination	14,400	2.6
Groundwater Contamination	500	0.089
Superfund	50	0.0089
Totals	557,650	100.8

^a Modified after *Burden of Gilt*, pages 6 and 31, Mineral Policy Center, June 1993

Types of AML issues

Types of AML Issues	Approximate Percentage of AML Sites
Landscape disturbances	70%
Safety hazards	20%
Environmental issues	10%

Typical AML site issues

- Hazardous underground openings
- Dangerous highwalls and open pits
- Unsafe structures and buildings
- Physically unstable or erodible mine waste deposits
- Acid rock drainage/metal leaching (ARD/ML)
- Surface and ground water impacts
- Blowing dust from tailings piles
- Contaminated soils





SELECTING SITES

Site selection factors

- Biophysical conditions
- Site features
- Stakeholder input
- Location/remoteness
- Land status
- Proximity of water
- Access
- Benefit
- Cost effectiveness
- Samaritan preference



Possible site objectives

- Improved environmental conditions
- Stability
- Improved safety
- Preservation of historic features
- Ongoing care requirements
- Productive land use



We cannot solve our problems with the same thinking we used when we created them.

Albert Einstein

Thank you