

02-03-15

LUNCH & LEARN:

MINERAL

ECONOMICS AND

MINERAL

EXPLORATION

<TARGET><BILL></BILL><SUBJECT>02-03-15 LUNCH and LEARN
MINERAL ECONOMICS AND MINERAL
EXPLORATION</SUBJECT><COMM>HRES29</COMM></TARGET>



[Home](#) [Legislature\(2015 - 2016\)](#) [Meetings](#)

Legislature(2015 - 2016)
02/03/2015 12:00 PM RESOURCES

CAPITOL 106

* first hearing in first committee of referral
+ teleconferenced
= bill was previously heard/scheduled

[Schedule](#)

[Documents](#)

+ Lunch & Learn: "Economics of Mining Exploration & Development" by Council of Alaska Producers - Bob Loeffler, Professor of Public Policy, Institute of Social & Economic Research, University of Alaska Anchorage **Streamed live on AKL.tv**	TELECONFERENCED
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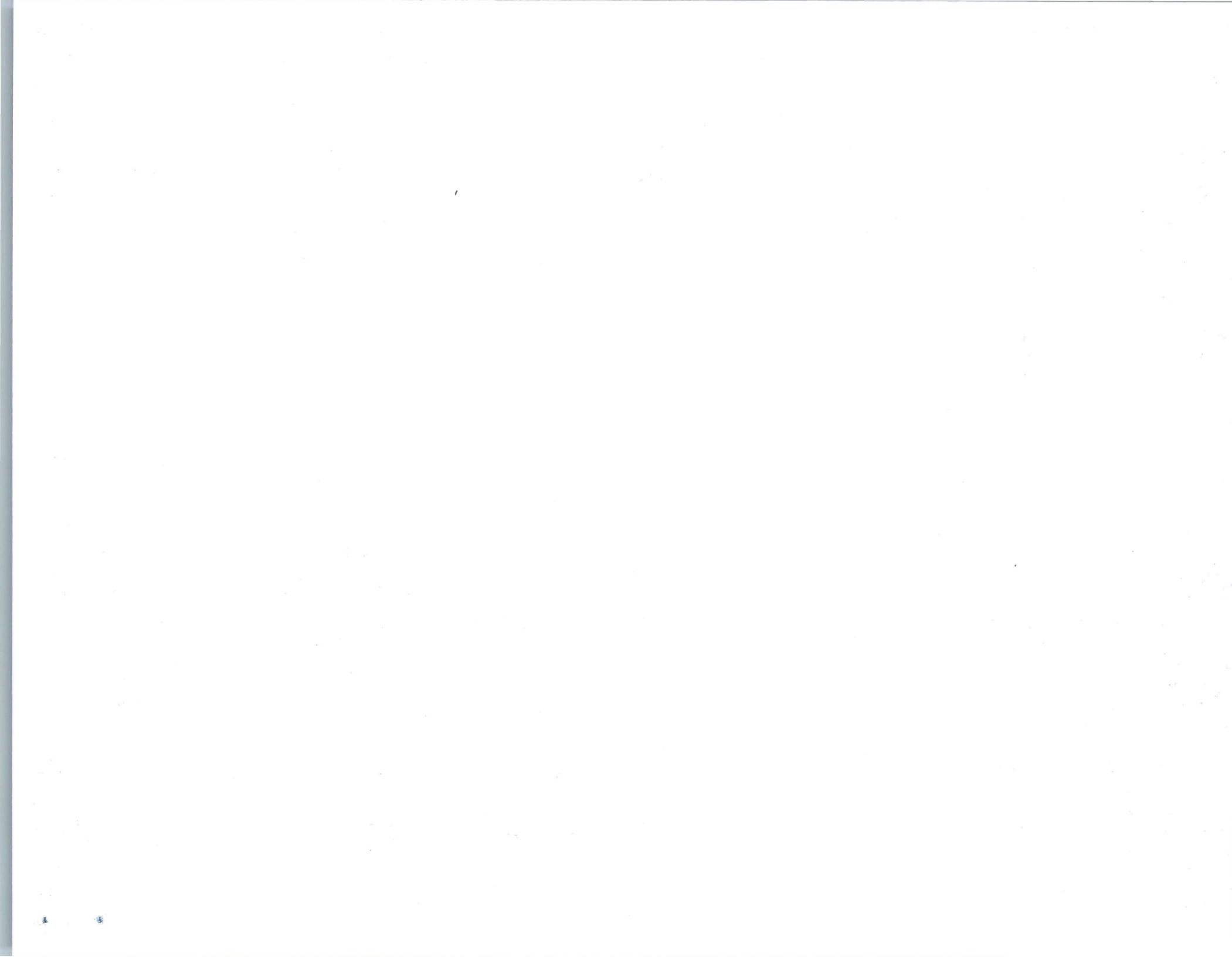
Mineral Economics and Mineral Exploration

Bob Loeffler

UAA, Institute of Social and Economic Research

February 3, 2015









Hard-rock Mineral Exploration

1. General Office Data Collection

2. *Regional* Exploration

3. *Property* Exploration

4. Advanced Exploration

5. Feasibility Studies / Design & Permitting



Office Data Collection

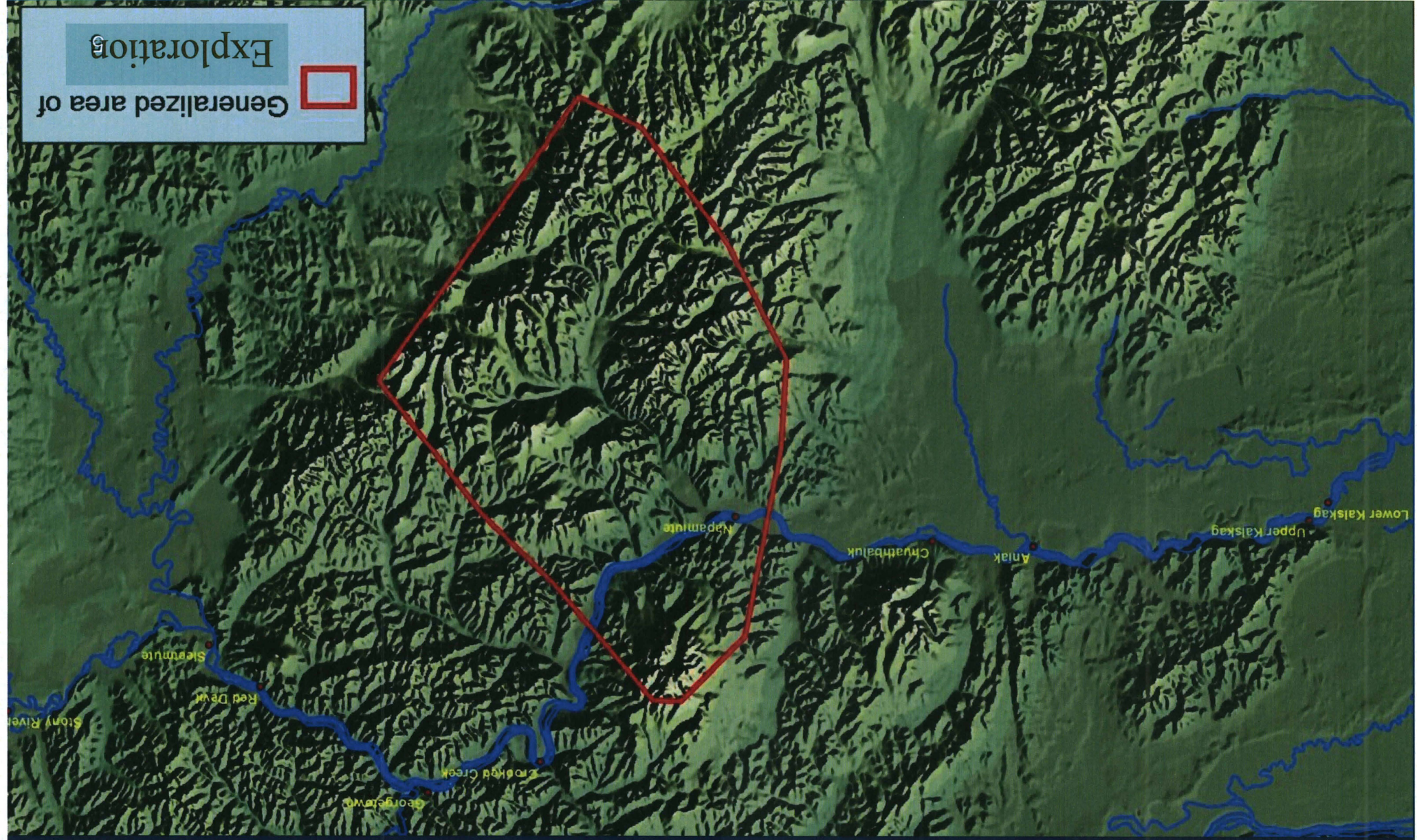
GOALS: Determine where geologic indicators and known gold occurrences come together.

ACTIVITIES: research and compile geology and geophysics maps, previous state and federal sampling data, etc, etc.





Regional Exploration: Getting out on the ground





Early Stage Regional Exploration

ACTIVITIES:

- stream and ridge rock sampling,
- systematic stream sediment and/or pan concentrate sampling,
- assay for gold and other pathfinder elements;
- stake prospecting sites and claims

COSTS: With remote camp and helicopter is roughly \$10,000/day for a crew of 6. \$200-\$500K

PROBABILITY: of profitable major mine ~ 1-2%



Stream-sediment sampling Soil Sampling





Early Stage Property Exploration

Stony River
Red Devil
Steelmute
Crooked Creek
Georgetown
Napamint
Chuatbajuk
Amik
Kalskag





Early-Stage Property Exploration

GOAL: look for significant anomalies

ACTIVITIES:

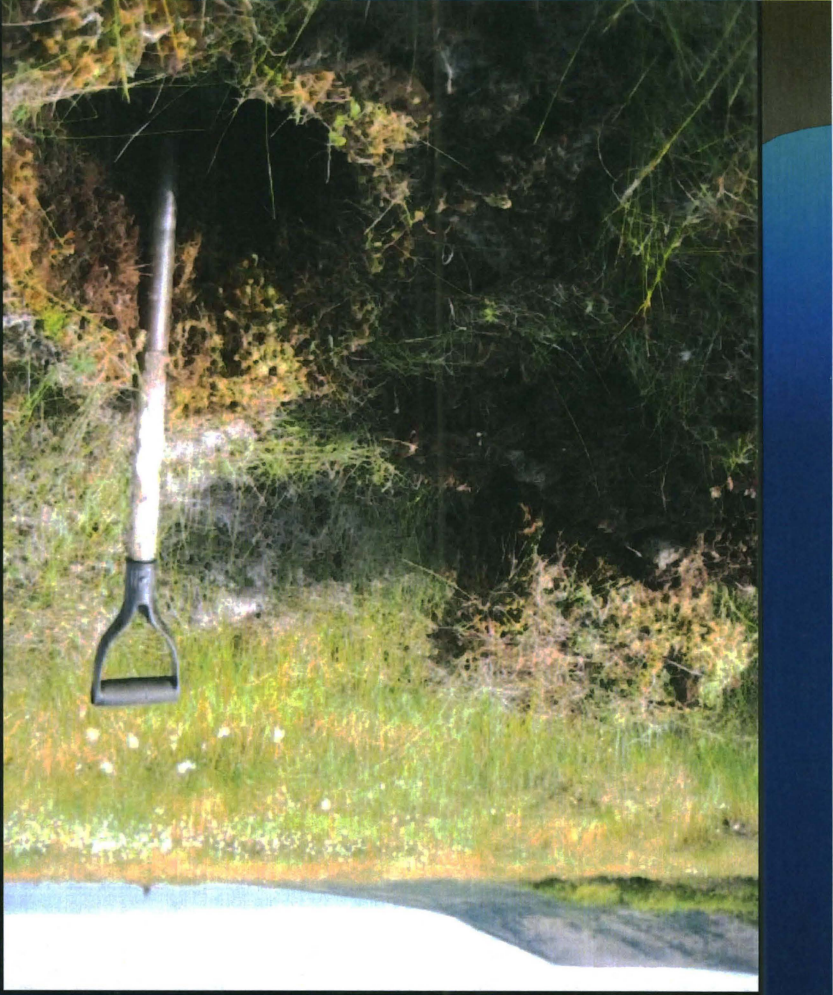
- soil and rock sampling on surveyed grids;
- geologic mapping,
- Aerial geophysics
- ground geophysics;

COSTS: 12-15 people; \$500K+ for 5 weeks. Multiple properties can be more.

PROBABILITY: of profitable major mine ~ 2-5%



Sediment Sampling; Ground Geophysics





Arial Geophysics





Bob's
Preferred
Method of
Mineral
Exploration





Mid-Stage Property Exploration

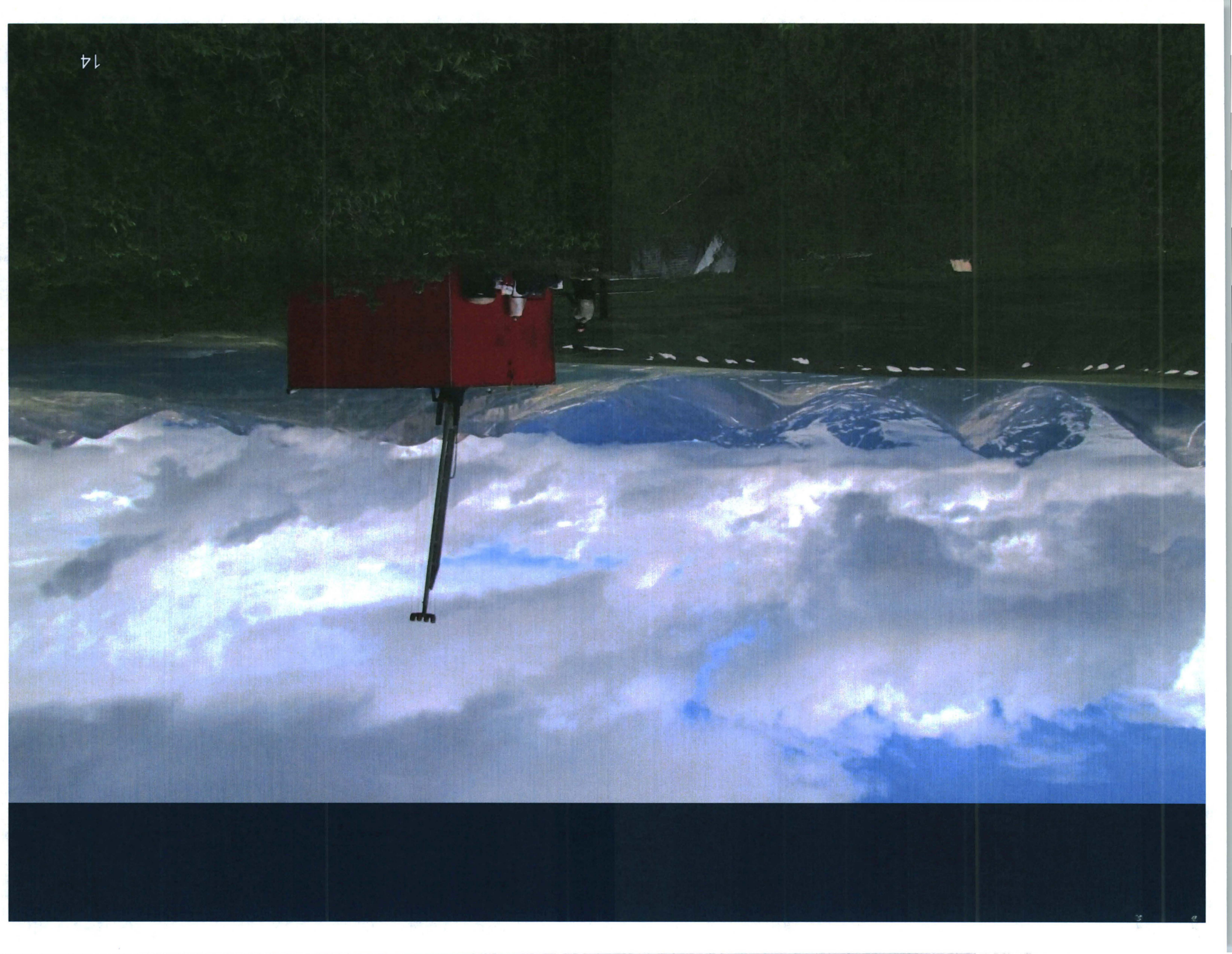
GOAL: find the mother lode - is there significant gold all in one place?

ACTIVITIES: closer spaced ground geophysics, drill holes, and sometimes trenches

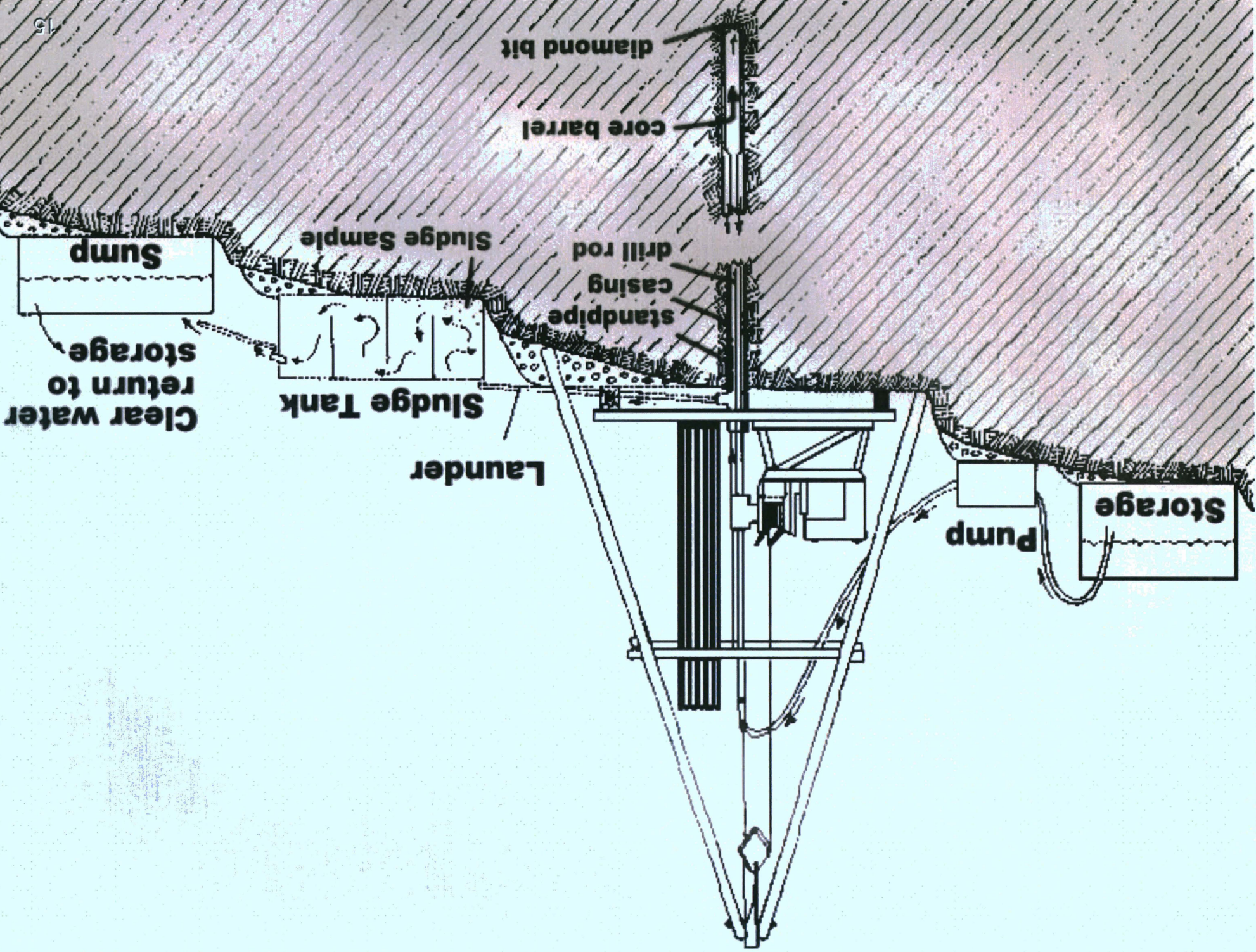
COSTS: Perhaps 25-person camp; few million \$ to \$10 million +

PROBABILITY: of profitable major mine ~ 5-10%

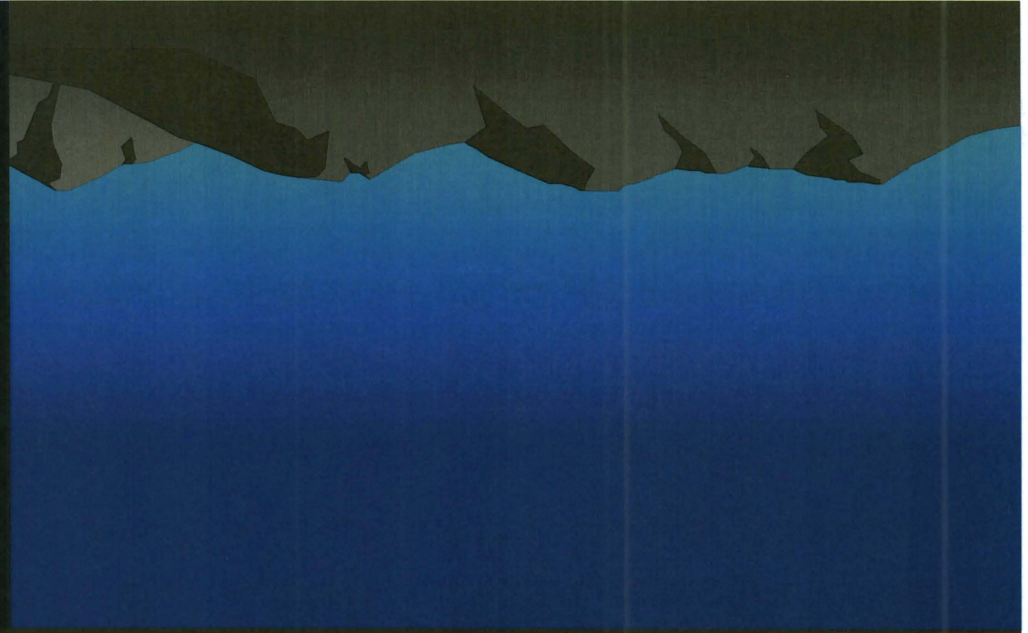
















The core is normally split along its axis; one half is analyzed, the other half is retained intact for further geologic study.





Geologist Reviewing Kensington Core





Advanced Exploration
Donlin Creek; Late 1990s or early 2000s





Advanced Exploration

GOAL: Determine the size and continuity of the deposit; gain information for mine design and environmental information for permitting

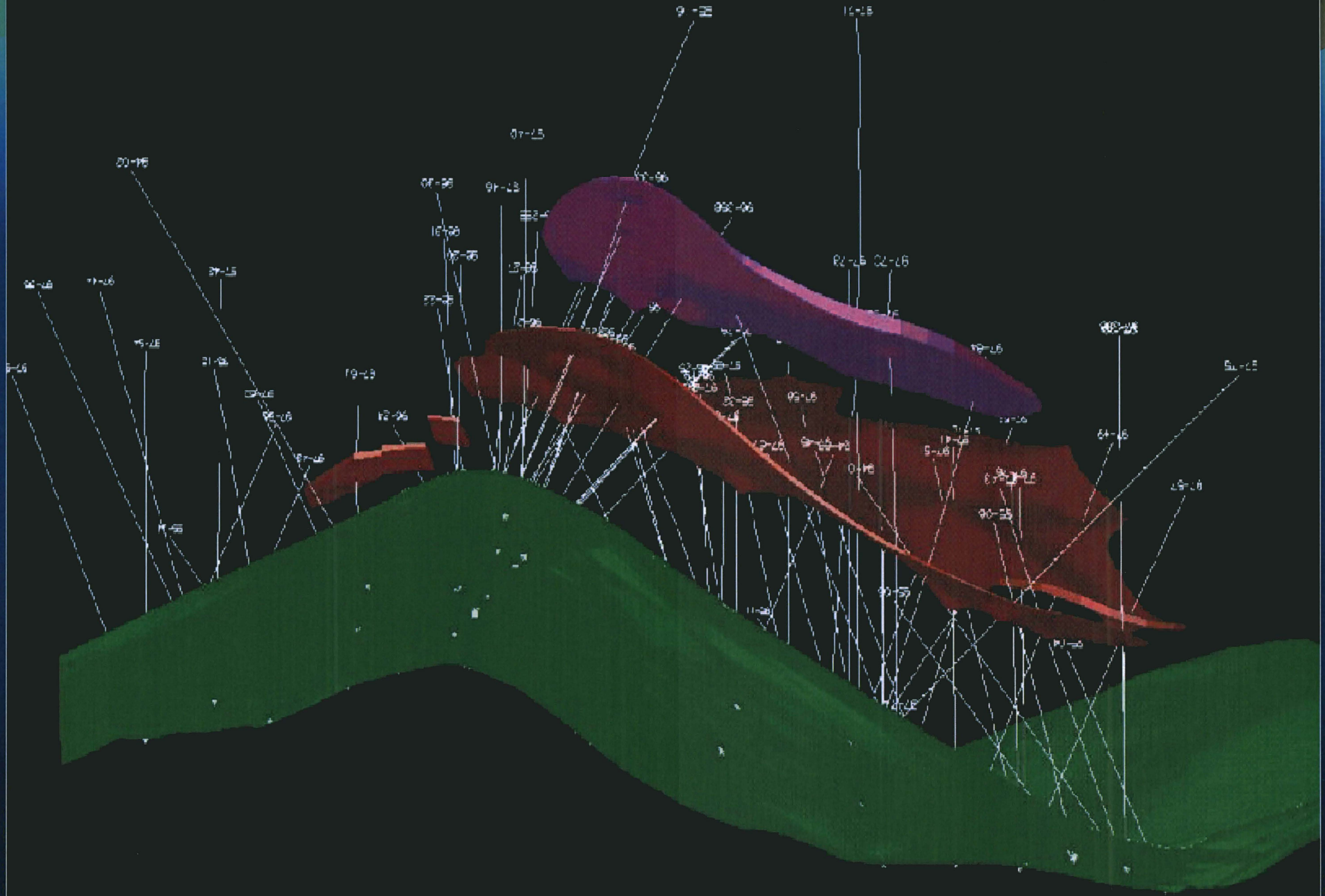
ACTIVITIES:

- Water Quality Data; Geochemistry Data; Etc.
- Develop internal road/trails if necessary; airfield;
- Hundreds of drillholes, trenches, or possibly underground adit.

COST: \$10s of millions to much more

PROBABILITY: of profitable major mine ~ 10% - 30%







Pre-Feasibility and Feasibility Studies

GOAL: Determine if mining deposit is feasible

ACTIVITIES: In-depth financial, geotechnical, environmental, logistical studies

COST: \$10,000,000 to \$??? Million

PROBABILITY: of profitable major mine ~ 10% - 30% or possibly more



Environmental Characteristics of Exploration

- No significant ground disturbance until drilling/trenching
- Drill sites reclaim well; hard to find the next season.
- Helicopter traffic is most frequent issue



Economic Characteristics of Mine Exploration/Development

- Very long time frame... Decades
- Very expensive up-front costs with low probability of return
- Expensive Development Costs



Risk of Mine

Exploration/Development

- Geologic Risk (Mine Won't Turn Out)

- Environmental Permitting Risk

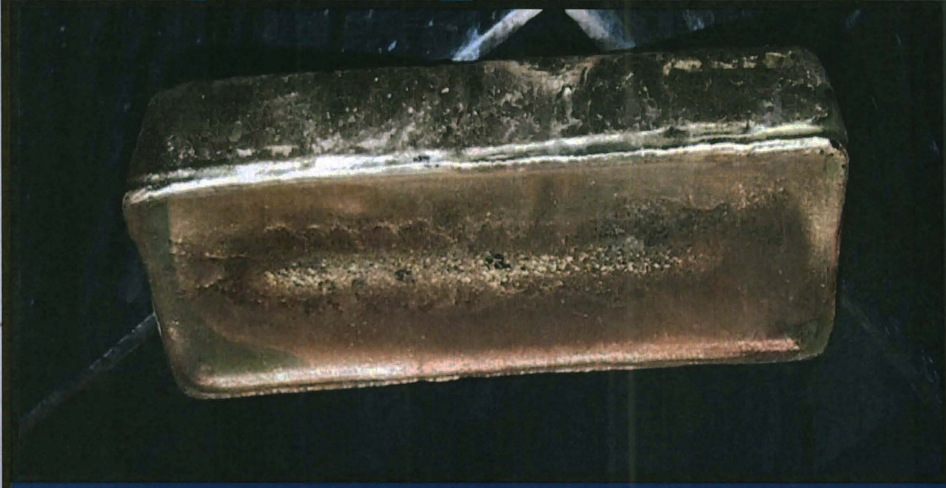
- Land Tenure Risk

- Tax Risk

- Labor Cost Risk

- Commodity Price Risk (i.e., the price of gold)



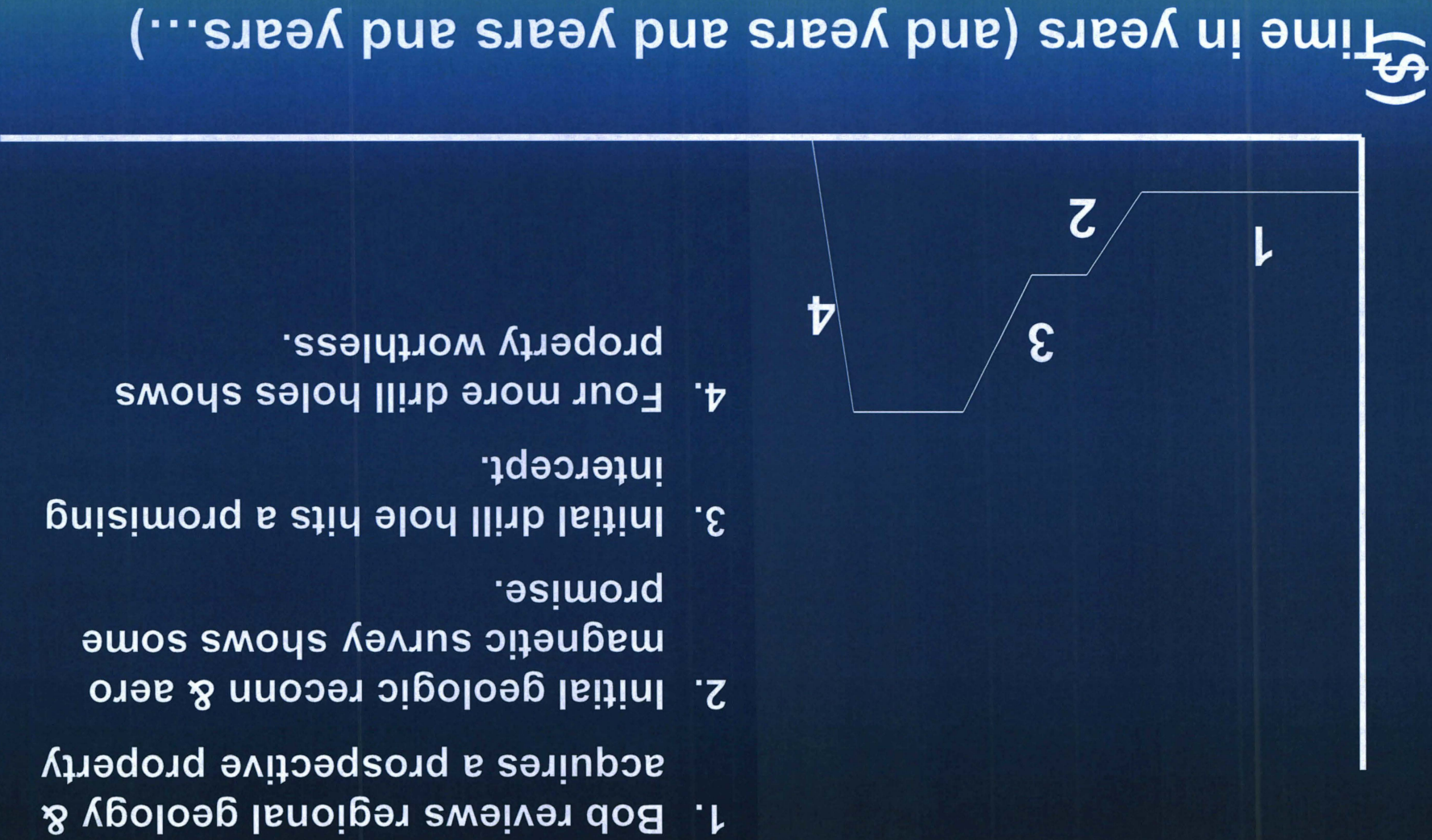


How Do Exploration
Companies Make Money?



Bob's Make-Believe Mine Property

Bob's Property's Value





Bob's Make-Believe Property II



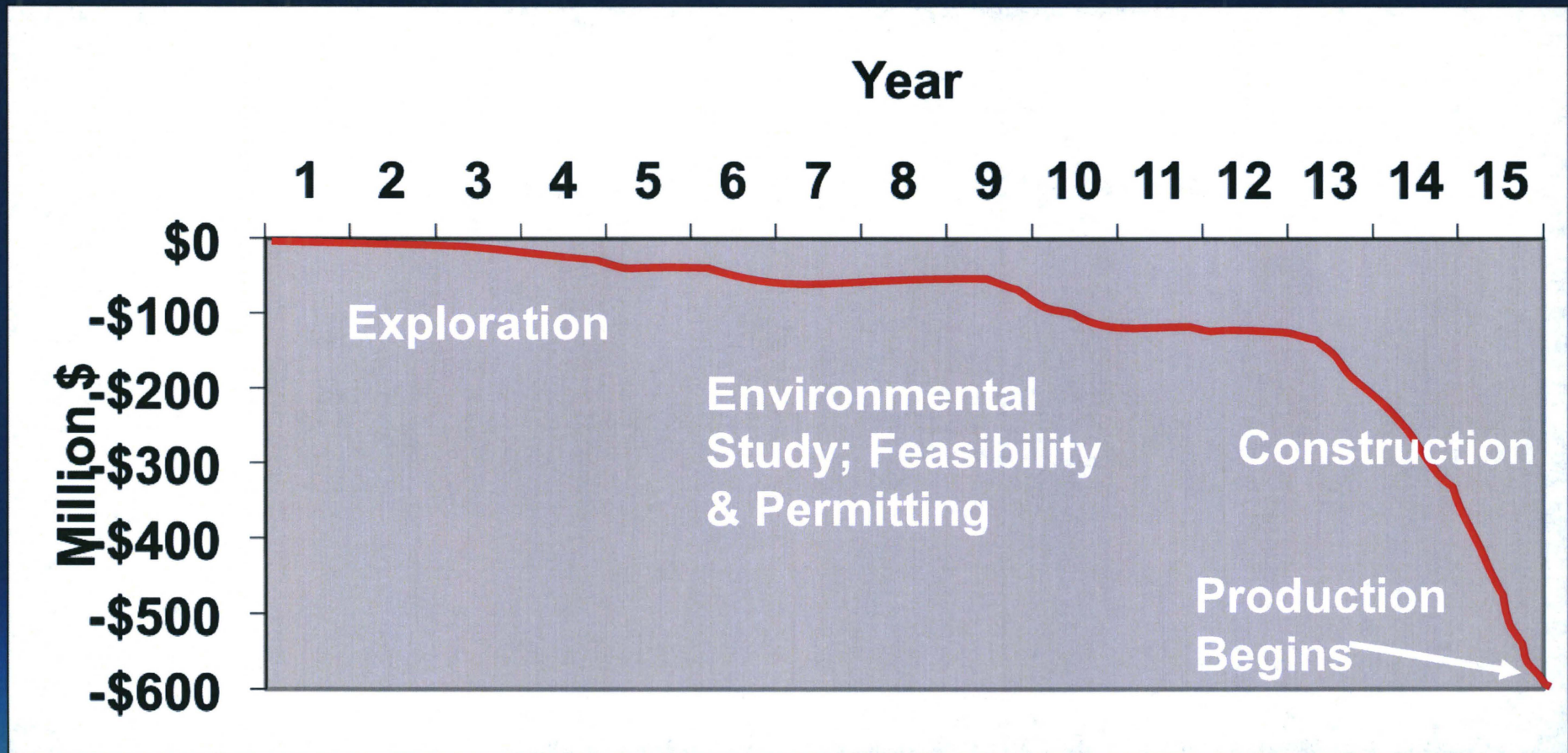


Drilling Economics Demonstration





Hypothetical Cumulative Investment (before Production)



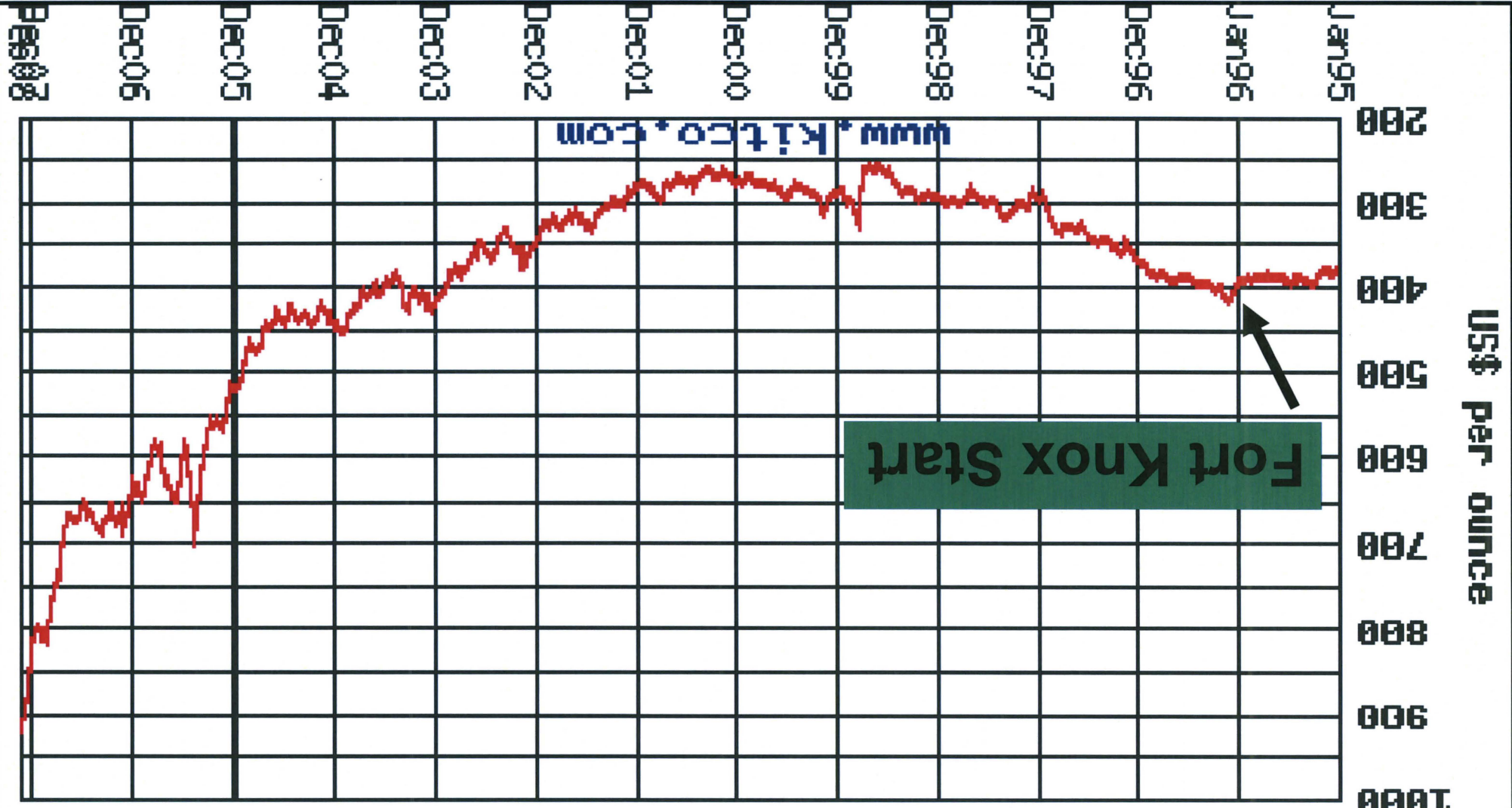


Mining is an economically risky industry

- **Geologic Risk (Mine Won't Turn Out)**
- **Commodity Price Risk (i.e., the price of gold)**
- **Environmental Permitting Risk**
- Land Tenure Risk
- Tax Risk
- Currency Risk
- Labor Cost Risk

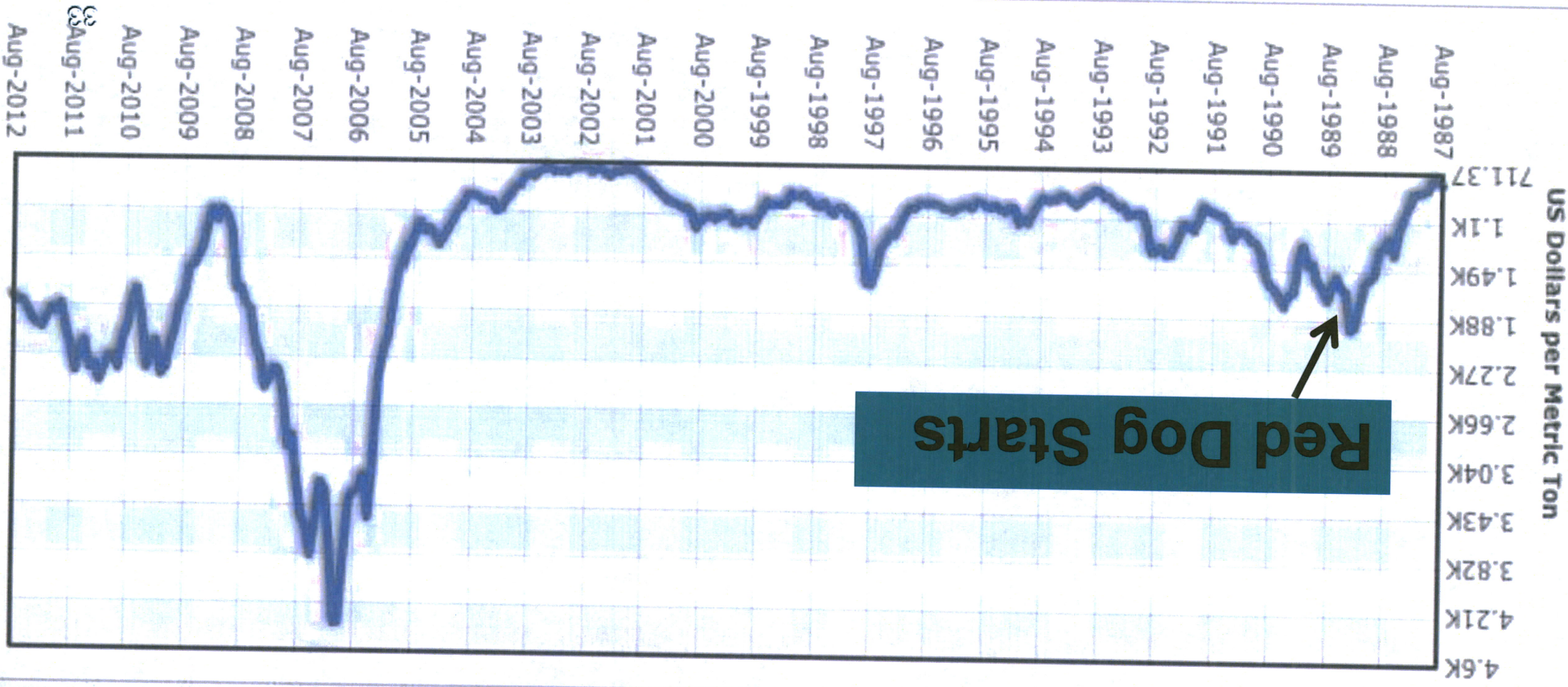


Gold - London PM Fix 1995 - present



www.kitco.com

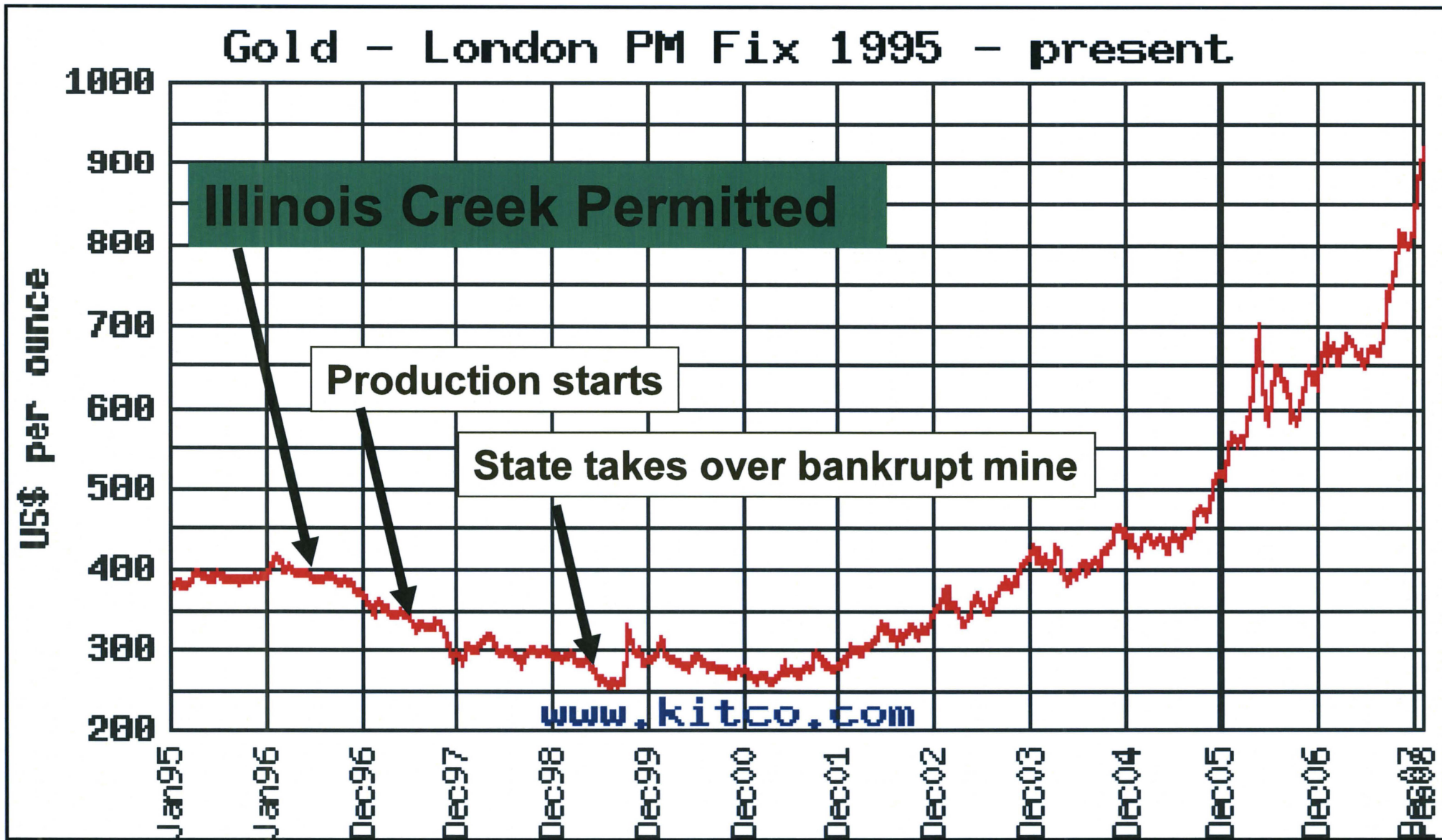
Monthly Zinc Price August 1987 – August 2012





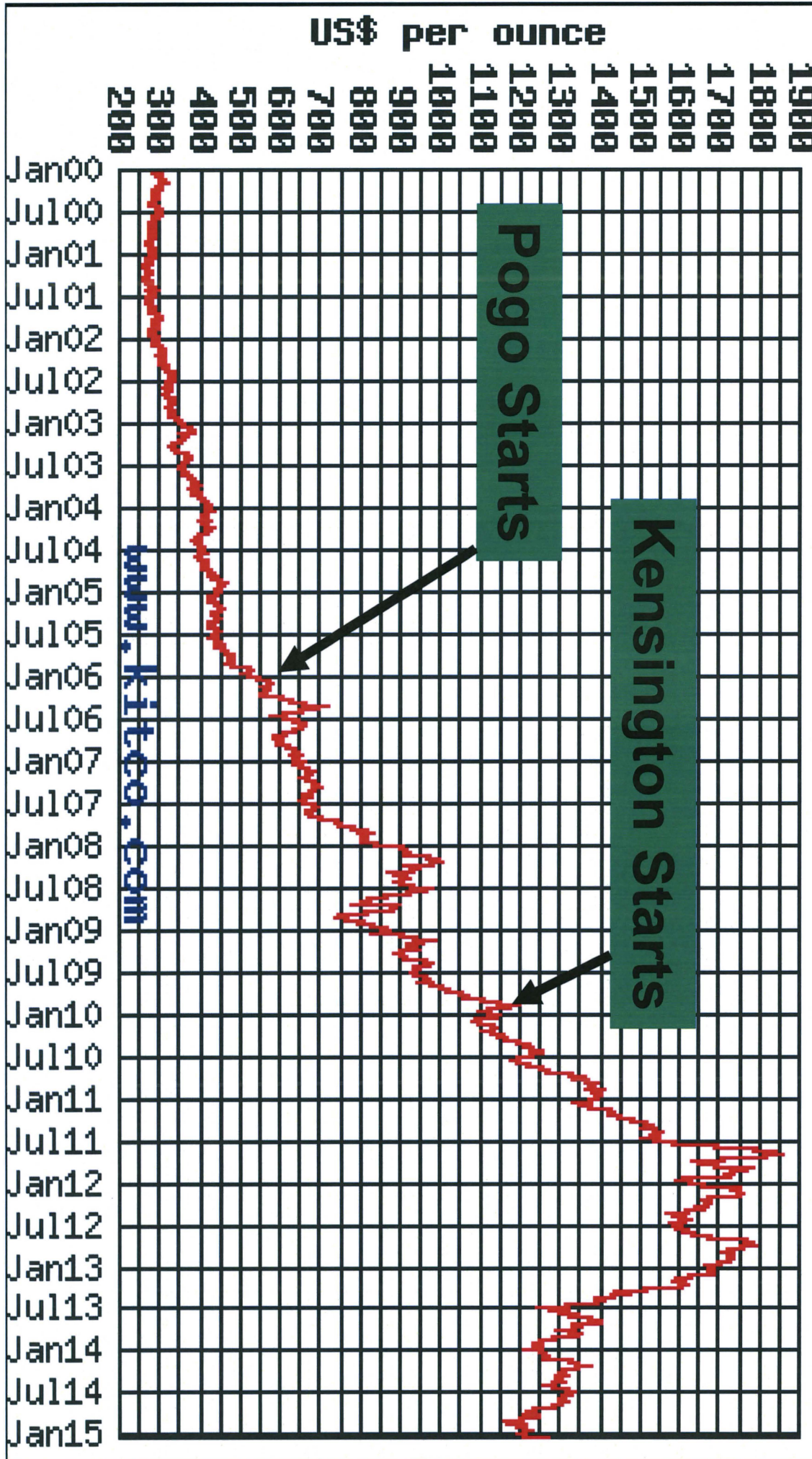
Silver - London PM Fix 1985 - present





Note: Mine fully reclaimed, fall 2005. No public money involved. No environmental violations.

Gold - London PM Fix 2000 - present



www.kiteco.com

Summary of Alaska's Mines

Mine	Target Mineral	Mineral Price After Start-up	Notes
Red Dog	Lead, Zinc	Drop	21 Years to pay back capital cost
Greens Crk	Silver, Lead	Drop	Shut '93-96 ; due to low price
Fort Knox	Gold	Drop	
Illinois Creek	Gold	Drop	Bankrupt, now reclaimed
Nixon Fork	Gold	Various	Stops and starts, bankrupt once
Pogo	Gold	Rise	
Rock Creek	Gold	Rise	No gold produced
Kensington	Gold	Rise	

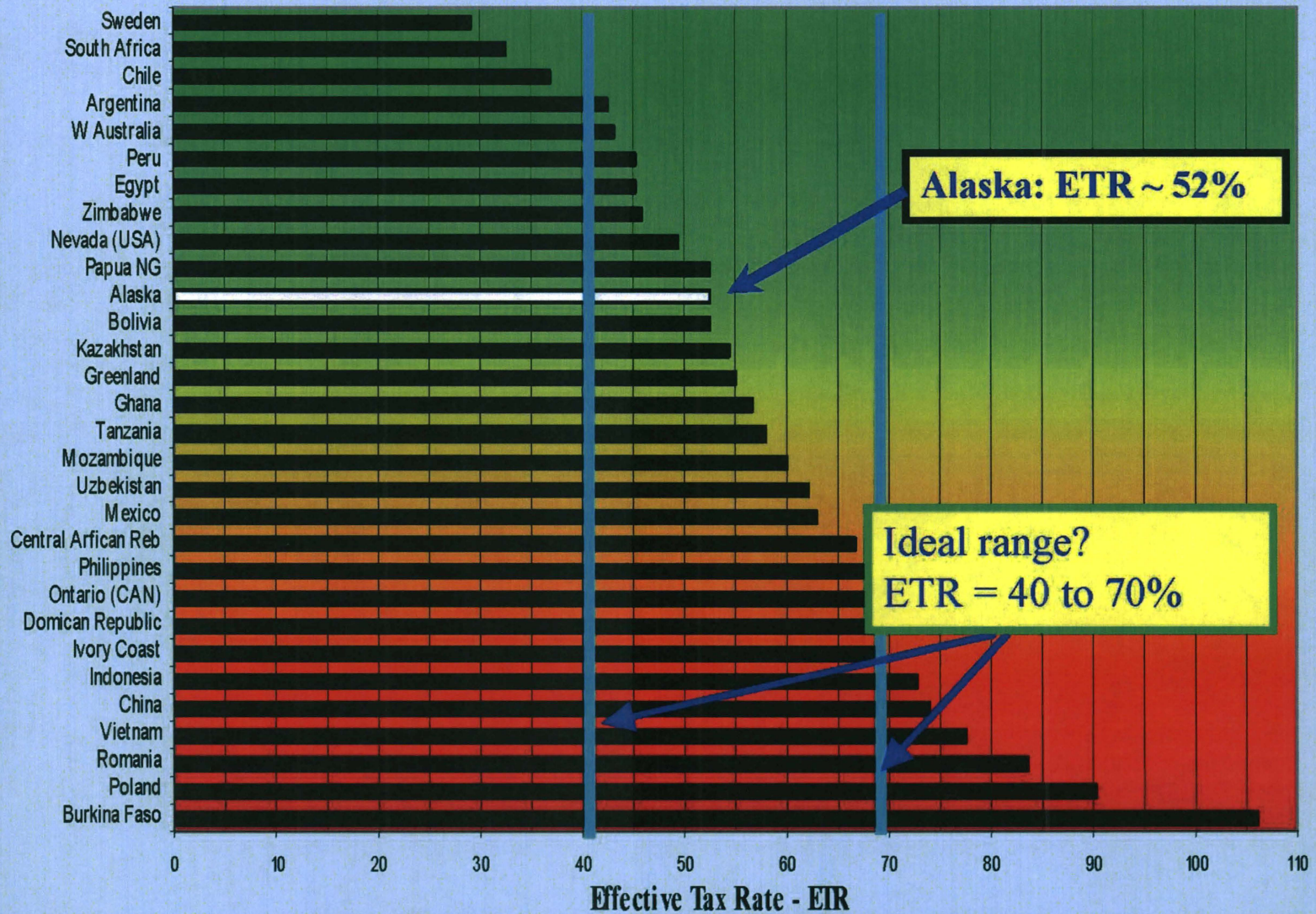
Revenues: State Contribution

Tax Structure

- Royalty (state land) 3% net Profits
 - Mining License Tax: 7% net profits
 - Corporate Income Tax: 9.4% net profits
-
- Total up to: 17.5% net profits

Federal Income tax up to 38%.

Model Gold Mine



Alaska Mineral Revenues

	1997	2005	2006	2010	2011
State	\$5.0	\$64.7	\$173.4	\$153.0	\$98.3
Muni!	\$8.4	\$11.4	\$14.4	\$14.2	\$20.4
Total:	\$13.4	\$76.7	\$187.8	\$167.3	\$118.7

In 2013, \$143 million to NANA; \$93.5 redistributed to other Corporations

