

Alaska's Major Mines

American Water Resources Association - Alaska Section

April 5, 2011

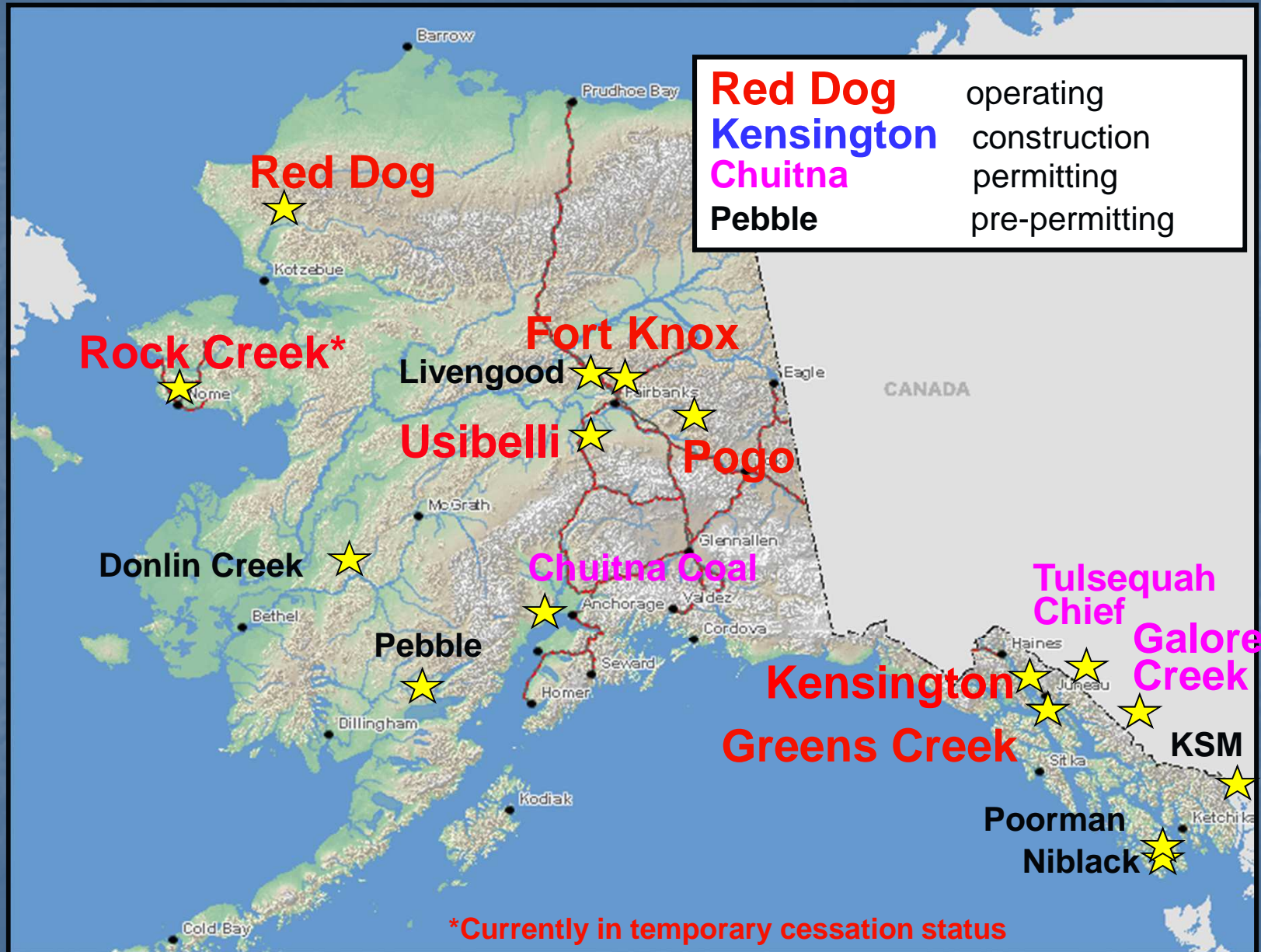
Chena Hot Springs, Alaska

Ed Fogels

Deputy Commissioner

Alaska Department of Natural Resources

Large mining projects in Alaska



The Process

No Single Permit to Mine: there are many permits & authorizations

STATE

- Plan of Operations (DNR)
- Reclamation and Bonding (DNR)
- Waste Management Permits and Bonding (ADEC)
- APDES Permit (ADEC)
- Certification ACOE Permit (ADEC)
- Sewage Treatment System Approval (ADEC)
- Air Quality Permits (ADEC)
- Fish Habitat and Fishway Permits (DNR)
- Water Rights (DNR)
- Right of Way/Access (DNR/DOT)
- Tidelands Leases (DNR)
- Dam Safety Certification (DNR)
- Cultural Resource Protection (DNR)
- Monitoring Plan (Surface/Groundwater/Wildlife) (DNR/DEC)
- Coastal Zone Consistency Determination (DNR)

FEDERAL

- US EPA Air Quality Permit review
- US EPA Safe Drinking Water Act (UIC Permit)
- US ACOE Section 404 Dredge and Fill Permit
- US ACOE Section 10 Rivers and Harbors Act
- US ACOE Section 106 Historical and Cultural Resources Protection
- NMFS Threatened and Endangered Species Act Consultation
- NMFS Marine Mammal Protection Act
- NMFS Essential Fish Habitat
- NMFS Fish and Wildlife Coordination Act
- USFWS Threatened and Endangered Species Act Consultation
- USFWS Bald Eagle Protection Act Clearance
- USFWS Migratory Bird Protection
- USFWS Fish and Wildlife Coordination Act

(These are only some of the authorizations required)

And many agencies.

- **Department of Natural Resources**
- **Department of Environmental Conservation**
- **Department of Fish and Game**
- **Department of Transportation & Public Facilities**
- **Department of Commerce, Community and Economic Development**
- **Department of Law**
- **US Environmental Protection Agency**
- **US Army Corps of Engineers**
- **US Fish and Wildlife Service**
- **National Marine Fisheries Service**
- **Bureau of Land Management**
- **U. S. Forest Service**
- **National Park Service**

Large Mine Permitting Team (LMPT)

DNR Coordinates the permitting of large mine projects in the state in accordance with AS27.05.010(b):

The department is the lead agency for all matters relating to the exploration, development, and management of mining, and, in its capacity as lead agency, shall coordinate all regulatory matters concerning mineral resource exploration, development, mining, and associated activities. Before a state agency takes action that may directly or indirectly affect the exploration, development, or management of mineral resources, the agency shall consult with and draw upon the mining expertise of the department.

State Agencies

LARGE MINE PERMITTING TEAM

- **Department of Natural Resources**
(Lead State agency for coordination)
- **Department of Environmental Conservation**
- **Department of Fish and Game**
- **Department of Transportation & Public Facilities**
- **Department of Commerce, Community and Economic Development**
- **Department of Law**
- **Department of Health & Social Services**

Coordinated State/Federal Process

- **NEPA drives the process**
- **State is a Cooperating Agency**
- **Public involvement (meetings, notices, etc) are synchronized**

Mining 101

Types of Mining

Placer



Open Pit

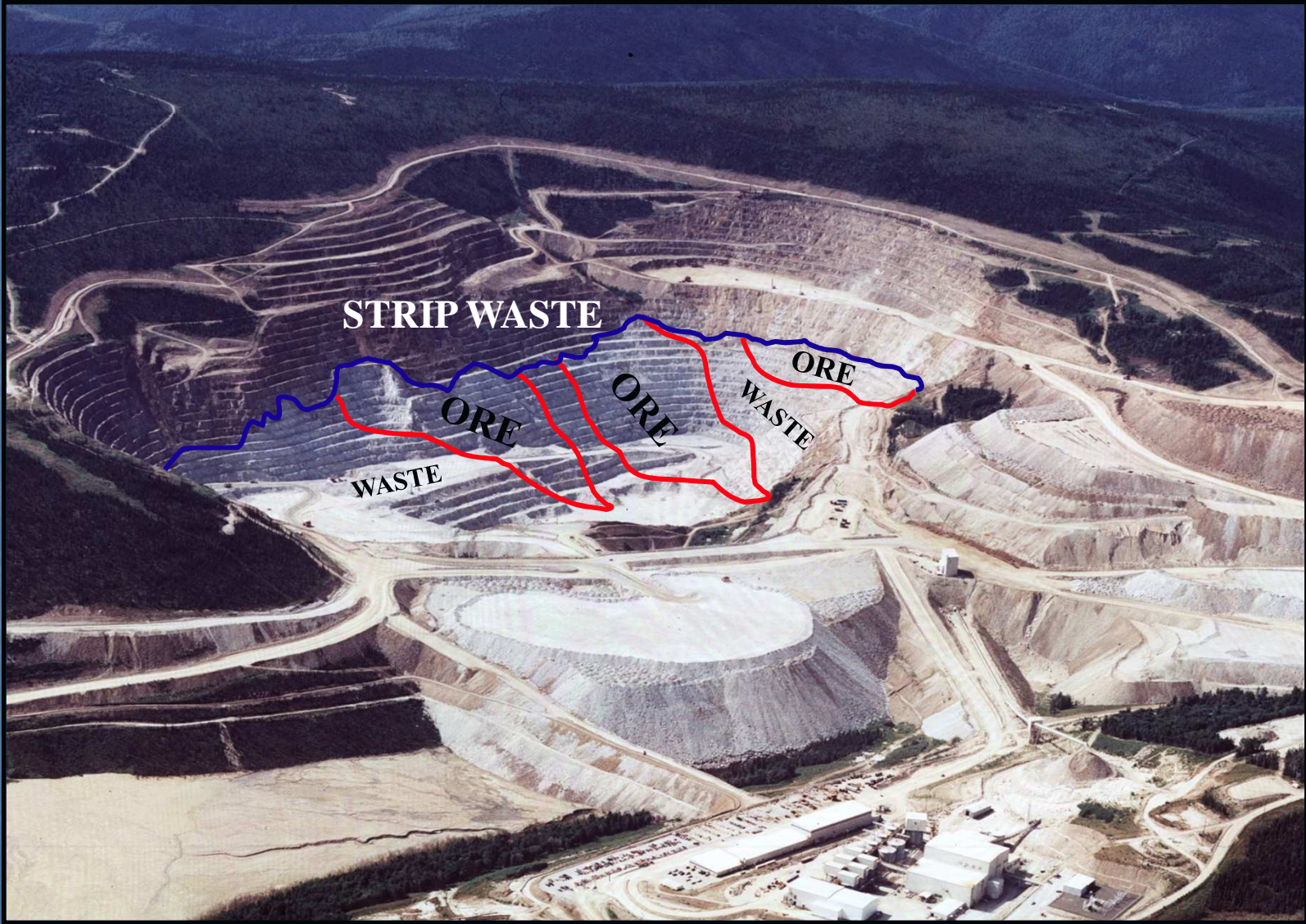


Underground



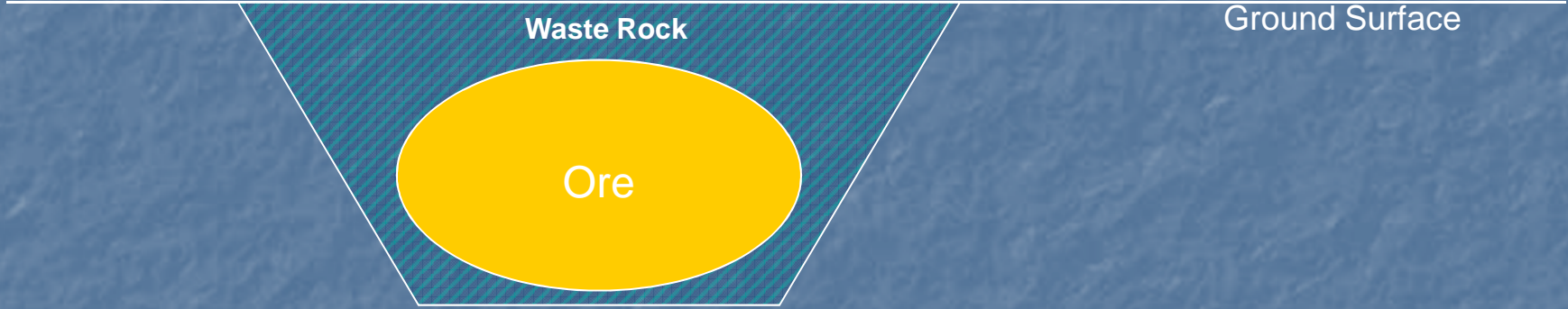
Ore and Waste

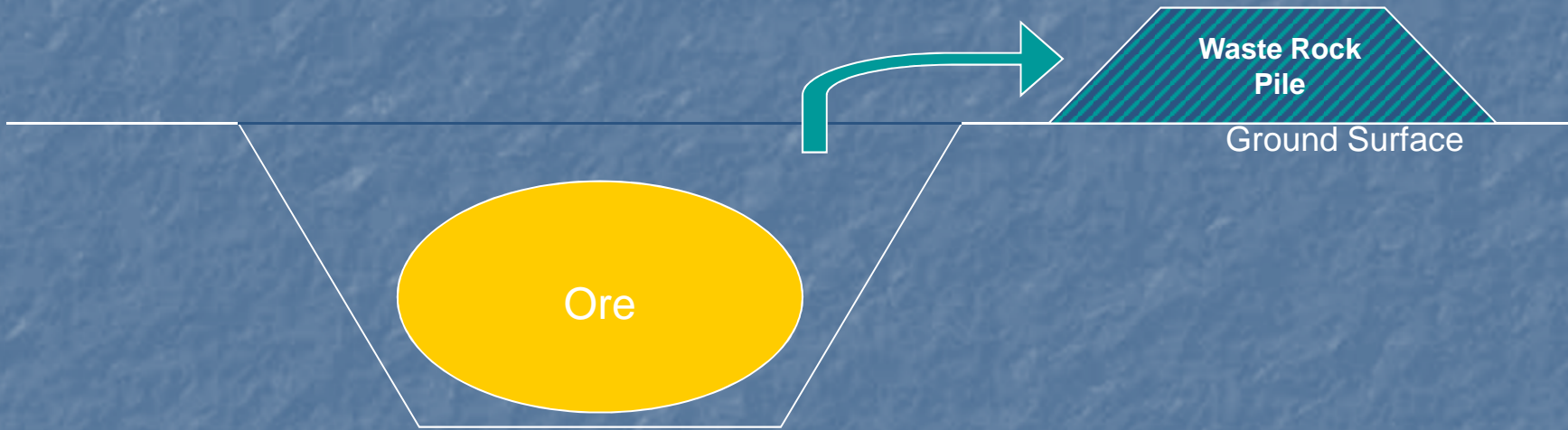
A generalized example, based on Fort Knox



Ground Surface

Ore





To Mill

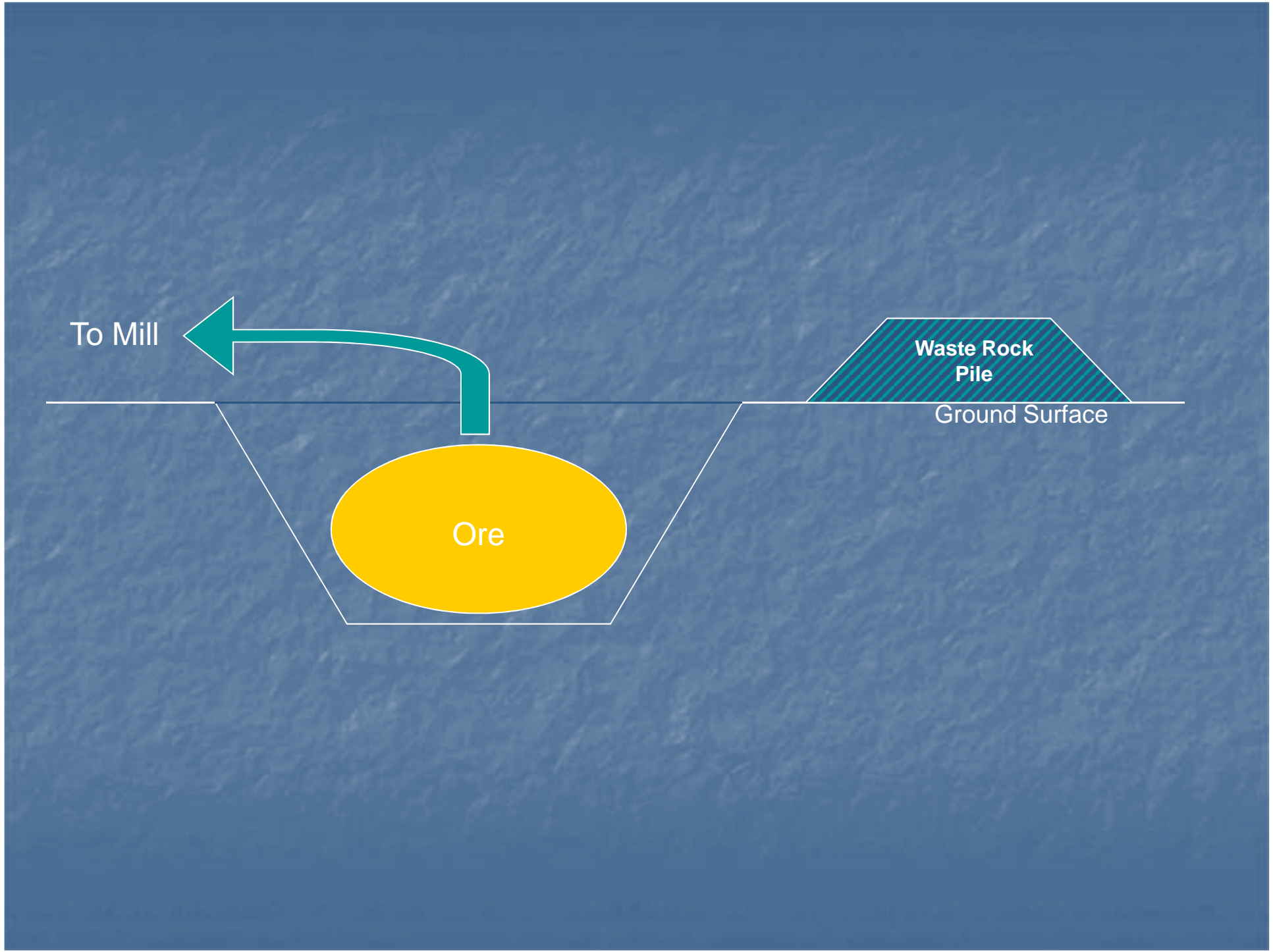


Ore



Waste Rock
Pile

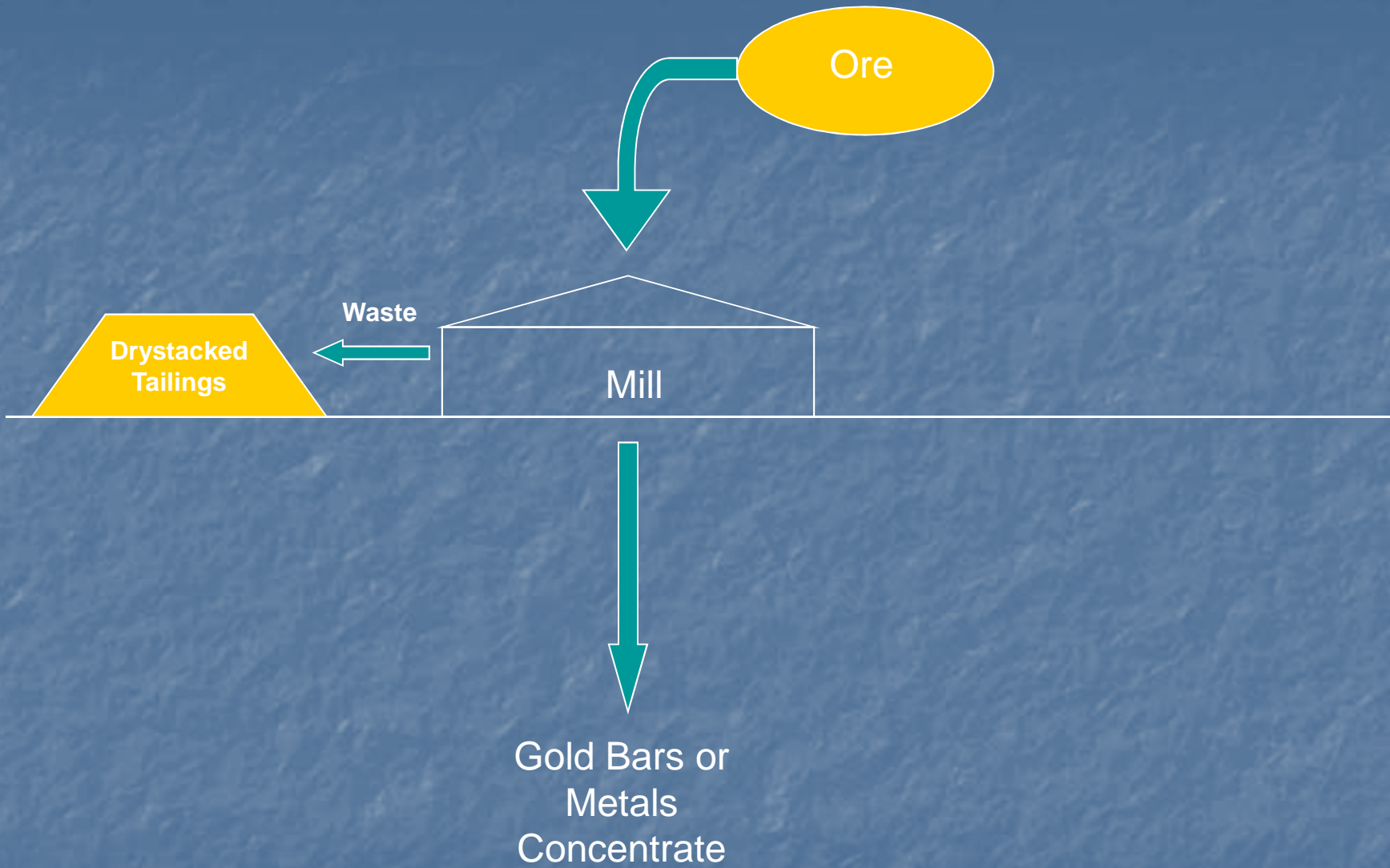
Ground Surface

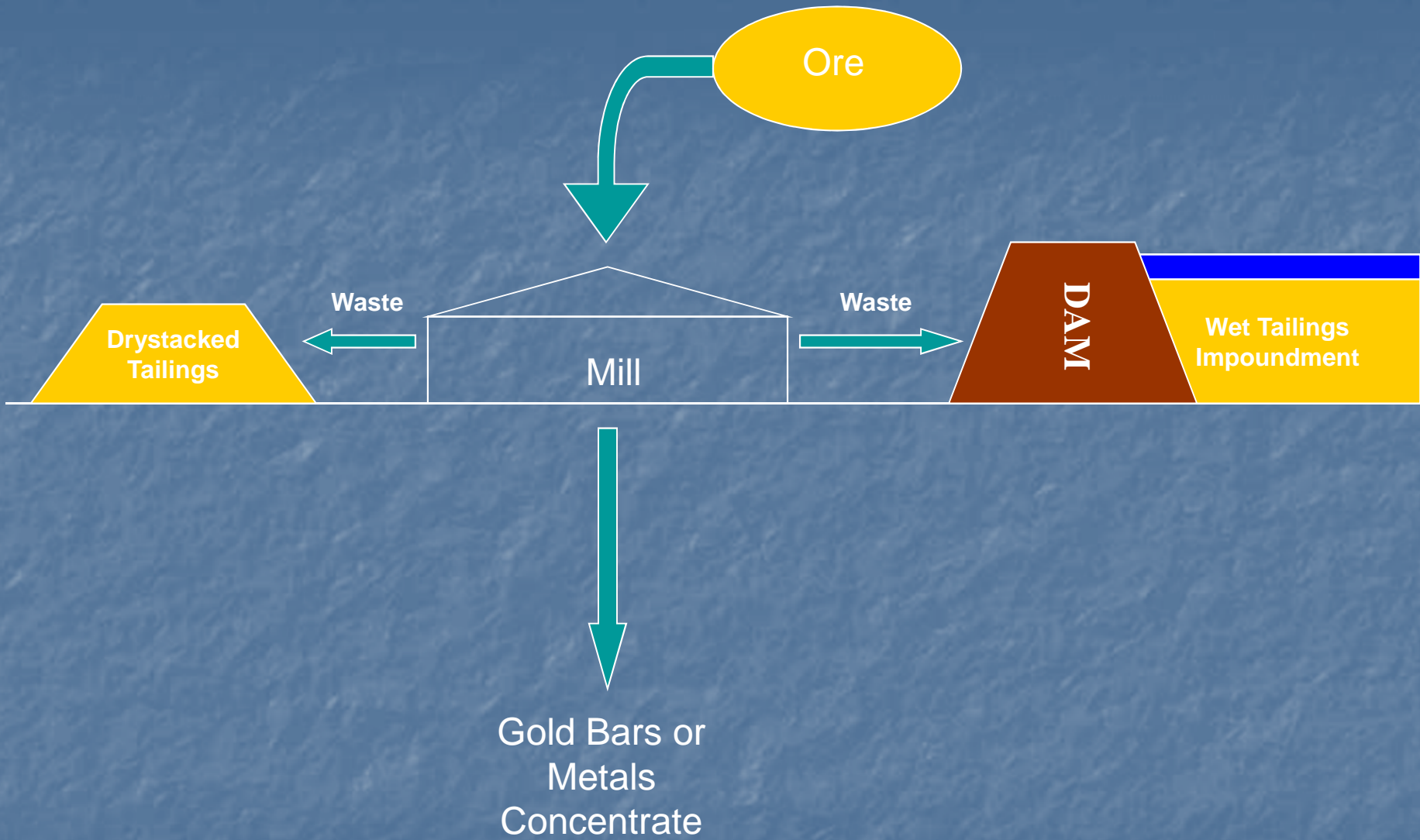


Ore



Gold Bars or
Metals
Concentrate





WASTE PRODUCTS

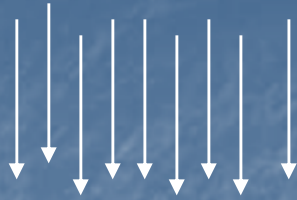


Geochemistry (Water Chemistry)



Water Quality!

Rain



Reactive
Waste Rock
or Tailings

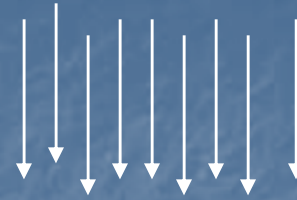


Acid Rock
Drainage
(ARD)



Metals
Leaching
(ML)

Rain

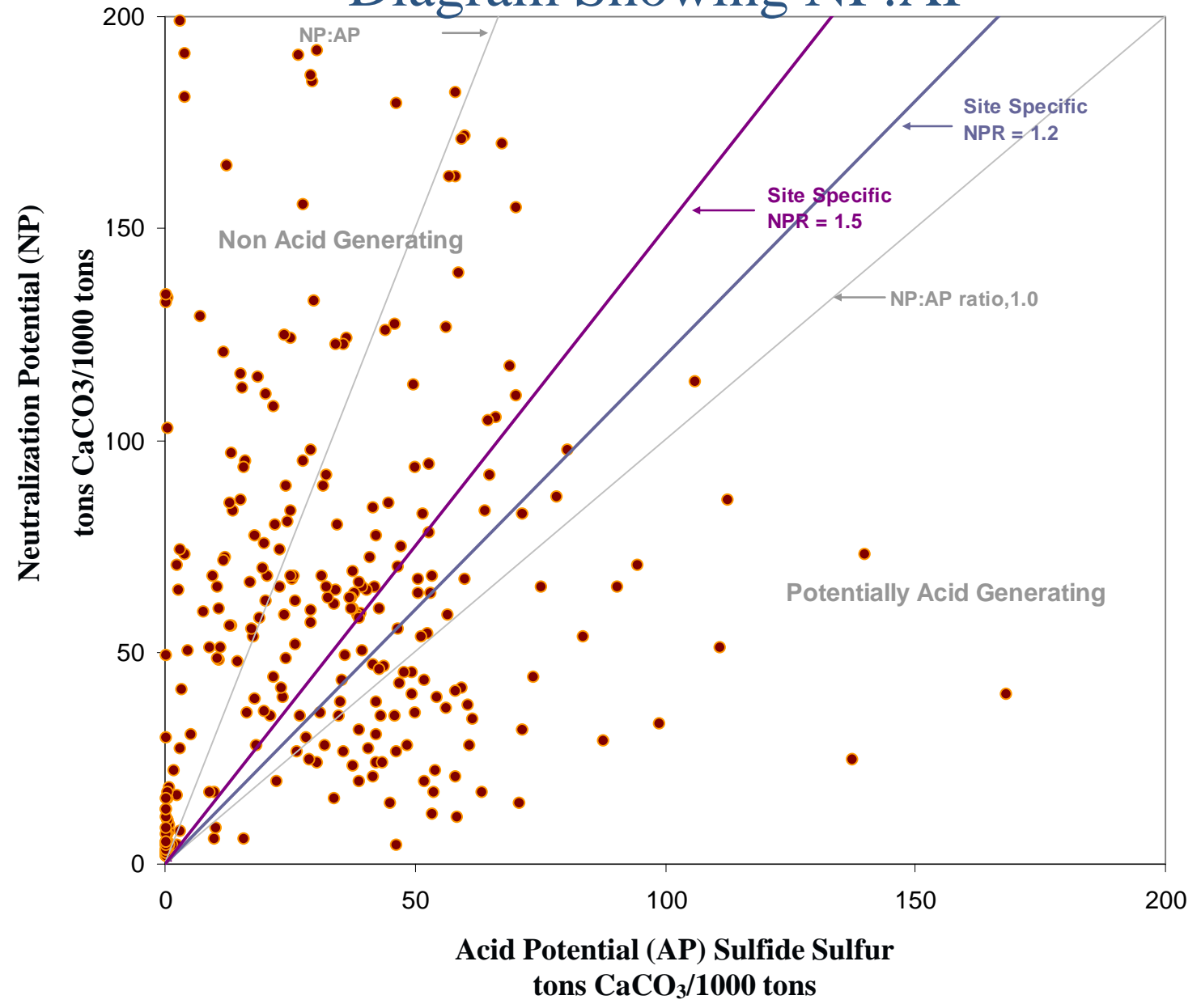


Benign Waste
Rock or
Tailings

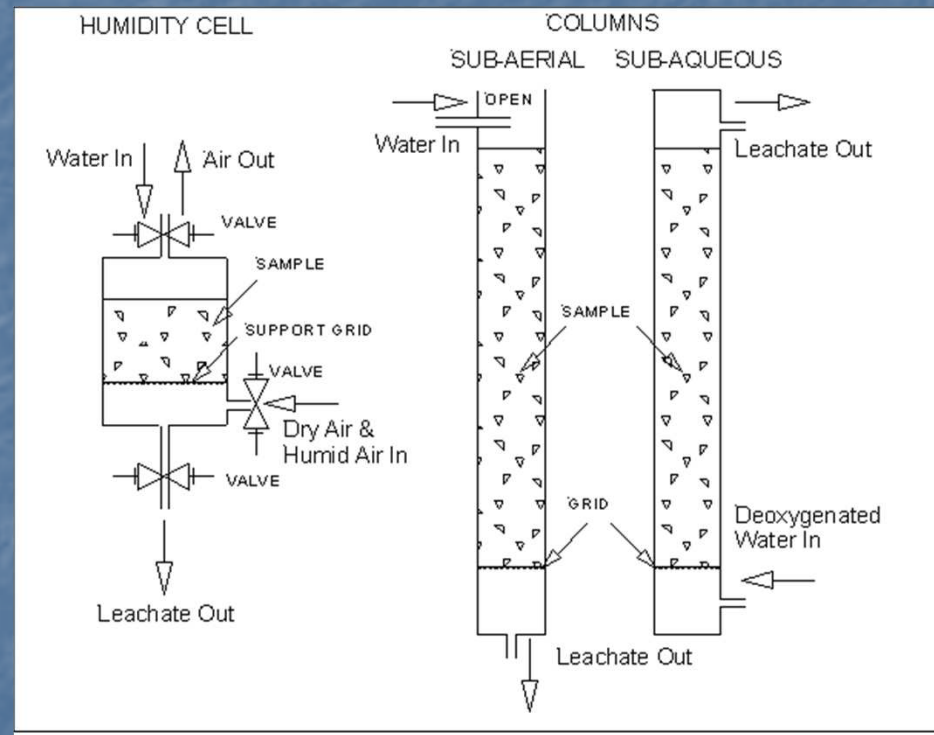


Water meets
Clean Water
Standards

Diagram Showing NP:AP

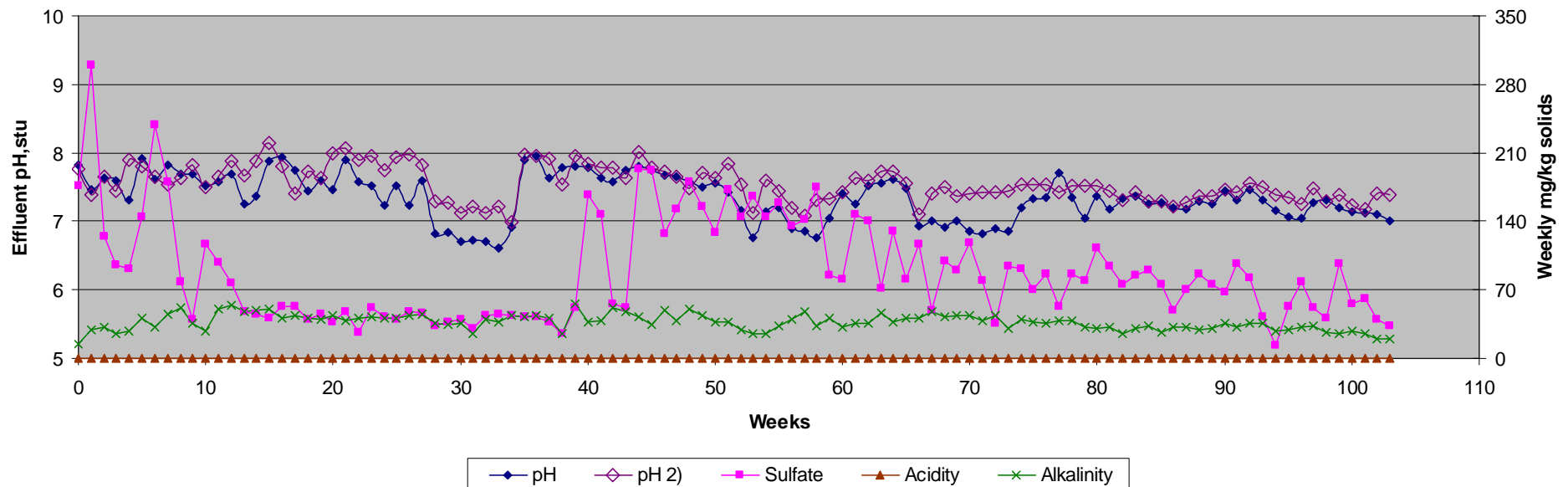


Column Tests or Humidity Cells Measure Long Term Chemical Trends in Waste Rock




Humidity Cell Tests

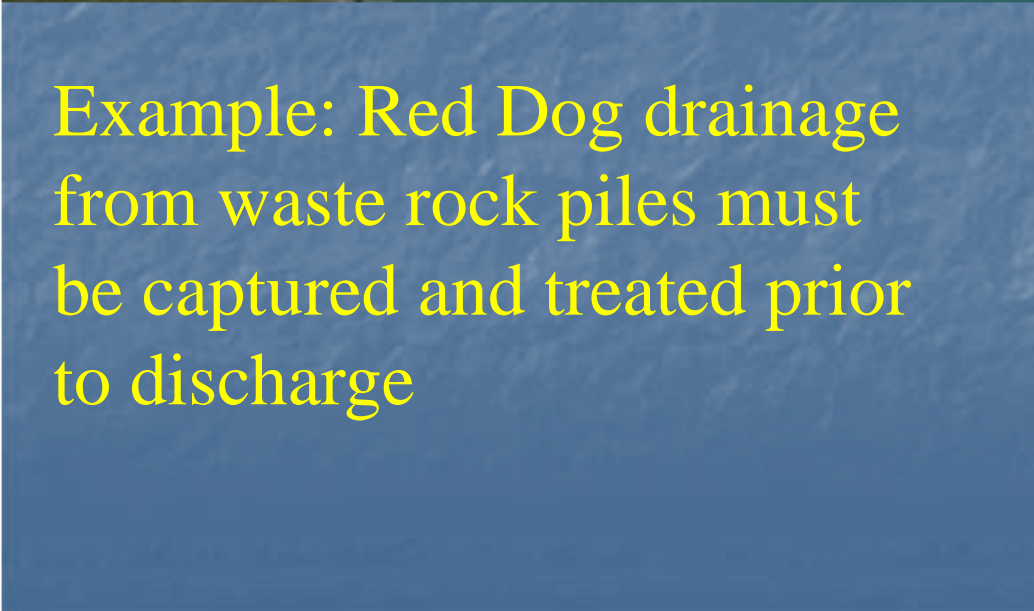
Figure 1a.- Weekly Humidity Cell Analytical Results



This test lasted for 103 weeks before being terminated.



Understanding the chemistry is essential to designing the mine (including waste storage, closure options)



Example: Red Dog drainage from waste rock piles must be captured and treated prior to discharge



The Permits

Overview of ADEC Integrated Waste Management Permit

- **Integrated Waste Management Permit**
 - 18 AAC 60 – Solid Waste Management
 - 18 AAC 70 – Water Quality Standards
 - 18 AAC 72 – Wastewater Disposal
- **Typical Wastes Managed**
 - Tailings
 - Waste Rock
- **Potential contaminants controlled**
 - Acid Rock Drainage
 - Metals Leaching
 - Process Chemicals
- **Primary Focus of Protection**
 - Surface Water
 - Groundwater

ADEC

APDES Permit

- Alaska Pollution Discharge Elimination System Permit
- Delegated program from US EPA (replaces NPDES permit)
- Assumed mining sector on October 2010

RECLAMATION PLAN APPROVAL

Issued by DNR

Division of Mining, Land and Water/Mining Section

- Minesite must be returned to a stable condition, compatible with the post-mining land use (AS 27.19.020)
- Financial Assurance must ensure State can do reclamation even if company cannot.

DAM SAFETY CERTIFICATION

Issued by DNR

- All dams (tailings and water storage) must be designed to State standards.
- Includes seismic standards
- Financial assurance for long term care and maintenance

Financial Assurances for Alaska Mines

Not static, audited & recalculated every 5 years
or when significant changes occur

<i>Operation</i>	<i>Total Bond (\$ Millions)</i>
Greens Creek Mine	\$29.2
Red Dog Mine	\$305.0
Fort Knox (& True North) Mine	\$37.6
Usibelli Coal Mine & Exploration	\$11.3
Kensington Project	\$7.4
Rock Creek Mine	\$6.8
Pogo Mine	\$27.6
Nixon Fork Mine	\$3.5
TOTAL	\$428.4

Monitoring Plan Approval (ADEC/DNR/ADF&G)

- Air Q
- Water Q
 - Surface
 - Groundwater
- Fish & Wildlife Studies

Baseline



**Operation
(Compliance)**



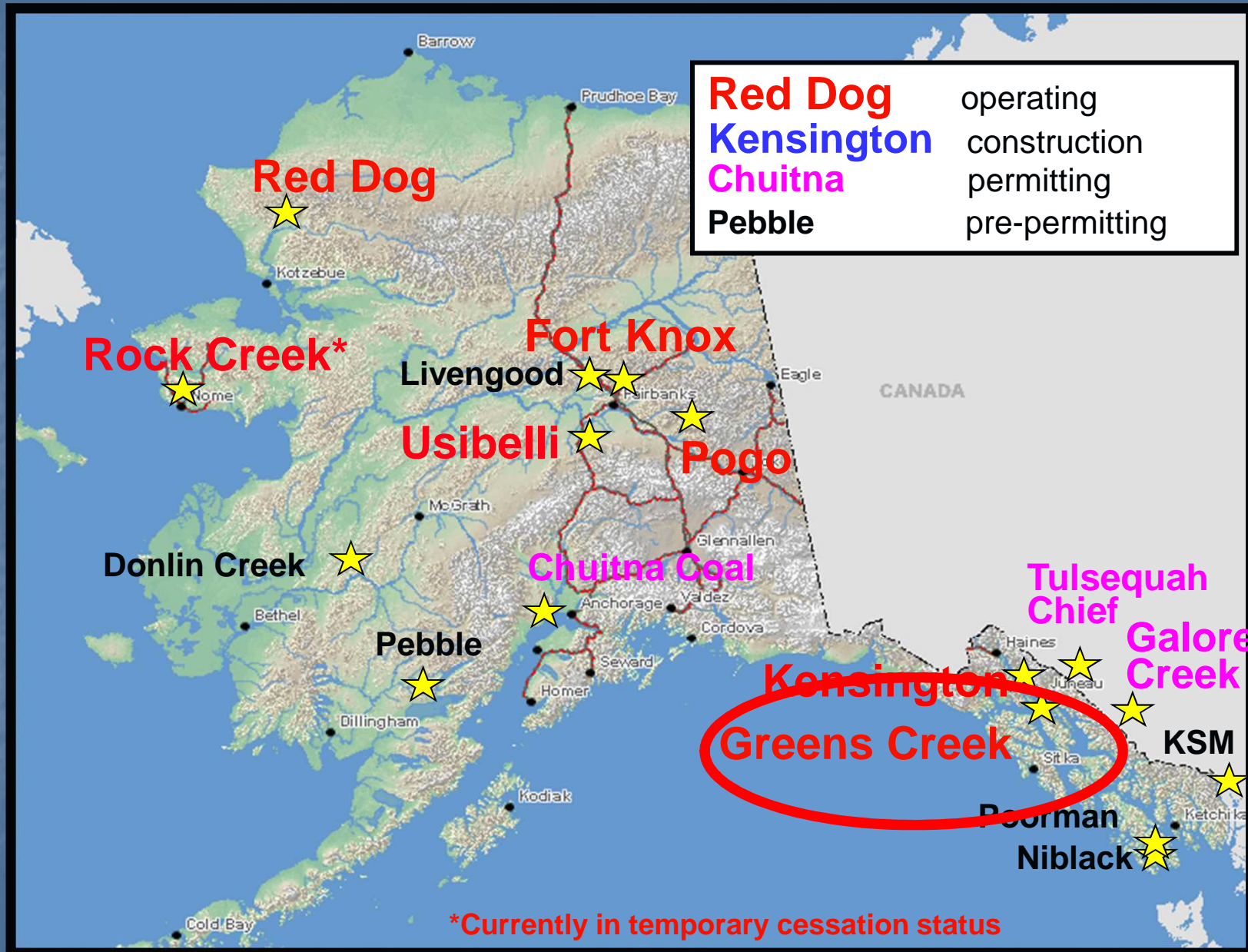
**Post-Closure
(Compliance)**

Environmental Audits

- Environmental Audits on 5 year schedule tied to reissuance of permits
- All environmental systems audited
- Audits evaluate Agencies as well as operations
- Audits by 3rd party experts
- Financial Assurances revisited and recalculated based on Audit results

The Mines

Large mining projects in Alaska



Greens Creek

Owner-operator: Hecla Mining

- Volcanogenic massive sulfide (Kuroko) deposit containing economic amounts of silver, lead, zinc and gold.
- Underground mine with an average grade of 582.7 grams/tonne silver.
- 3rd largest silver producer in North America.
- Ten years of reserves.





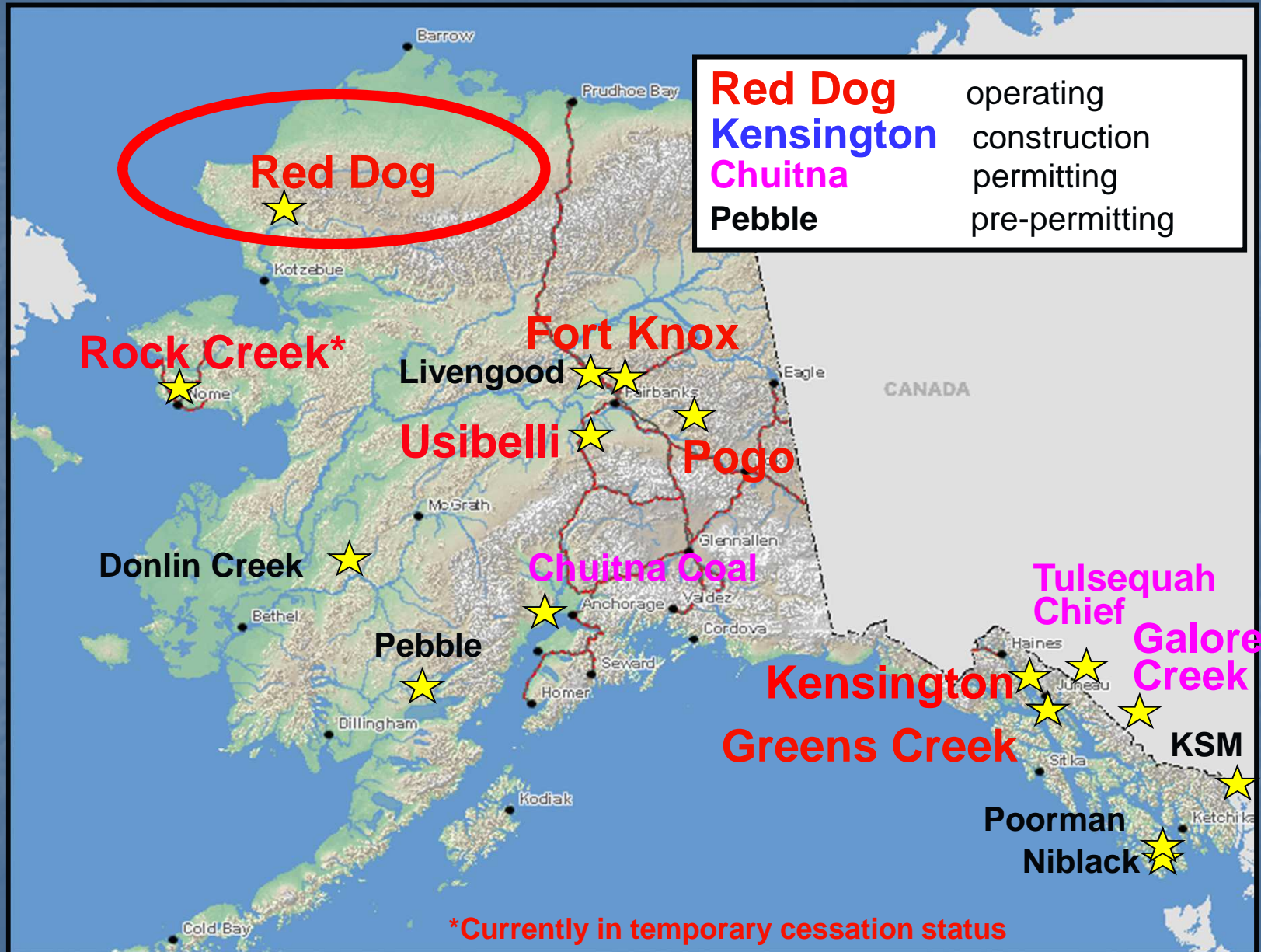


Greens Creek Mine – Upper Water Treatment Building

Permitting Status

- Currently developing EIS for expansion of tailings facility
- Public notice for APDES permit posted through May 2, 2011
- Waste management permit and financial assurances under review

Large mining projects in Alaska



Red Dog

A joint venture between NANA Regional Corp. and Teck Resources

- Large shale-hosted Pb-Zn deposit.
- Surface and minerals owned by NANA Corp.
- The world's largest zinc reserve (110 million tonnes of ore).
- World's largest producer of zinc concentrate.
- 2.7 million tonnes of ore mined annually at an average grade of 22% zinc, 6% lead and 102.8 grams/tonne silver.
- Mine employs 450 people (including contractors) 50+% of which are NANA shareholders.
- Stores concentrate for 8-9 months a year.













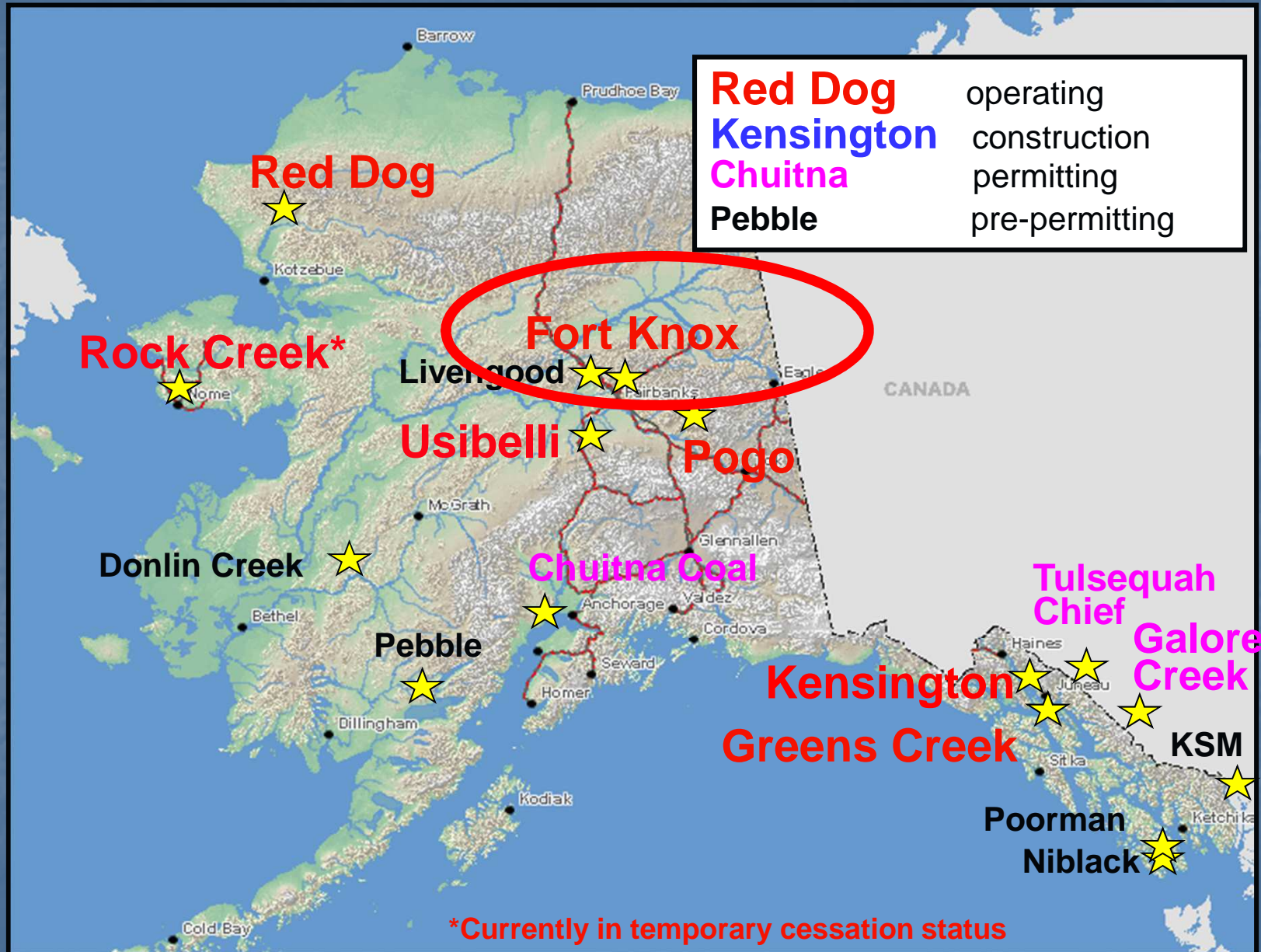




Permitting Status

- Completed EIS for Aqalluk extension last year
- NPDES permit in litigation
- Financial assurance in place for perpetual treatment and monitoring

Large mining projects in Alaska



Fort Knox

Owner/operator: Kinross Gold Corporation

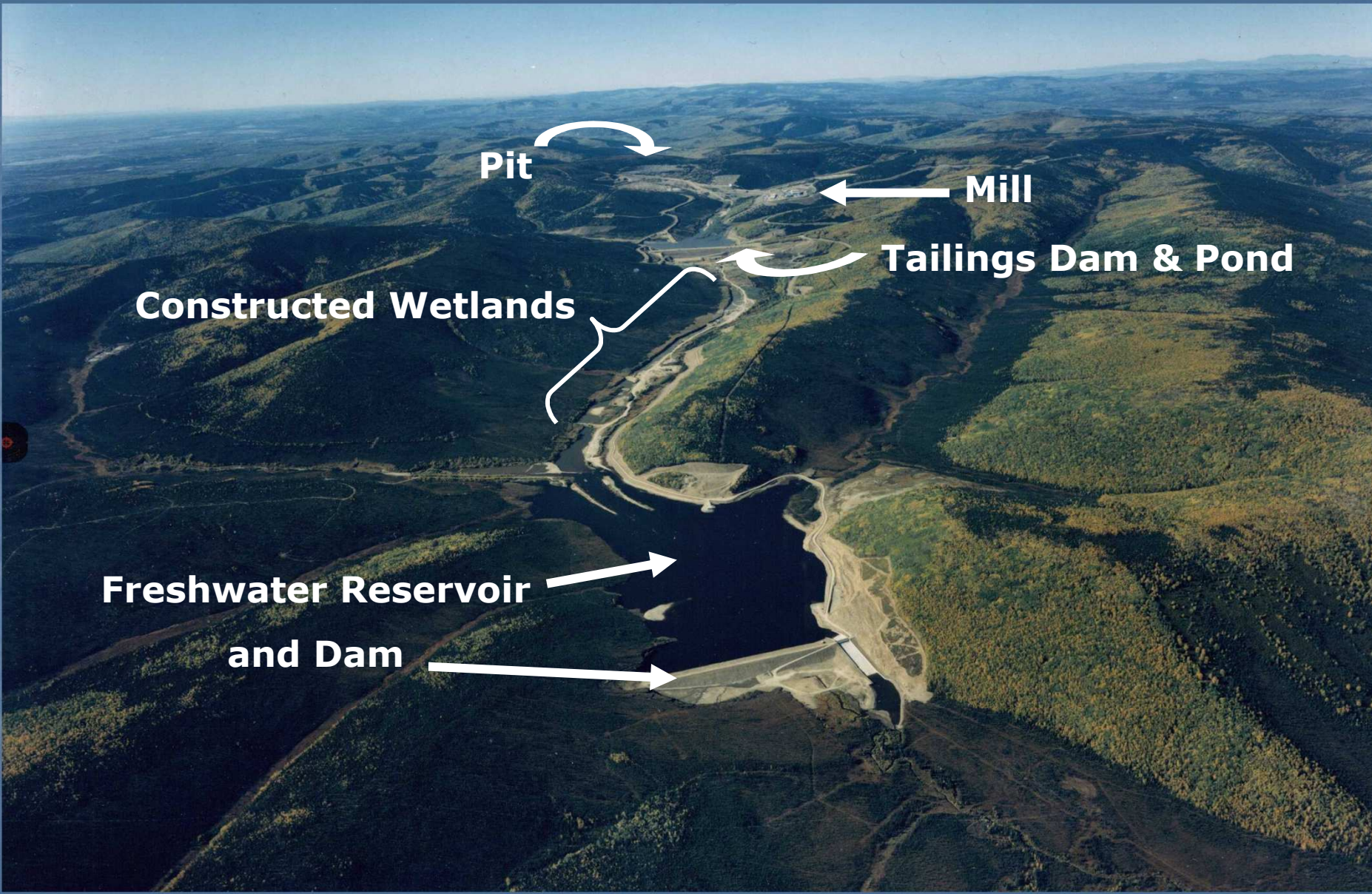
- Large intrusive-hosted gold deposit.
- Operating open-pit gold mine producing 9,350 – 11,620 kilograms annually.
- Average combined grade is 0.86 grams/tonne.
- The mine employs over 400 people and has an annual economic impact of \$196 million on the community of Fairbanks.











Pit

Mill

Tailings Dam & Pond

Constructed Wetlands

Freshwater Reservoir

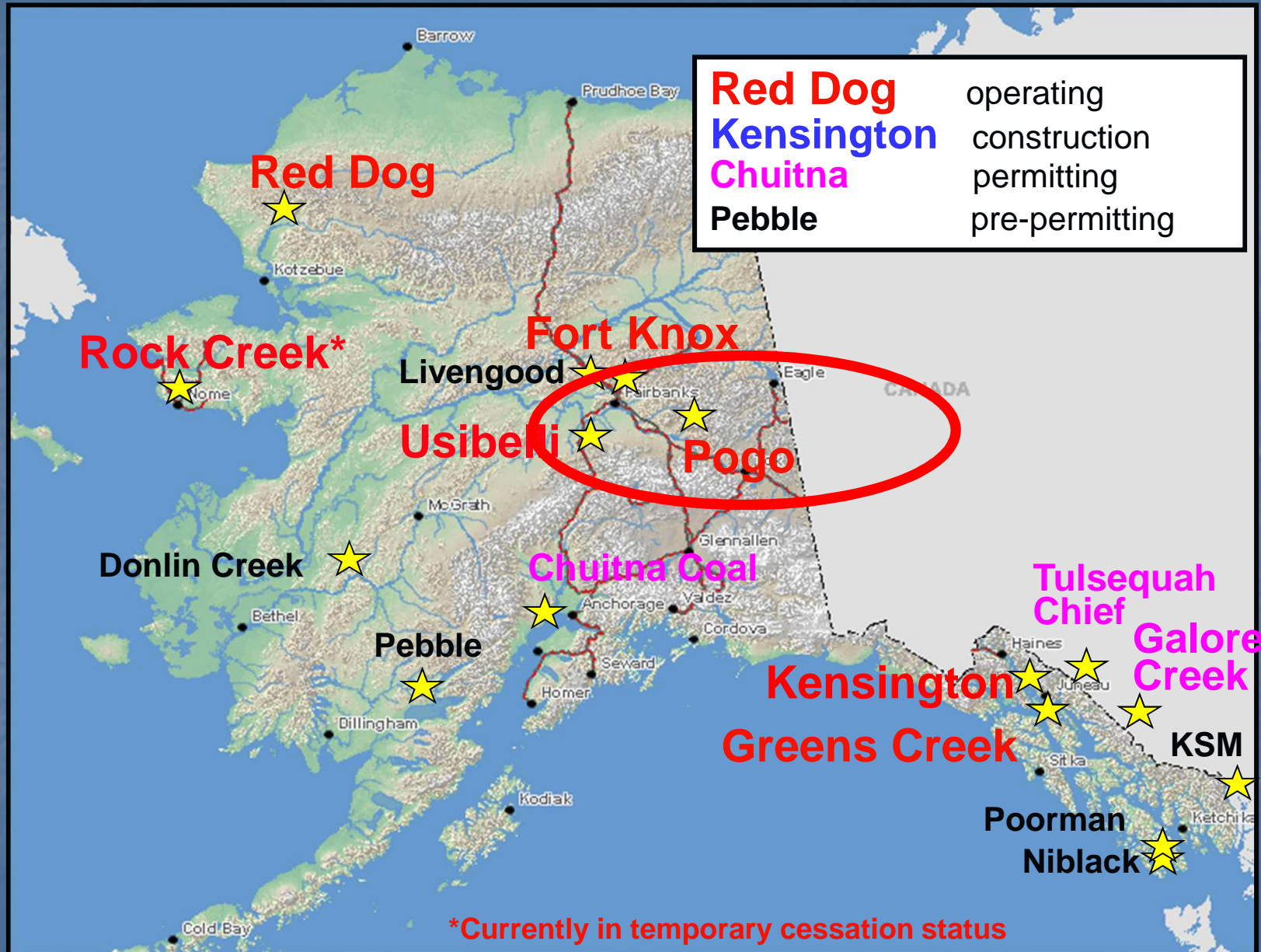
and Dam



Permitting Status

- Zero discharge facility
- Recently completed permitting of dam raise
- Reclamation plan under review

Large mining projects in Alaska



Pogo

Owner/operator:
Sumitomo Metal Mining Co., Ltd.



- Mesothermal Intrusive related, shear-hosted, gold-quartz vein system.
- Discovered through systematic exploration in 1994.
- Contains 102,000 kilograms of gold at 16.11 grams/tonne.
- Construction started in 2004, commissioned 1st quarter of 2006. Construction cost est. - \$347 million.
- Employment 238 people. Production rate: 2,200 tonnes/day. Mine life: 10 years. Annual production ~10,200 kilograms.

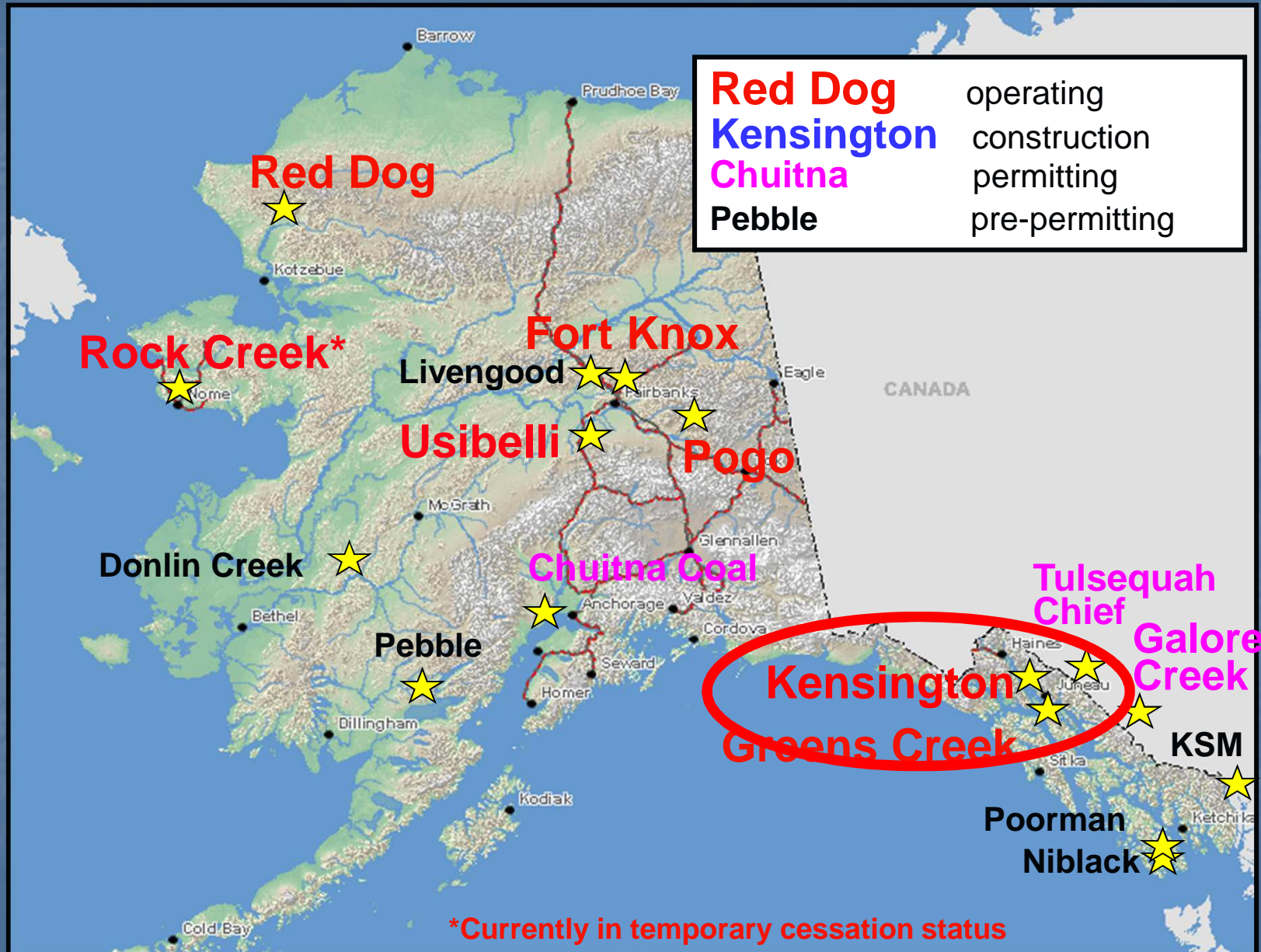




Permitting Status

- First AK APDES permit for large mine
- Reclamation plan under review

Large mining projects in Alaska



Kensington

Owner/operator: Coeur Alaska



- Mesothermal intrusive-hosted shear vein gold deposit.
- Reserves: 3.8 million tonnes @ 8.6 grams/tonne.
- Operating mine provides 250 full time workers and spend \$13m annually on local purchases. .
- Construction cost - \$190 million.
- Mining/milling rate - 1,000 tonnes/day.

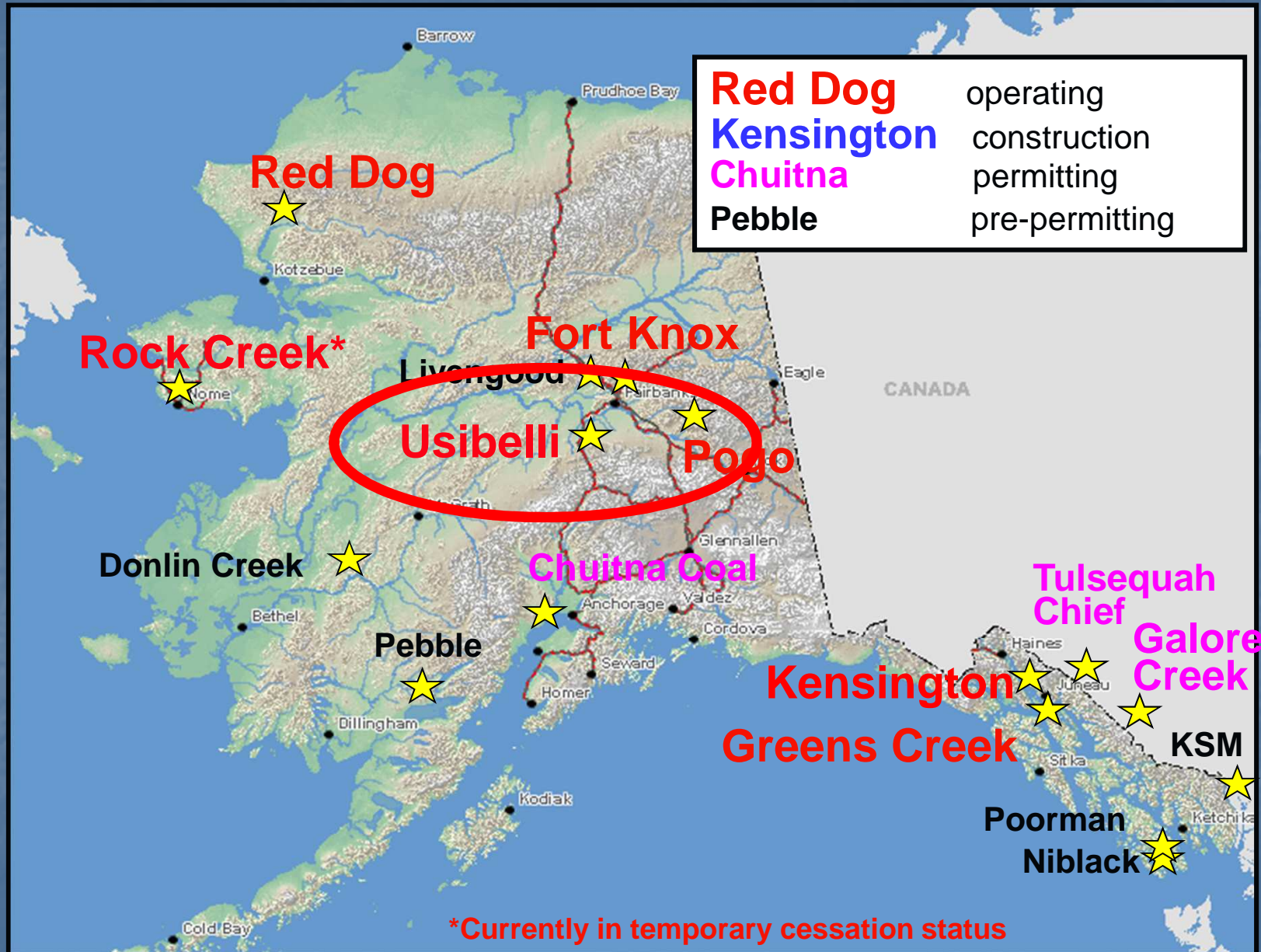




Permitting Status

- APDES permit to be public noticed this month

Large mining projects in Alaska



Usibelli

Owner/operator: Usibelli Coal Mine, Inc.



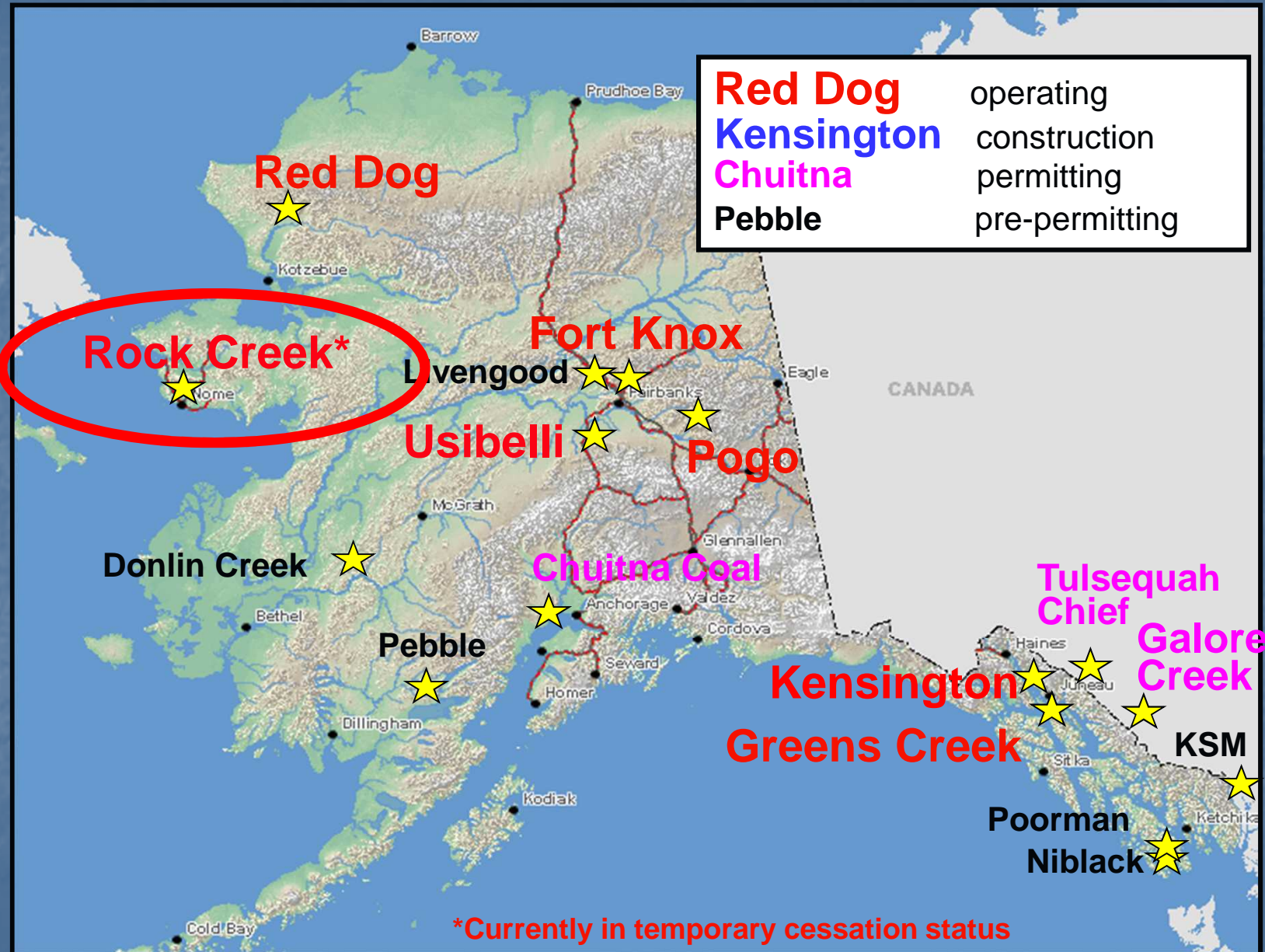
- Alaska's only operating coal mine
- Produced 1.7 million tonnes in 2009.
- Currently looking at significant expansion at Jumbo Dome (Healy) and Wishbone Hill (Palmer).



Permitting Status

- NPDES permit administratively extended under APDES program
- Starting EIS for Marguerite Creek (Jumbo Dome) expansion

Large mining projects in Alaska



Rock Creek/Big Hurrah

- Ownership: NovaGold Resources
- Employment: 130 - 150



- Sheeted quartz-vein system
- Production: 2,835 kilograms/year
- Commissioned in 2008, currently in temporary suspension
- Big Hurrah: satellite pit 48 km. east of Rock Creek



Permitting Status

- Mine will need a new waste permit to reopen
- Evaluating possibility of APDES permit

“NEVER A DULL MOMENT!”

<http://www.dnr.state.ak.us/opmp/>

or

<http://www.dnr.state.ak.us/mlw/mining/largemine.htm>

Ed Fogels

Ed.Fogels@alaska.gov

(907) 269-8431