Environmental Commitment

Coeur is a leader in environmental protection. We have earned more than 20 environmental awards by conducting our activities in such a manner as to protect the physical environment and our employees - and by being a proactive member in the communities in which we operate. The Kensington Gold Mine will operate in accordance with the highest standards of environmental compliance and we have pledged $7.3 million to ensure we restore the site to productive wildlife and aquatic habitat after mining. This policy can be simply stated as: "Producing and Protecting."

There has been considerable discussion about tailings management at Kensington. Tailings are the sand-sized material that remains after gold and other metals are removed in the processing step. Kensington tailings have less metal content than the natural lake sediments where they will be placed. Management of the tailings in Lower Slate Lake was the permitted alternative as it had the least environmental impact. After mining, the reclaimed lake will be about 60 acres (three times larger than current size) with productive wetland and open water habitats - and native wild fish will be restocked into the lake.

Protecting Berners Bay

Berners Bay Before Kensington

Berners Bay After Kensington

Why Lower Slate Lake Placement?

This approved plan is a temporary use of a small, relatively unproductive lake called Lower Slate Lake. The naturally occurring water quality in the lake does not meet state standards, and there is little or no spawning habitat for native fish. A conventional dam will be built at the outlet. During mining this area provides a geotechnically sound location for tailings while minimizing long-term impacts to productive wetland and other wildlife habitat. At the end of mining, the tailings area will be reclaimed into a lake with improved productivity and aquatic habitat, as determined through the Final Supplemental Environmental Impact Statement prepared by the Forest Service.

The mill and the underground mine are not visible from Berners Bay. As a result the mine does not impact the panoramic views that Alaskans enjoy. The National Marine Fisheries Service concluded the project would not adversely affect marine mammals. To further protect the marine mammals and fishery, we have developed a Transportation Plan relating to boat and barge traffic. This plan includes scaling and noise controls, restrictions on construction when marine mammals are present, reduced traffic during Eulachon and herring spawning periods, and an extensive monitoring program.

Lower Slate Lake Before Kensington

Lower Slate Lake After Kensington

3:30PM

ALASKA MINERALS COMMISSION REPORT TO THE LEGISLATURE 2006

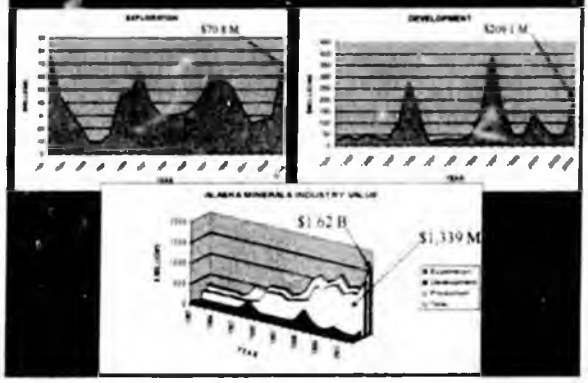
Joint Resources Committee

FEB. 8, 2006

ALASKA MINERALS COMMISSION

- Created by the 21st Legislature signed into law on June 7, 1999
- Active as of mid-January 2004
- Eleven Member Commission appointed
- Commission's Remit – Make recommendations to the Governor and the Legislature on ways to alleviate constraints on the development of mineral [illegible] coal
- Many recommendations implemented, [illegible] report in January 2007

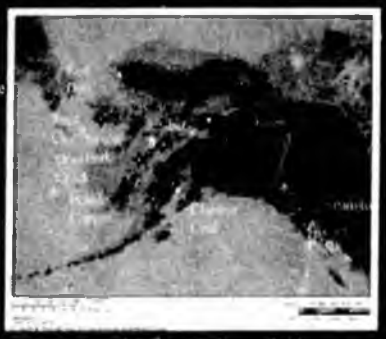
INDUSTRY OVERVIEW



INDUSTRY OVERVIEW

Major producing mine

Developing and major exploration projects



MINING LICENSE TAX

First enacted by Territorial legislature in 1913

Component of resource policy at statehood

7% Net Profits for major operations

Payable by all operations in State regardless of land status or mineral ownership

MINING RENTS & ROYALTIES

Mineral development major factor at statehood

1981 - State AG questioned state policy (Section 6(i))

1981/82 legislature tried modification

1983-1987 litigation

1987- AK Supreme Court – rents ***or*** royalties

1989 legislature – rents ***and*** royalties

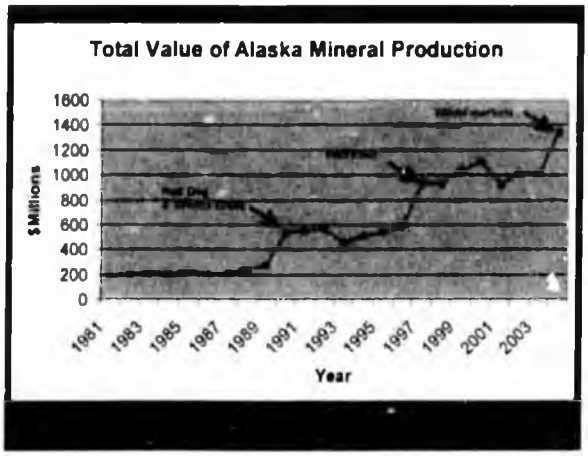
MINING RENTS & ROYALTIES

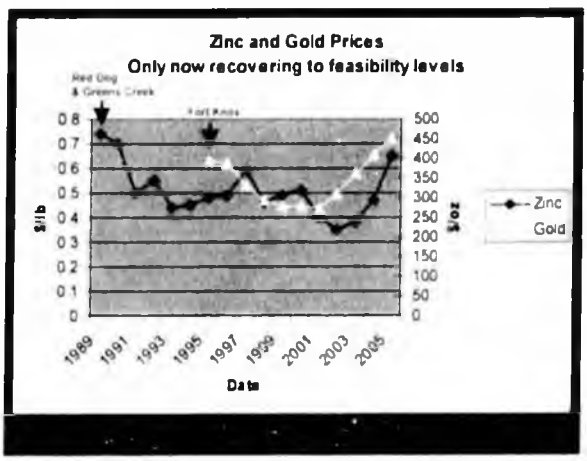
Rent – up to $3.30 per acre/yr

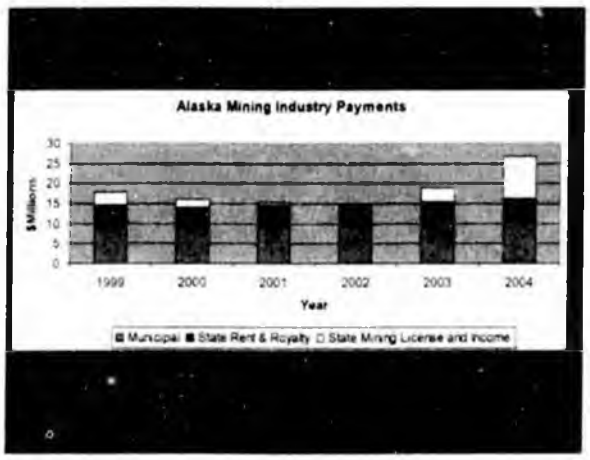
Royalty – 3% Net Profits

State land only

Debate and resolution occurred prior to industry expansion







FINDINGS AND RECOMMENDATIONS TO RESOURCE

- NPDES PRIMACY
- PERMIT EFFICIENCY
- MIXING ZONES
- TAX CONSIDERATIONS
- GEOLOGICAL AND GEOPHYSICAL MAPPING
- POWER SUPPLIES

FINDINGS

- NPDES PRIMACY

RECOMMENDATIONS

- NPDES PRIMACY
  - ADEC aggressively pursue primacy
  - Legislature ensure appropriate funding

FINDINGS

- PERMIT EFFICIENCY

RECOMMENDATIONS

- PERMIT EFFICIENCY
  - **the Legislature require a periodic permitting status report accounting for agency staff and management**

FINDINGS

- MIXING ZONES

RECOMMENDATIONS

- MIXING ZONES
  - ADEC finalize the promulgation of the mixing zone regulation, after considering the comments provided during the comment period that result in enhancements to the proposed regulations and without detracting from the original three improvements in the proposed regulation.

FINDINGS

- TAX CONSIDERATIONS
  - Mineral development provides private sector investment and employment to diverse areas of the State
  - A substantial portion of the State's mineral potential lies in unorganized boroughs
  - The formation of boroughs presents uncertainty regarding future taxation

FINDINGS

- TAX CONSIDERATIONS
  - The mining industry is willing to pay [illegible] share of the tax burden, such as an equitable land based tax, a property tax, not an industry specific severance tax
  - An industry-specific tax could be a disincentive to development of the industry in rural areas and thereby becomes a negative to the rural communities
  - Tax uncertainty makes investment decisions in the State difficult and contributes to the disincentive against investment in mining in Alaska

RECOMMENDATIONS

- TAX CONSIDERATIONS
  - The Governor and the Legislature take steps to improve the investment climate for the mining industry by ensuring that future municipal taxes especially in those areas presently within the unincorporated regions of Alaska, are broad-based, equitable, and stable

FINDINGS

- GEOPHYSICAL & GEOLOGICAL MAPPING
  - Alaska [illegible] is one of poorest in the world
  - Declining investment
  - When privately done, for baseline for progress
  - mapping expenditures since 1993 have averaged $[illegible] per annum
  - Approximately [illegible] square miles, less than [illegible] of the State's land entitlement, has been mapped during this period
  - $[illegible] for digital geophysical & geological mapping and $ 350,000 for pipeline Delta to Canada
  - geophysical-geological mapping has been proposed by the governor for FY 1997

RECOMMENDATIONS

- GEOPHYSICAL & GEOLOGICAL MAPPING
  - The Governor and the Legislature increase annual rate of funding in geophysical and geological mapping to more than $1,000,000 per year
  - Provide $500,000 to complete both surficial and bedrock geologic mapping of the Delta Junction to Canada border pipeline corridor

FINDINGS

- POWER SUPPLIES
  - Major mines require substantial power supplies
  - Many remote mines must generate their own power using costly modular diesel or other forms of generation
  - Extensions of Alaska's power supply and grids could enhance project development and provide more economical power to rural communities
  - Coal fired generation offers the means to provide stable long-term, economical power supply to Alaska

RECOMMENDATIONS

- POWER SUPPLIES
  - The Governor and Legislature support development of a long-term electrical generation plan for the existing electrical grid that incorporates the use of coal.

OTHER FINDINGS & RECOMMENDATONS

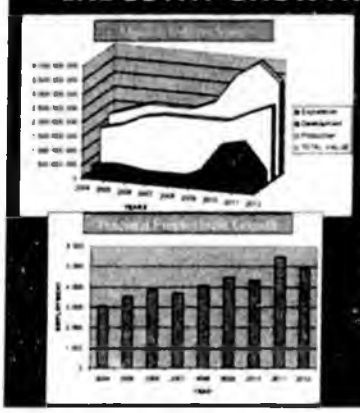
- Litigation Reform
- General Permits for Small Remote Work Camps
- AMEREF
- Roads to Resources
- RS2477 Trails
- Navigability
- College of Engineering & Mines
- Minerals Marketing & Foreign Trade Offices

FINDINGS & RECOMMENDATONS

Federal Level

- Tailings Impoundment Classification
- Toxic Release Inventory
- Geological Mapping
- Resolution of Outdated Segregations
- Essential Fish Habitat
- MSHA Training & Relief for Small Mines

INDUSTRY GROWTH POTENTIAL



Thank You

The Alaska Minerals Commission

An Economic Impact Profile

From the report
The Economic Impact of Mining on Alaska,
prepared for the Alaska Miners Association

Alaska's Mining Industry

February 2006

The Benefits of Mining

Historically, mining was a cornerstone of the Alaska economy. Many roads, docks, and other infrastructure throughout Alaska were originally constructed to serve the mining industry. Today, a rejuvenated mining industry is bringing a broad range of economic benefits to Alaskans and Alaska communities.

For example, mining:

- Offers some of the highest paying occupations in Alaska.
- Provides jobs in many rural areas in Alaska, where there are few other private sector jobs available.
- Makes significant local government tax payments.
- Benefits Native corporations from mining activity on their land, both in jobs for shareholders and through direct payments.

The future promises even greater economic benefits. However, the mining industry requires a stable and equitable tax environment for Alaskans to realize the greatest potential economic benefits from mineral resouce development.

Alaska's mining industry includes exploration, mine development and mineral production. The industry produces zinc, lead, gold, silver, coal, as well as construction materials, such as sand, gravel and rock.

In 2004:

- There were 26 significant exploration projects in Alaska. Exploration spending totaled $71 million (2005 exploration expenditures are over $95 million).
- Another $209 million was invested for development of new mines in Alaska.
- Alaska's three largest metal mines, Red Dog, Fort Knox, and Greens Creek, spend approximately $170 million annually in Alaska in support of their operations.
- Approximately 73 open-pit, underground, mechanical placer, and suction dredge mines were in production in Alaska.
- There are at least 37 rock quarries and 71 active sand and gravel operations.

Key 2004 Mining Industry Economic Impacts

2,900 average direct mining jobs in Alaska

5,100 total jobs attributed to the mining industry in Alaska

$280 million in payroll attributed to the mining industry

$280 million spent in mining exploration and development in Alaska

$16 million paid by the mining industry to state government in royalties, fees, and taxes

$11 million paid by mines to local governments

$11 million paid by mines to Native corporations

$17 million paid to Alaska Railroad to move coal, sand and gravel to state and international markets

$18 million paid to the Alaska Industrial Development & Export Authority (AIDEA) for DeLong Mountain Regional Transportation System user fees

Employing Alaskans in Good Jobs

In 2004, the mining industry directly employed 2,900 Alaskans, paying them $194 million in wages. If indirect and induced jobs are added in, a total of 5,100 Alaskans with $280 million in payroll can be attributed to the mining industry.

Providing year-round jobs with good wages

The average annual wage for employees working in Alaska's metallic mineral mines is $70,750, 83 percent above the statewide average annual wage.

Fort Knox Mine employees' average salary was 70 percent higher than the Fairbanks North Star Borough average. Greens Creek Mine's 260 employees are among the highest-paid workers in Juneau with average annual wages of nearly $79,000, almost triple the average $29,000 wage for Juneau private sector workers.

Prior to Red Dog Mine's opening, average income in the Northwest Arctic Borough was well below the statewide average. Following development of Red Dog Mine, the median household income in the Borough increased by about 87 percent. Annual wages at the mine range from $45,000 to $85,000 per year, plus benefits.

Providing jobs in rural Alaska

Many jobs offered by the mining industry are rural-based, including those at Red Dog, Donlin Creek, Pogo, and Pebble. These jobs are offered where few if any other employment opportunities are available.

Red Dog Mine is the second largest employer in the Northwest Arctic Borough. Including contract employment, it accounts for 17 percent of all employment in the Borough.

Supporting Alaska workers and Alaska businesses

The mining industry has a higher resident hire rate, at 83 percent, than the statewide average of 80 percent, and significantly higher rates than other key Alaska industries.

Alaska Resident Hire by Key Industry, 2003

Industry	% Alaska Resident Workers
Mining	82.8%
Construction	80.1
Oil and Gas Extraction	77.3
Accommodation and Food Services	73.1
Seafood Processing	28.9
All Industries	81.9

Source: Alaska Department of Labor and Workforce Development

Mining projects offer employment and business opportunities to Alaskans. For example:

- Approximately 300 workers have been hired for the Pogo Mine construction project near Delta Junction. Pogo's labor force is 85 percent Alaska resident.
- For construction of the Kensington Gold Project near Juneau, $42 million in contracts have been awarded so far, 85 percent to Alaskan companies.
- In 2005, Calista shareholders made up 94 percent (111 employees) of Donlin Creek's direct and contract employees. Seven of eight supervisors on the project are shareholders.
- In 2005, for the Pebble project, 45 consulting firms have been hired to conduct environmental baseline studies, planning, and research. These firms reported 441 Alaskan employees worked on some aspect of the project. Of the Alaska workforce, 21 percent were hired locally from the Bristol Bay region and 26 percent were Alaska Native.

More mining jobs in the future

With the Pogo and Kensington projects coming on line within the next two years, metal mining will introduce 500 more high-paying jobs for Alaskans, increasing mining's payroll by $35 million.

Projects currently in exploration, such as Pebble, Donlin Creek, Rock Creek, and Chuitna Coal, have the potential to employ 1,500 Alaskans.

Training Alaskans

Many jobs in the mining industry offer transferable skills in an industry rapidly growing in Alaska and worldwide. There are a number of Alaska education institutions and organizations that provide training for and with the mining industry throughout Alaska.

Strengthening Government

Mining companies are a significant source of revenue for local governments. In 2004:

- Red Dog paid $6.2 million in payment in lieu of taxes (PILT) to the Northwest Arctic Borough, representing three-fourths of its General Fund receipts.
- Fort Knox/True North was the second largest property tax payer to the Fairbanks North Star Borough, paying $3.5 million in property taxes.
- Greens Creek Mine is the largest private property tax payer, paying $660,000 in property taxes to the City and Borough of Juneau.
- Usibelli Coal Mine paid property taxes of $125,000 to the Fairbanks North Star Borough and $155,000 to the Matanuska-Susitna Borough, and $75,000 in other taxes to the Denali Borough.
- Alaska Gold Company was the fourth largest property tax payer to the City of Nome, paying $53,300 in real property taxes.

Rock Creek Development Project. Photo courtesy of NovaGold Resources.

More local government support expected

In a PILT agreement between the Pogo Mine and the City of Delta Junction, mine developers paid the city $500,000 in 2005, will pay another $500,000 in 2006, and another $1,000,000 in 2007 (if a Borough has not yet been incorporated).

Reviewing core samples at the Pebble Project. Photo courtesy of Northern Dynasty Mines Inc.

Generating state government revenues

The mining industry paid $15.8 million to the State of Alaska in 2004 through a variety of taxes, rent, royalties, and fees. Mining license taxes were the largest source of revenue, totaling $10.3 million in FY 2005, a year when metal prices were just beginning to improve.

Mining is an important source of revenue for the Alaska Railroad Corporation. In FY 2004, the railroad earned approximately $17 million from movement of coal and gravel destined for Alaska or export markets (representing 15 percent of its total operating revenue).

Red Dog Mine paid the Alaska Industrial Development & Export Authority close to $18 million in annual user fees for use of the state-owned DeLong Mountain Regional Transportation System road and port that serves Red Dog Mine.

Greens Creek underground drill rig. Photo courtesy of Kennecott Greens Creek Mine.

Supporting the Alaska Mental Health Trust

The Alaska Mental Health Trust earned $167,000 in rents and royalty payments from the mining industry in 2004. The Trust also earned $60,000 from construction material sales.

Partnering with Alaska Native Corporations

Red Dog is operated by Teck Cominco under an agreement with NANA Regional Corporation. NANA is the landowner and Teck Cominco is the operator. Teck Cominco pays a net smelter return royalty to NANA, which in 2004 was $10.9 million. Of the 2004 royalty payment, NANA redistributed $5.9 million to the other 11 ANSCA regional corporations as part of its 7(i) payment. Teck Cominco paid $90.1 million in total royalties to NANA from 1982 to 2004.

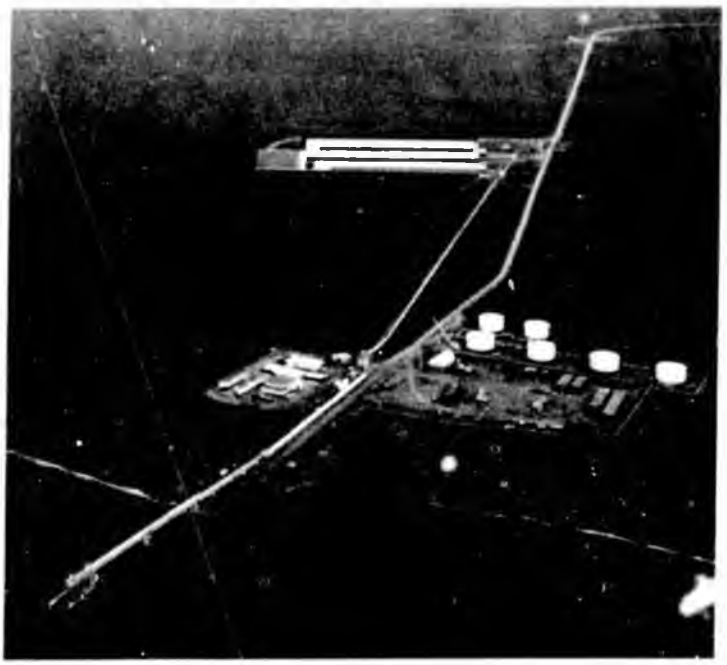
Of the 480 employees at Red Dog, approximately 360 are employed directly by Teck Cominco, while most of the remaining employees are employed by NANA/Lynden and NANA Management.

Teck Cominco has hired more than 1,000 NANA shareholders at Red Dog Mine since production began in 1989. This does not include many more who have worked as contractors at the mine. A third of the people holding Red Dog jobs live in the small villages of the Northwest Arctic Borough.

Placer Dome, developer of the Donlin Creek project, has entered into exploration and mining lease agreements with Calista Corporation and The Kuskokwim Corporation, and is talking with Calista and Kuskokwim about opportunities for service contracts.

Alaska Gold Company has exploration and mining lease arrangements with Bering Straits Native Corporation and Sitnasuak Native Corporation for mining and surface use.

Fort Knox Mine. Photo courtesy of Kinross Gold.



DeLong Mountain Regional Transportation System Port. Photo courtesy of Teck Cominco.

Developing Important Infrastructure

The mining industry has historically played a key role in the development of important infrastructure in Alaska. Development of the Alaska Railroad, the Richardson Highway, and the settlement of Anchorage, Fairbanks, Juneau, Skagway, and Nome are all linked with early mining industry activity. The mining industry is also responsible for the development of smaller communities throughout Alaska, such as Eagle, Circle, and McGrath, among others.

Mining industry development of Alaska infrastructure continues today. Examples include the DeLong Mountain Regional Transportation System port and road (developed in support of the Red Dog Mine), the Seward coal-loading facility, and the Pogo Mine road. Mining-related infrastructure can also reduce the cost of basic services to Alaskans. For example, because Ft. Knox is a large purchaser of electric power, other local customers enjoy lower power rates.

Contents of this handout are taken from the report, *The Economic Impact of Alaska's Mining Industry* (February 2006), prepared by McDowell Group, Inc. The full study is available online at www.alaskaminers.org or from the Alaska Miners Association in Anchorage at (907) 563-9229.

Alaska Department of Natural Resources
Division of Geological & Geophysical Surveys

Mineral Resources Program

Robert Swenson
Acting Director & State Geologist
Division of Geological & Geophysical Surveys

http://www.dggs.dnr.state.ak.us
http://akgeology.info

February 7, 2006

Alaska Department of Natural Resources

Division of Geological & Geophysical Surveys

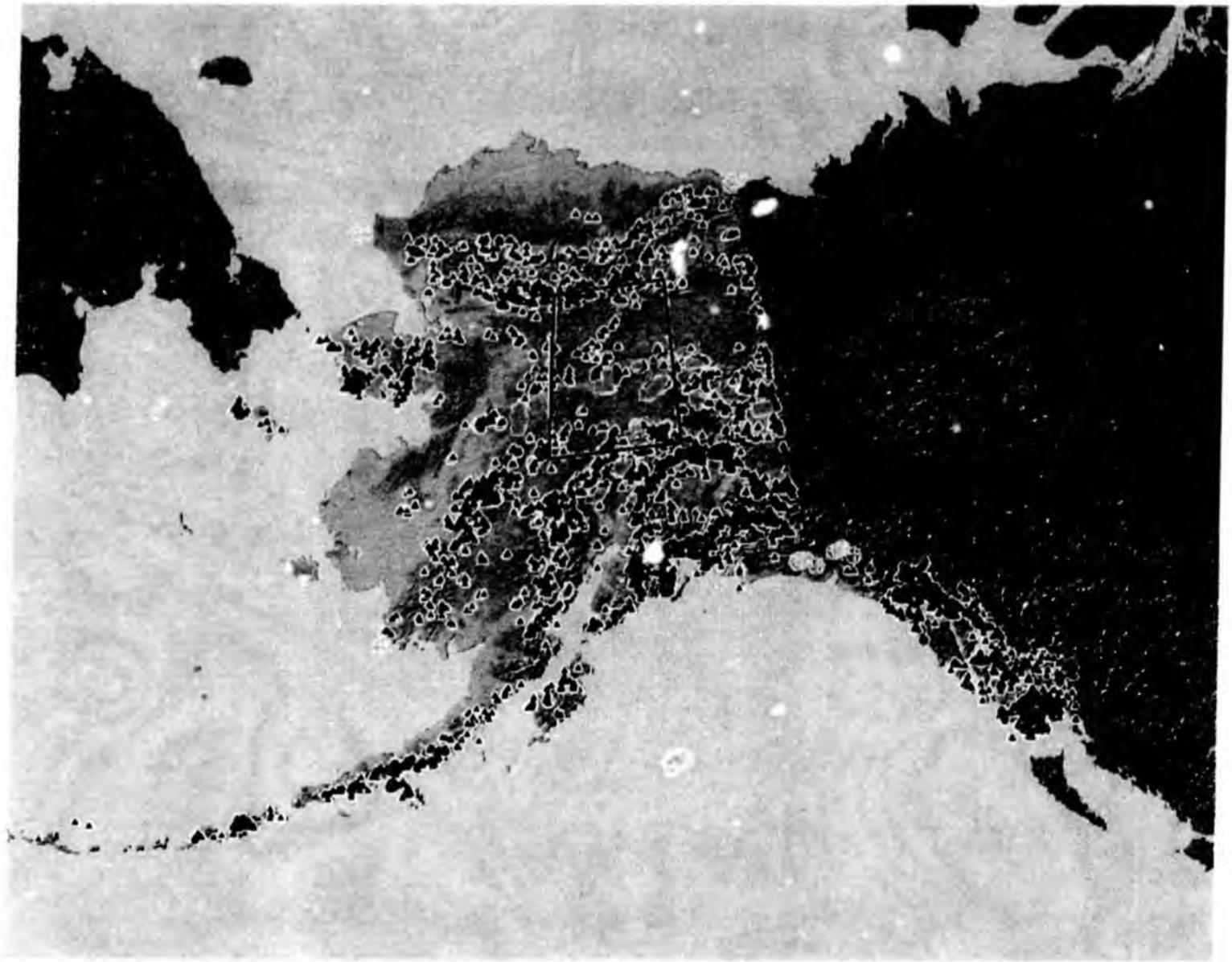
MISSION STATEMENT

Alaska Statutes 41.08.020

Conduct geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources; the locations and supplies of groundwater and construction materials; and the potential geologic hazards to buildings, roads, bridges, and other installations and structures.

DGGS Mineral Resource Program

Challenge



Mineral Resource Program

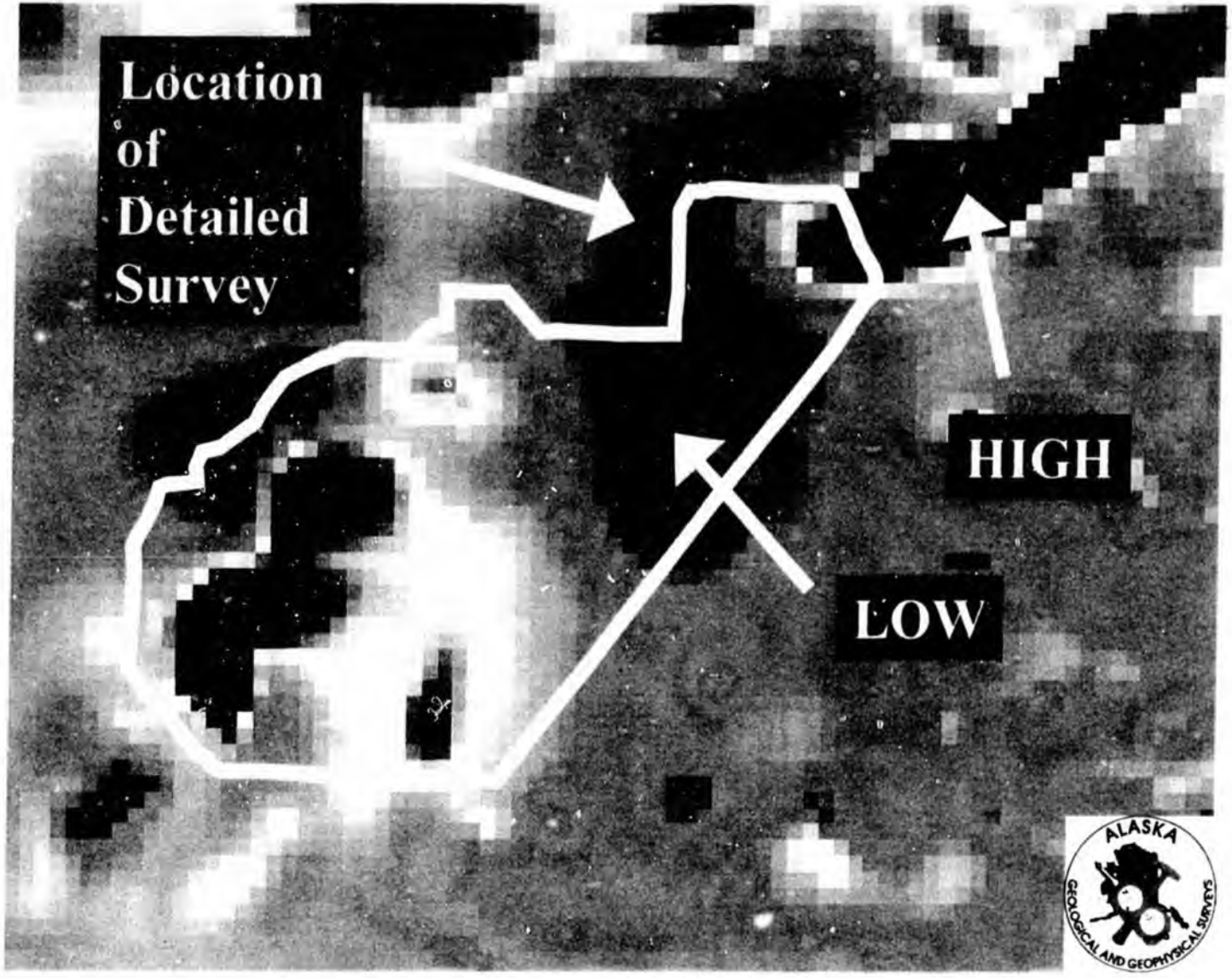
Statistics

- **$1.7 mm Federal Matching Funds for Geologic Mapping since 1993**
- **6.1 mm acres (9,531 sq. mi) of high resolution geophysics state funded, 3.7 mm acres (5,781 sq. mi) BLM funded**
- **40 million acres (62,500 sq. mi) currently identified as high potential**
- **Geophysics cost about $575/sq. mile ($0.90/acre) currently**
- **Over 3 Million Acres (4,700 sq. mi) of 1:63,360 Detailed Geologic Mapping completed and published using High Resolution Geophysics**

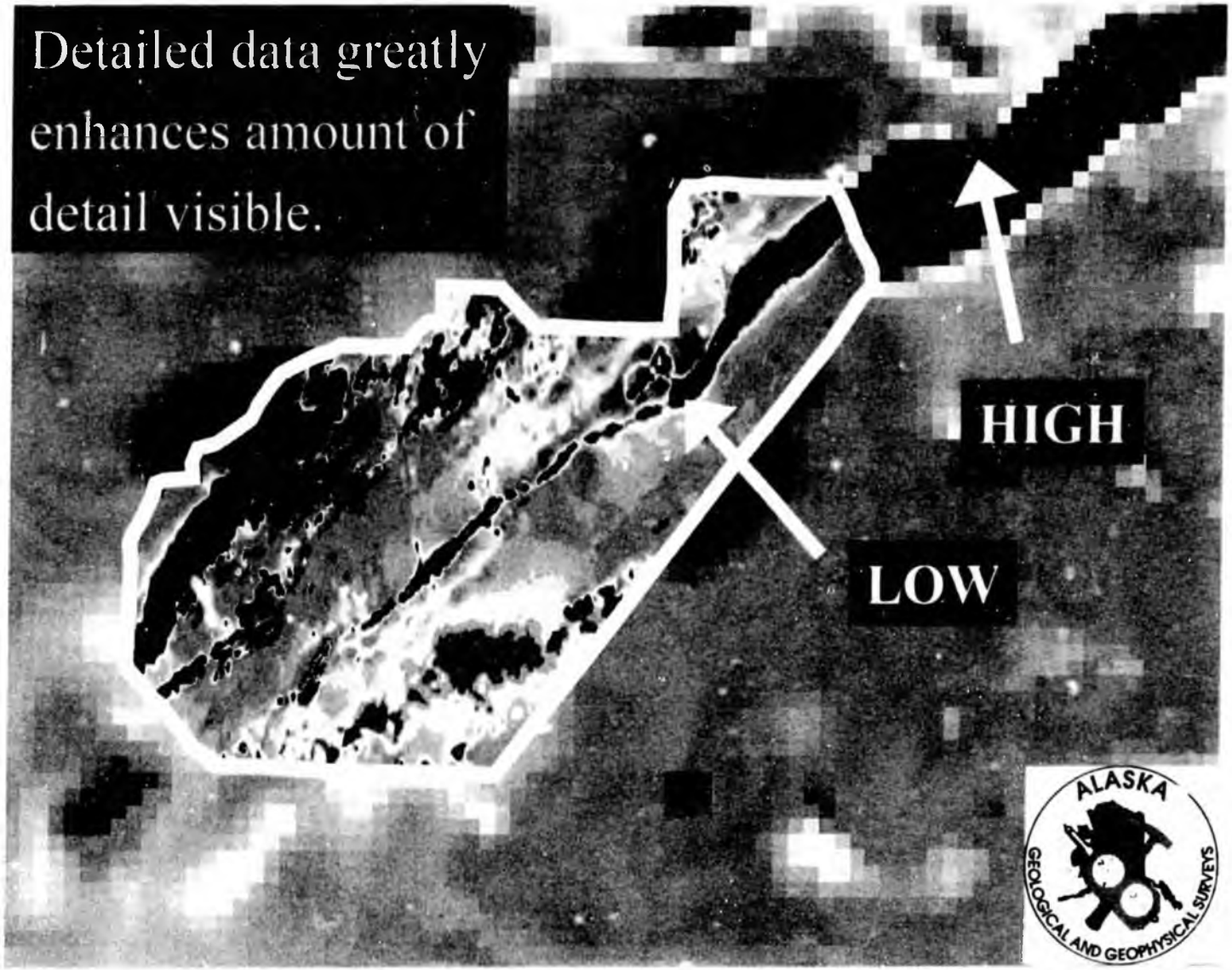
Mineral Resource Program
Benefit

- Better assessment of State's resource base
- Keeps high-resolution data in public realm
- Viable prioritization of land selections and transfers
- Stepping-off point for explorers
- Critical data for infrastructure and community planners and

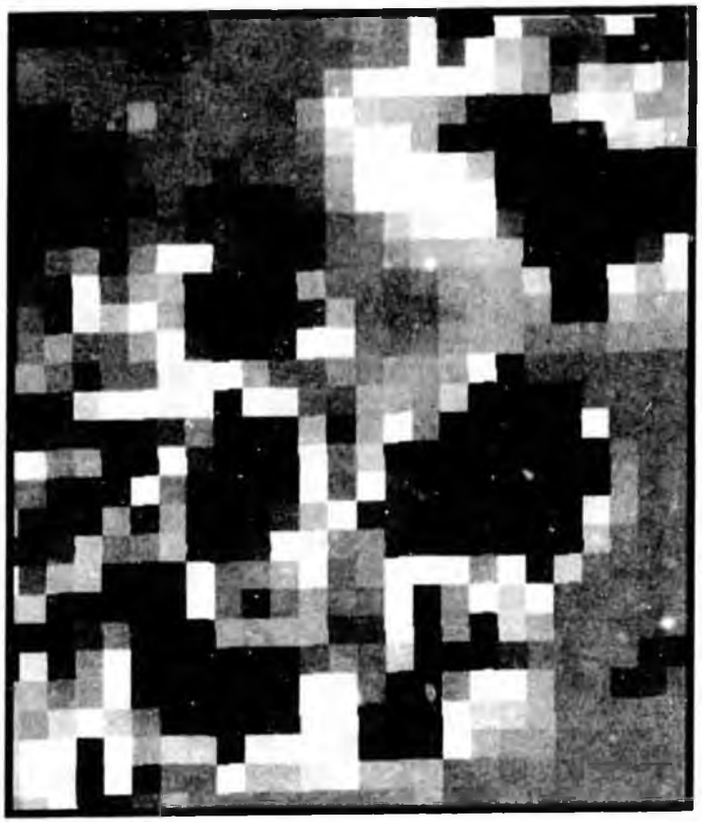
Regional Magnetics – Chulitna Area



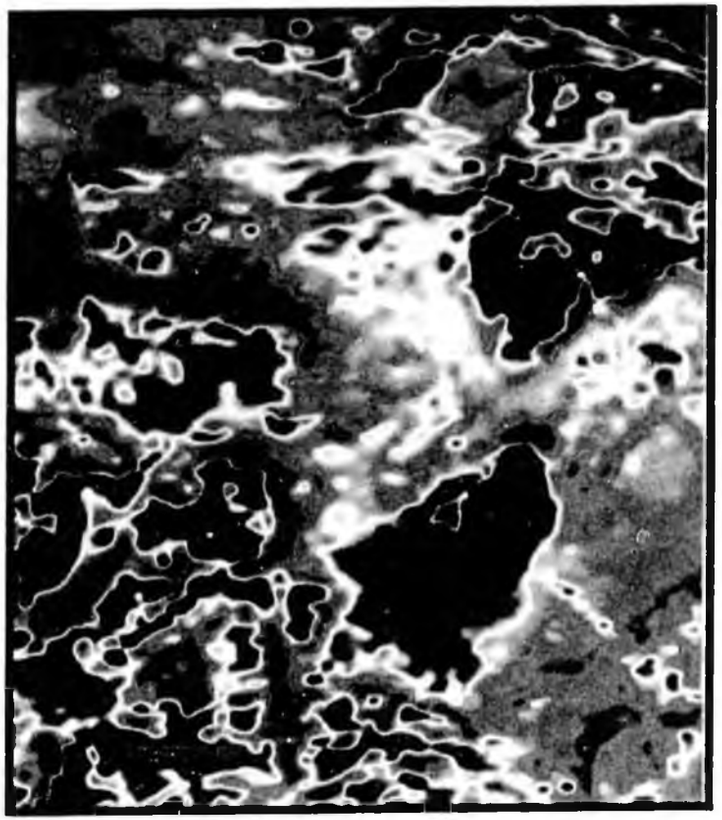
Detailed Magnetics – Chulitna Area



REGIONAL AEROMAGNETICS



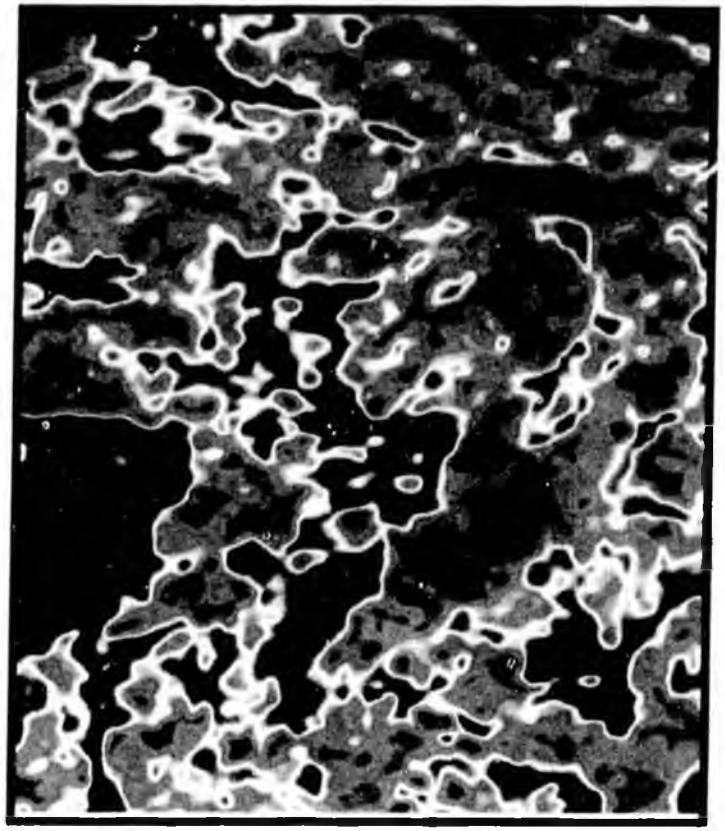
DETAILED AEROMAGNETICS



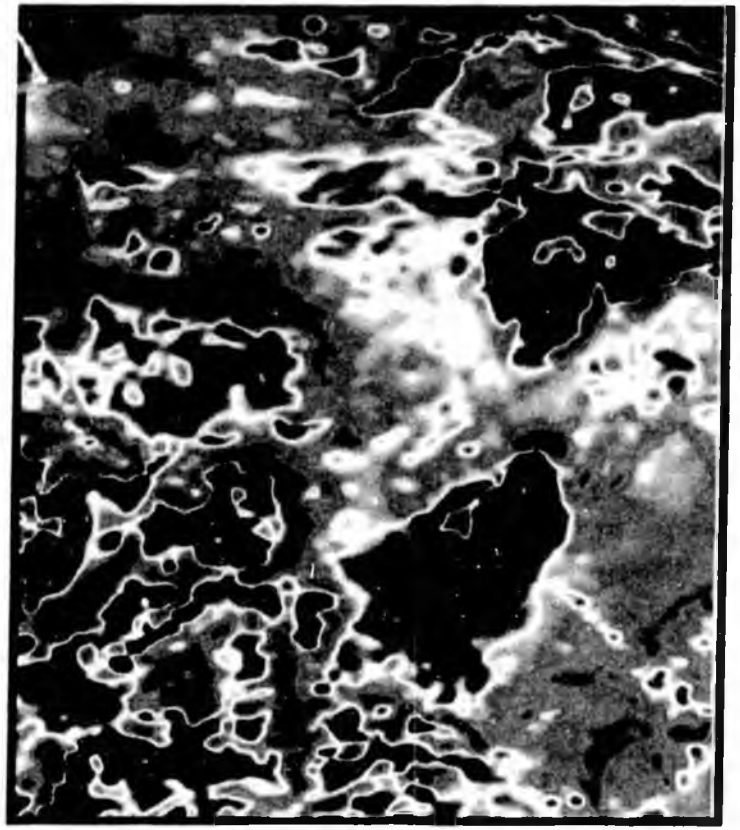
Eagle A-2 Quadrangle

5 Miles

7200 HZ RESISTIVITY



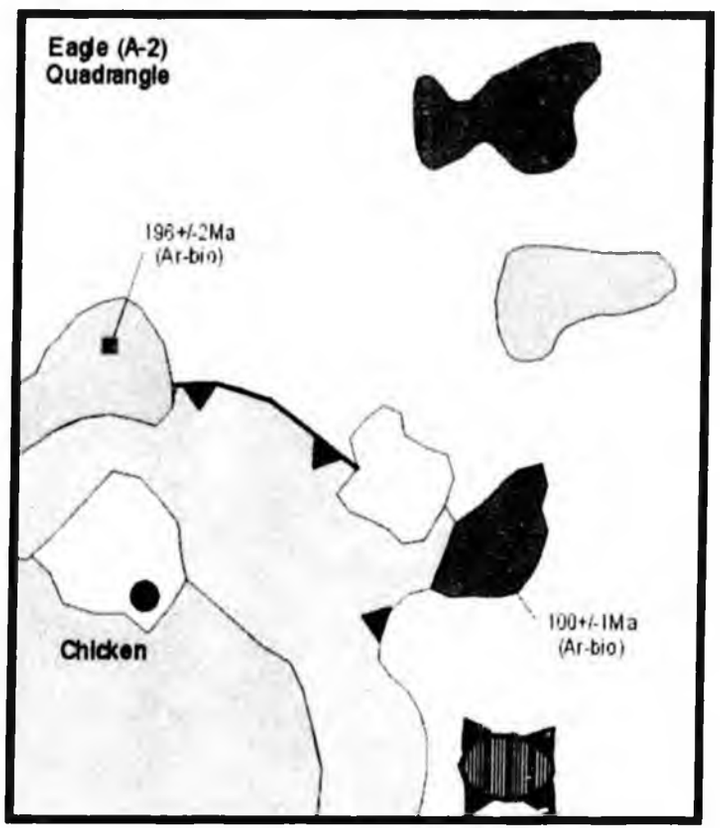
DETAILED AEROMAGNETICS



Eagle A-2 Quadrangle

5 Miles

GEOLOGY WITHOUT GEOPHYSICS

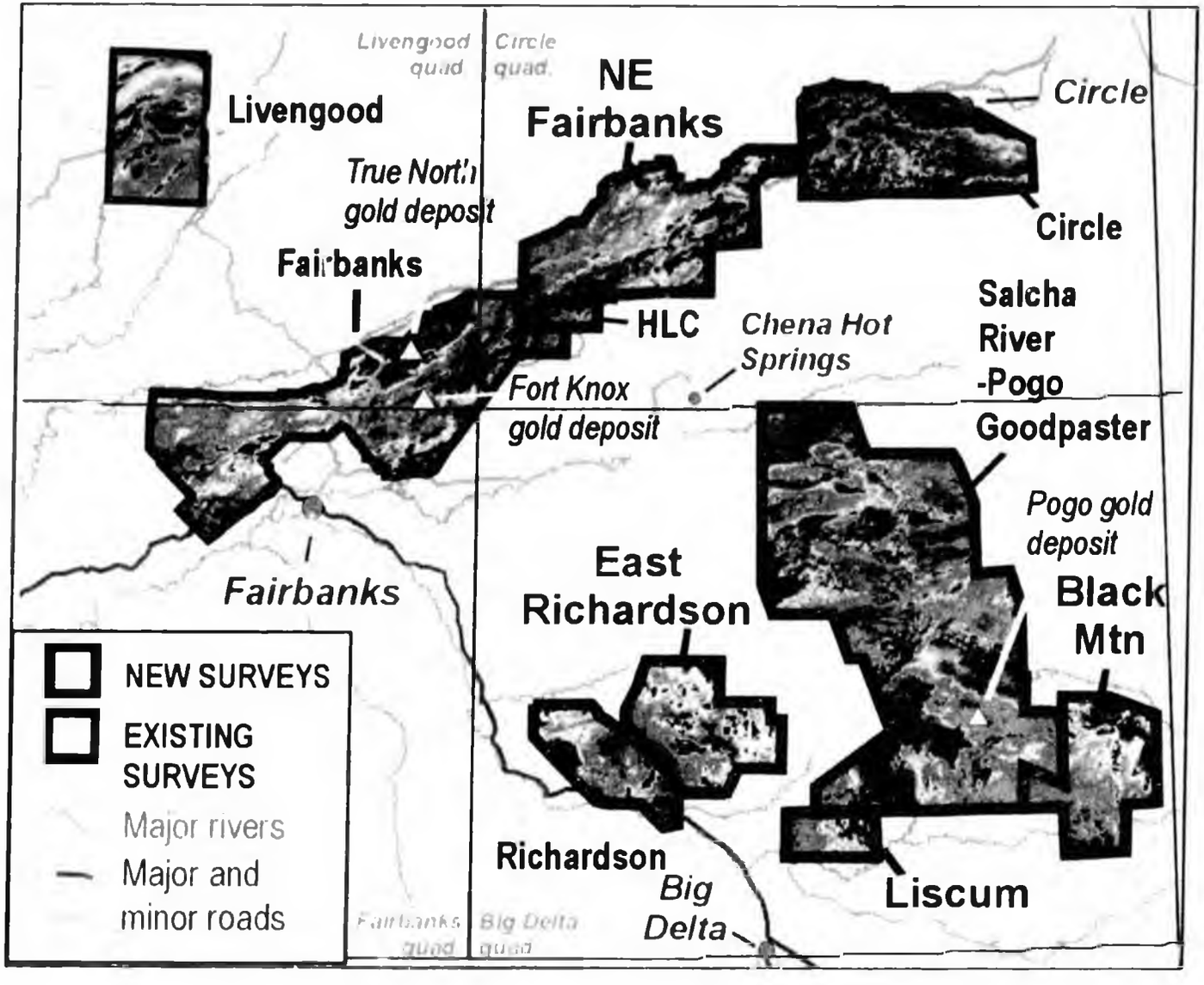


GEOLOGY WITH GEOPHYSICS

Eagle A-2 Quadrangle

Fort Knox Footprint ■ Pogo Footprint

Alaska Geophysical/Geological Mineral Inventory Program



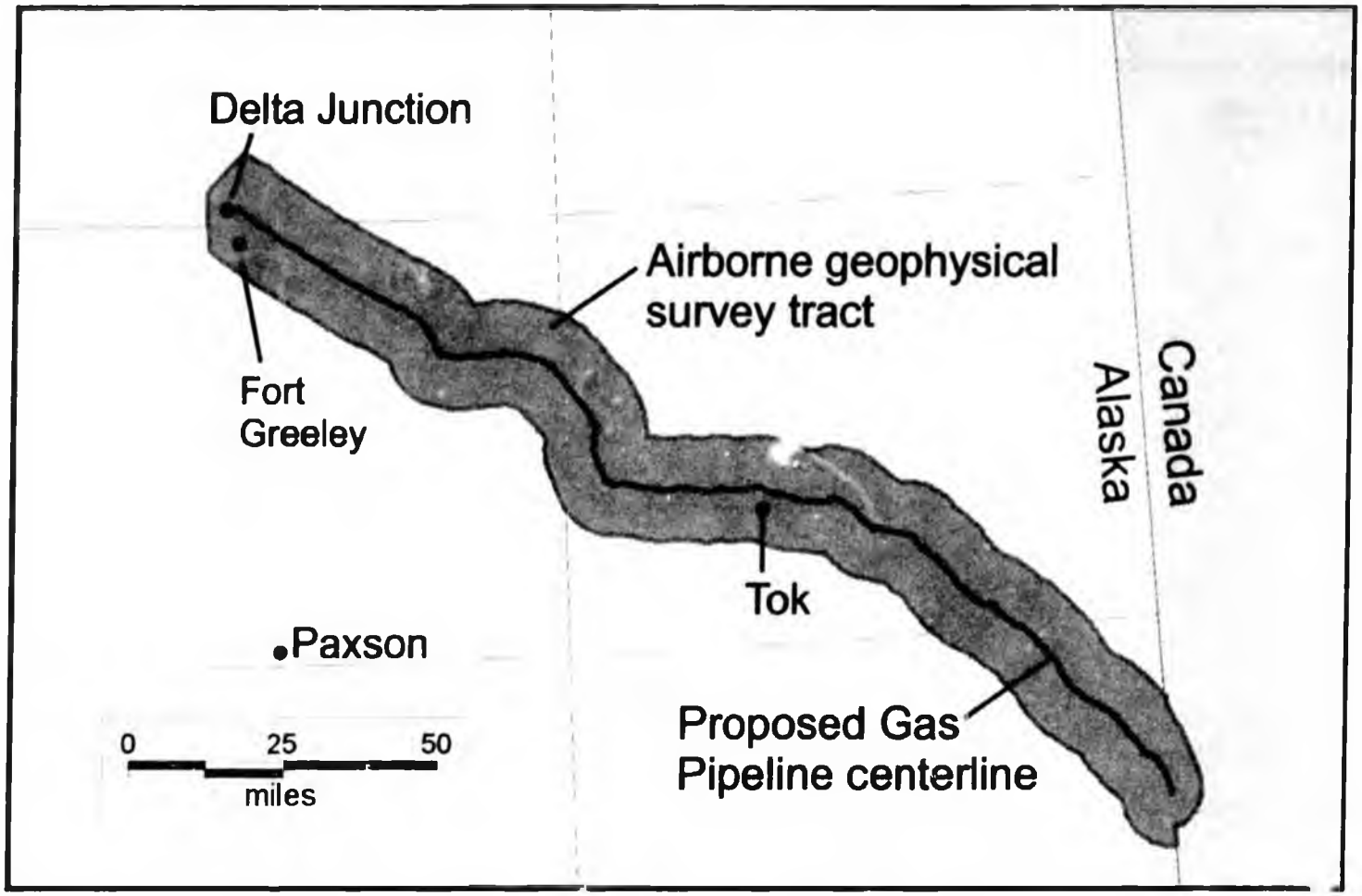
NE Fairbanks

E. Richardson

Liscum

Black Mountain

Airborne Geophysical Survey of the Proposed Gas Pipeline Corridor, Interior Alaska: First Phase of Geologic Hazards and Resource Evaluation



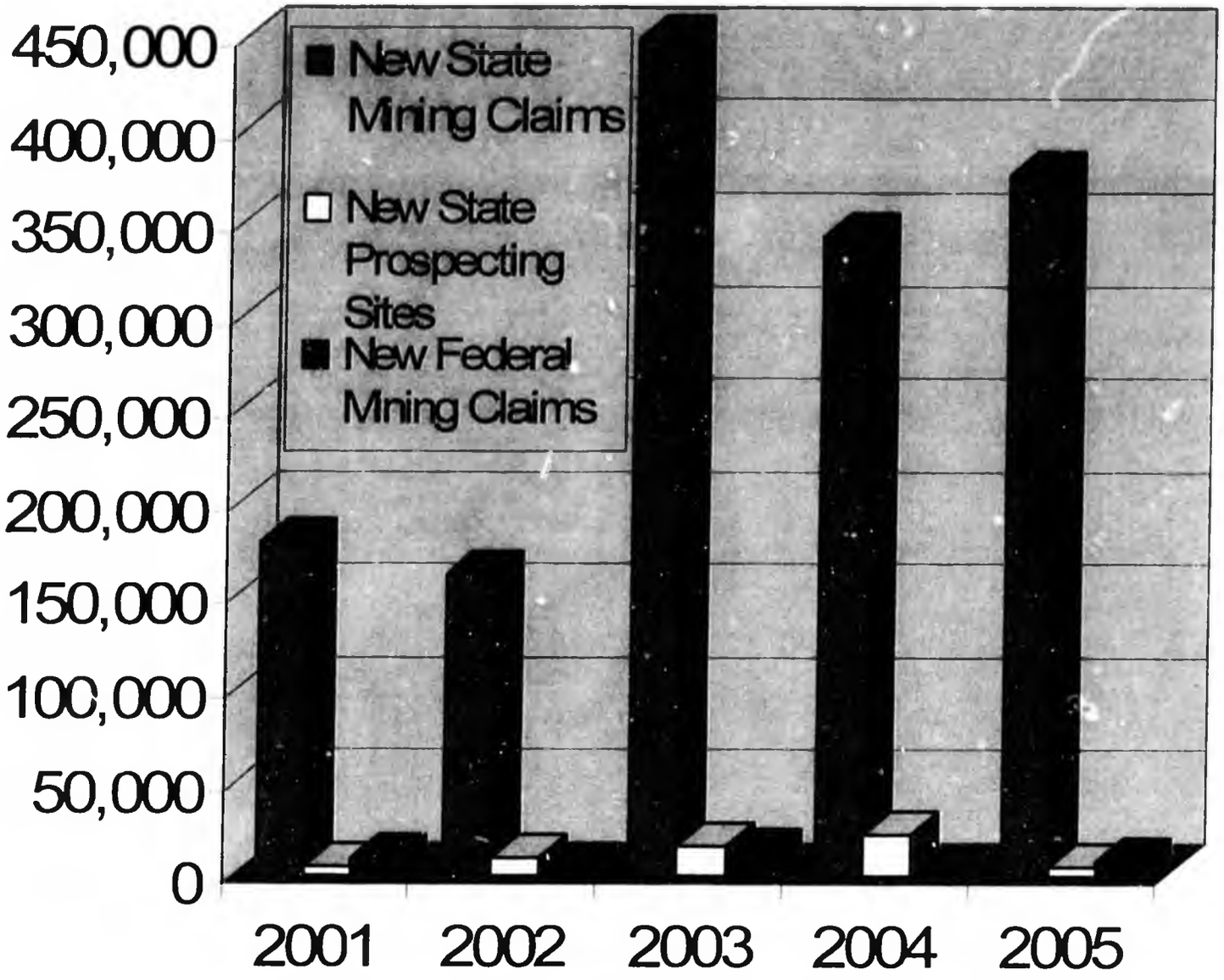
Geophysics Release

January 2006 -- Vancouver, Fairbanks, Anchorage

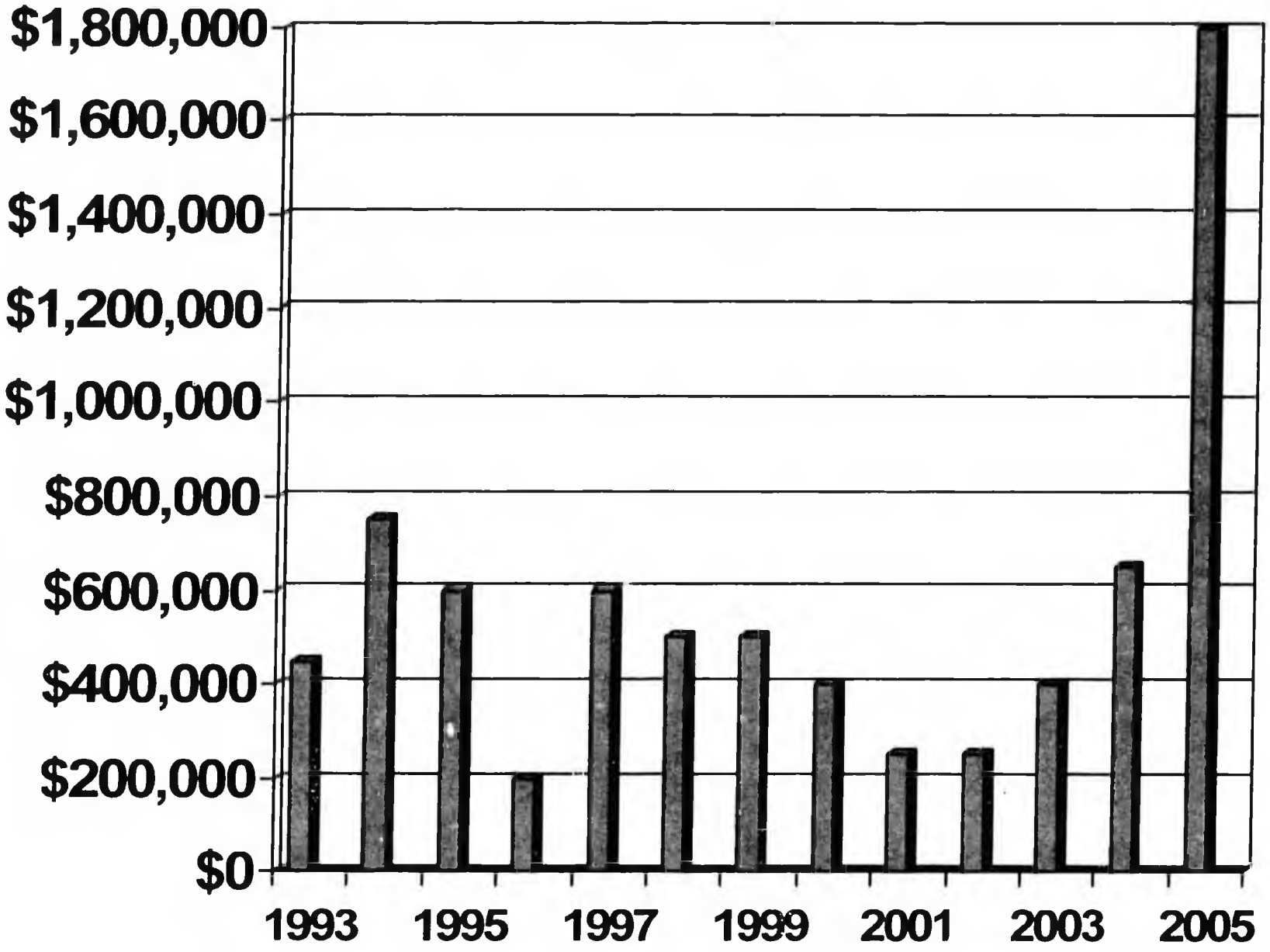
- **Barrick Gold Corp.** (the world's largest gold mining company) – purchase
- **Kennecott Exploration Co.** (a subsidiary of Rio Tinto Co., the world's 2nd largest mining company) – purchase
- **Phelps Dodge Corp.** (one of the world's (top 5) largest copper producers, world's largest molybdenum producer) – questions, etc.
- **AngloGold Ashanti Ltd.** (one of world's largest gold producers, employs 60,000 worldwide) – purchase/paid for part of survey costs
- **Rimfire Minerals Corp.** (Canadian junior mining company with major claim holdings in the Pogo area) – purchase
- **Geoinformatics Exploration Inc.** (Canadian junior mining company in worldwide strategic alliance with Kennecott Mining Co.; working on Uncle Sam area near Delta Junction and Nixon Fork Mine near McGrath) – purchase
- **Select Resources Corp.** (U.S. junior mining company with Alaskan holdings in Livengood and Richardson mining districts, recently purchased Calder marble mine in Southeastern Alaska from SeaAlaska Corp.) – purchase
- **Tanya Strate** (Australian geophysicist moving to North America) – purchase
- **Nicholas Van Wyck** (Alaskan certified professional geologist) – purchase
- **Avalon Development** (Alaskan mineral exploration company) – purchase
- **Interior Landscaping** (Alaskan company) – purchase

2004 & 2005 Alaska Exploration

Acreage of New Mining Claims Staked Per Year



Historic Funding of Program



Benefits of Stable Funding

- **Ability to negotiate long-term contract**
- **Cost savings on mobilization /demob**
- **Increased coverage of geophysics and high-resolution geologic mapping on state land**
- **Understanding the state's resource base**

PRESENT-ATION: NATURAL GAS 101, 1/19/05

Natural Gas
& Natural Gas Liquids

Presented by

Dennis Steffy, Director
Mining and Petroleum Training Service

KPC

UAF

Natural Gas & Natural Gas Liquids

Purpose:

To establish
Hydrocar
com

Origin of Oil and Gas

Oil and gas originated from the remains of microscopic life in shallow marine environments

Fossil Fuels are composed of *hydrocarbons*

Origin of Oil and Gas

The total amount of organic matter stored this way is less than 1% of all the organic matter that has been formed by plants and animals over geologic time

La Brea Tar Pit, Los Angeles, ca 1920

Origin of Oil and Gas

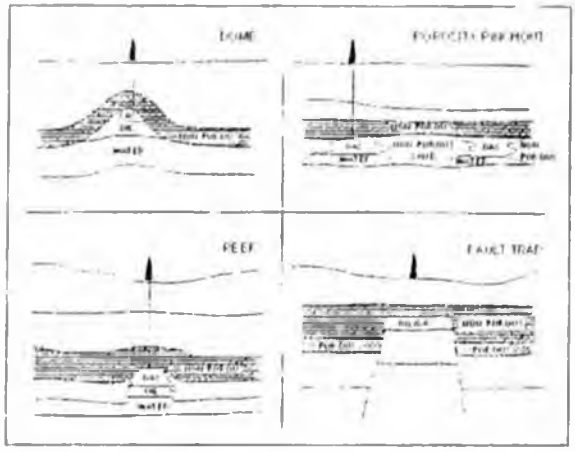
These remains decomposed to form oil and gas

They migrated upwards until trapped by some sort of subsurface geological formation

Natural Gas & Natural Gas Liquids

The rock where oil and gas is called the [illegible]

The [illegible]



Oil and Gas Reservoirs

High Porosity and Permeability
are good

Porosity is open space in the formation where oil and gas can accumulate

Oil and Gas Reservoirs

More Porosity
= more room for oil and gas

Permeability is the ability of oil and gas to move through the formation

High permeability means easy and rapid movement of oil and gas to the well

Oil and Gas Reservoirs

Organic rich limestone - a good source rock

Certain conditions of pressure and temperature are required to create petroleum - the *hydrocarbon window*

Oil forms in a *source rock* like organic shale

It migrates until it is trapped by a cap rock

It resides in a reservoir rock like sandstone.

Reservoirs **should have high porosity, permeability**

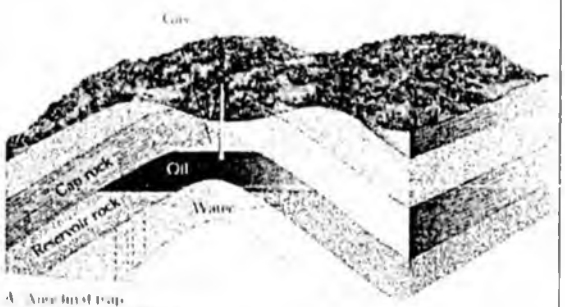
Examples: sandstone, conglomerate, cavernous limestone, highly fractured rocks (even granite)

Oil and Gas Reservoirs

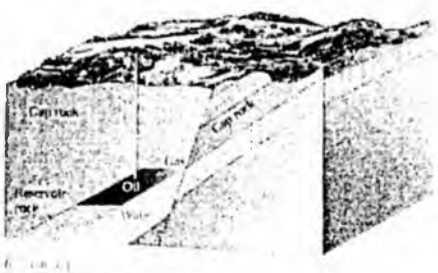
In the reservoir:

Water is

Oil migrates *up dip* because it is less dense than rock
Oil floats on water of the saturated zone; natural gas (methane) floats on top of the oil



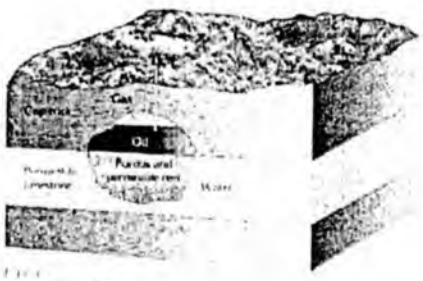
Faults may themselves seal off migration, or may place impermeable rock against the reservoir to block escape



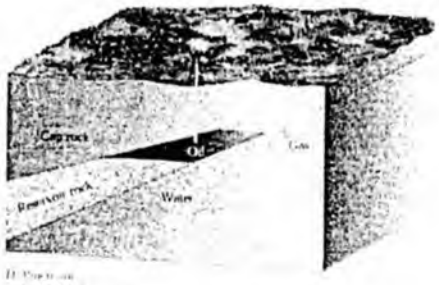
Angular unconformity traps oil in lower dipping layers

Fossil reefs are bulbous lenses interbedded with normal layers

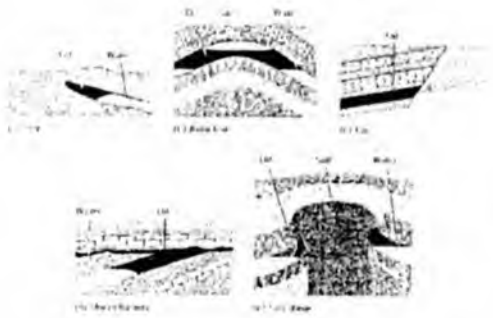
They trap oil derived from lower source rocks

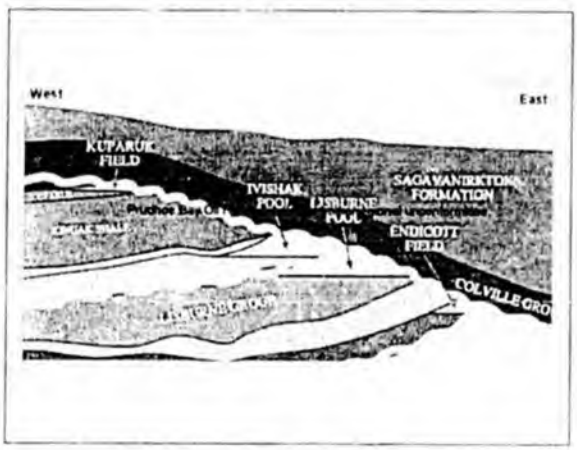


Sedimentary facies changes create lens-shaped wedges or pinch-outs that may serve as traps in some conditions



Summary of Petroleum Traps

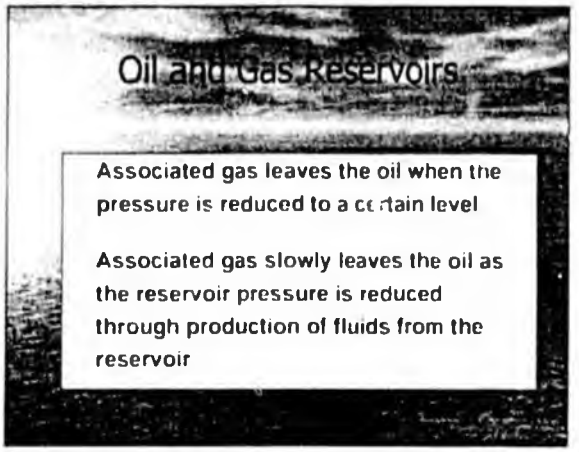




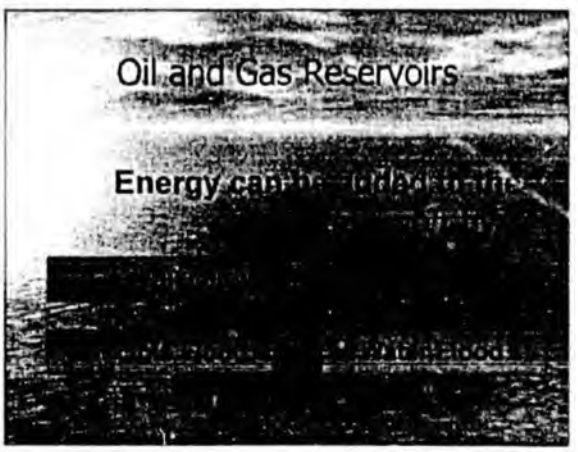
Oil and Gas Reservoirs

Much gas can also be found dissolved

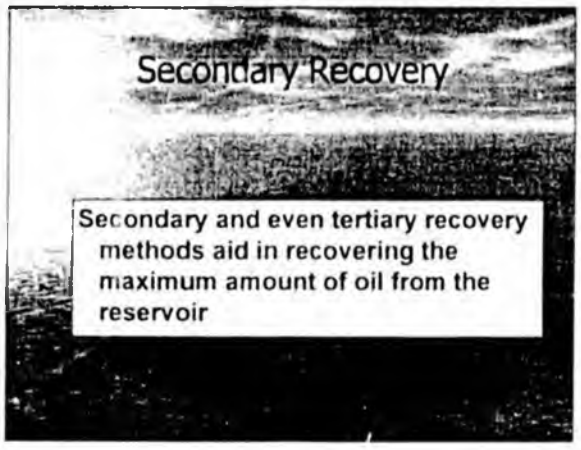
THE
FOLLOWING
DOCUMENT(S)
ARE
POOR
ORIGINAL
COPIES

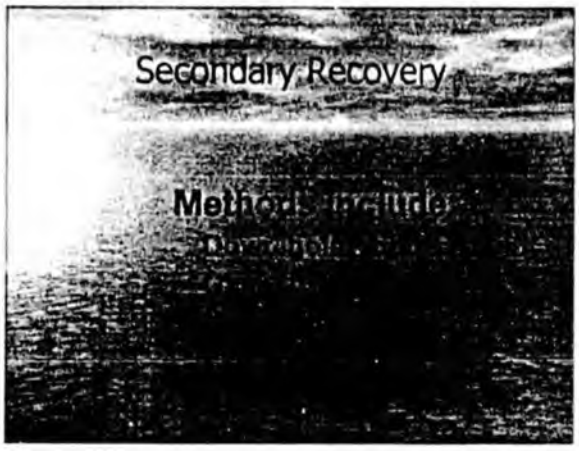

Oil and Gas Reservoirs
Associated gas leaves the oil when the pressure is reduced to a certain level
Associated gas slowly leaves the oil as the reservoir pressure is reduced through production of fluids from the reservoir


Oil and Gas Reservoirs


Oil and Gas Reservoirs


Oil and Gas Reservoirs


Secondary Recovery
Secondary and even tertiary recovery methods aid in recovering the maximum amount of oil from the reservoir


Secondary Recovery

Other Gas Sources

Methane

connecti

depos

Oil and Gas Reservoirs

Dep

Other Gas Sources

Large numbers of Cows

A burping cow is a polluting cow!

Cows, which have doubled in population in the last 40 years to an estimated 1.3 billion worldwide, produce one pound of methane for every two pounds of meat that they yield

Petroleum Hydrocarbons

Hydrocarbons are composed only of Hydrogen and Carbon

We will deal with rather simple hydrocarbons in this presentation

The hydrocarbons of interest all end in the letters '-ane'

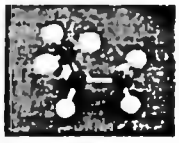
Physical Properties

Chemical Name	Formula	Boiling Point	Heating Value
Methane	CH4	-260 F	931 BTU
Ethane	C2H6	-127	1770
Propane	C3H8	-44	2517
Butane	C4H10	+31	3260
Pentane	C5H12	+97	4009

Methane CH4

Ethane

C3H8 Propane



Contaminates in Produced Gas

North Slope gas may have significant amounts of undesirable contaminates including:

- Carbon Dioxide up to 13%
- Hydrogen Sulfide up to 250 ppm
- Water

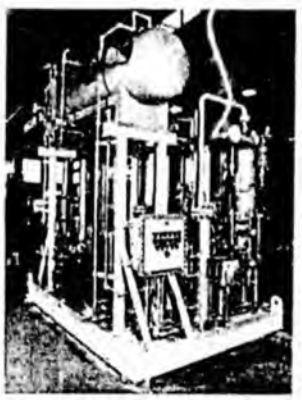
Conditioning Natural Gas for Transmission

To transport gas in a pipeline, a "contract" establishes the maximum amounts of undesirable contaminates

Oil and Gas Reservoirs

A conditioning plant must be designed to meet contract specifications over the life of the project

Hydrocarbon Dewpoint Control System



Conditioning Natural Gas for Transmission

Carbon Dioxide and Hydrogen Sulfide are called "acid gases" (often called Sour Gas) because they form acids when in contact with water.

Conditioning Natural Gas for Transmission

Acid gases cause severe corrosion of process equipment and pipelines

Hydrogen Sulfide is an **extremely toxic** substance, immediately dangerous to life and health at very low levels

Conditioning Natural Gas for Transmission

The removal of 'sour gas' from a methane stream is called "sweetening" and is a part of the conditioning of gas to meet pipeline contract specifications

There are many processes to sweeten gas, however the most common is the Amine system

This natural gas sweetener is designed to remove H2S to less than 4 vppm and water to less than 1 vppm

The pictures above illustrate a natural gas sweetener installed at a plant site

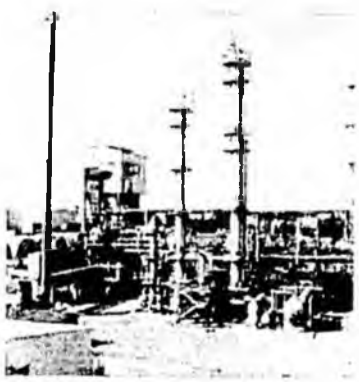
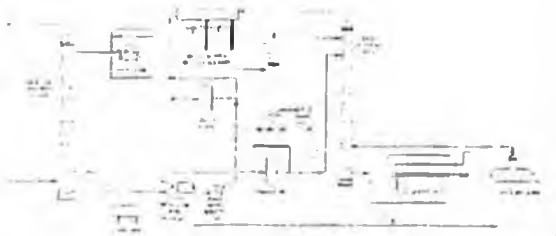
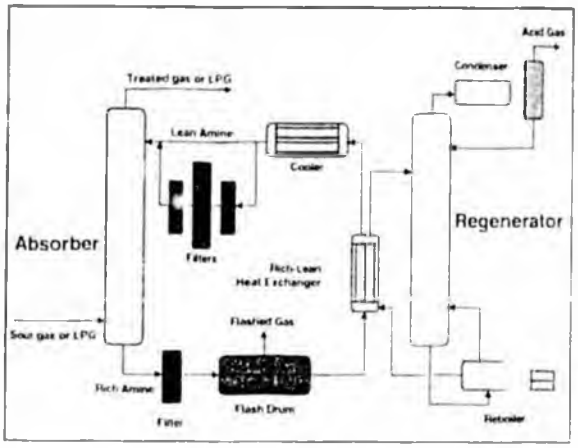


Figure 1 Typical Amine Systems Flow Diagram





MEA filtration gas sweetening unit

Gases are washed in a counter current washing column and the dissolved H2S separated in a later step using steam

Fines, worn from the piping, collect in the amine solution, which ultimately lead to blocking and foam generation in the column

Filters for cleaning these streams and discharging either wet or dry cakes have yield excellent results

Conditioning
Natural Gas for Transmission

Amine Treatment can remove both Carbon Dioxide and Hydrogen Sulfide

Conditioning
Natural Gas for Transmission

Carbon Dioxide can be re-injected into the formation to maintain pressure and sweep oil toward the well bore

Removal of Hydrogen Sulfide can generate large amounts of elemental Sulfur

Conditioning
Natural Gas for Transmission

Carbon Dioxide can form Dry Ice in process equipment and plug off critical components

Dry Ice must be thawed with heat to remove the plug

Frozen natural gas shed In Canada

Conditioning Natural Gas for Transmission

Water content must be reduced to a very low level

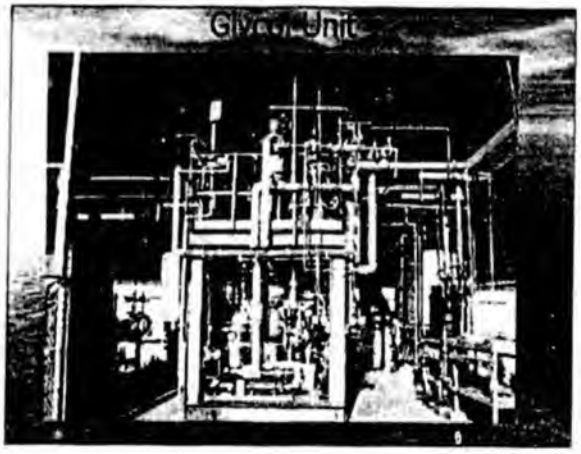
Water can freeze and plug critical process equipment

Water combines with Methane to form Hydrates that can plug off critical process equipment

Dehydration

The most common large scale process for removing water from a gas stream is called "Glycol Dehydration"

Glycol dehydration is used all over the Slope and the Inlet

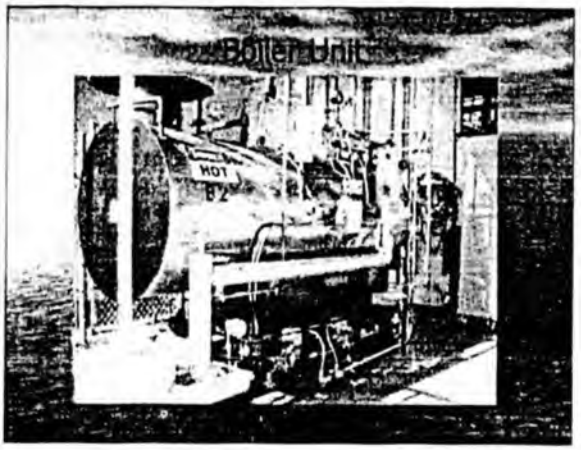


Dehydration

Cold Glycol can absorb large amounts of water vapor

When heated, the Glycol then gives up the water vapor and can be cooled and reused

Large equipment would be required to handle the amounts of gas contemplated by the North Slope gas line



Natural Gas Drying & NH3 Removal

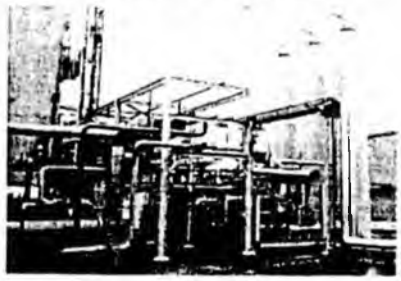
This design is capable of removing moisture and ammonia from natural gas through it's adsorption process

The system is capable of taking saturated feed gas and returning dry gas with less than 0.1 ppmv of water

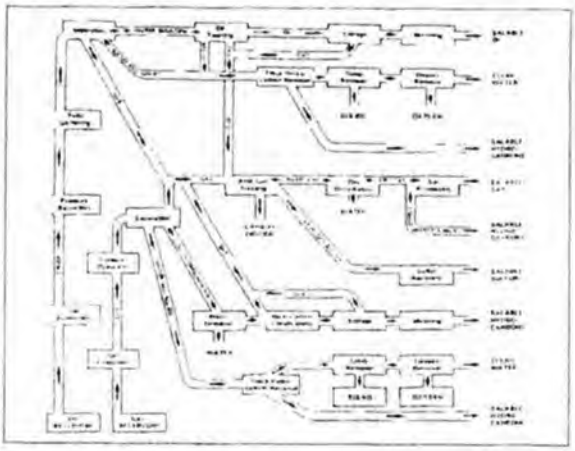
In addition NH3 is removed down to less than 0.2 ppmv

The pictures above depict a natural gas dryer prior to shipment

This LNG Prepurifier is designed to remove moisture, CO2, and mercaptans from natural gas taken from a pipeline



This allows the LNG facility to liquefy excess quantities during periods of low use and store them until they can be vaporized at a time of need



Gas Custody and Custody Transfer

The volume of gas transferred from seller to buyer is measured in SCF (Standard Cubic Feet), measured at 14.7 psi and 60 degrees F

Alternate specifications are more commonly stated in metric units

Gas Custody and Custody Transfer

The Heating Value of the gas in BTU's per cubic foot is an essential sales parameter

Gas Custody and Custody Transfer

Pure Methane generates 931 BTU

Penalties may be assessed when the BTU value is below contract specifications

The heating value is measured in a calorimeter that burns a carefully measured amount of gas under controlled conditions and measures the heat produced

Gas Custody and Custody Transfer

Standard Units for Gas Measurement

- MCF 1000 cubic feet=(10'x10'x10')
- MMCF Million Cubic feet=1000xMCF
  100'x100'x100'
- BCF Billion Cubic feet=1000XMMCF
  1000'x1000'x1000'
- TCF Trillion Cubic feet-1000xBCF
  10,000'x10,000'x10,000'

Stranded Gas

Stranded Gas is Gas that is

not yet connected

to a transportation system

Shrinkage

Shrinkage is the loss of gas used to process and transport the product

- Fuel for power generation
- Fuel for facility heating
- Fuel for compressors and process equipment
- Incidental losses through leaks, flares, carryover, etc.

Shrinkage

Typical Shrinkage numbers:

- ~4% to 5% for pipeline compression, the longer the line the greater the shrinkage, up to 8%
- ~1% to 4% for gas conditioning, probably greater on the Slope
- ~14% to 17% for LNG production

Contract Price

The price paid for long-term agreements or agreements to purchase an established volume of gas over a specific time period

Tied to the standard price per BTU for energy

Spot Market

Prices bid for short term or one-time purchases

Traded as commodities

Prices vary according to amounts in storage, anticipated weather conditions and international markets

Trading Floor at a Natural Gas Marketing Company

Storage Gas

In the lower 48 where demand is greater than local supply, gas is stored underground in reservoirs during periods of low demand and retrieved when demand increases above local supply

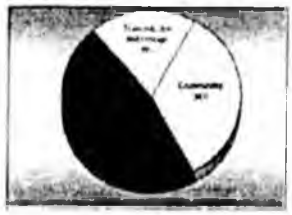
Suppliers can control amounts of gas sold for storage and influence later prices

Storage Gas

Sometimes gas can be purchased at lower cost during off-peak times and stored for later use

Storage gas maximizes the use of long distance pipelines that can ship at full capacity more gas than is required, and the excess stored against times of increased demand

Components of Residential Natural Gas Prices

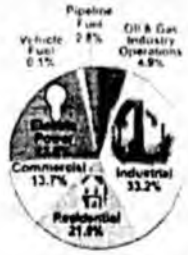


Transmission/Storage 19%
Commodity 34%
Distribution 47%

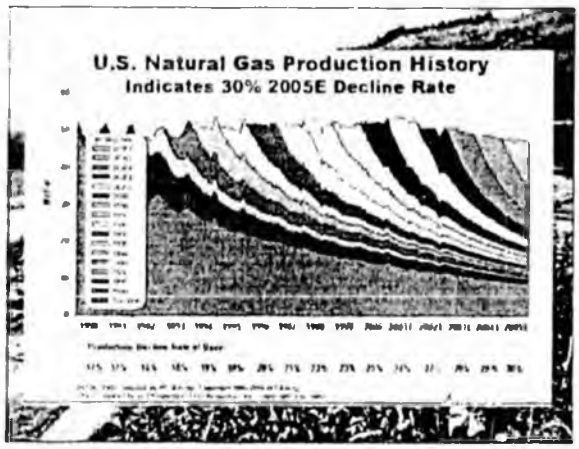
Source: Energy Information Administration

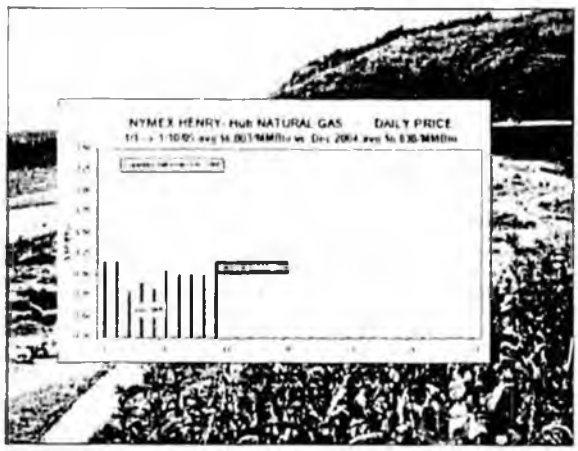
Industrial 33.2%
Elect. Power 23.8%
Residential 21.5%
Commercial 13.7%
O&G Indust Ops 4.9%
Pipeline Fuel 2.8%
Vehicle Fuel 0.1%

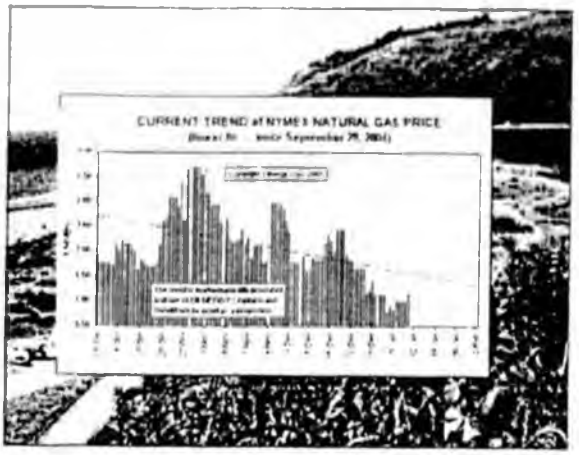
NATURAL GAS USE

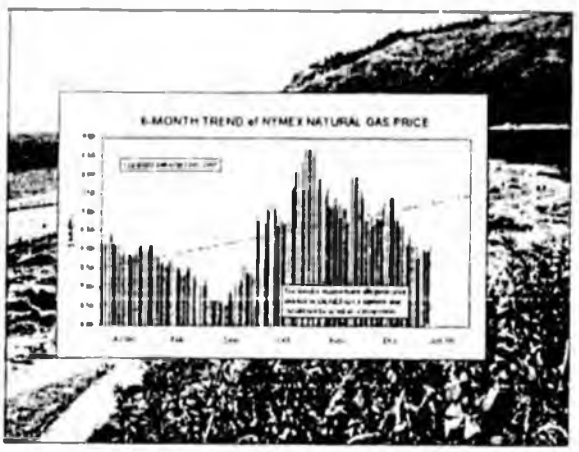


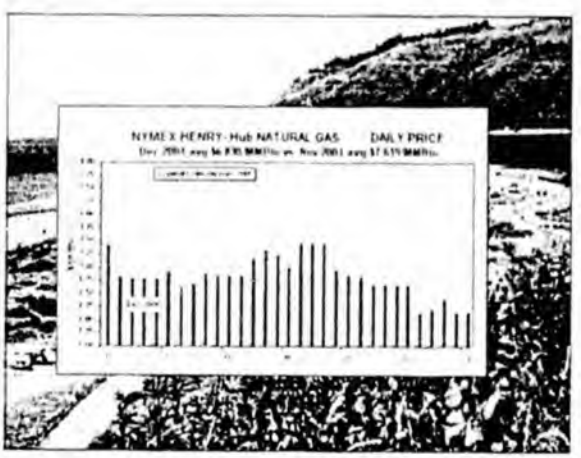
U.S. Natural Gas Production History
Indicates 30% 2005E Decline Rate

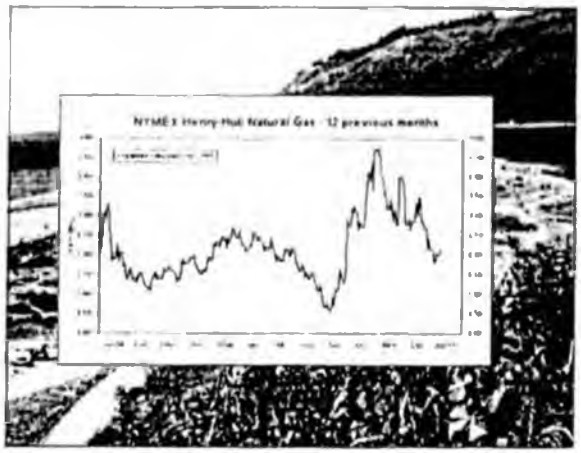


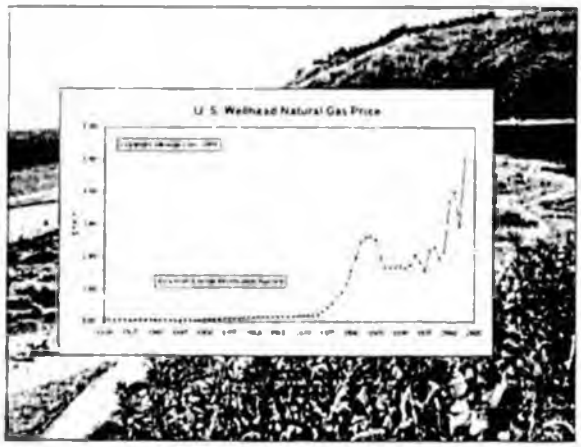


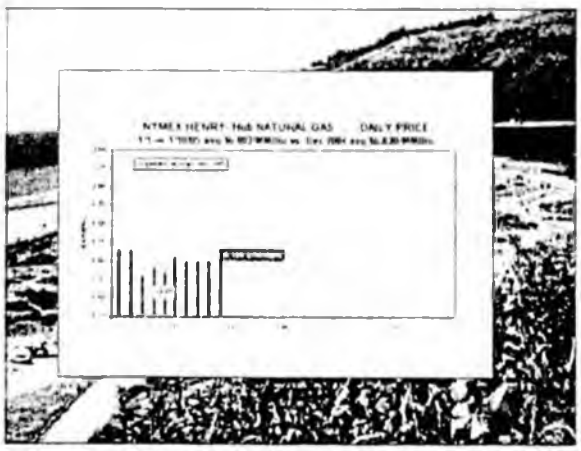

CURRENT TREND of NYMEX NATURAL GAS PRICE

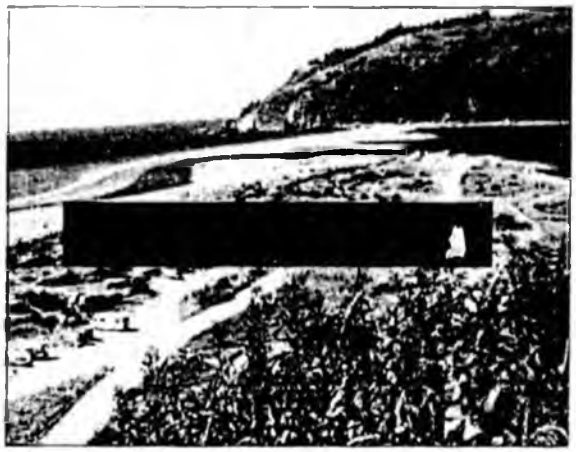

6-MONTH TREND of NYMEX NATURAL GAS PRICE


NYMEX HENRY Hub NATURAL GAS DAILY PRICE


NYMEX Henry Hub Natural Gas - 12 previous months


U.S. Wellhead Natural Gas Price


NYMEX HENRY HUB NATURAL GAS DAILY PRICE



PRESENT-ATION: NENANA BASIN GAS & OIL PROJECT, 3/30/05

DAN BRITTON - FAIR BANKS

Alaska State Legislature

Senate/House Resources Committees

&

House Special Committee on Oil and Gas

State Capitol, Juneau, Alaska 99801-1182

Special Committee Hearing on Nenana Basin Gas & Oil Project
Senate Finance Committee Room

Wednesday, March 30, 2005 2:30 to 4:30 pm

Presentation agenda:

Andex Resources- Bob Mason
DNR- Sean Parnell (Deputy Dir. DO&G)
Bob Swenson (Deputy Dir. DGGS)
Usibelli Energy- Mitch Usibelli
Doyon Limited- Jim Mery
Arctic Slope Reg. Corp.
Enstar- Curtis Thayer
Univ. of AK- Joe Beedle
Fairbanks Nat. Gas- Dan Britton
Fairbanks Home Build- Jack Abare

+ Teleconferenced

TOM DODDS - [illegible]

South Central Alaska Natural Gas Demand

Presentation by:

ENSTAR Natural Gas Company

Tony Izzo, President/CEO

John Lau,

Director, Transmission Operations

Curtis Thayer,

Director, Public & Government Affairs

March 30, 2005

State of Alaska

Joint House & Senate Resources Committee

ENSTAR

Natural Gas Company

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+ Teleconferenced

TOM DOODS - [illegible] ANDEX RESOURCES LLC

What can Leg do.?

- accelerate process - see timeline

? help out w/ conceptual issues

EXPLORATION PHASE - HIGH RISK
only 8-10 wks year to operate = so
need tax incentive program: extend
for New Region

- PERMIT RESPONSE TIMES (AUG/OCT latest)
  ≥ drill other than Jan Feb or March

South Central Alaska Natural Gas Demand

Presentation by:

ENSTAR Natural Gas Company

Tony Izzo, President/CEO

John Lau,

Director, Transmission Operations

Curtis Thayer,

Director, Public & Government Affairs

March 30, 2005

State of Alaska

Joint House & Senate Resources Committee

ENSTAR

Natural Gas Company

Two Driving Principles

- Take Care of the Customer
- Keeping Cost Down

Who We Are – ENSTAR Facts

- Established 1961
- Number of Alaskans Served* - 320,000
- Number of Meters – 118,000
- Miles of Distribution Mains and Transmission Mains – 3,000
- Direct Impact on Alaska's Economy - $170 mil
- Number of ENSTAR Employees – 167
- Rank among Alaskan energy Utilities – 1
- New Customers in 2004 – 3,532

* 118,000 Meters x 2.7 Alaskan Consumers per Meter

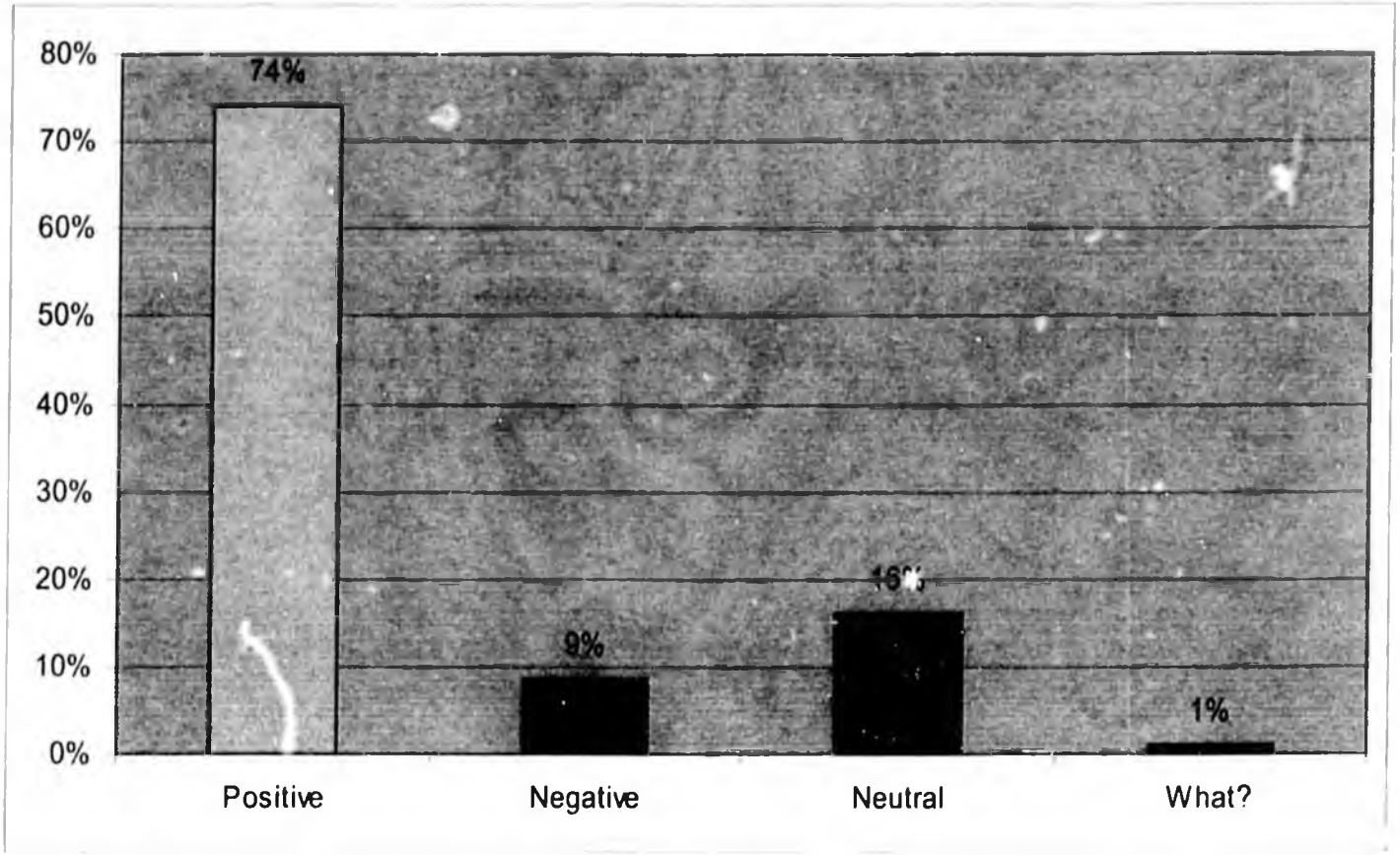
All Our Energy Goes Into Our Customers

ENSTAR
Natural Gas Company

Alaska Pipeline Company (APC)

- Engineering/Construction
- 45 Years of Experience in Alaska
- Constructed and Operates 450 miles of Transmission Mains and 2600 miles of Distribution Mains
  - Represents 75% of all gas transmission pipeline in Alaska
  - Represents100% of distribution mains in South-Central Alaska
- Expertise
  - Compression Plant Engineering & Construction
  - Engineering
  - Environmental/Permitting
  - Construction/Construction Management

ENSTAR Natural Gas Company's rating

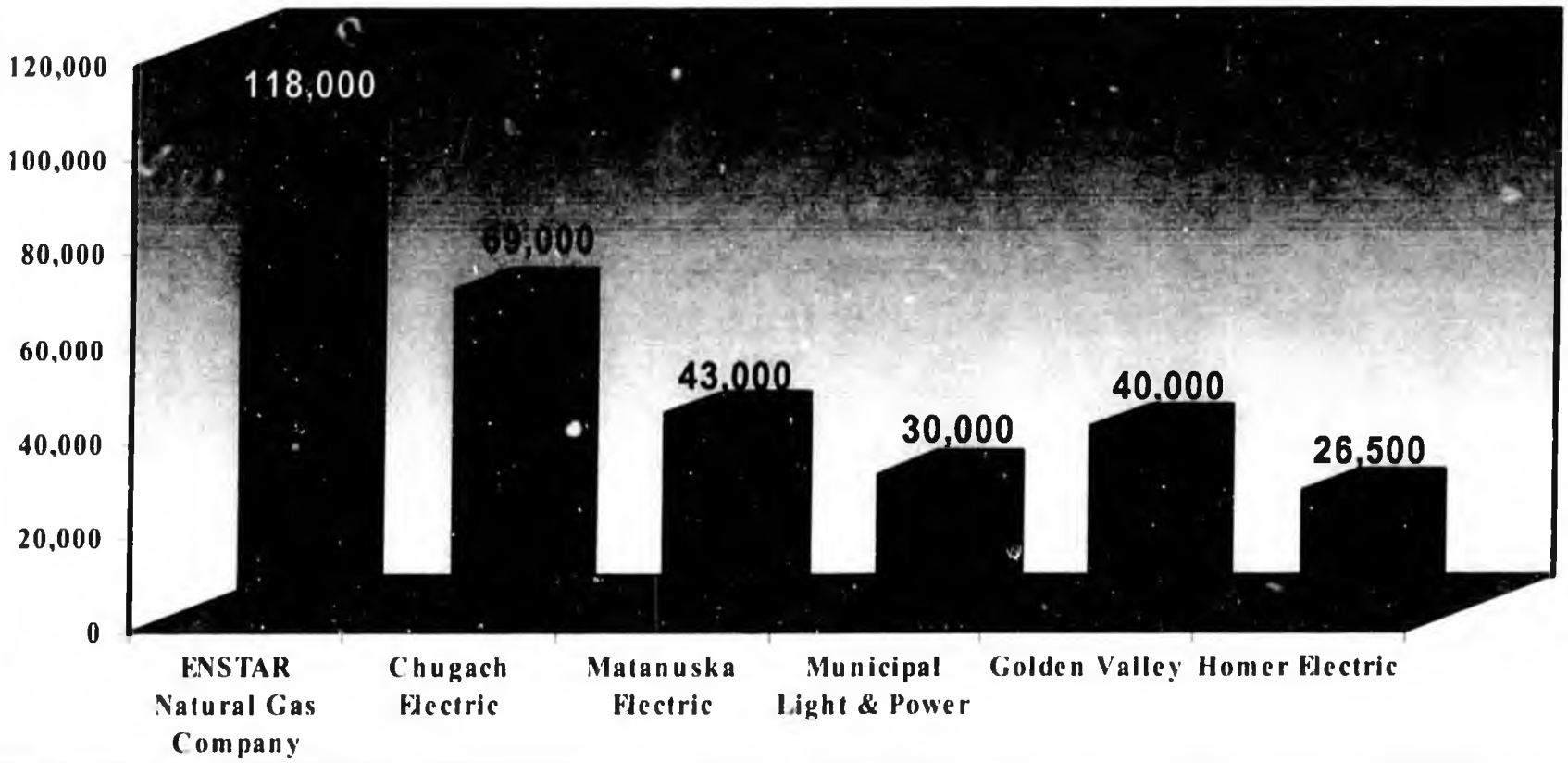


(Based on Anchorage survey performed by Hellenthal Associates on Feb 2005)

All Our Energy Goes Into Our Customers

ENSTAR Natural Gas Company

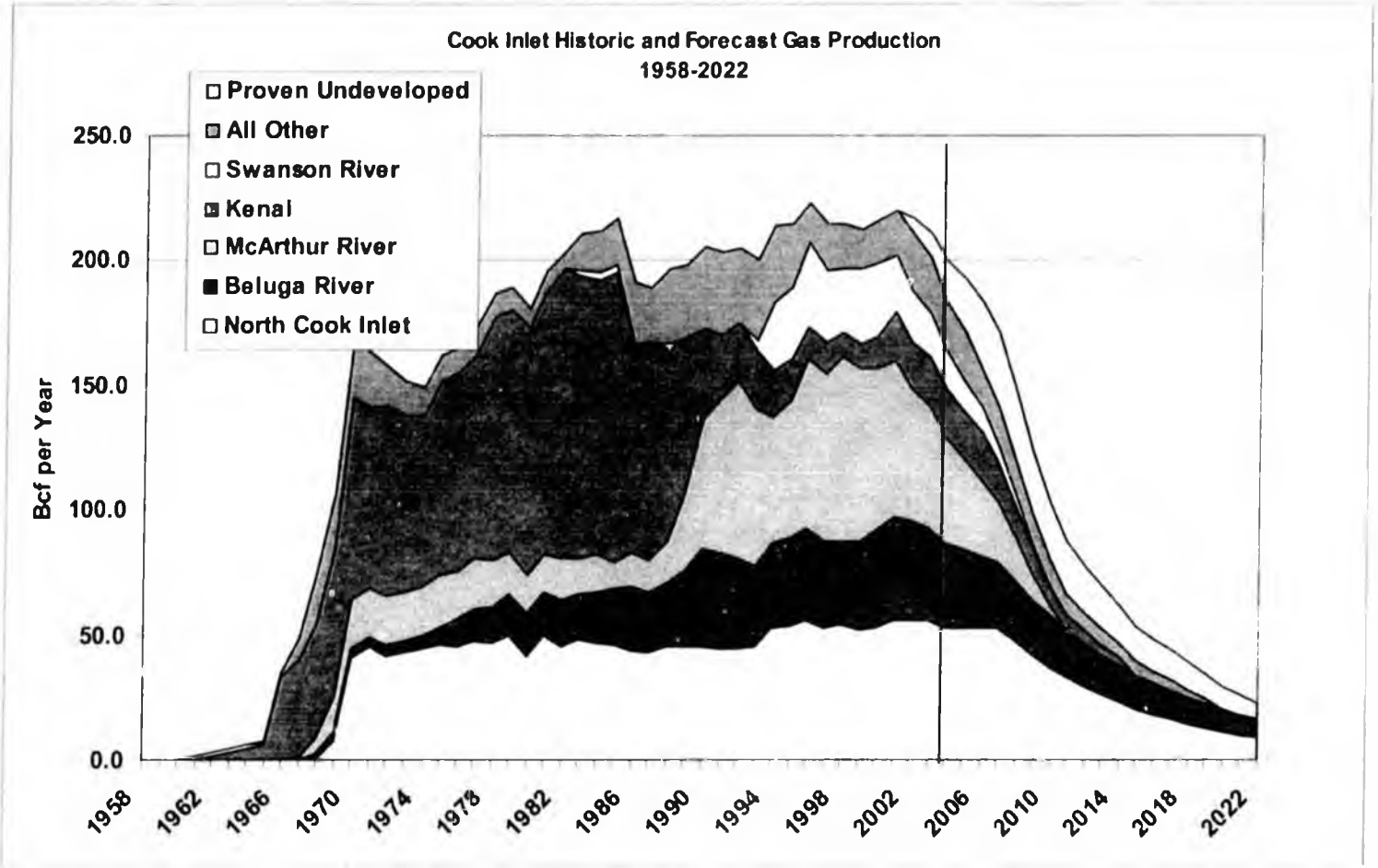
Utilities – Number of Meters



All Our Energy Goes Into Our Customers

ENSTAR Natural Gas Company

Cook Inlet Gas Supply



ADNR Division of Oil and Gas, Alaska Oil & Gas Report, December 2003 has been updated and the new forecast is included.

All Our Energy Goes Into Our Customers

ENSTAR
Natural Gas Company

Trends in Alaska Natural Gas Usage

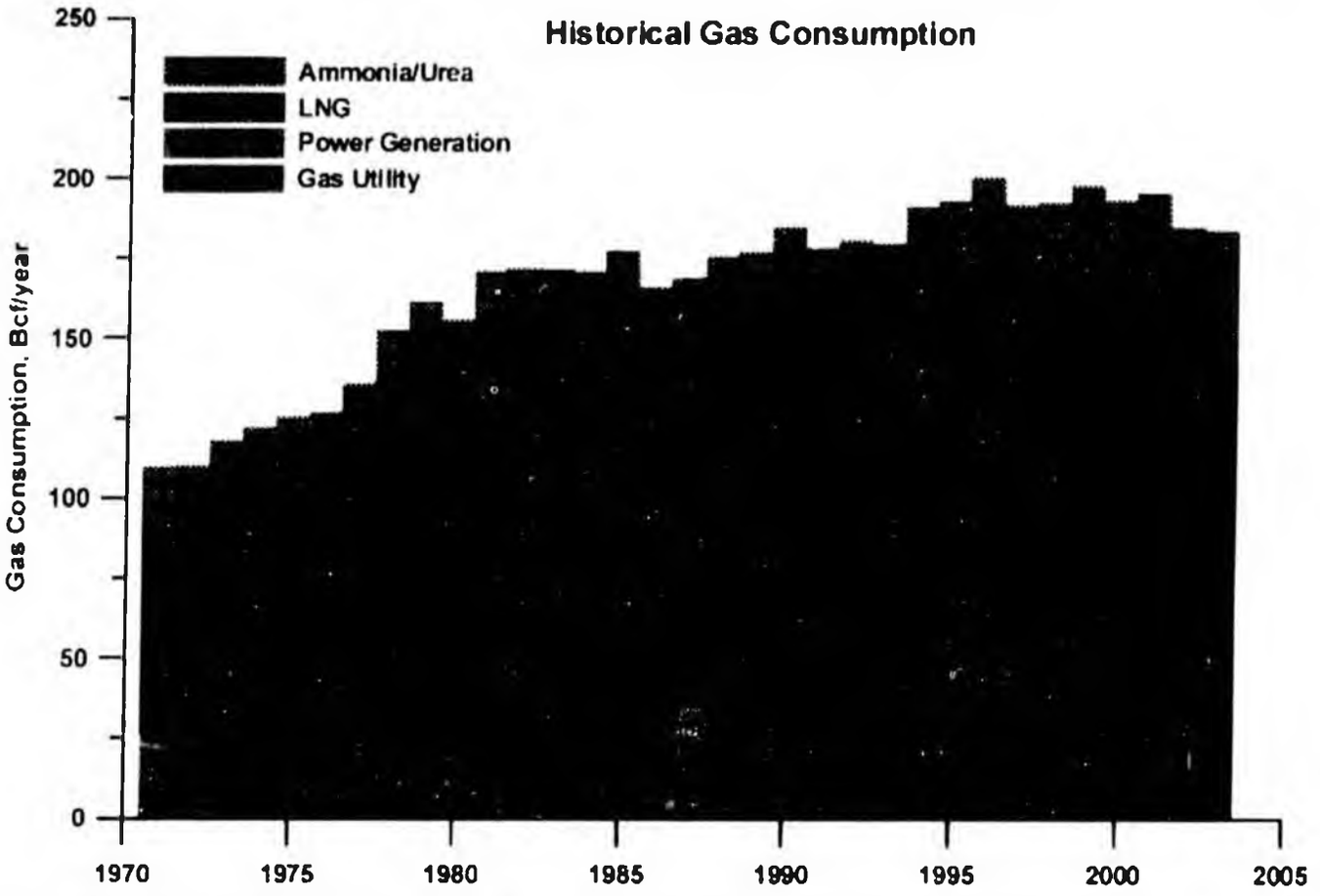
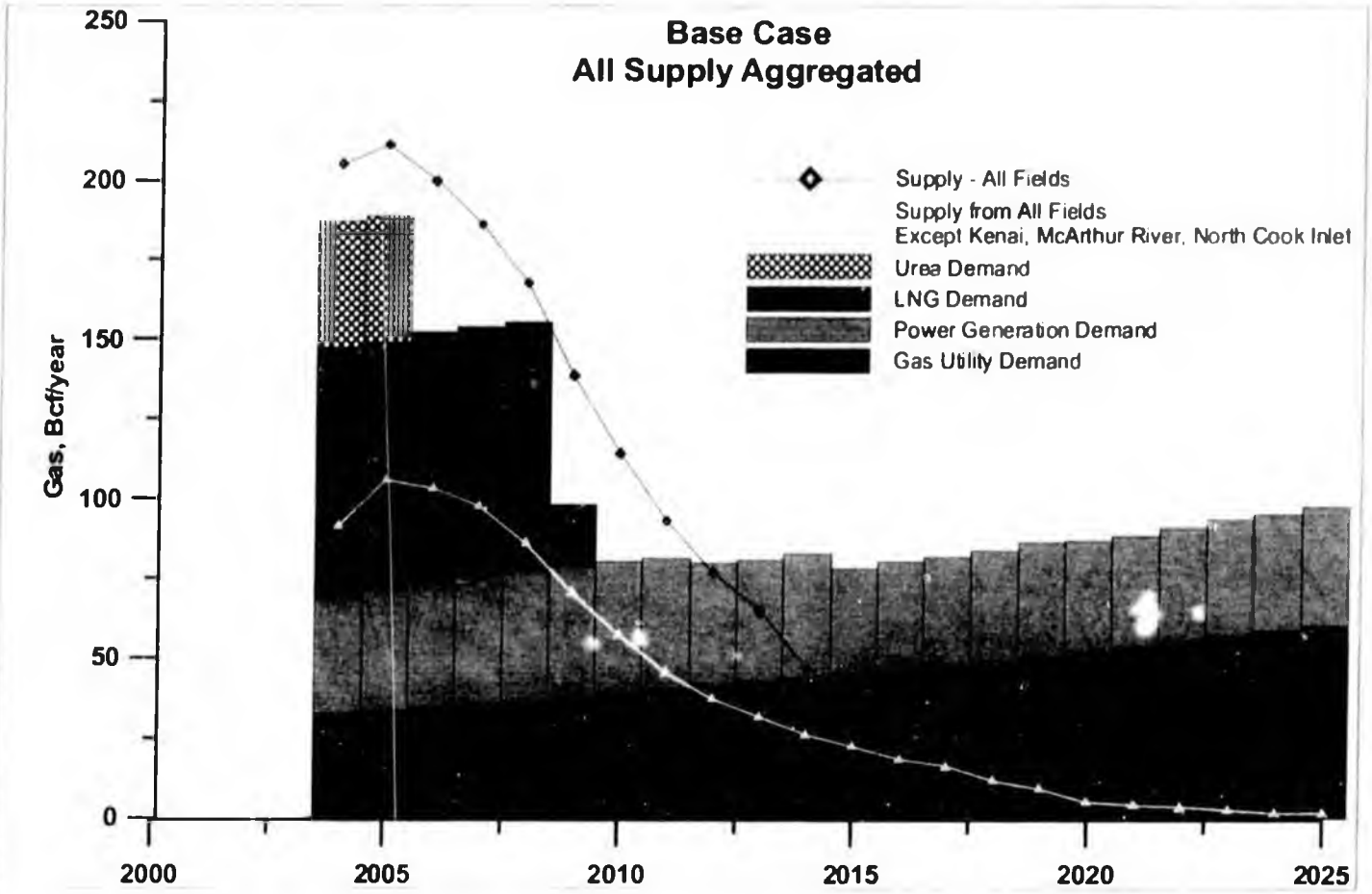


Figure 4.1. Historical gas consumption, excluding lease operations (ADNR, 2004)

Base Supply & Demand



Department of Energy, June 2004

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