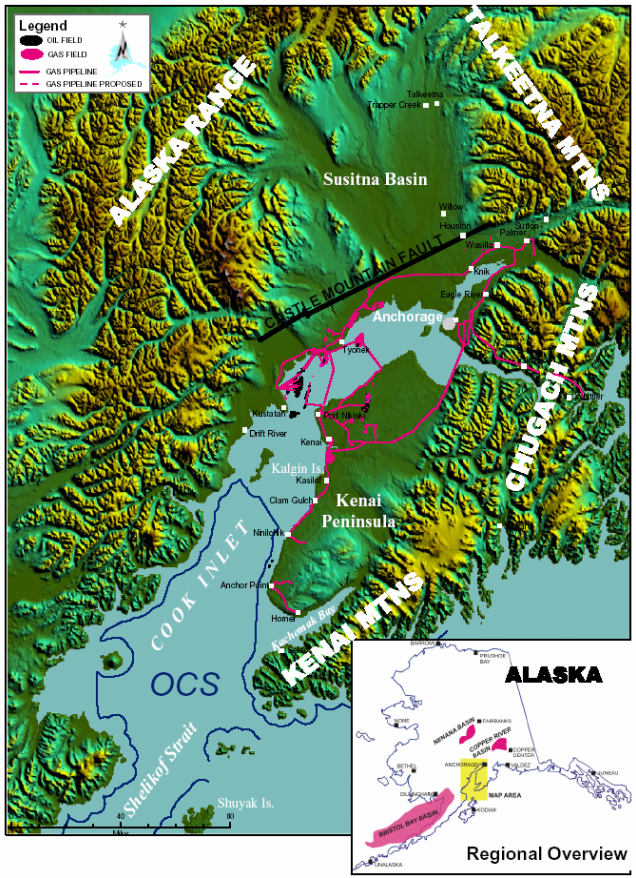
Arctic Energy Office
U.S. Department of Energy



South-Central Alaska
Natural Gas Supply and Demand

South Central Alaska Energy Forum
Sept. 20-21, 2006

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Anchorage, Alaska

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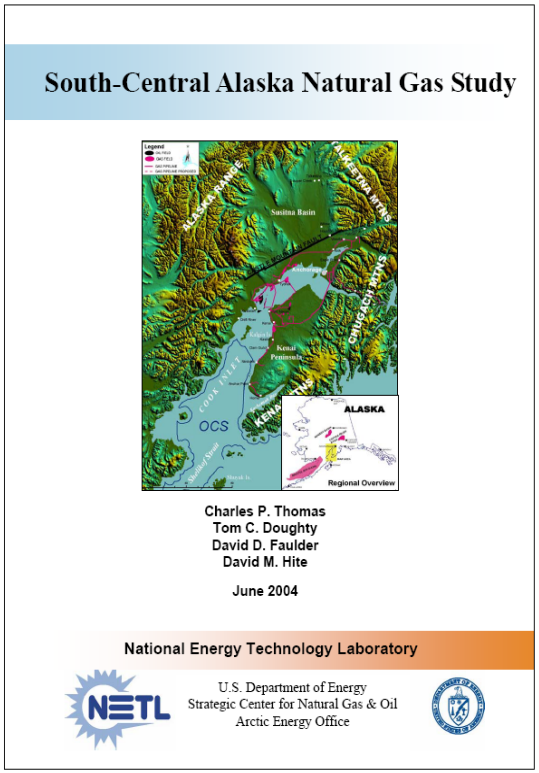
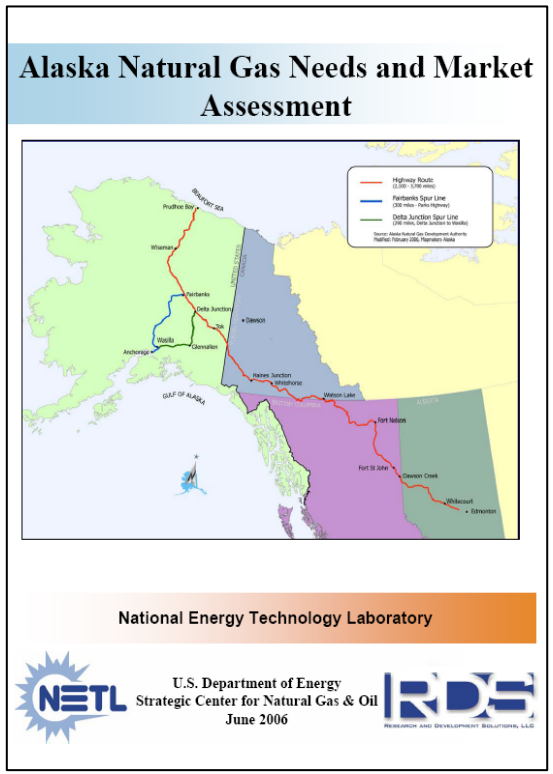


http://www.netl.doe.gov/technologies/oil-gas/ReferenceShelf/RefShelf_archive.html#Reports04



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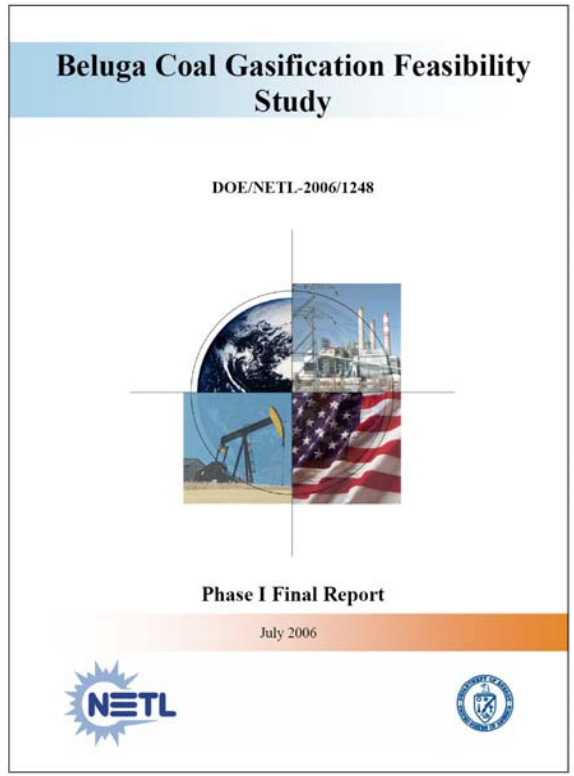


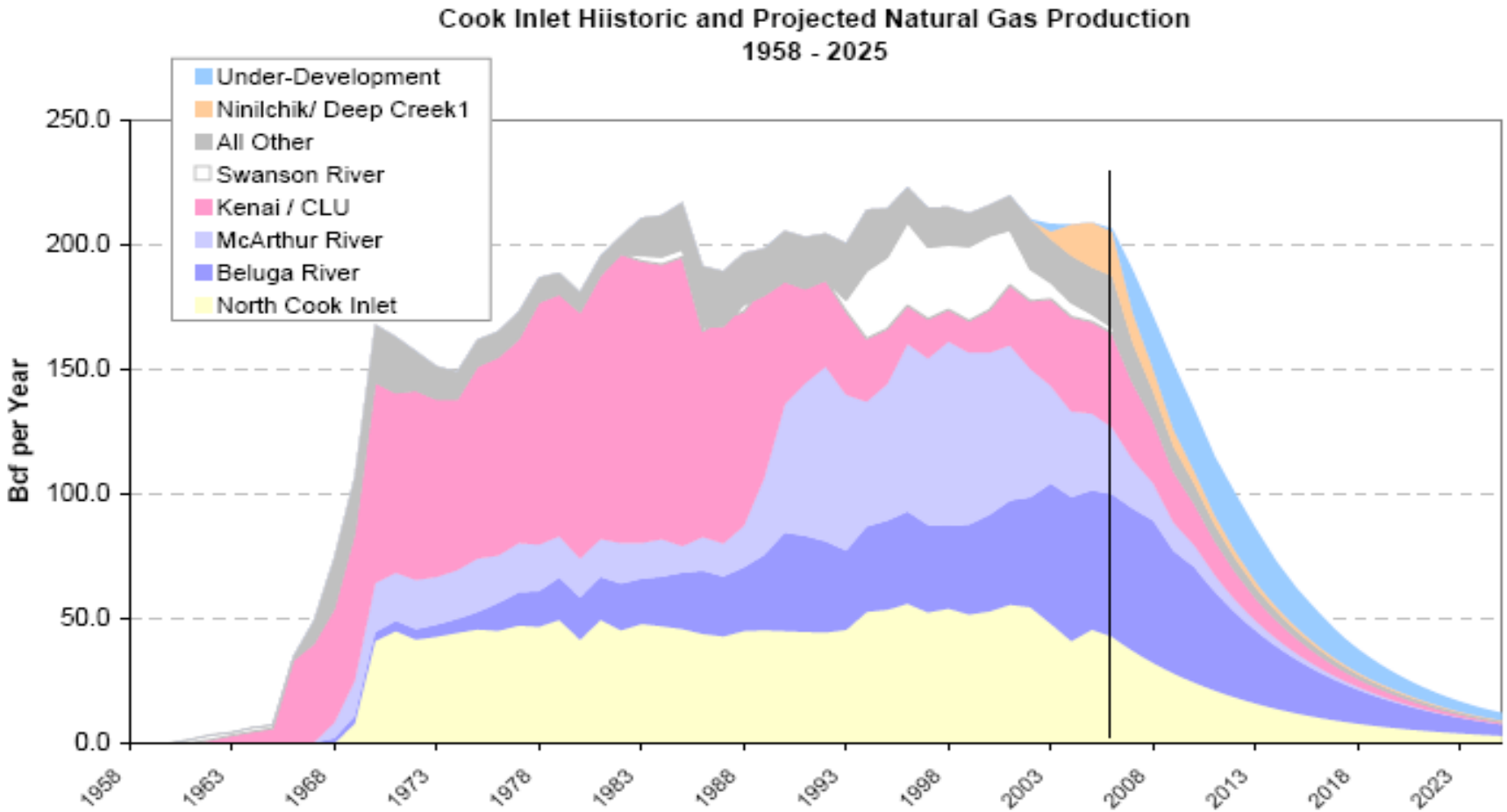
http://www.netl.doe.gov/index.html

Work funded by the U.S. Department of Energy, National Energy Technology Laboratory's Arctic Energy Office, Fairbanks, AK

OUTLINE

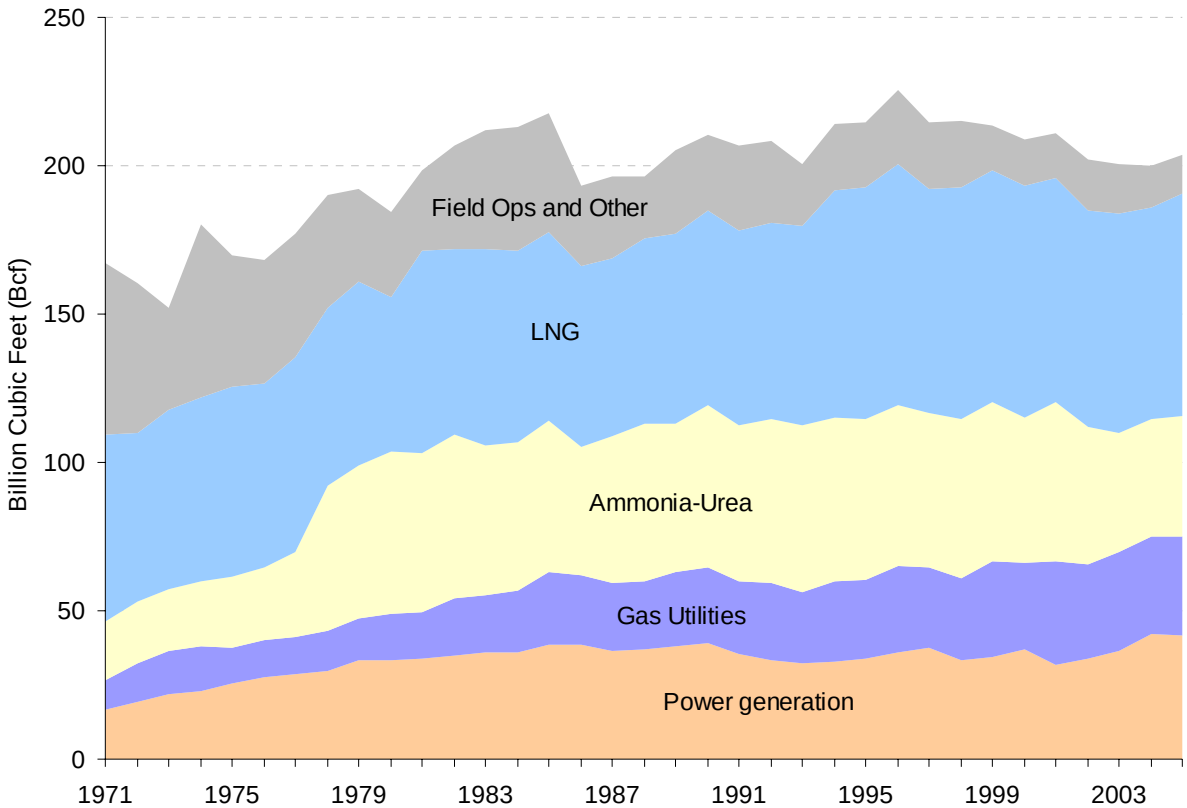
- Cook Inlet gas supply and options to meet projected demand
- Cook Inlet estimated ultimate reserves (EUR)
- Potential for increased Cook Inlet gas reserves
- Comparison of gas reserves and demand forecasts
- Conclusions and Observations

WHY ARE WE HERE TODAY?



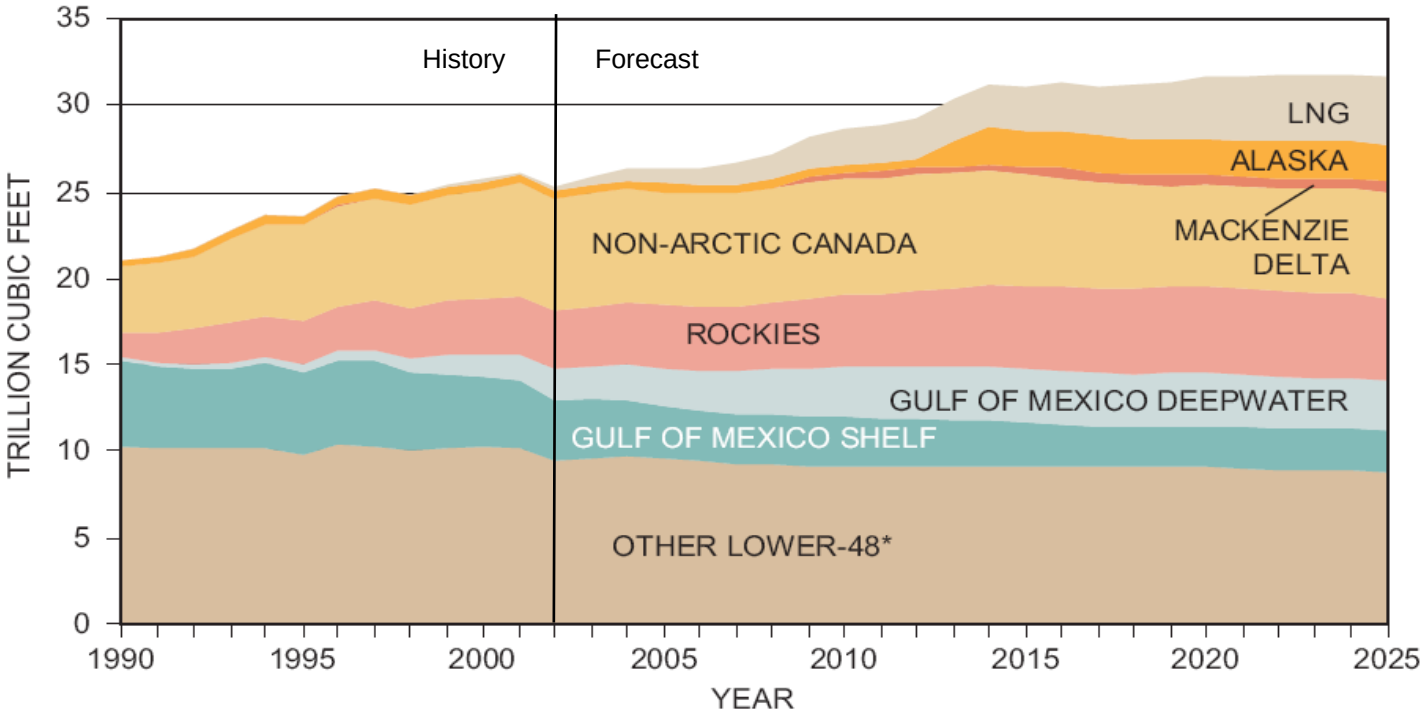
Alaska Department of Natural Resources, Division of Oil & Gas 2006 Report

CONSUMERS OF COOK INLET GAS



	Average 2001-2005 (Bcf)	Average 2001-2005 (%)
Power Generation	37.2	18.3%
Gas Utilities	33.3	16.3%
LNG	73.6	36.2%
Ammonia-Urea	44.1	21.6%
Field Operations and Other	15.4	7.6%
Average Total	203.5	

U.S. Demand & Source of Supply



* Includes lower-48 production, ethane rejection, and supplemental gas.

- Production from traditional basins remains strong but has plateaued; Rockies and deepwater Gulf of Mexico offset declines in other areas.
- Growth is driven by LNG imports and Arctic supply.

FIGURE 2
U.S. AND CANADIAN NATURAL GAS SUPPLY

National Petroleum Council – Balancing Natural Gas Policy – Fueling the Demands of a Growing Economy, September 2003.

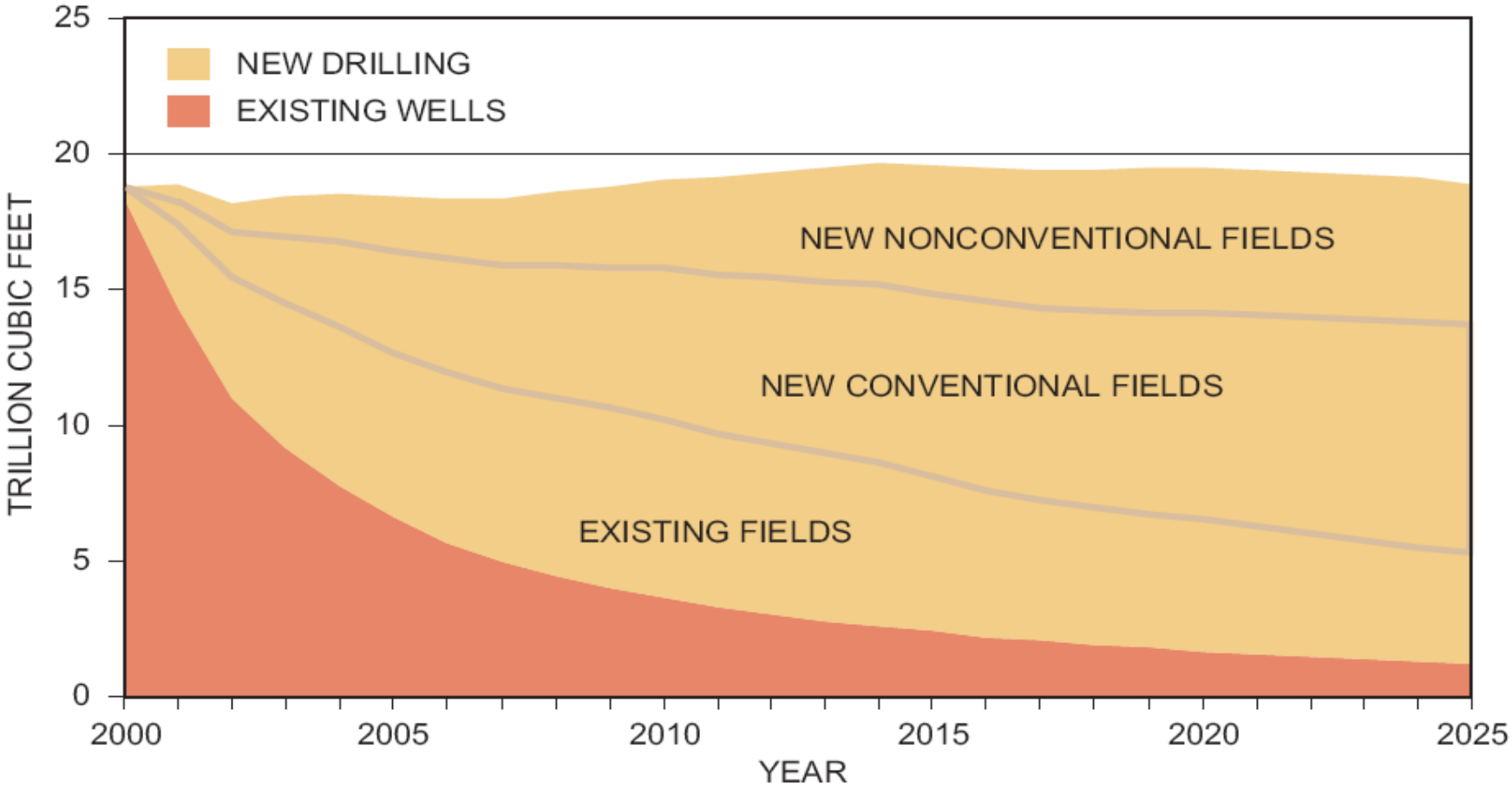
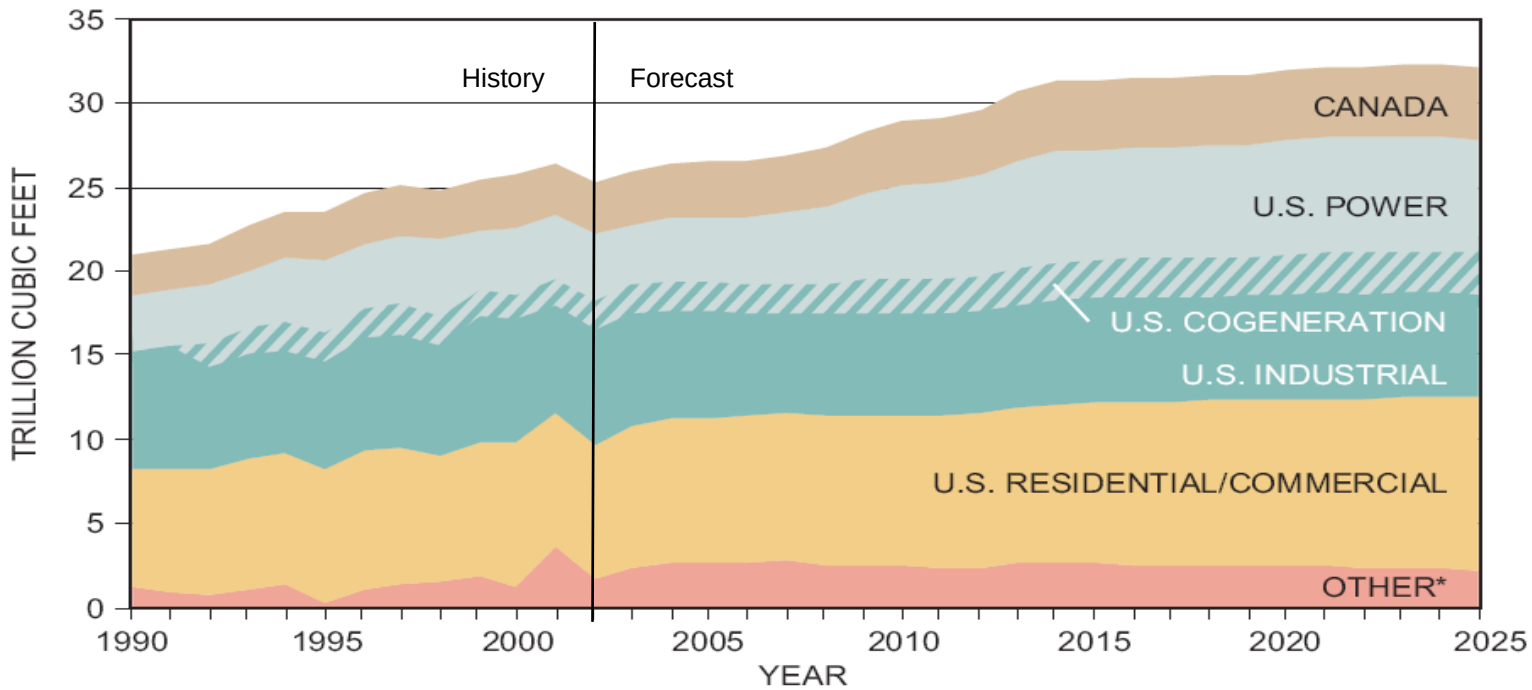


FIGURE 28
LOWER-48 PRODUCTION, EXISTING AND FUTURE WELLS

National Petroleum Council – Balancing Natural Gas Policy – Fueling the Demands of a Growing Economy, September 2003.

U.S. Demand by Segment



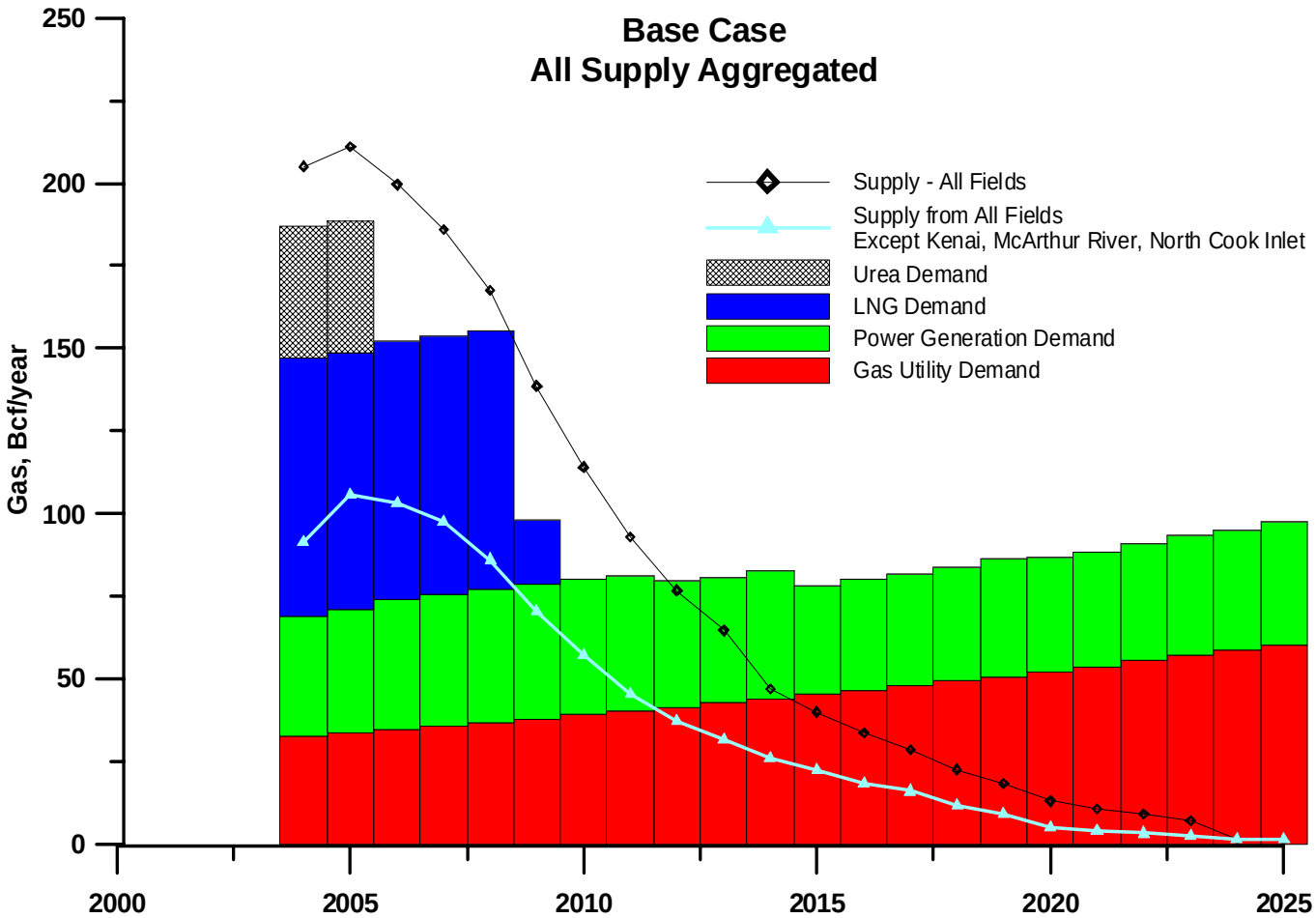
*Includes net Mexico exports, lease/plant/pipeline fuel, and net storage.

- Natural gas demand for power generation increases, reflecting future utilization of recent, significant additions of natural gas-fired generation.
- Natural gas use in the industrial sector erodes, illustrating projected losses in industrial capacity in the most gas-intensive industries.

FIGURE 1
U.S. AND CANADIAN NATURAL GAS DEMAND

National Petroleum Council – Balancing Natural Gas Policy – Fueling the Demands of a Growing Economy, September 2003.

Base Case Supply* & Demand – June 2004 DOE Report



* Dry gas pools only.

FUTURE ENERGY SUPPLY OPTIONS FOR SOUTH CENTRAL ALASKA

- **Cook Inlet conventional natural gas resources**
  - Reserves growth in existing fields
  - New fields through exploration
- **Unconventional gas; e.g., Coal bed natural gas (CBM)**
  - Economic potential not established
- **Import gas from outside South Central Alaska**
  - Spur gas pipeline to bring gas from North Slope (or other undeveloped basins)
  - Import LNG into Alaska
- **Other potential contributing factors**
  - Gas storage – offset season demand variations
  - Conservation and increased efficiency
  - Reduce industrial use (or convert to coal)
  - Power generation alternatives to offset NG use:
    - Coal, wind, geothermal, hydropower, biomass, etc.

OIL & GAS EXPLORATION AND GAS FIELD DISCOVERIES IN COOK INLET, 1955-2003

- 240 Exploration Wells
- Exploration Activity Decreased Over Time
- Virtually All Gas Fields Found By 1970
- All Exploration Until Mid-90s Was For Oil
- Recent Activity (Last Five Years) Has Focused On Gas
- Approximately 10 Tcf OGIP, 8.5 Tcf EUR

- **Oil and Gas Fields**
- **28 Gas accumulations and 8 Oil Accumulations**
- **Two Distinct NNE Trends**
- **Associated With Anticlines**

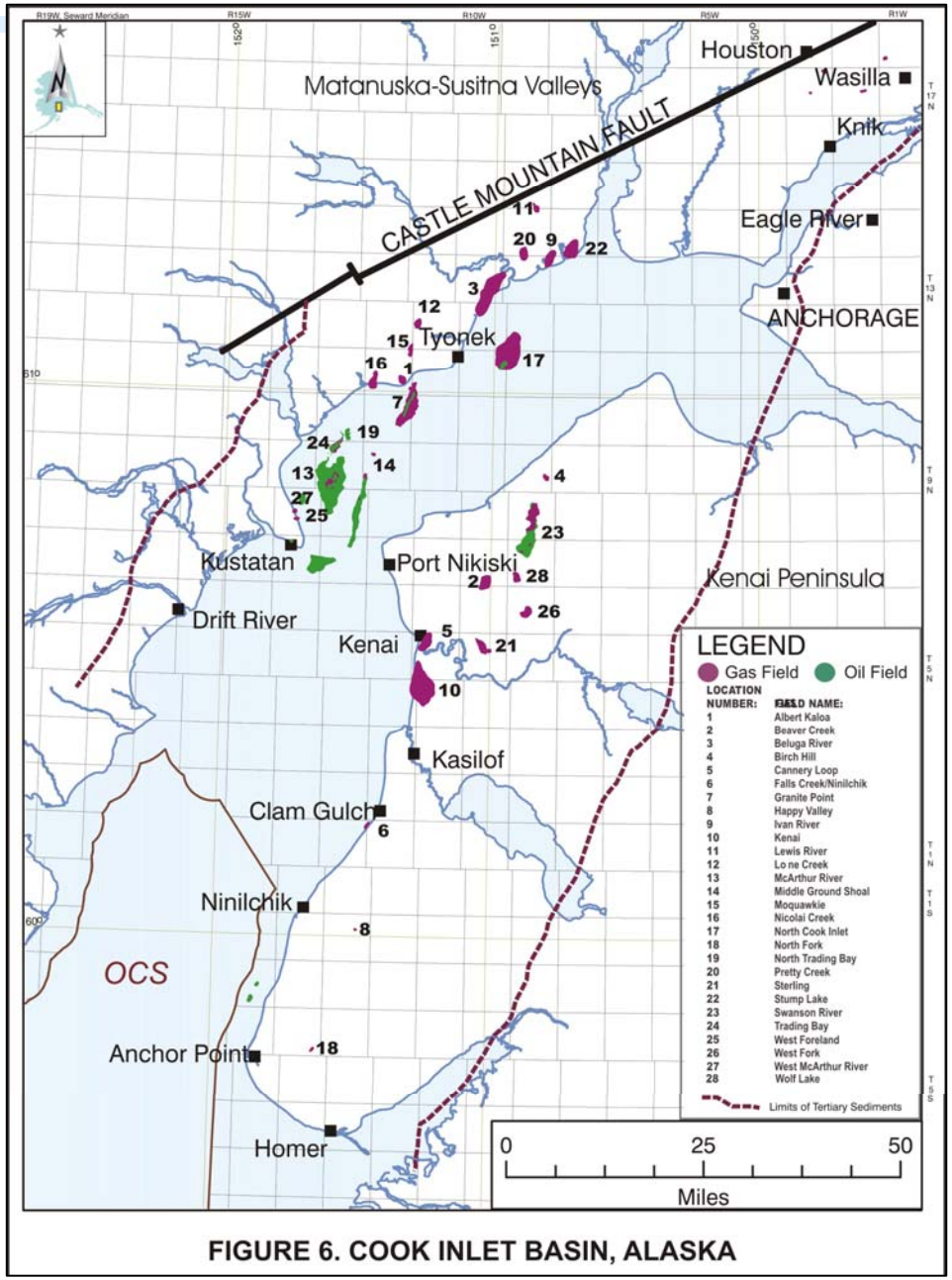
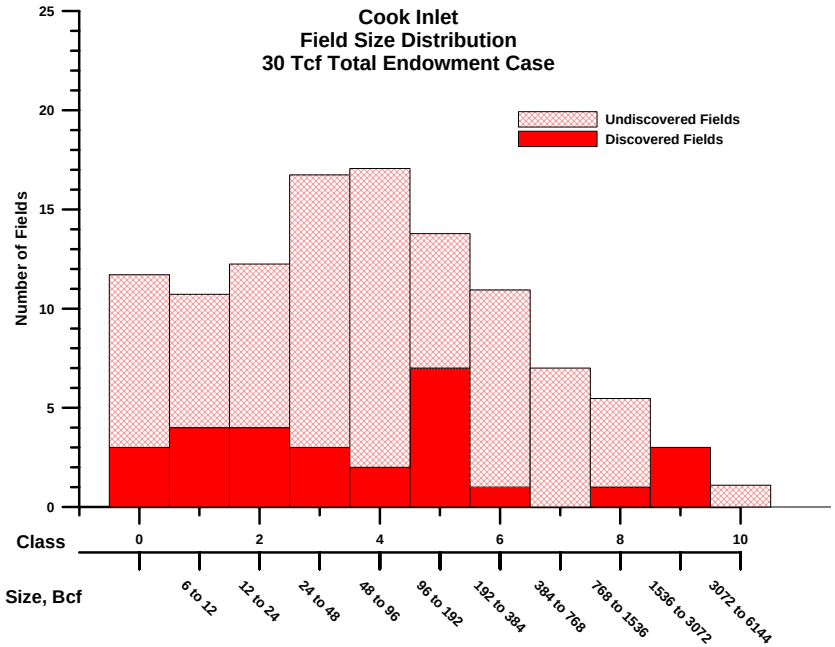
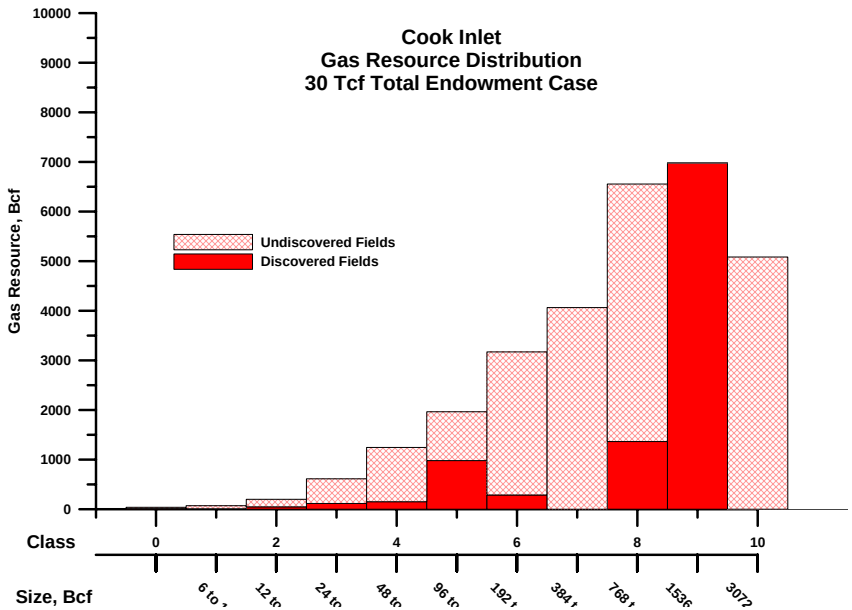


FIGURE 6. COOK INLET BASIN, ALASKA

Cook Inlet – 30 Tcf Endowment





Basin endowment is estimated to be between 25 and 30 Tcf OGIP

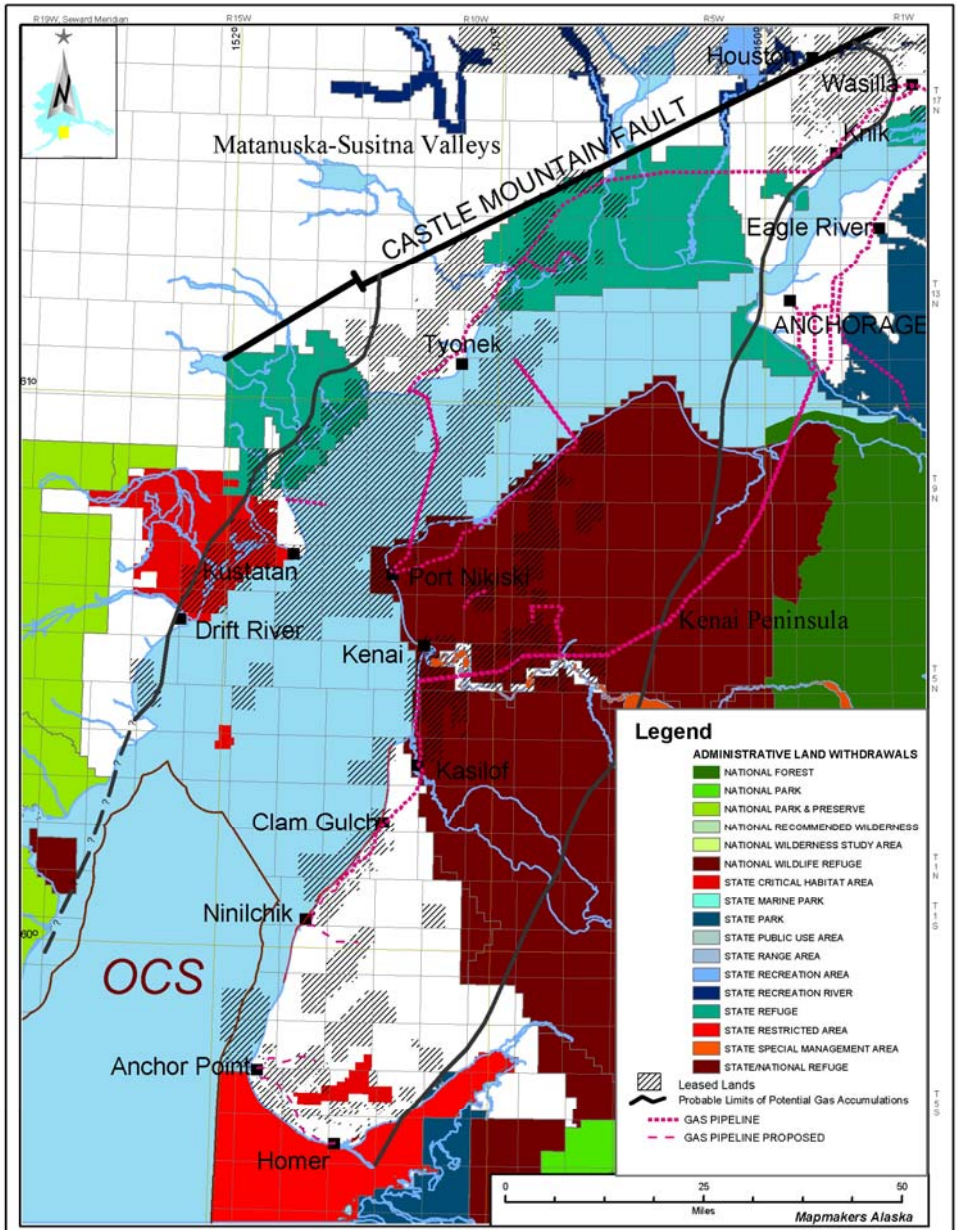
- Analysis does not provide any evidence on where the fields will be located in the basin

Resource Base Summary and Conclusions

- Cook Inlet Basin Gas endowment may be as much as 25 to 30 Tcf OGIP
- If true, Cook Inlet Basin undiscovered conventional recoverable resources are 15 Tcf or more
- Realization of this potential is dependent on:
  - Access to prospective areas
  - Large capital investment
  - Drill ship for Cook Inlet exploration
  - Application of 3-D seismic & long-reach drilling

Land Classifications, Leases, and Pipelines in Cook Inlet

- Large portion of land area is federal and state wildlife refuges, parks, and restricted areas
- Some leased land, historical production, and pipelines already in these areas
- Potential exists that up to 30% to 50% of the prime exploration areas could have restricted access or be off limits



COOK INLET BASIN, ALASKA

GAS PIPELINES AND LAND CLASSIFICATIONS

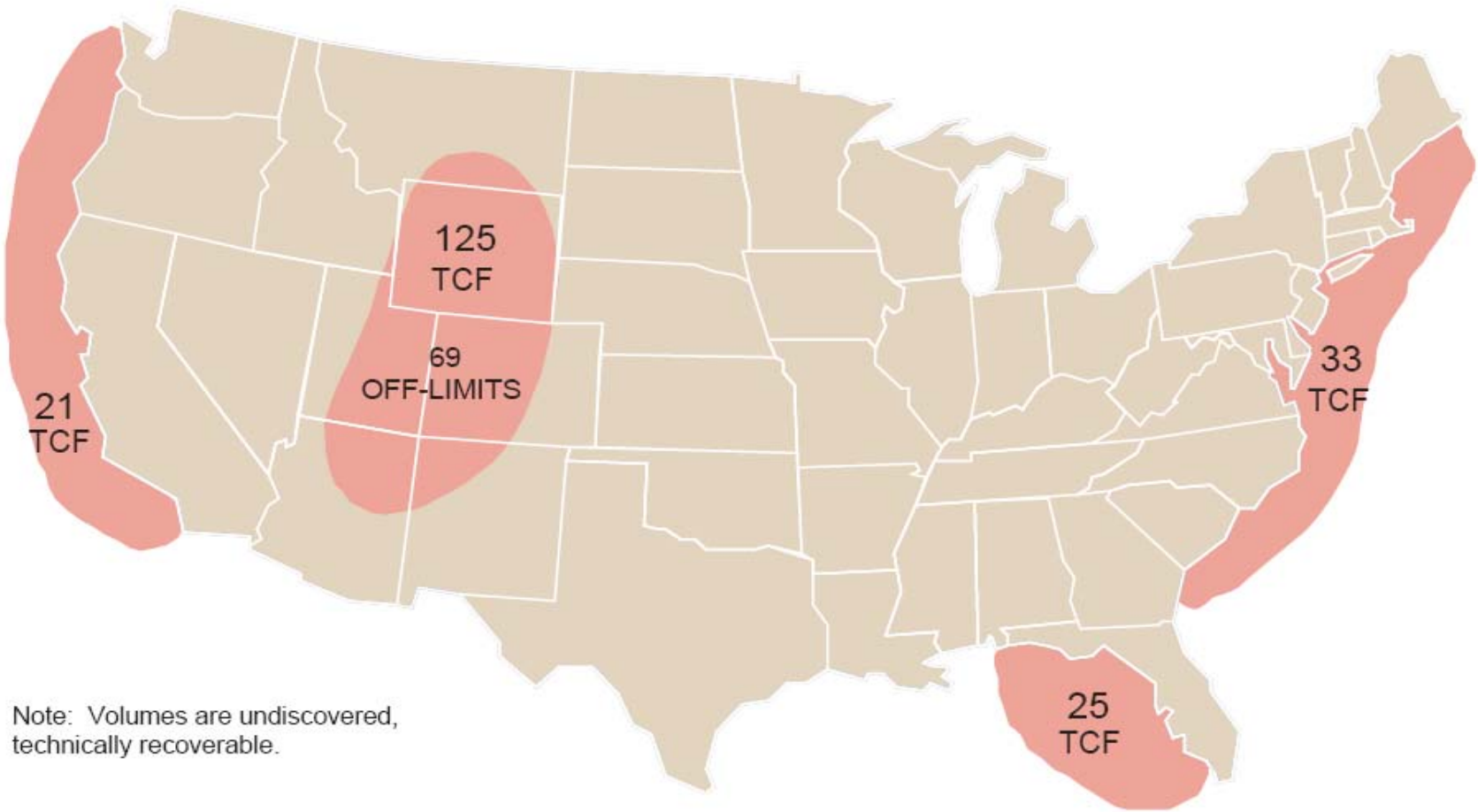
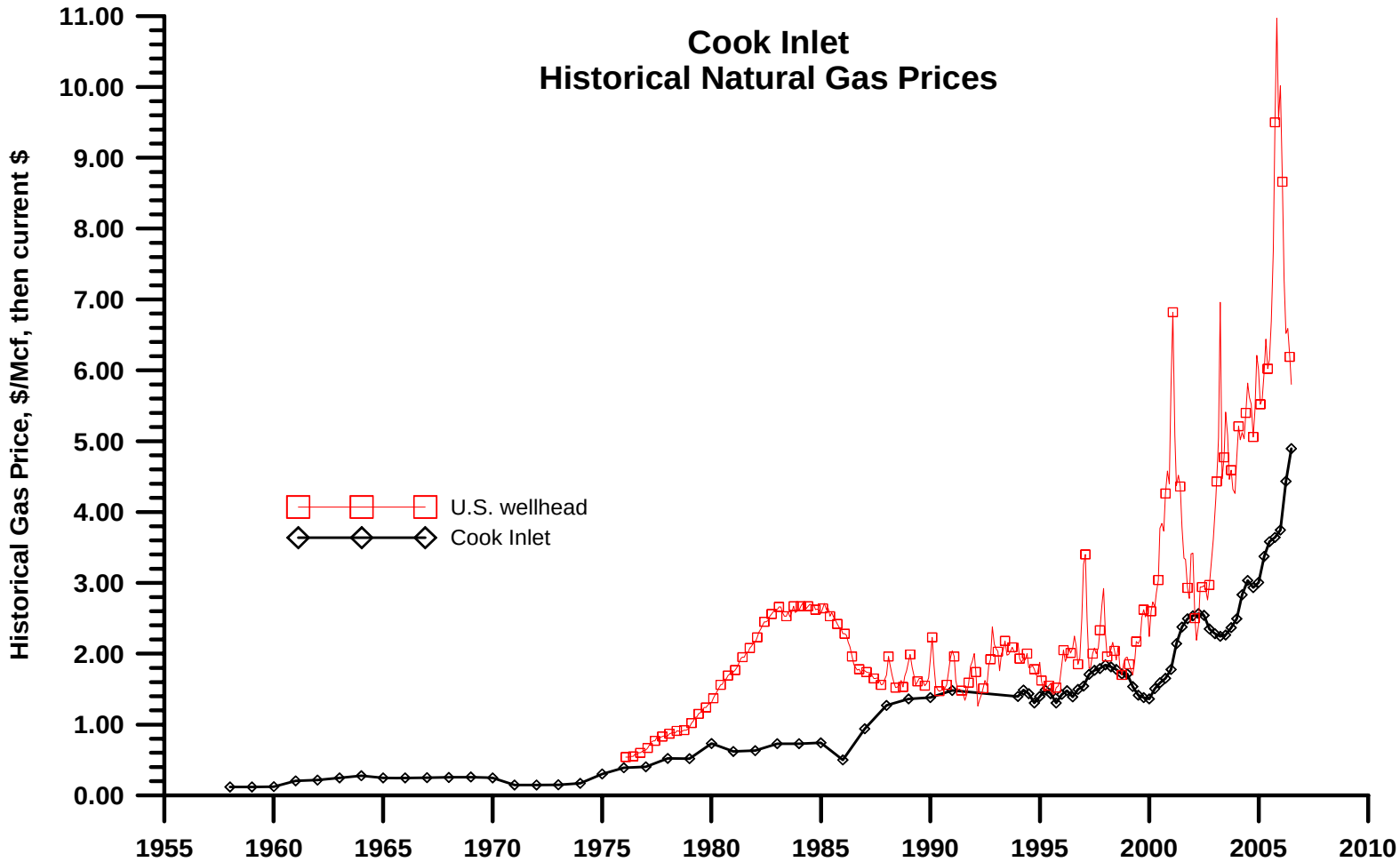


Figure 4c-26: Technical Resources Impacted by Access Restrictions

National Petroleum Council – Balancing Natural Gas Policy – Fueling the Demands of a Growing Economy, September 2003.

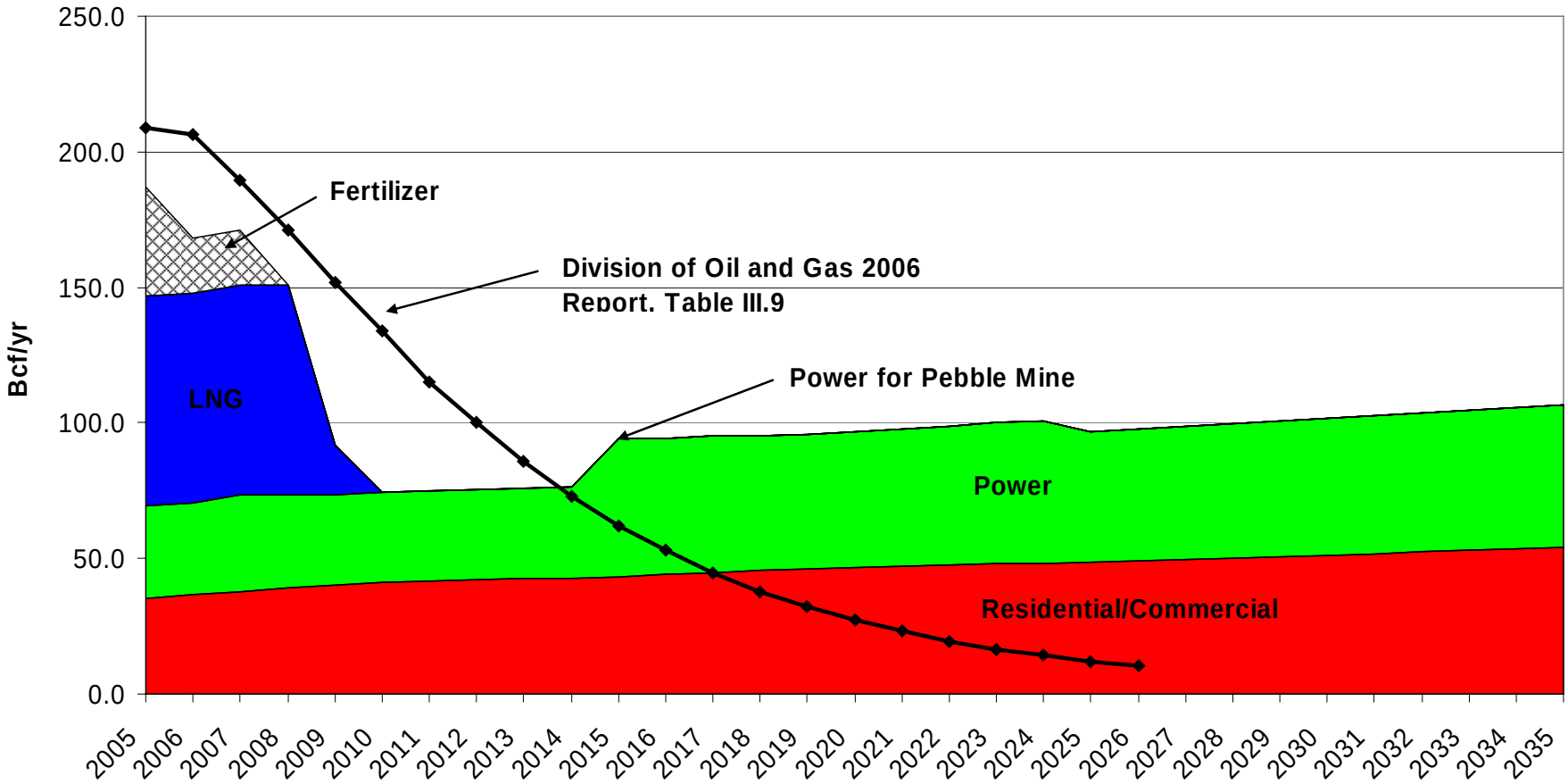
Historical Cook Inlet Gas Prices



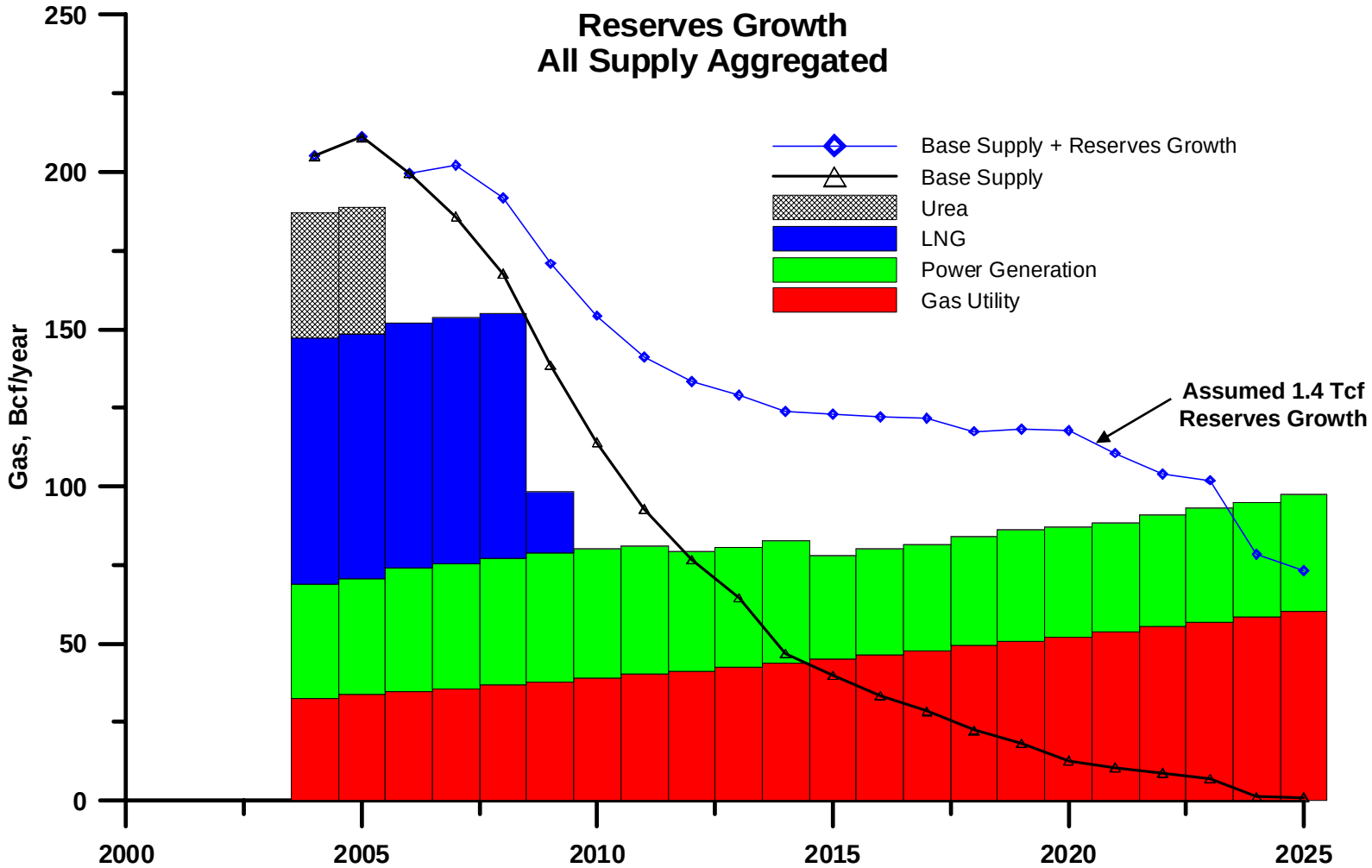
Source: April 1996 DNR Historical and Projected Oil and Gas Consumption,
DOR Cook Inlet Prevailing Value, 1994-2006
EIA - U.S. Natural Gas Wellhead Price data series N9190US3

DDF
9/19/2006

Supply (DOG 2006) & Demand (DOE– June 2006 Study)



Reserves Growth Supply & Demand



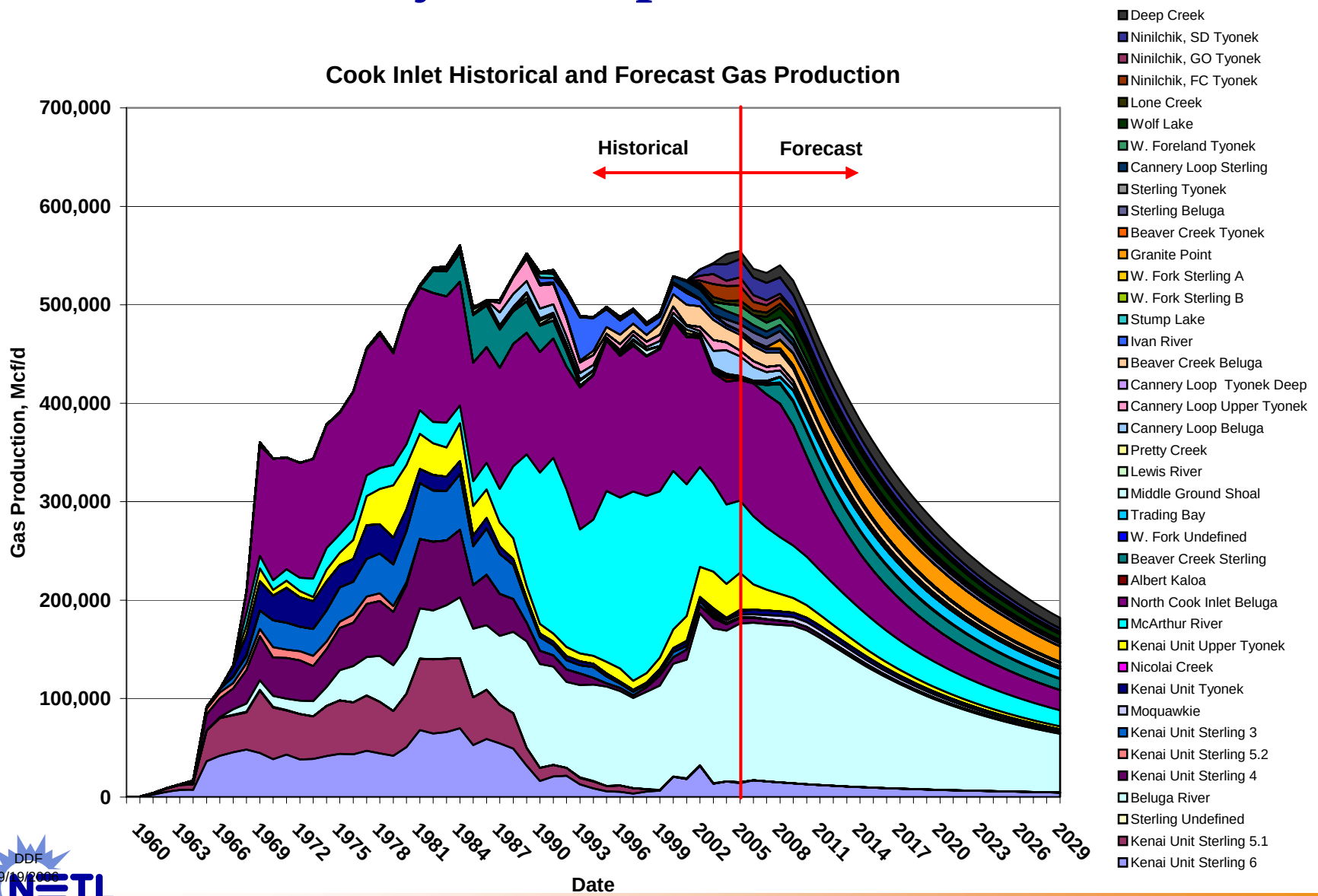
Fields and Pools Examined

Class Size	Proved
6	Beaver Creek/Tyonek undefined
7	Lewis River/undefined
7	Middle Ground Shoal/undefined
7	Ninilchik - G. Oskolkoff /Tyonek
8	Cannery Loop/Sterling undefined
8	Ninilchik-Falls Creek/Tyonek
8	Ninilchik - S. Dionne/Undefined
9	Beaver Creek/Beluga
9	Cannery Loop/Beluga
9	Cannery Loop/Upper Tyonek
10	Ivan River/undefined
10	Kenai/Sterling 5.2
11	Beaver Creek/Sterling
11	Kenai/Sterling 3
11	Kenai/Tyonek
11	Kenai/Upper Tyonek Beluga
12	Kenai/Sterling 4
12	Kenai/Sterling 5.1
12	Kenai/Sterling 6
13	McArthur River/mid-Kenai
14	Beluga River/undefined
14	North Cook Inlet/Tertiary

Class Size	Smaller Proved
4	Albert Kaloa
4	Cannery Loop/Tyonek D
5	Nicolai Creek/undefined
5	Sterling/undefined
5	West Fork/Sterling A
5	West Fork/Sterling B
6	Pretty Creek/undefined
6	Stump Lake
6	West Fork/undefined
8	West Foreland/Tyonek undefined

Class Size	Underdeveloped
7	Lone Creek
8	Moquawkie
8	Sterling/Beluga undefined
9	Wolf Lake/Beluga Tyonek
10	Trading Bay/undefined
10	Deep Creek/Tyonek (Happy Valley)
10	Granite Point/undefined

Currently Developed Fields Forecast



Reserves Additions from 2004 to 2006

- **Cook Inlet EUR was estimated in 2004 report (12/31/2003) to be 7926.7 Bcf.**
- **Cook Inlet EUR as of 12/31/2006 is now estimated to be 8,186.2 Bcf. An increase in EUR of 260 BCF.**
- **Reserves estimates increased because of**
  - Additional reserves resulting from lower reservoir pressure through added compression

  Analysis does not include estimated reserves growth potential of 1,017 Bcf.

CONCLUSIONS

- Base Case (June 2004 Report)
  - Conventional gas will meet commercial and residential consumer demand until about 2012 with the existing reserves base, if industrial use is curtailed as assumed
- Current estimates suggest 2015 with limited reserves growth included,
- E&P efforts have been successful so far in replacing a portion of reserves but more is required for Cook Inlet to supply basic needs and support industrial base.
- Exploration, reserves growth, or some combination can provide the additional supply needed
  - Incremental capital cost for reserves growth on the order of $3-$4/BOE [$0.50 to $0.75 /Mcf]
  - To F&D 50% (7.5 Tcf) of CI potential will require capital investment of $3.8 to $5.6 billion over 20 to 25 yrs
- With reserves growth (1.4 Tcf), sufficient gas through 2025 for commercial and residential consumers and perhaps one industrial user

Observations

- **Aggressive/successful Cook Inlet exploration has the potential to support basic needs and industrial base for 25-30 years.**
- **A Spur pipeline assures supply from the North Slope for life of AGP from North Slope resources.**
- **LNG import is an option, just like in Lower 48.**
- **Alternative energy sources (wind, hydro, geothermal, biomass, and coal), conservation by consumers, and increased efficiency are important components of a sound energy policy.**
- **What are the tradeoffs between these supply options?**

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