

# 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

Charles Thomas - SAIC  
Anchorage, Alaska



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## South-Central Alaska Natural Gas Study



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June 2004

National Energy Technology Laboratory



U.S. Department of Energy  
Strategic Center for Natural Gas & Oil  
Arctic Energy Office



[http://www.netl.doe.gov/technologies/oil-gas/ReferenceShelf/RefShelf\\_archive.html#Reports04](http://www.netl.doe.gov/technologies/oil-gas/ReferenceShelf/RefShelf_archive.html#Reports04)

## Alaska Natural Gas Needs and Market Assessment



National Energy Technology Laboratory



U.S. Department of Energy  
Strategic Center for Natural Gas & Oil  
June 2006



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

## Beluga Coal Gasification Feasibility Study

DOE/NETL-2006/1248



Phase I Final Report

July 2006



<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



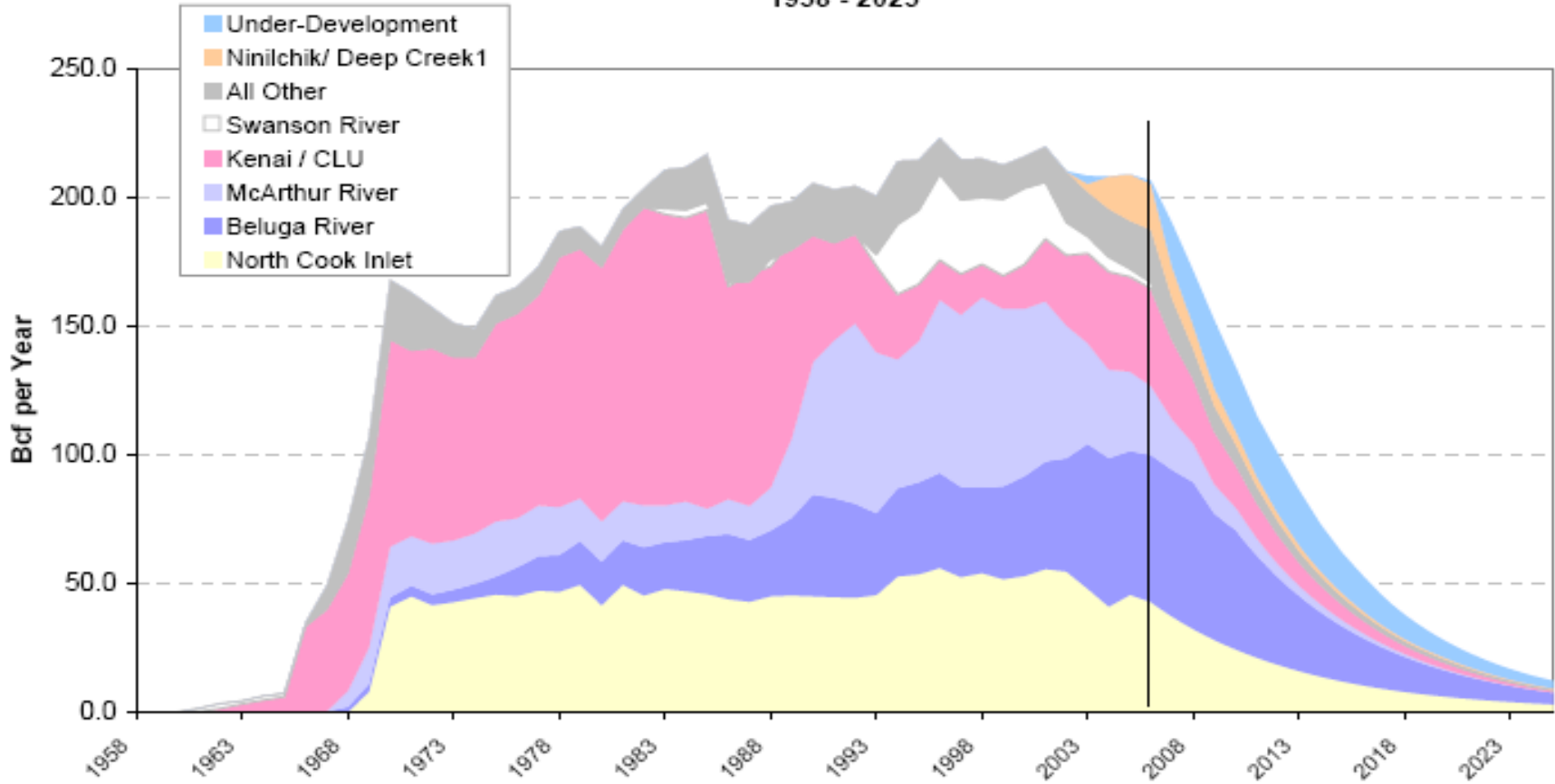
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# OUTLINE

- **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?

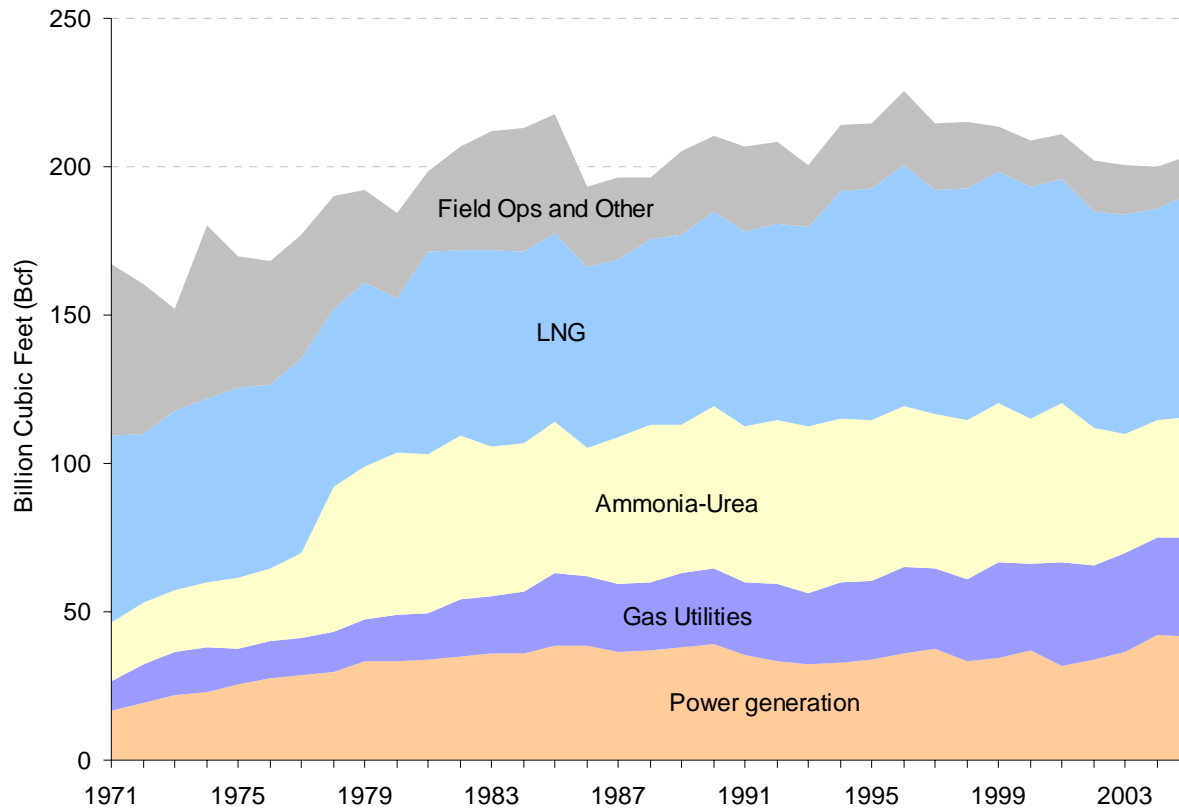
Cook Inlet Historic and Projected Natural Gas Production  
1958 - 2025



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



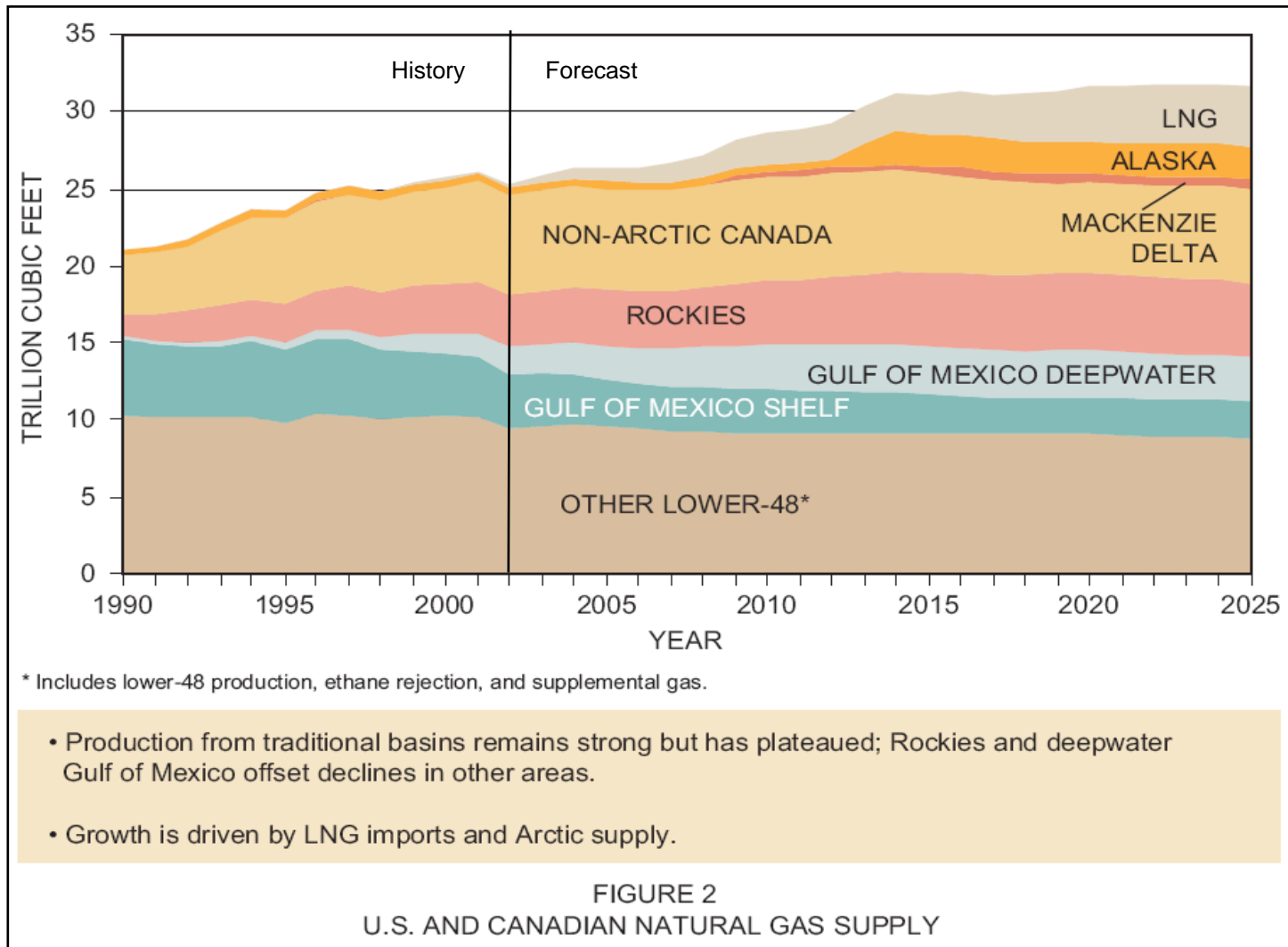
# CONSUMERS OF COOK INLET GAS



	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%
<b>Average Total</b>	<b>203.5</b>	



# U.S. Demand & Source of Supply



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



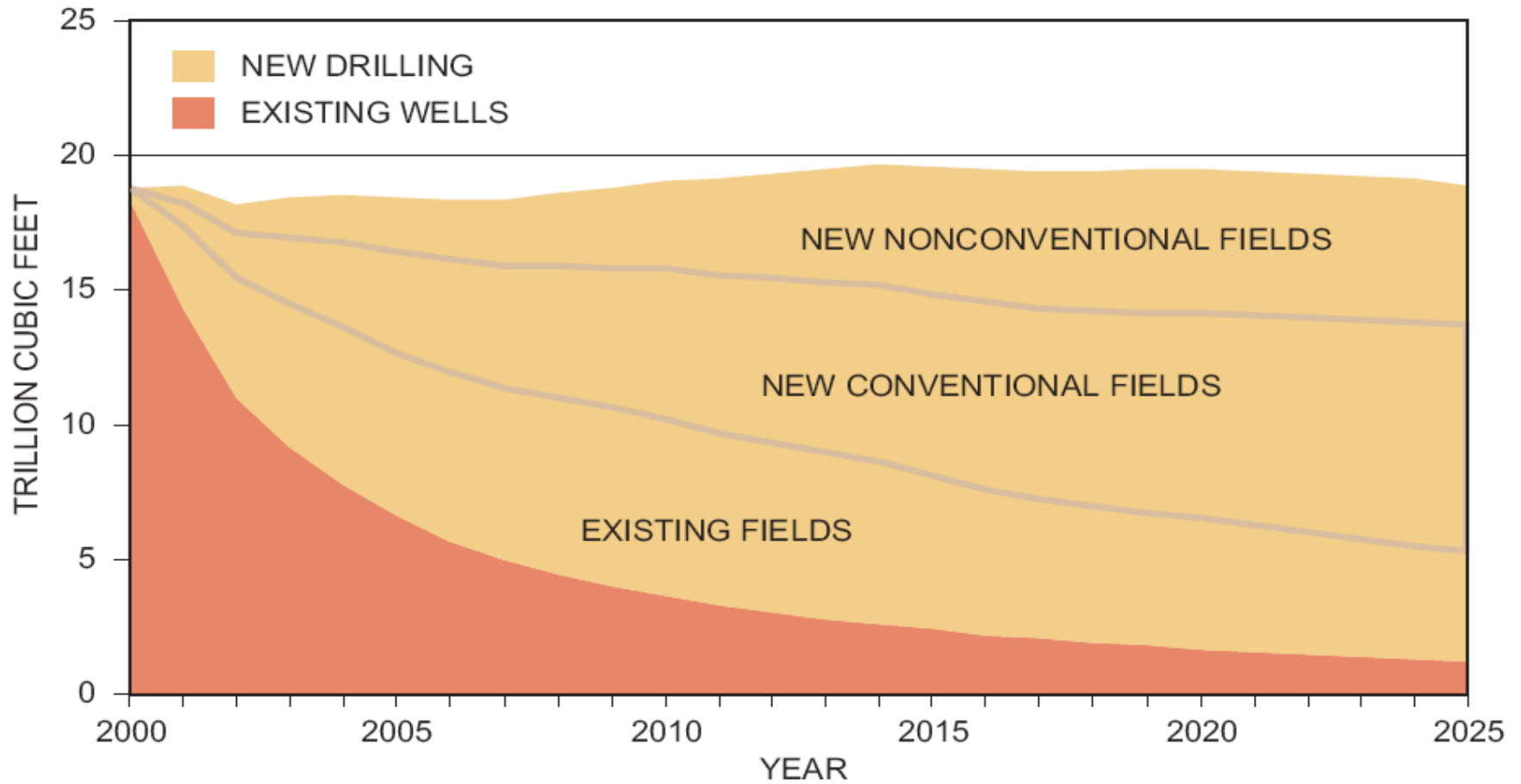
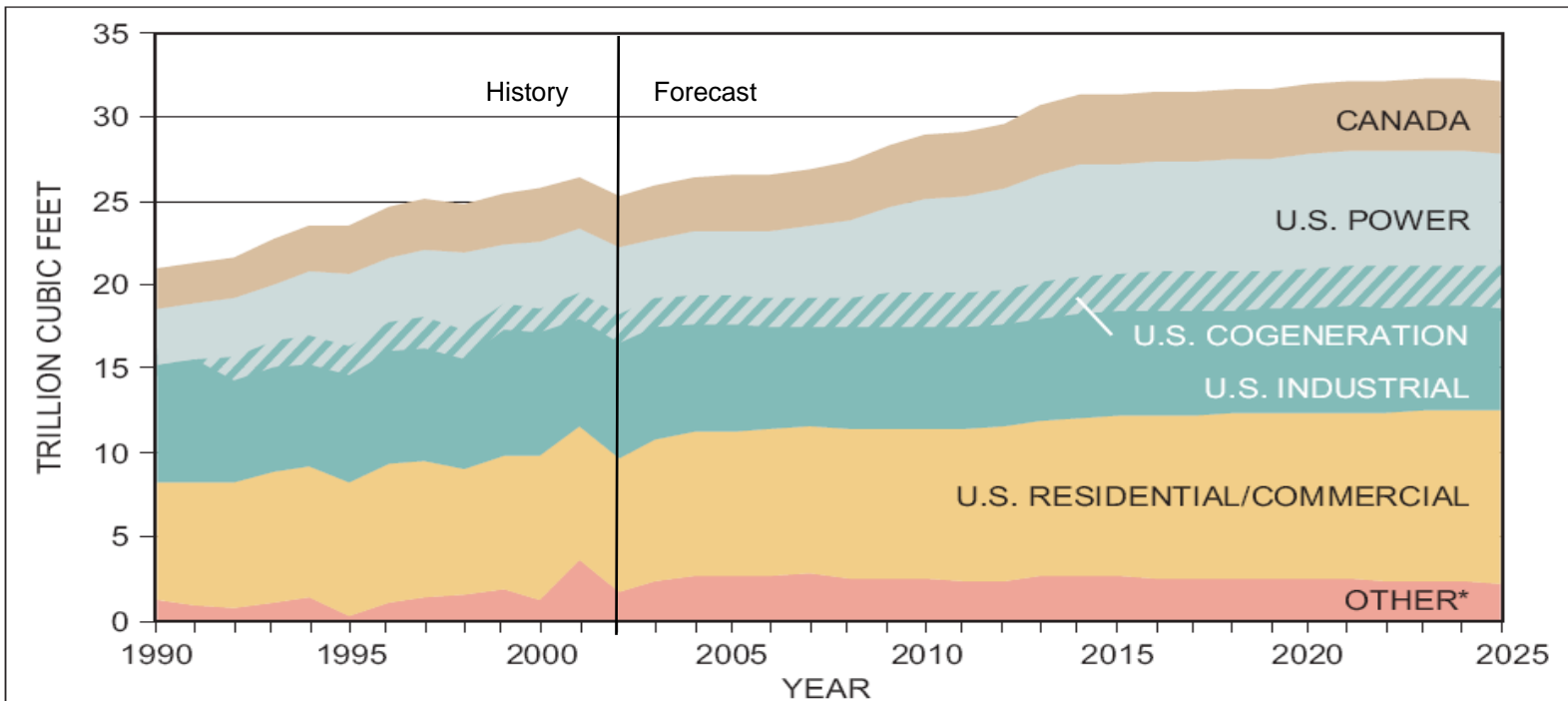


FIGURE 28  
LOWER-48 PRODUCTION, EXISTING AND FUTURE WELLS

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



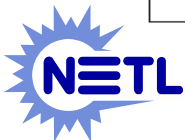
# U.S. Demand by Segment



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

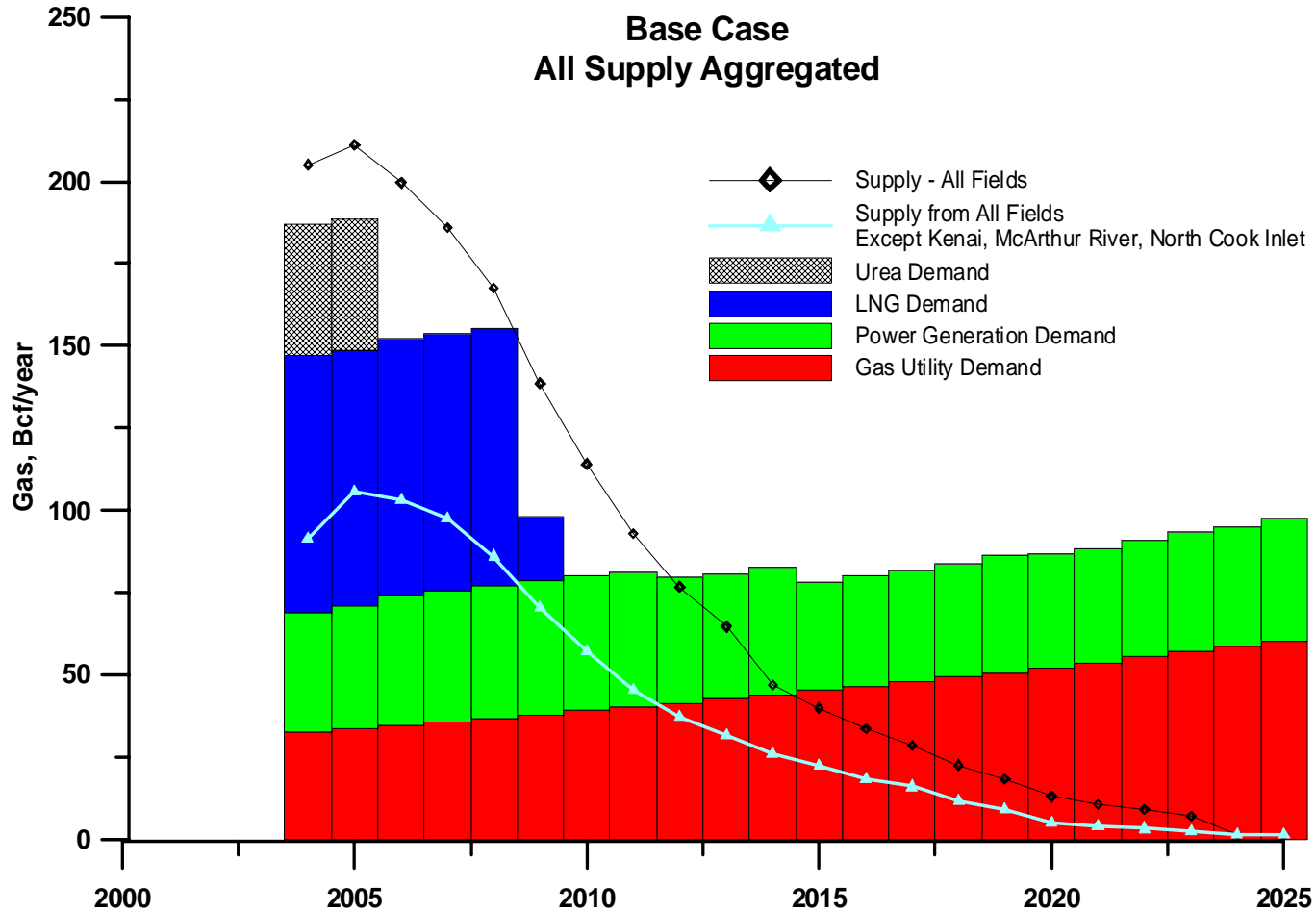
- Natural gas demand for power generation increases, reflecting future utilization of recent, significant additions of natural gas-fired generation.
- Natural gas use in the industrial sector erodes, illustrating projected losses in industrial capacity in the most gas-intensive industries.

FIGURE 1  
U.S. AND CANADIAN NATURAL GAS DEMAND





# 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

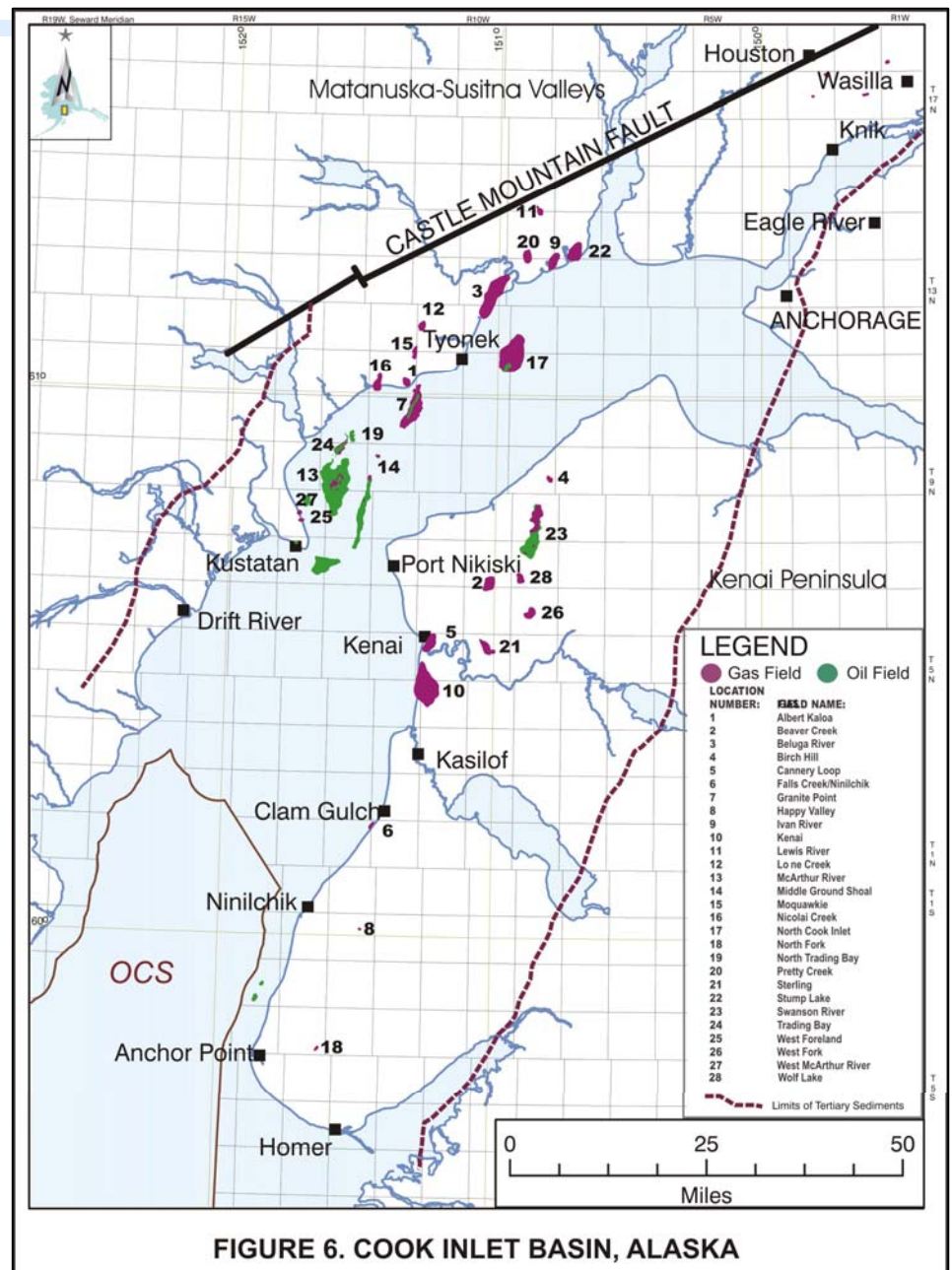
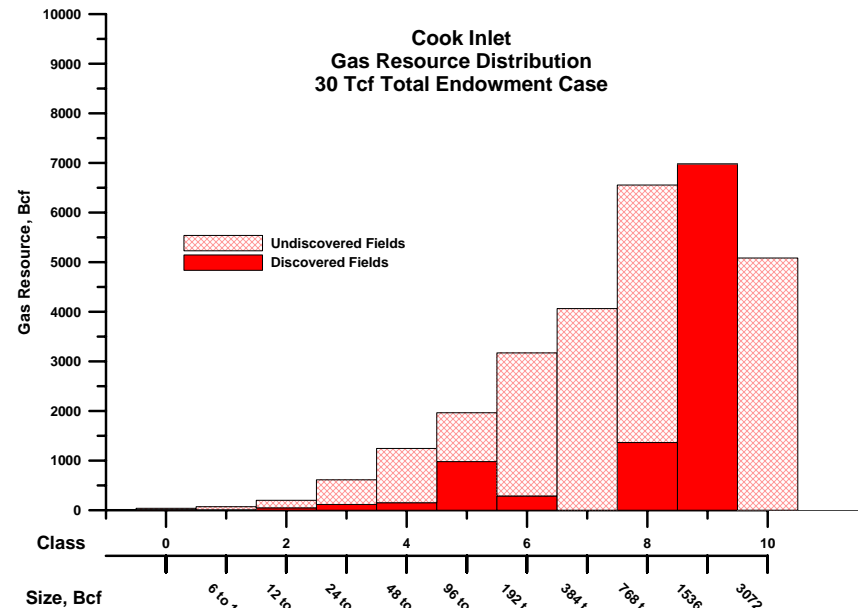
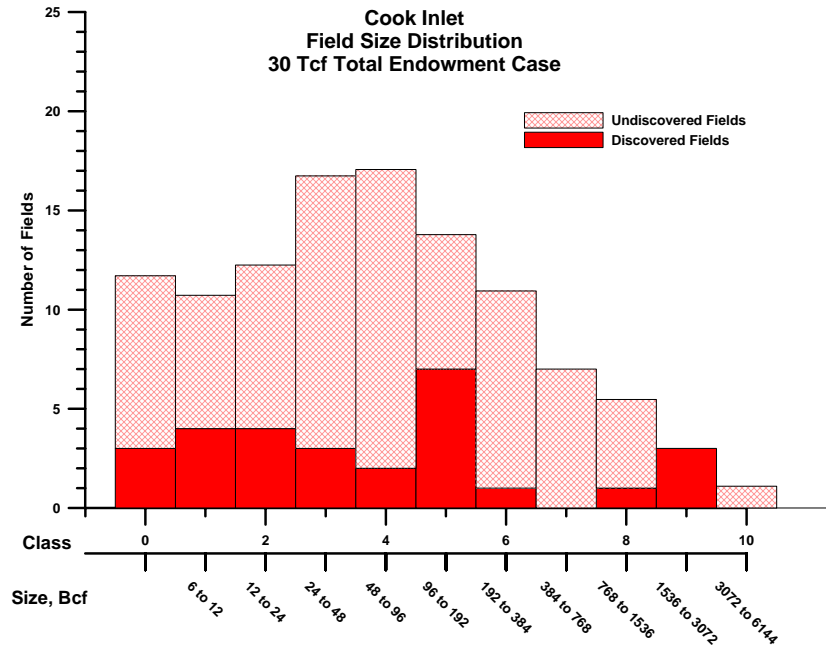


FIGURE 6. COOK INLET BASIN, ALASKA

# 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



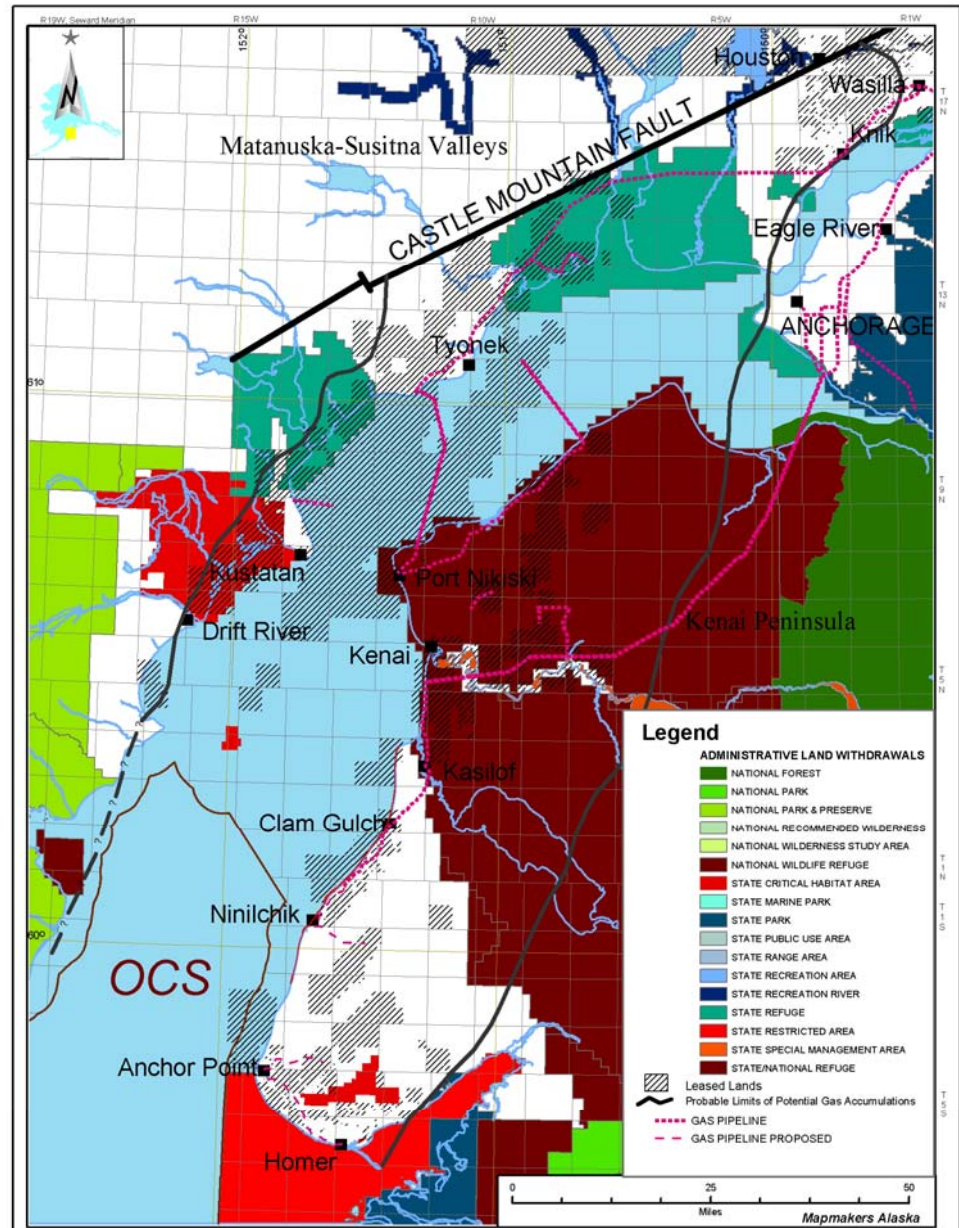
# Resource Base Summary and Conclusions

- 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

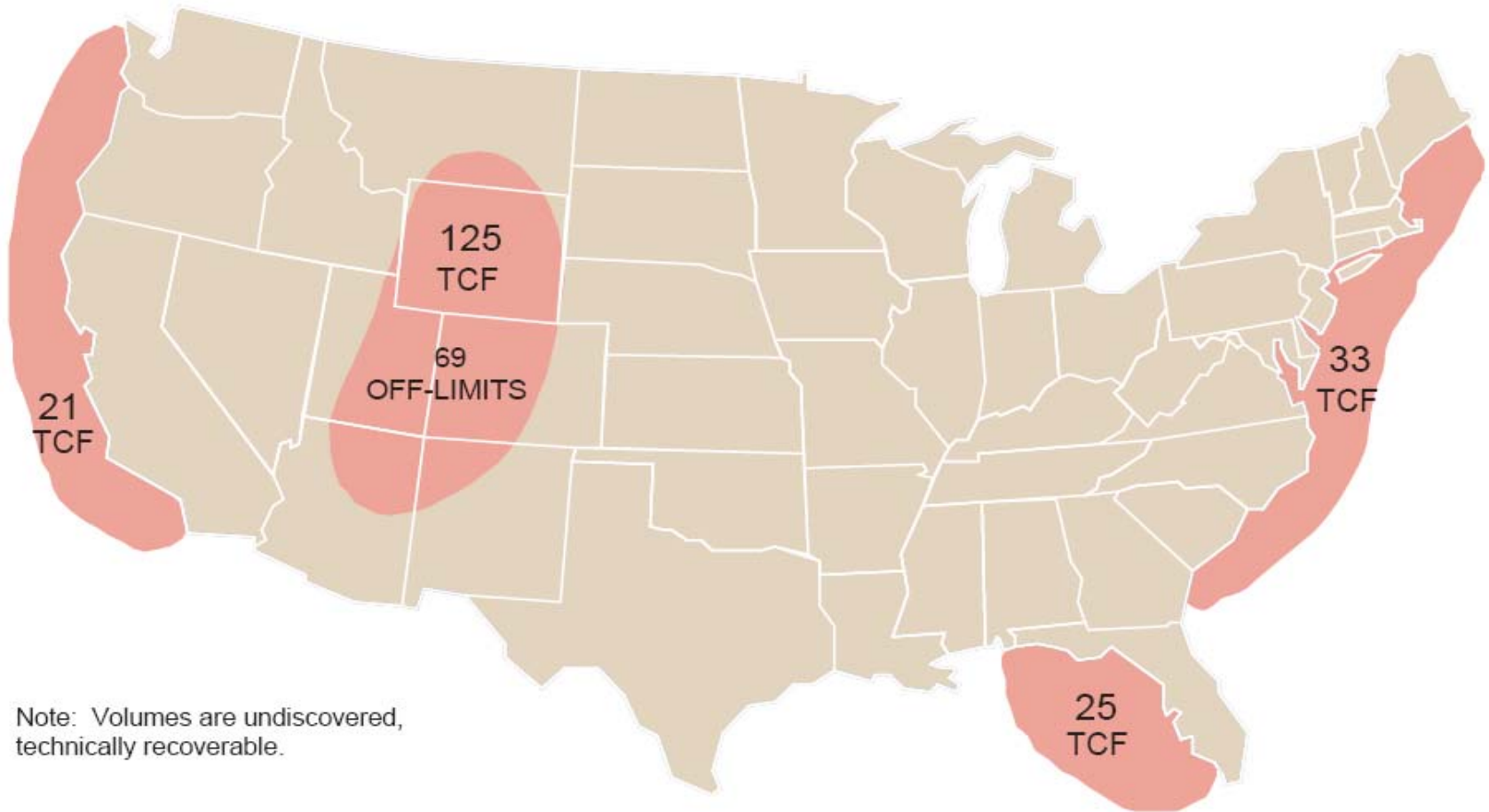
- Large portion of land area is federal and state wildlife refuges, parks, and restricted areas
- Some leased land, historical production, and pipelines already in these areas
- Potential exists that up to 30% to 50% of the prime exploration areas could have restricted access or be off limits



COOK INLET BASIN, ALASKA  
 GAS PIPELINES AND LAND CLASSIFICATIONS



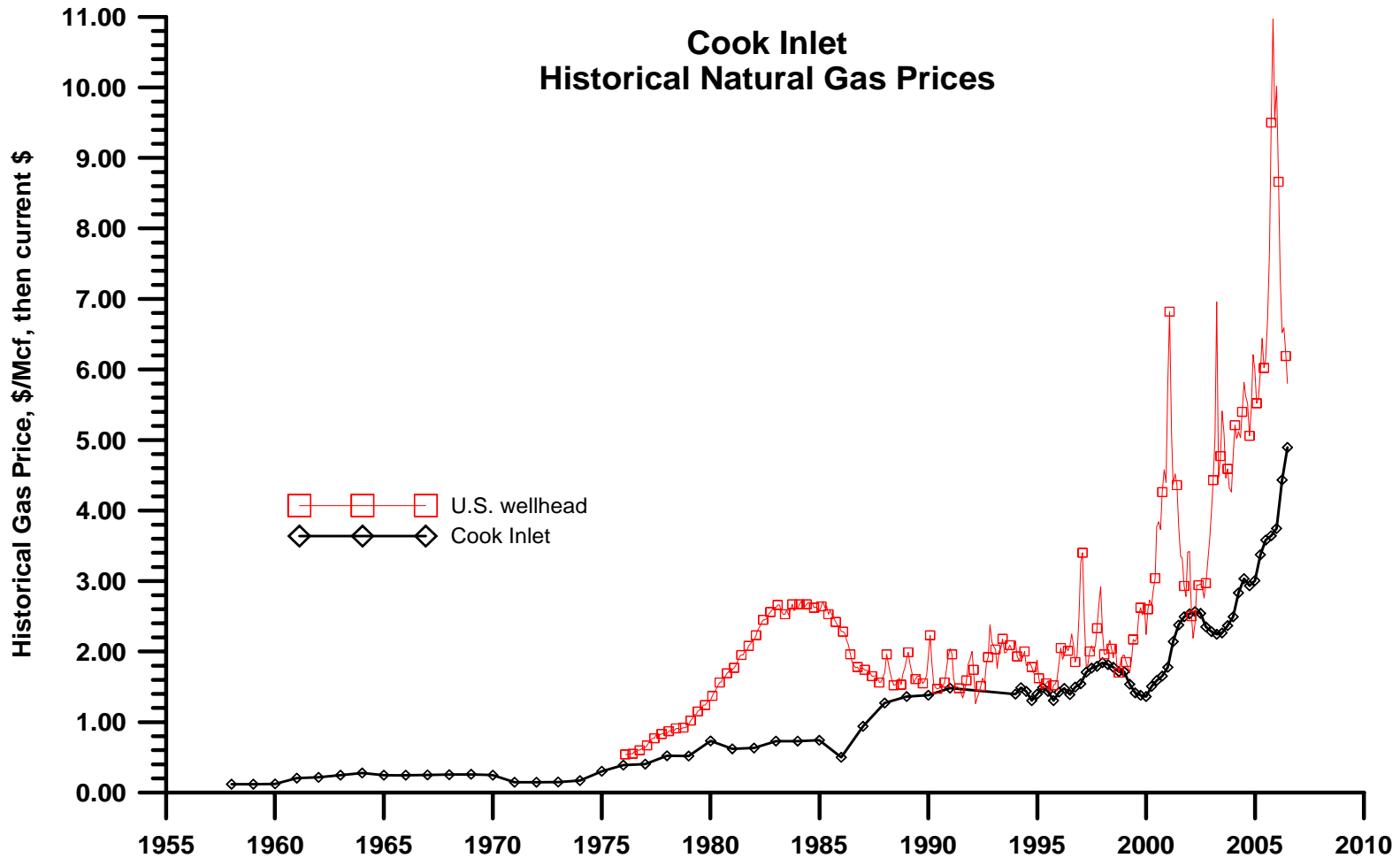




**Figure 4c-26: Technical Resources Impacted by Access Restrictions**

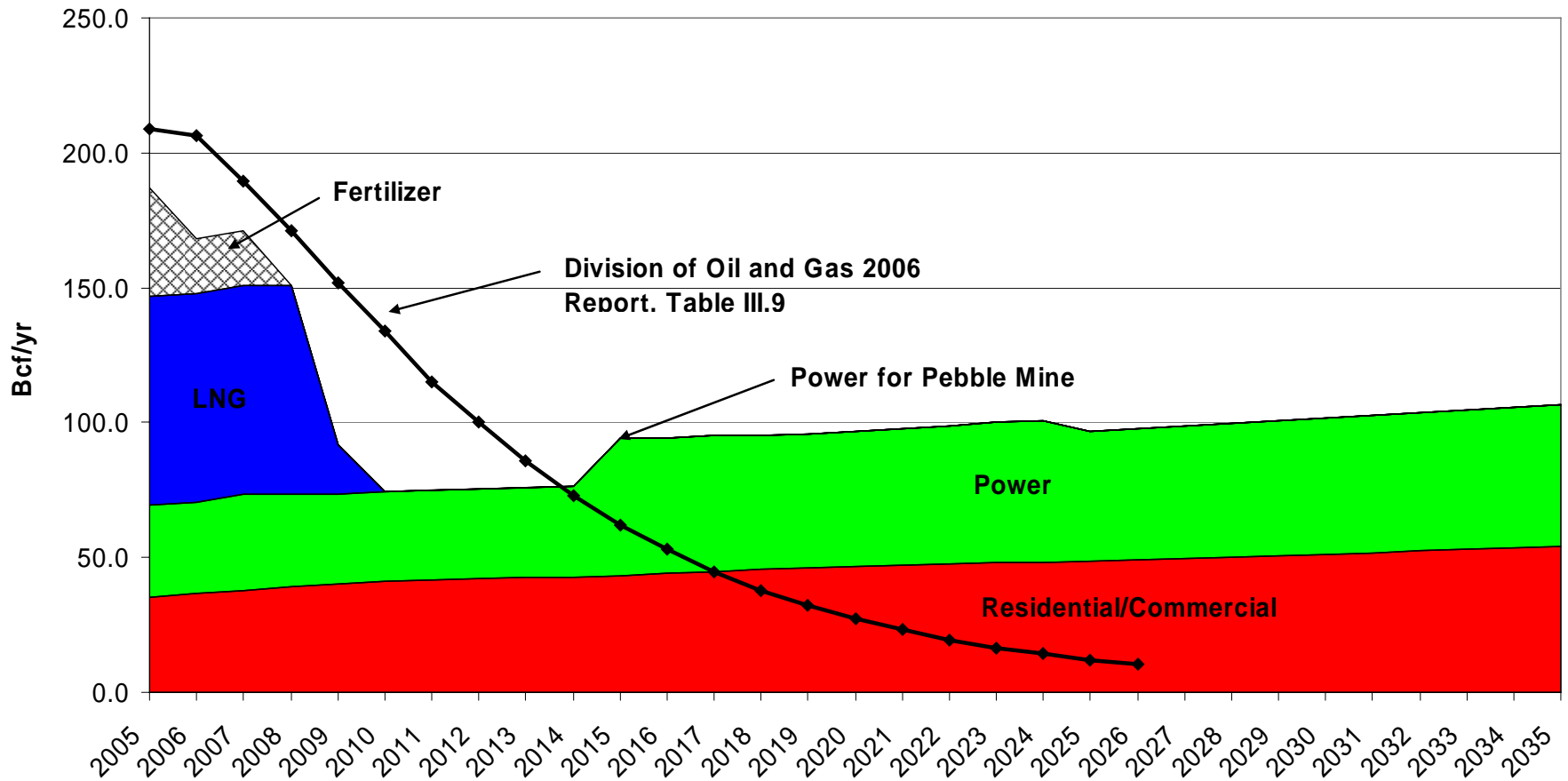


# Historical Cook Inlet Gas Prices

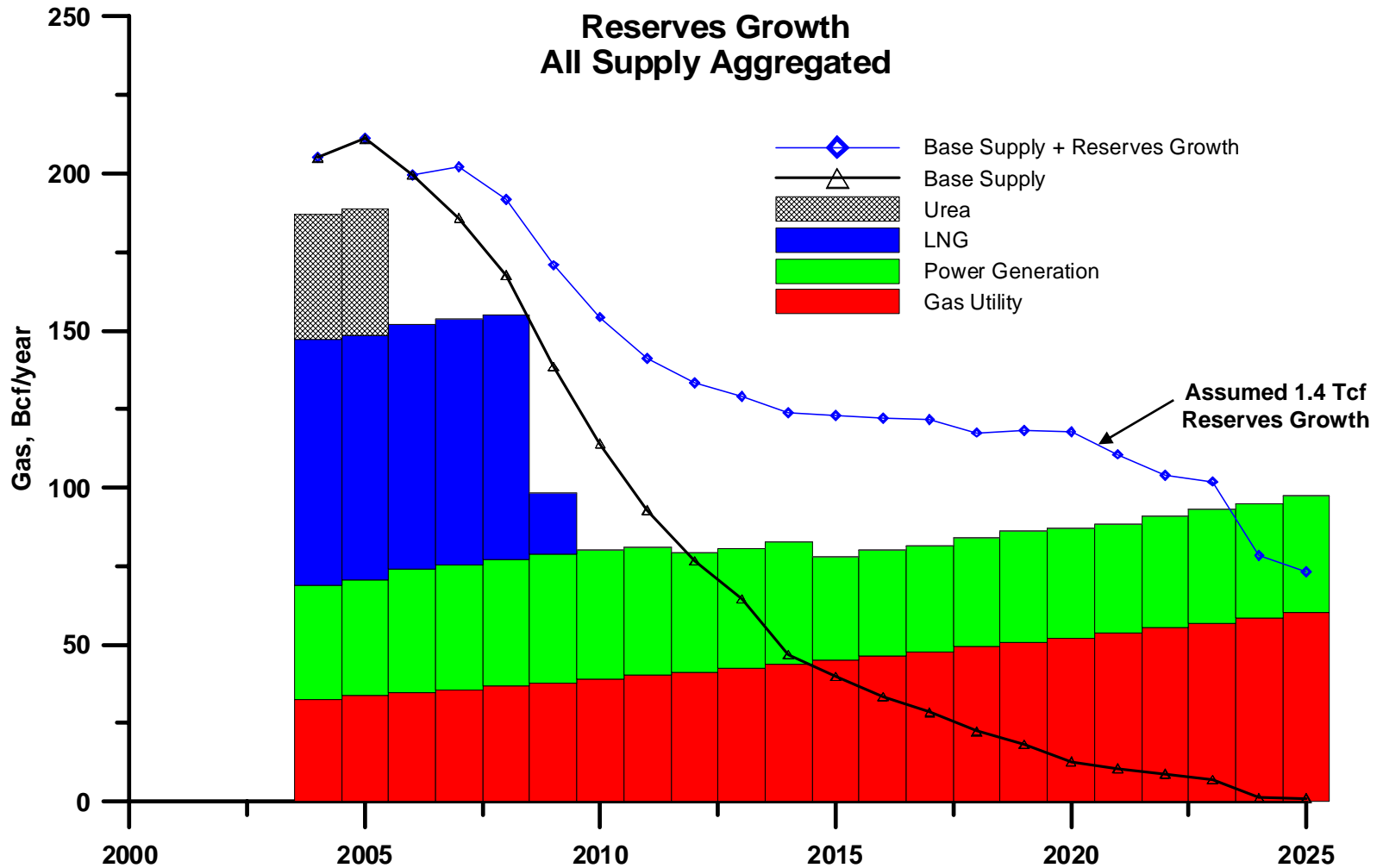


Source: April 1996 DNR Historical and Projected Oil and Gas Consumption,  
DOR Cook Inlet Prevailing Value, 1994-2006  
EIA - U.S. Natural Gas Wellhead Price data series N9190US3

# 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

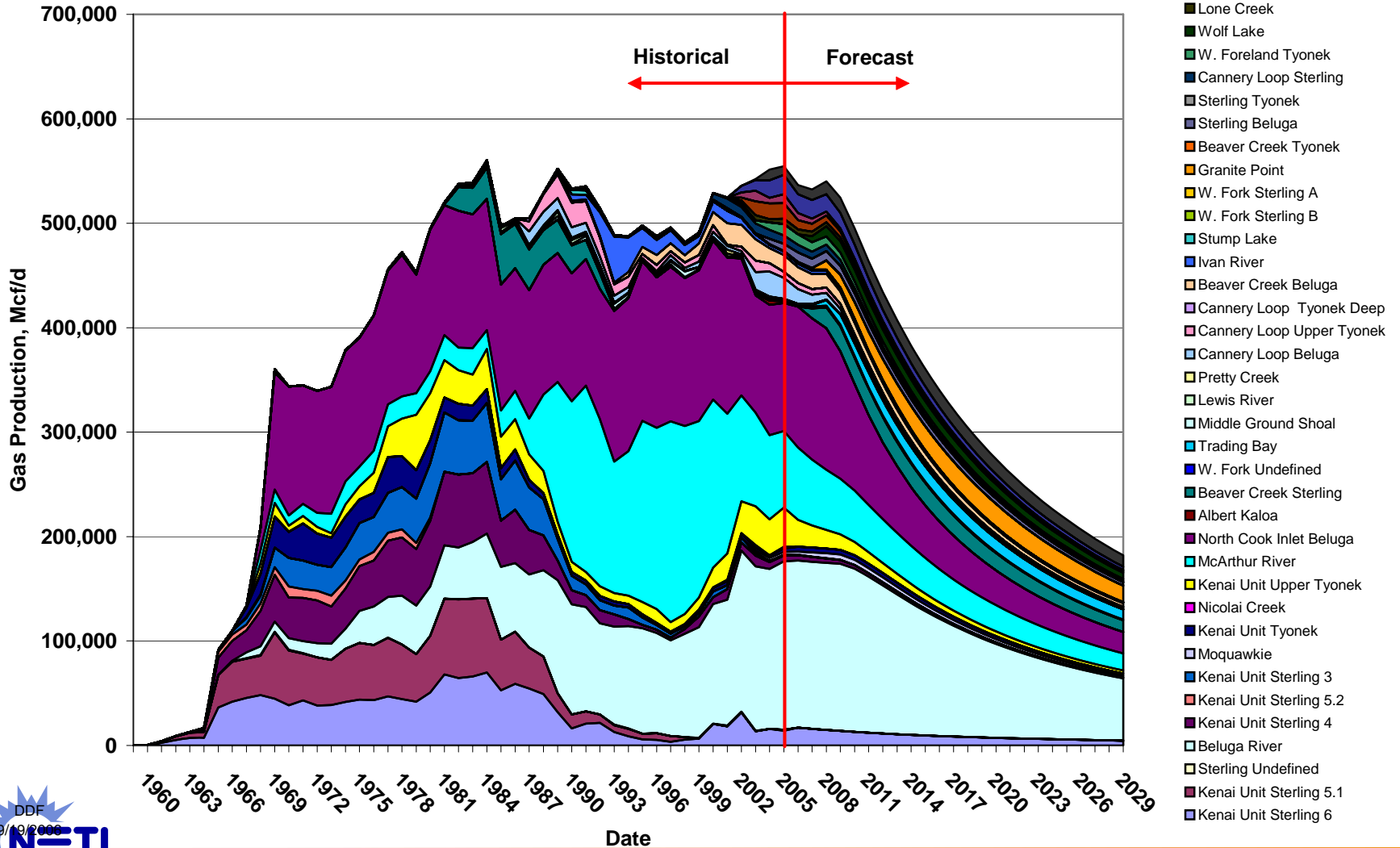
Class Size	Smaller Proved
4	Albert Kaloa
4	Cannery Loop/Tyonek D
5	Nicolai Creek/undefined
5	Sterling/undefined
5	West Fork/Sterling A
5	West Fork/Sterling B
6	Pretty Creek/undefined
6	Stump Lake
6	West Fork/undefined
8	West Foreland/Tyonek undefined

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

Cook Inlet Historical and Forecast Gas Production



# 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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**GOM Hydrates JIP/DOE Drilling Data & Hydrate Tool & Protocol Development Workshop** - This workshop will be held April 13th & 14th in Houston, Texas and is open to JIP members and others interested in the latest developments in the commercialization of naturally occurring gas hydrates. [Visit the workshop website for more information.](#)

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