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# Trans-Alaskan Pipeline

Private Industry's Most Expensive Undertaking

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# Summary

- History
  - Original Proposals
  - Political/Environmental Battles
  - Final Design
  - Economic Impact
  - Future Pipelines
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# World History of Oil

- Oil use documented for more than 5000 years
  - 1859-First oil well drilled in Pennsylvania
  - 1930s-Texas and Saudi Arabia Oil Fields
  - 1946-Oil becomes world's most popular energy source
  - 1960-OPEC formed
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# Oil in Alaska

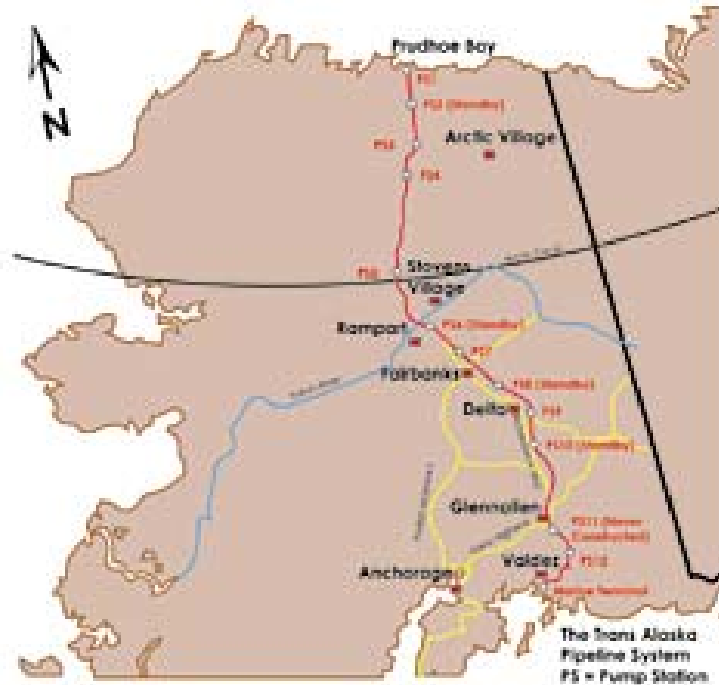
- 1968-Announcement of Prudhoe Bay petroleum discoveries
  - Prudhoe Bay- largest oil field in the US, total production+reserves=10+ billion barrels
  - Took 10 years to bring to market, could have taken 4, costs of nearly \$8 billion, almost twice as much when you add in costs of financing and developing oil field
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# Original Proposals

- Submarine
  - Rail
  - Tanker Transport
  - Pipelines
    - Prudhoe Bay – Valdez
    - Prudhoe Bay – existing Canadian pipelines
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# Final Route



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# Political, Social and Environmental Battles

- 1970- National Environmental Policy Act
  - Pipeline frozen within two months
  - EIS for three years
  - Legislation shaped by TAPS
  - Trans-Alaska Pipeline Authorization Act of 1973 allowed the pipeline to proceed without more interference
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# Actual Pipeline Costs

description of costs	total amount (million \$)	time begin (month)	time end (month)
exploration costs	40.8	1	24
archeological survey	2.4	25	48
land lease	900	13	24
access road	120	37	42
drill well	277	13	48
pipe & machine	1500	19	22
construction	6380	76	114
repairs to pipeline	240	114	----

**Total Present Worth of Costs: \$5,500 million**



# Expected Revenue

1977

Oil shipped to West Coast: \$17228

(2 million b/d)

Oil exported to Japan: \$694

(100 thousand b/d)

Total Revenue: \$17,922 million

1990

Oil shipped to West Coast: \$6891

(800 thousand b/d)

Oil Exported to Japan: \$1387

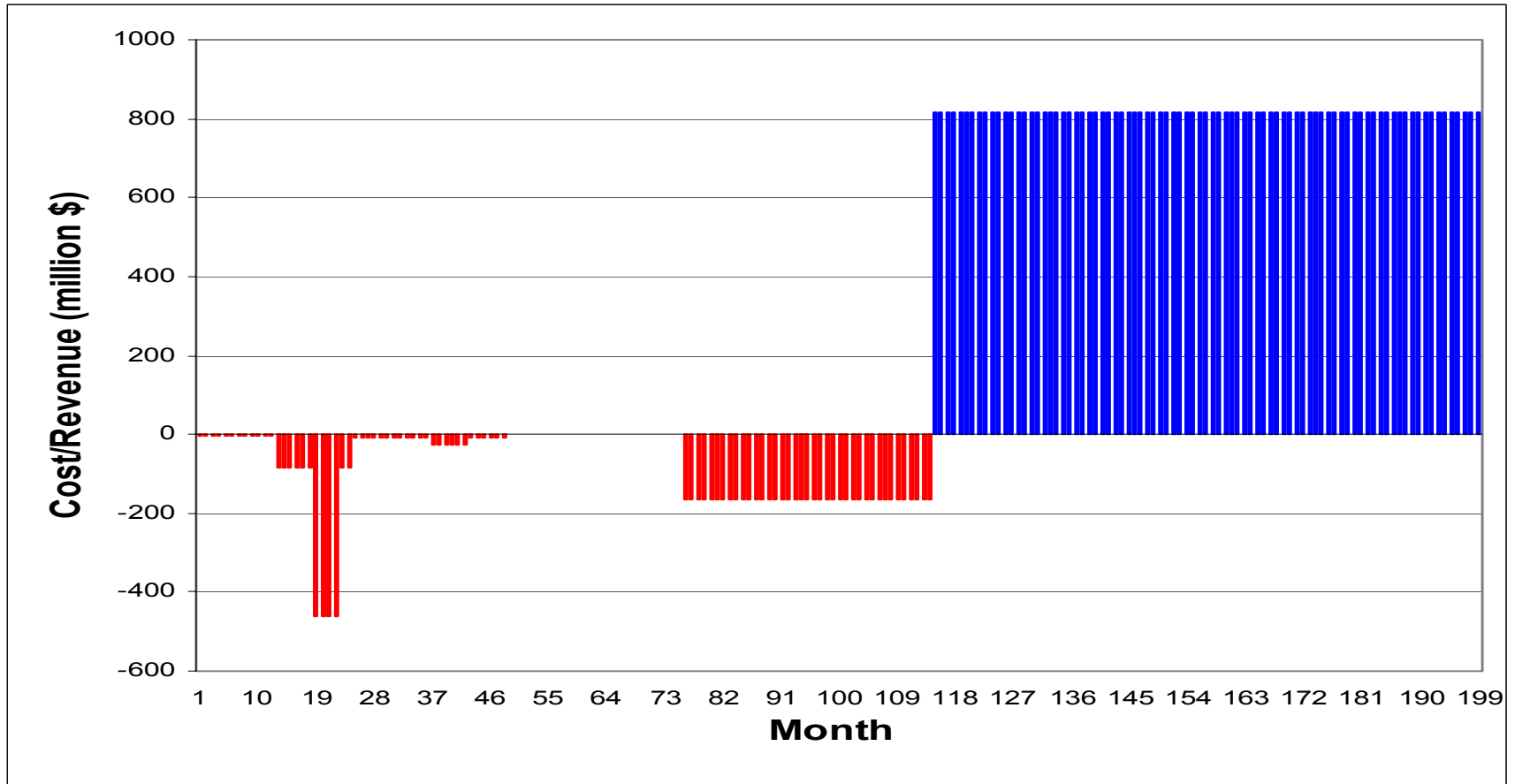
(200 thousand b/d)

Total Revenue: \$8,278 million

$PW(\text{Revenue}) - PW(\text{Cost}) = PW(\text{Profits})$

$\$8,300 - \$5,500 = \mathbf{\$2,800 \text{ million}}$

# Cost/Revenue Graph



# Sensitivity Analysis

	cost	expected revenue	low price revenue	low yield revenue	low price&yield revenue
base	5300	18000	13000	8600	6200
rapid construction	6000	18000	13000	8600	6200
delayed construction	4300	18000	13000	8600	6200
monthly repairs	5300	18000	13000	8600	6200
small yearly earthquakes	5500	18000	13000	8600	6200
large&small earthquakes	11000	18000	13000	8600	6200
rebuild	13000	18000	13000	8600	6200
rebuild&large earthquakes	22000	18000	13000	8600	6200

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# Environmental Considerations

- Earthquakes
  - Permafrost
  - Animal Migration Patterns
  - Oil Spills
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# Impact on Alaskan Economy

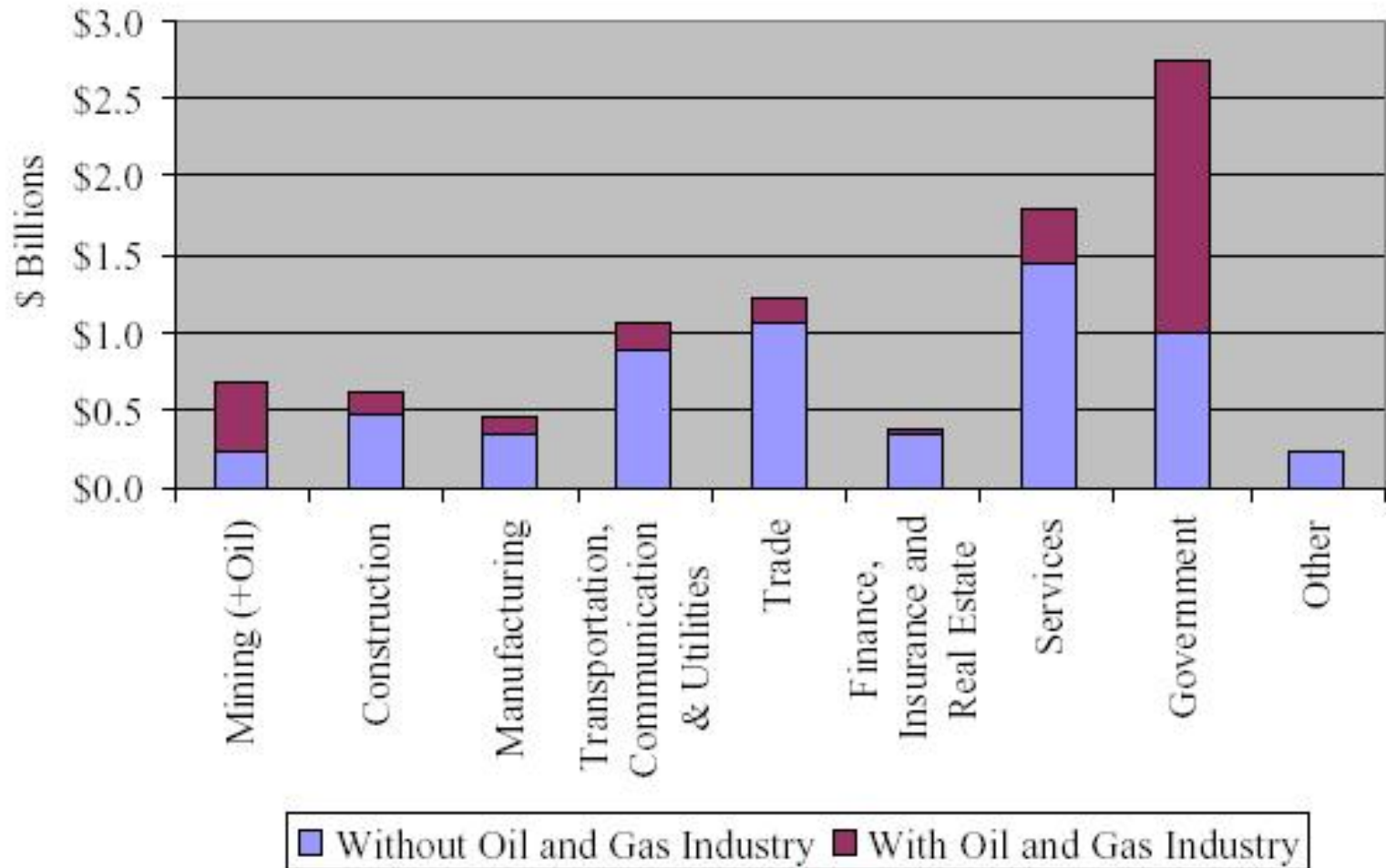
- More than 70,000 workers
  - Population of the state increase 50% between 1975 and 1980
  - State received 20% royalty, created problems when project was delayed
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# Impact of Oil Industry Today

- Industry spends \$1.7 billion/year on goods and services=State of Alaska's general fund spending
  - Indirectly impacts 25,000 jobs with \$880 million in payroll
  - 1999- \$2.1 billion in spending, \$3.1 billion total output with value added
  - \$258 million in oil royalties
  - \$2000 yearly dividend
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# Impact on Payroll



# Drilling in ANWR

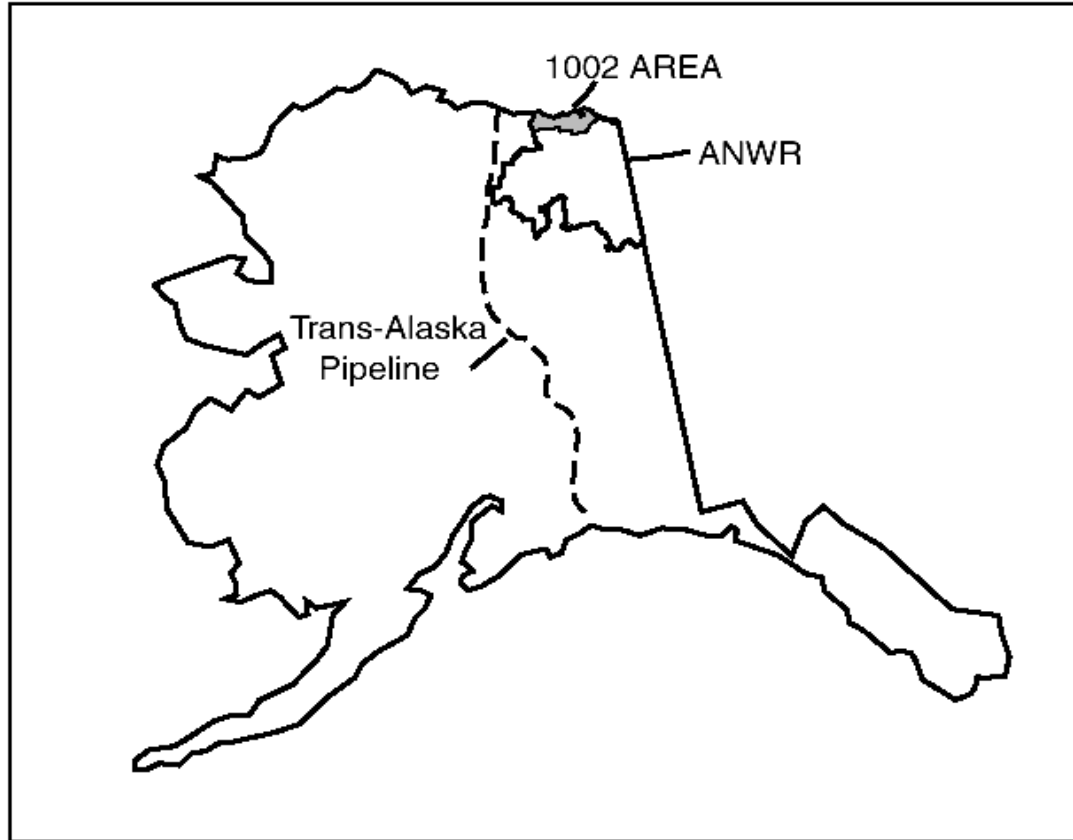


Figure 1A. Location map of the Federal 1002 Area in relation to the entire Arctic National Wildlife Refuge and Alaska's North Slope.



# Proposed Pipeline Route

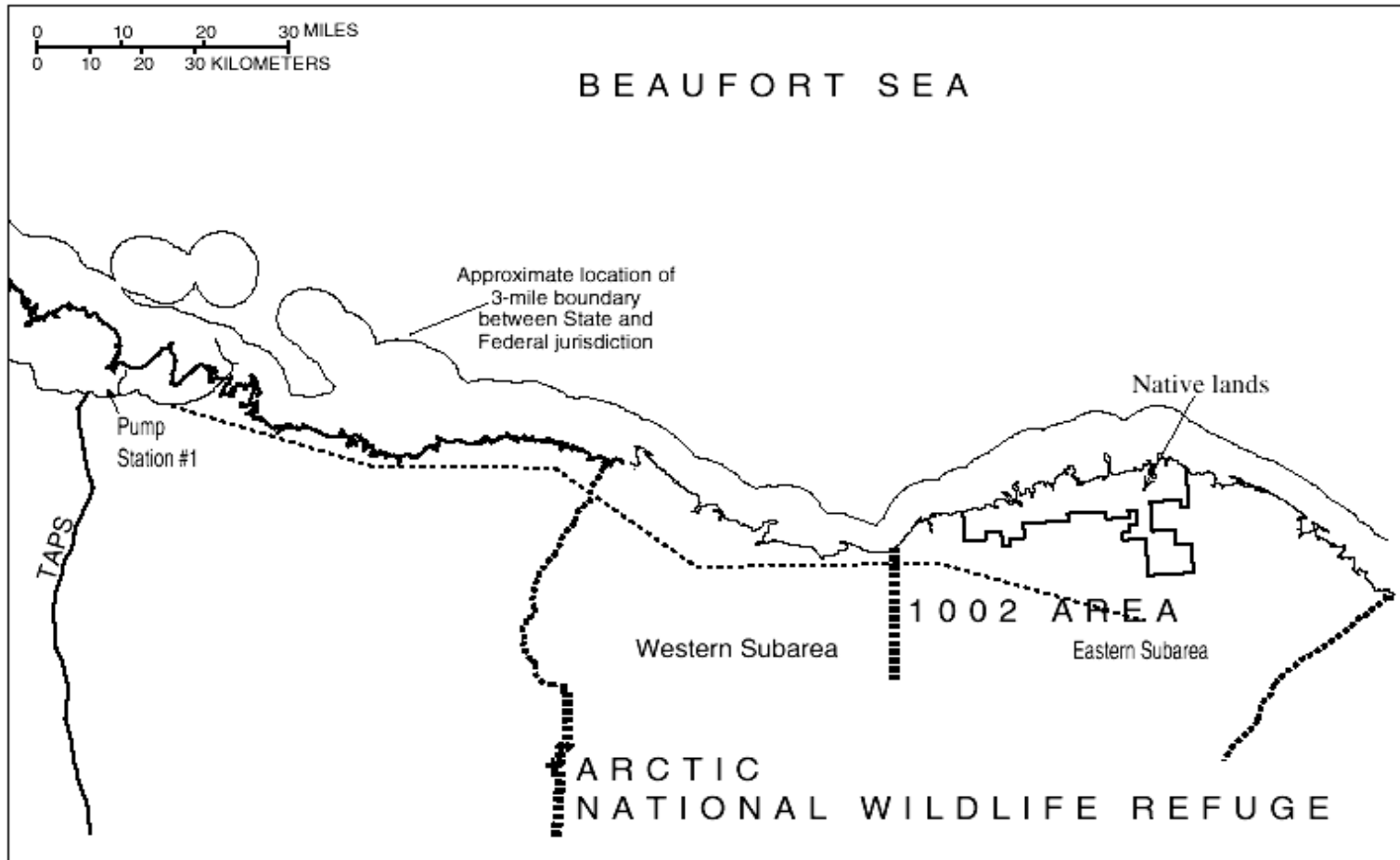
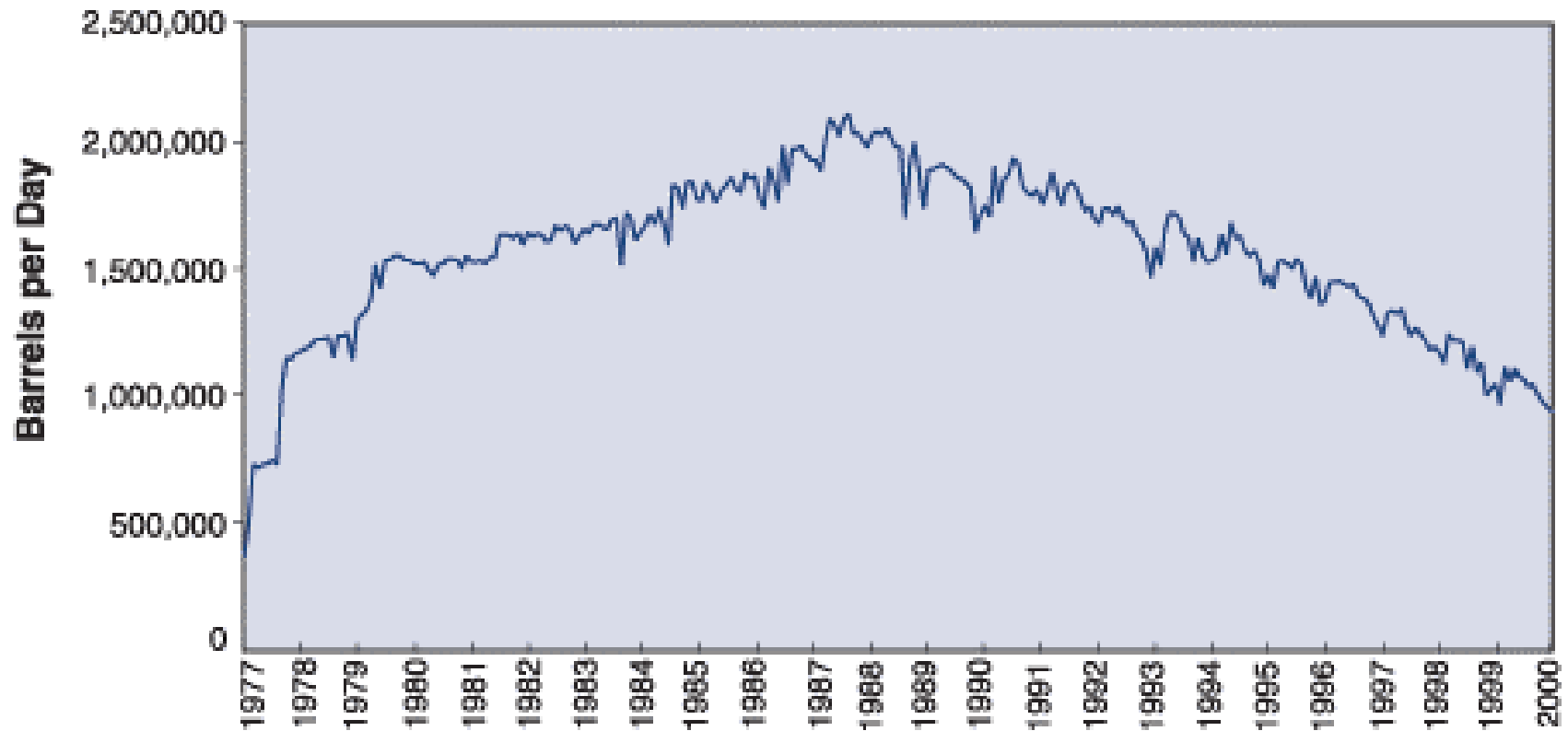


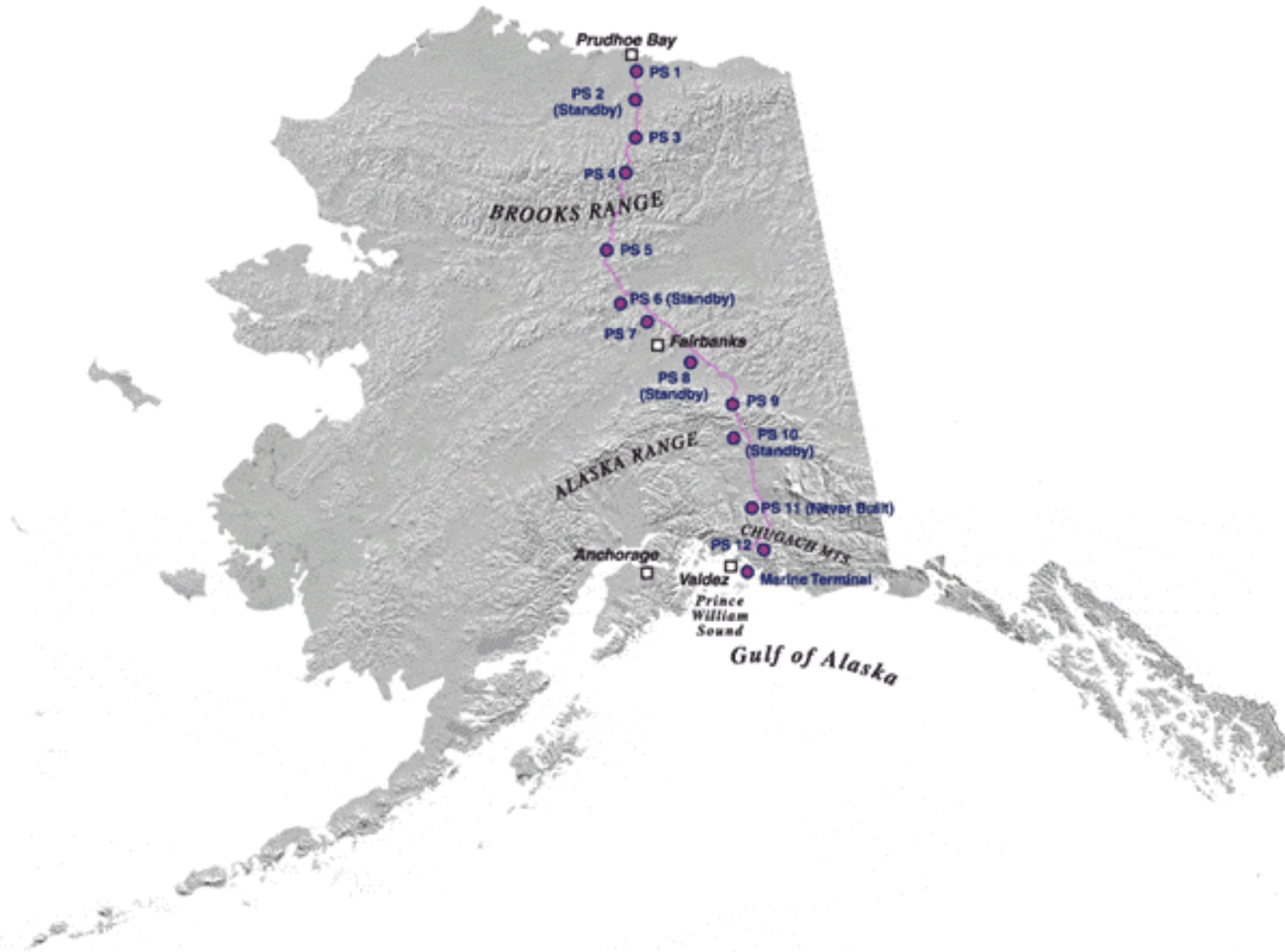
Figure 2. Map shows partition of the 1002 Area into east and west subareas and assumed pipeline (dashed east-west line) to Pump Station # 1 of the Trans-Alaska pipeline (TAPS).

# TAPS Daily Throughput

**Daily Average Throughput Since Startup**  
July 1977 through July 2000



# Pump Station Locations



# Drag Reducing Agent

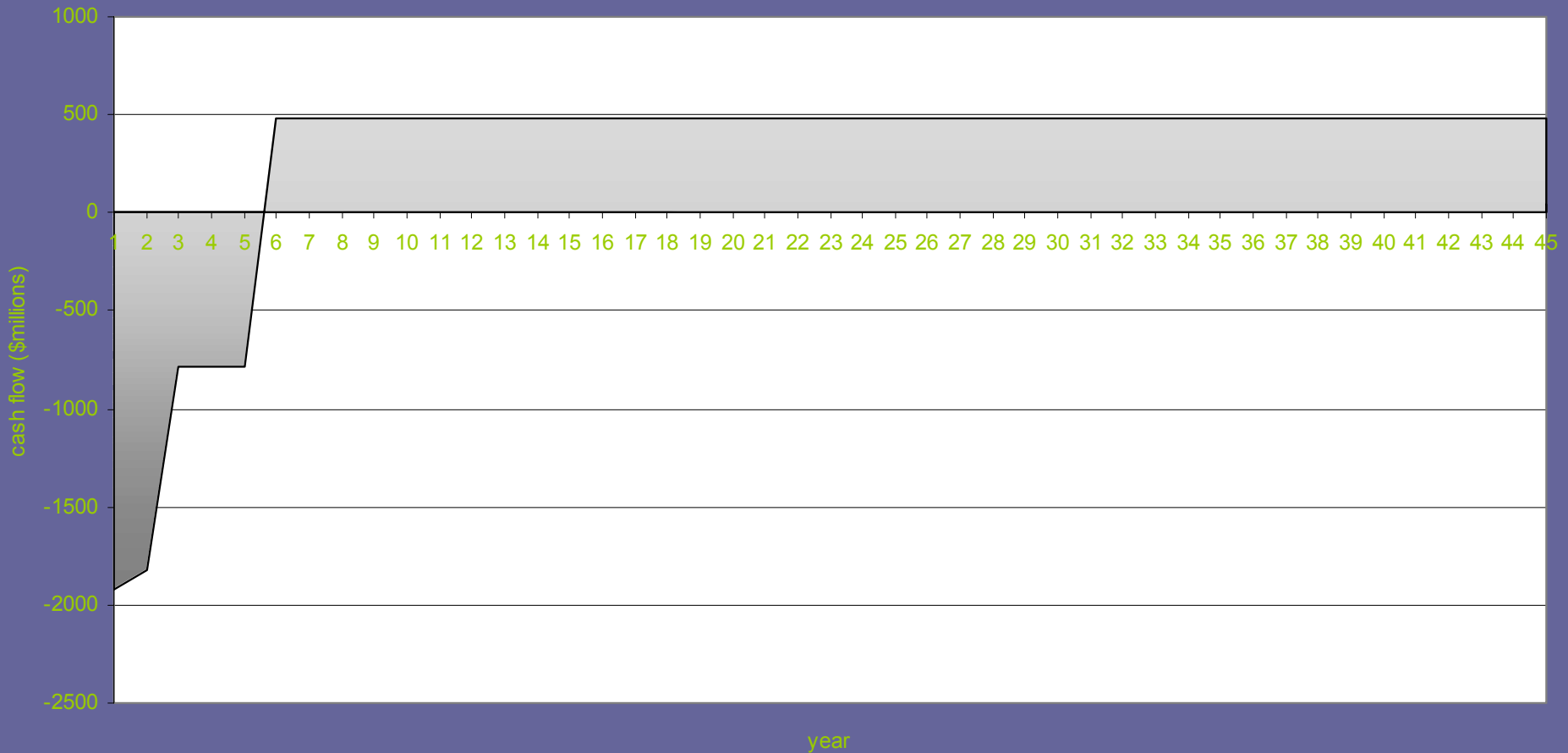


Drag reducing agent (DRA) reduces the loss of energy due to friction as fluid travels through the pipeline. DRA allows higher throughput without additional pumps, and allows earlier rampdown of pump stations as throughput declines.

# Tanker Route Map



# Cash Flow Diagram



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# Conclusion

- Economic viability does not seem to be a problem with pipelines (unless there is a dramatic change in the price of oil).
  - Social, environmental and economic impacts instead are what influence construction
  - We recommend further studies before drilling in ANWR
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