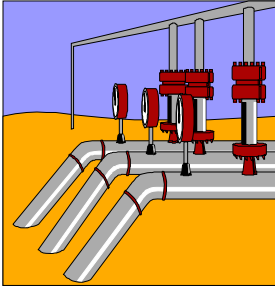

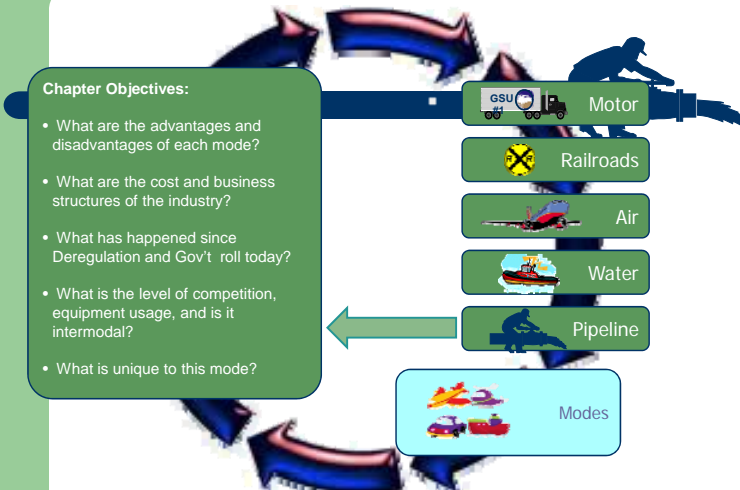


# Pipelines

## Chapter 8


# Road Map to Success



**Chapter Objectives:**


- What are the advantages and disadvantages of each mode?
- What are the cost and business structures of the industry?
- What has happened since Deregulation and Gov't roll today?
- What is the level of competition, equipment usage, and is it intermodal?
- What is unique to this mode?

# Brief History



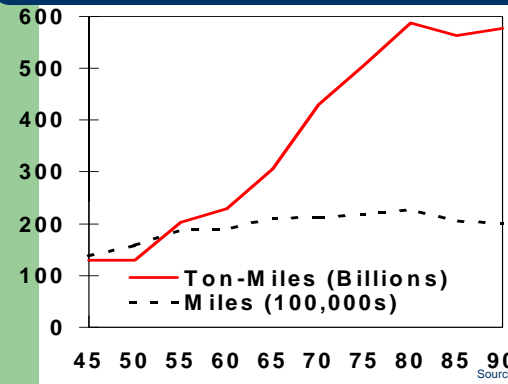
- Keyed to discovery of  - 1859
- 1st line in  in 1865
- Focus on supplying the other forms of transportation
- Standard Oil Company began the trend of ownership

# Number and Types of Carriers



- Types
  - For Hire - Common -  %
  - Few Private left
- Number
  - in nature
  - High barriers to entry
  - 135 firms move over 85% of the total ton-miles

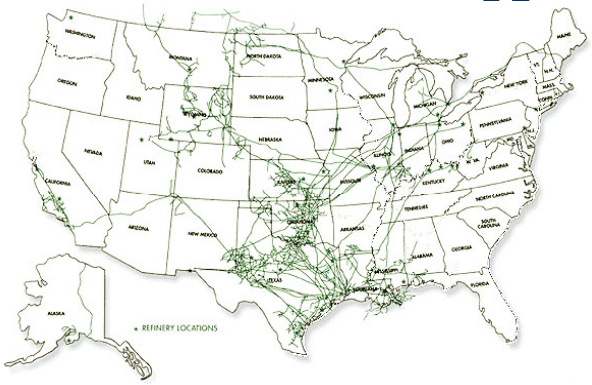
### Growth of Infrastructure



- Steady growth until the early 1980s of both ton-miles and pipeline miles

Source: ENO Transportation Foundation, 1992.

### Major Crude Pipelines



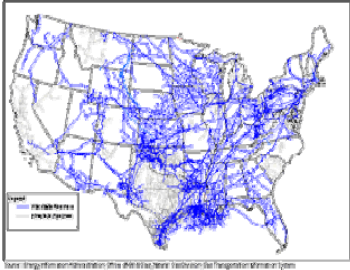
### Major Crude Pipelines



### Natural Gas Pipelines



- More than 210 natural gas pipeline systems
- 305,000 miles of interstate and intrastate transmission pipelines
- More than 1,400 compressor stations that maintain pressure on the natural gas pipeline network
- More than 11,000 delivery points throughout the United States
- 5,000 receipt points for natural gas throughout the United States
- 1,400 interconnection points that provide for the transfer of natural gas throughout the United States.
- 24 hubs or market centers that provide additional interconnections
- 400 underground natural gas storage facilities
- 49 locations where natural gas can be imported/exported via pipelines
- 8 LNG (liquefied natural gas) import facilities and
- 100 LNG peaking facilities



## Total Pipeline Mileage

- Gas Pipelines = 1,424,200 miles
  - 77% are distribution main lines
- Oil Pipelines = 160,868 miles
  - 50/50 crude vs. product lines

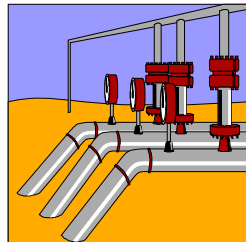


## US Pipeline Network (Product)

- Majority of Lines run from the Houston to base north to the Mid-West and to the Northeast
- Pipeline another USA major pipeline
- See Figures in book as well.

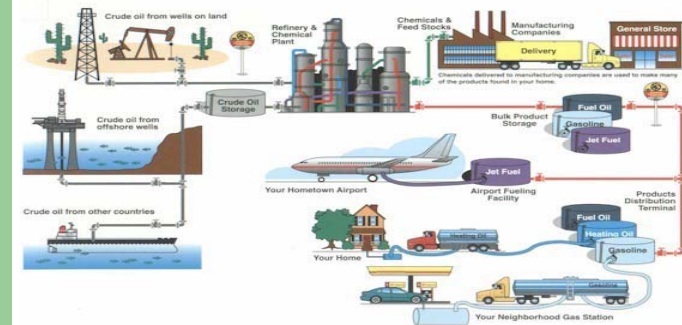
## Operations

- Similar to Hub and Spoke
- Gathering Lines
  - inches
  - Crude oil brought in
  - Field to storage or refineries
- Trunk Lines
  - inches
  - Ships crude and refined product
  - Much longer haul
- Pumping stations
- Diameter determines throughput

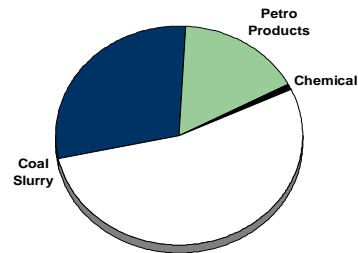


## Typical Network

### Pipeline Transportation – Supporting The American Way Of Life



## Types of Commodities



- Requires liquids for transport
  - Coal/Slurry is major exception

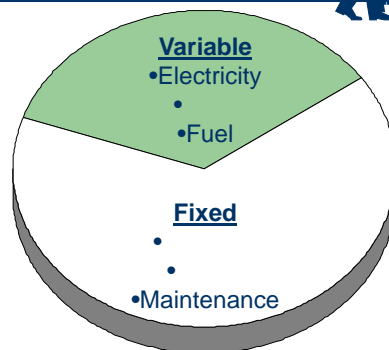
Source: ENO Transportation Foundation, 1992.

## Competition

- Intramodal
  - Oligopolistic due to few firms
  - Low due to the lack of parallel lines
  - Joint ownership between carriers and shippers
- Intermodal
  - Water - tanker barges
  - Rail competes some overland
  - Pipe is normally the best choice once it is in place

## Costs (Approximate)

- Very high fixed costs



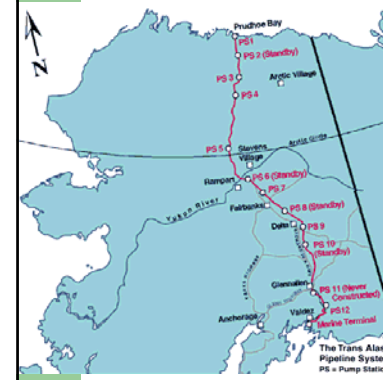
## Strengths and Weaknesses

- Advantages:
  - Normally lowest per ton-mile
  - Acts as a warehouse in transit
  - Very high dependability
  - Highest in terms of capacity
  - Very due to infrastructure
- Disadvantages:
  - Limited commodities due to
  - One of the modes
  - Less flexibility due to fixed routes
  - Right of Ways expensive and create

## Trans-Alaska Pipeline

- The Trans-Alaska Pipeline is an oil pipeline that runs from Prudhoe Bay, an arm of the Arctic Ocean, 1,285 km (800 Miles) south to Valdez, an ice-free port on the northern end on the Gulf of Alaska. The 1.2-m-diameter (48-in) pipeline is designed to carry more than 2 million barrels of crude oil per day from the Alaskan North Slopes, located some 400 km (250 Miles) north of the Arctic Circle. The North Slopes contain estimated reserves of nearly 10 billion barrels.
- The project, which received congressional approval in 1973, was opposed by environmentalists, who feared the harmful effects of the construction on the land, wildlife, and the people of Alaska; some studies have shown that oil drilling in northern Alaska has indeed caused significant environmental damage. The pipeline was built by the Alyeska Pipeline Service Company, a consortium of 8 oil corporations, and was completed in 1977 at a cost of almost \$8 billion. In addition to the pipeline, the project included a tanker terminal at Valdez, 12 pumping stations, and the Yukon River Bridge, a joint venture of Alyeska and the state of Alaska.

## Alaska Pipeline



## Trans-Alaska Pipeline

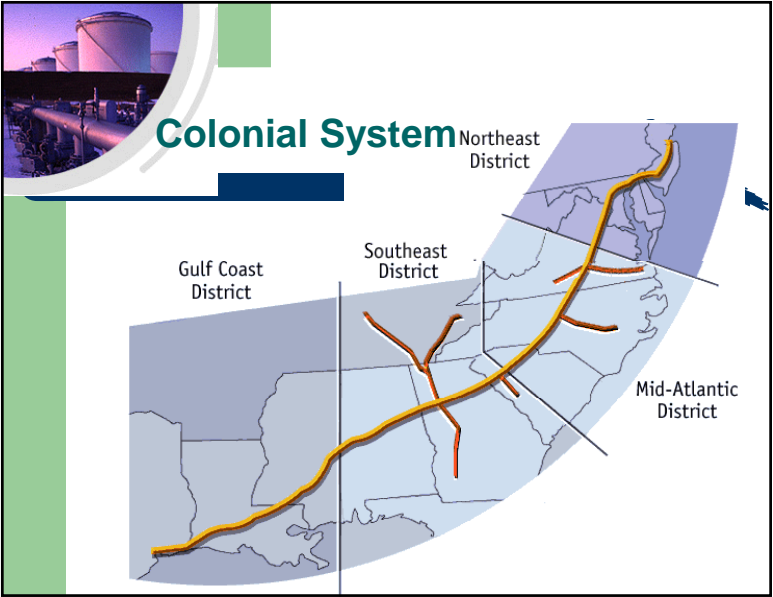


- Project was completed June 20, 1977
- There are a total of 11 pumping stations
- Here is a picture of the elevated 48-inch pipeline

## COLONIAL PIPELINE

Based in Atlanta, Colonial provides a vital service to communities and businesses throughout Eastern United States as we transport refined petroleum products. Colonial delivers a daily average of 80 million gallons of gasoline, diesel fuel, home heating oil, aviation and military fuels.

[www.colpipe.com](http://www.colpipe.com)



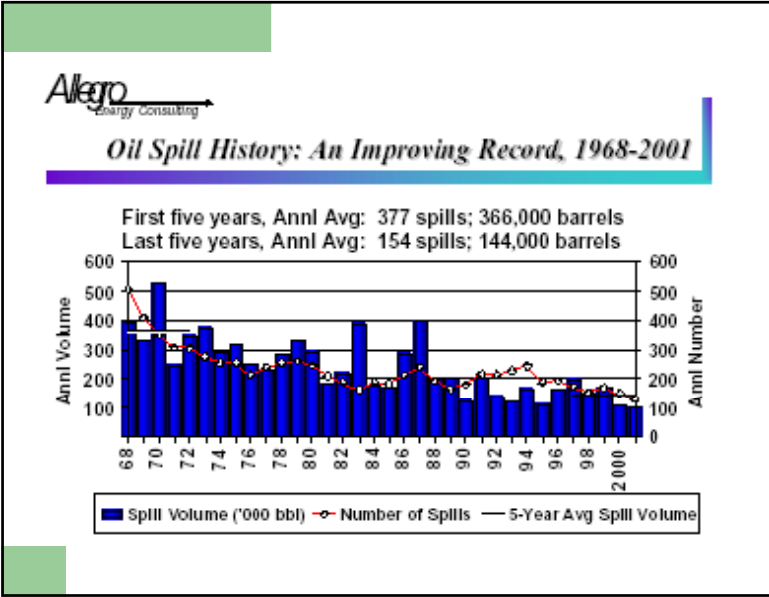
### Group Three: Maritime & Northeast Pipeline

- The pipeline consists of approximately 650 miles of underground mainline pipeline running from Goldboro, Nova Scotia through Nova Scotia and New Brunswick to the Canadian-US border near Baileyville, Maine. It later connects with the existing North American pipeline grid at Dracut, Mass.


The logo for the Maritime & Northeast Pipeline features a stylized ship icon. The map shows the pipeline route starting in Goldboro, Nova Scotia, passing through Saint John and Halifax, and ending at Dracut, Massachusetts. Other locations marked include Fredericton, Bangor, Portland, Concord, and Boston. The Sable Offshore Energy Project is also indicated.

### Current Issues

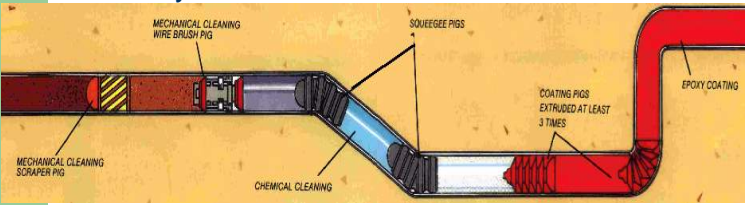
- Safety:**
  - risk is low of an accident
  - however, any accident could be extremely
  - leakage a concern (EPA)
- Forgotten mode of Transportation ( )
- Limited growth in the decade following deregulation



## Pigs



- Typical cleaning and coating process for rehabilitating an already corroded



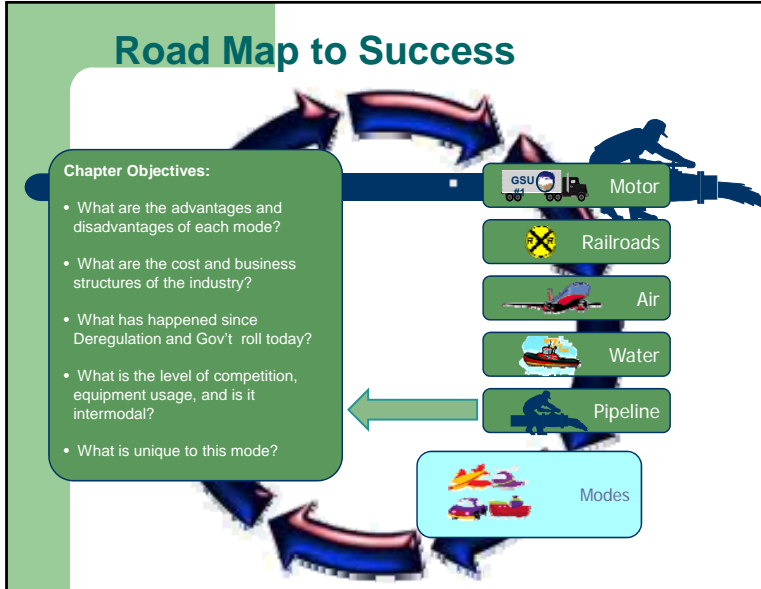
The diagram illustrates the following steps:

- MECHANICAL CLEANING WIRE BRUSH PIG**: Initial cleaning stage.
- MECHANICAL CLEANING SCRAPER PIG**: Second cleaning stage.
- CHEMICAL CLEANING**: Application of cleaning agents.
- SQUEEGEE PIGS**: Removal of excess material.
- COATING PIGS EXTRUDED AT LEAST 3 TIMES**: Application of epoxy coating.
- EPOXY COATING**: Final protective layer.

## Road Map to Success


**Chapter Objectives:**

- What are the advantages and disadvantages of each mode?
- What are the cost and business structures of the industry?
- What has happened since Deregulation and Gov't roll today?
- What is the level of competition, equipment usage, and is it intermodal?
- What is unique to this mode?



The diagram features a central green box with objectives and a circular arrangement of mode icons: Motor (truck), Railroads (train), Air (plane), Water (ship), Pipeline (oil rig), and Modes (intermodal).

## Road Map to Success



The diagram features a central blue box with 'Global Environment' and a circular arrangement of five interconnected boxes: Transportation Management Practices (chess pieces), Transportation Economics (money), Specialty Areas (globe), Modes (intermodal), and Global Environment (globe).