

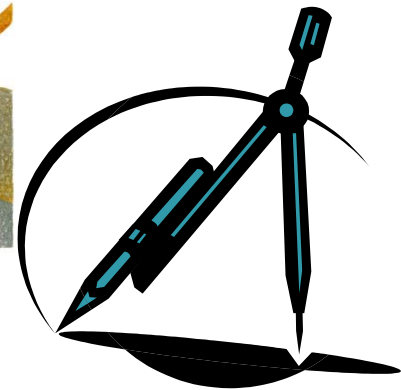
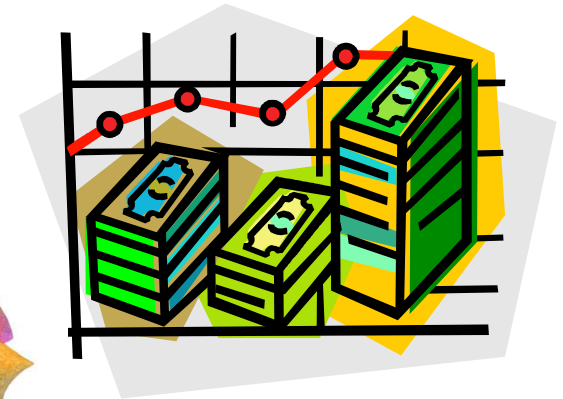
The Relationship of Economics, Engineering and the Environment at Coastal Plant Sites

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Topics

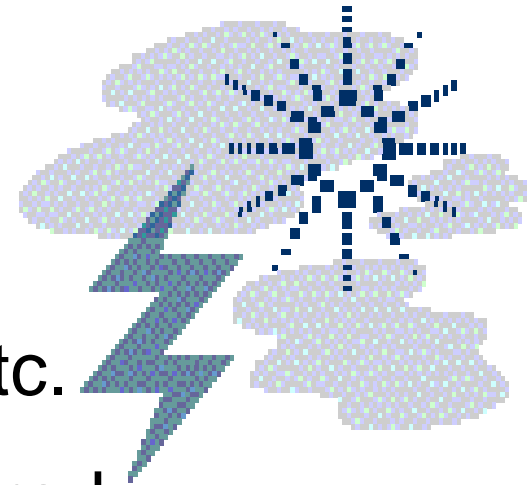
- Personal Experiences
- Engineering
- Environment
- Economics



Engineering Issues at a Site

Climatic Conditions

- Historical data of temperature, humidity, wind, storms, flooding, etc.
- Different for US Gulf Coast compared to Middle East Gulf area or North Sea coast
- Impact on materials of construction, cooling/heating requirements, waste treatment and costs





Orange, TX



Engineering Issues at a Site

Process Water

- salinity
- availability and recycling
- biological growth and fouling

Materials of Construction

- corrosion
- salt mist or salinity

Engineering Issues at a Site

Foundations Depending on Soil Loading

- water table
- flooding
- soil composition
- floating or pilings



Engineering Issues at a Site

- Cooling and Heating
- Additional equipment or additional capacity of equipment
 - wet bulb conditions- high humidity
 - dry bulb conditions- low humidity
 - extreme low or high temperatures

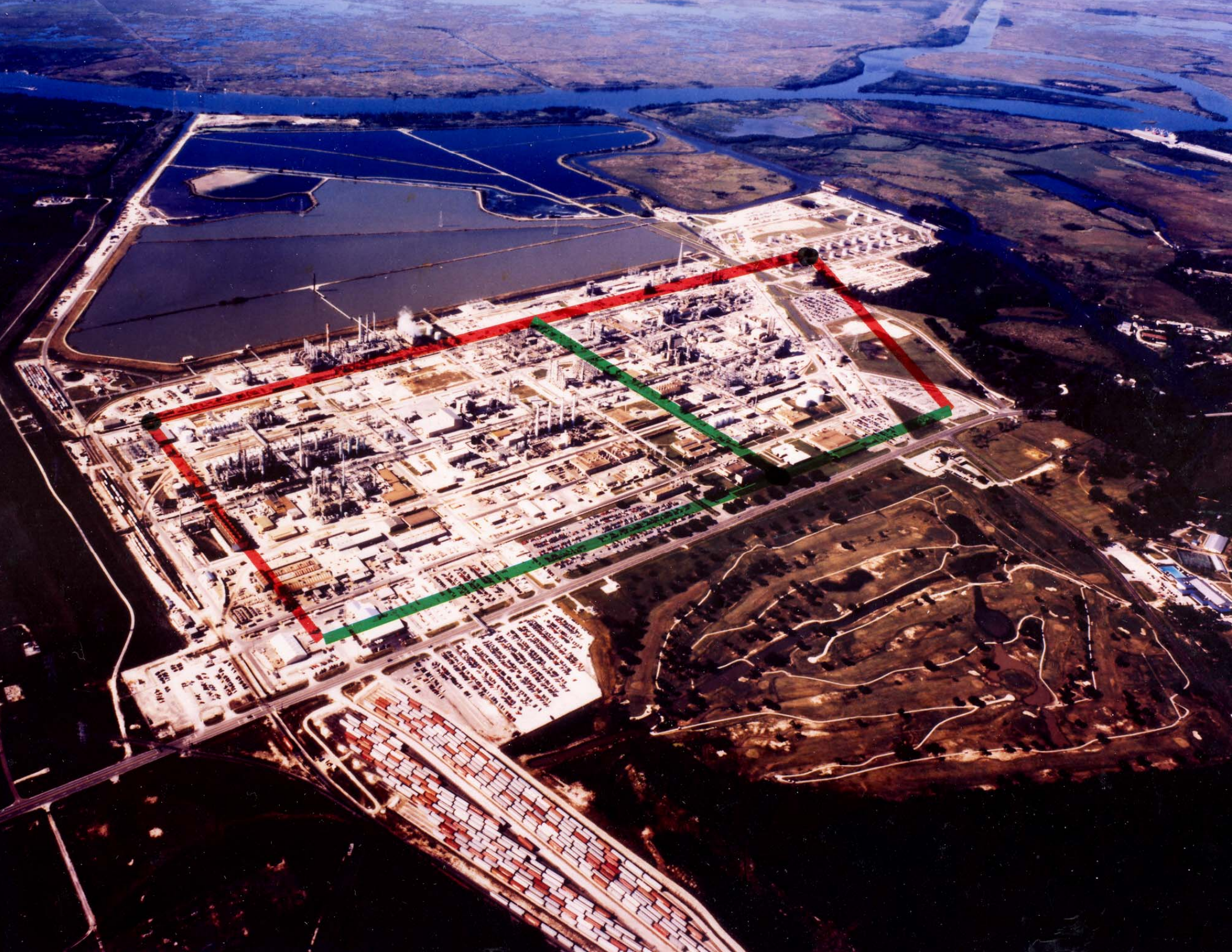
Environmental Issues at a Site

Waste treatment

- Air
 - Scrubbers
 - Thermal
- Liquid
 - Biological, thermal, deepwells or concentrate
- Solid
 - Landfill or thermal

Environmental Issues at a Site

- Prevention of releases with safety and process hazards reviews
- Unplanned releases and environmental impact
- Impact to waterways are usually most immediate and visible



Economic Issues at a Site

Total Costs

- Dependent on site location and the requirements discussed
- Transportation of raw materials and finished products
- Other issues may drive the decision
 - Where are your markets?
 - Where are the lowest price raw materials? Oil or coal based?



Economics Issues at a Site

To Help Maintain a Good Cost Position

- Good relations with Community & Local, State and Federal Agencies
- Constant and proactive involvement
- Good science that maintains involvement with new technologies and research
- Sourcing of equipment, raw materials

Summary

- Issues are similar around the world
- Emphasis may be different in different parts of the world
- Sum of the different elements determines final decision

