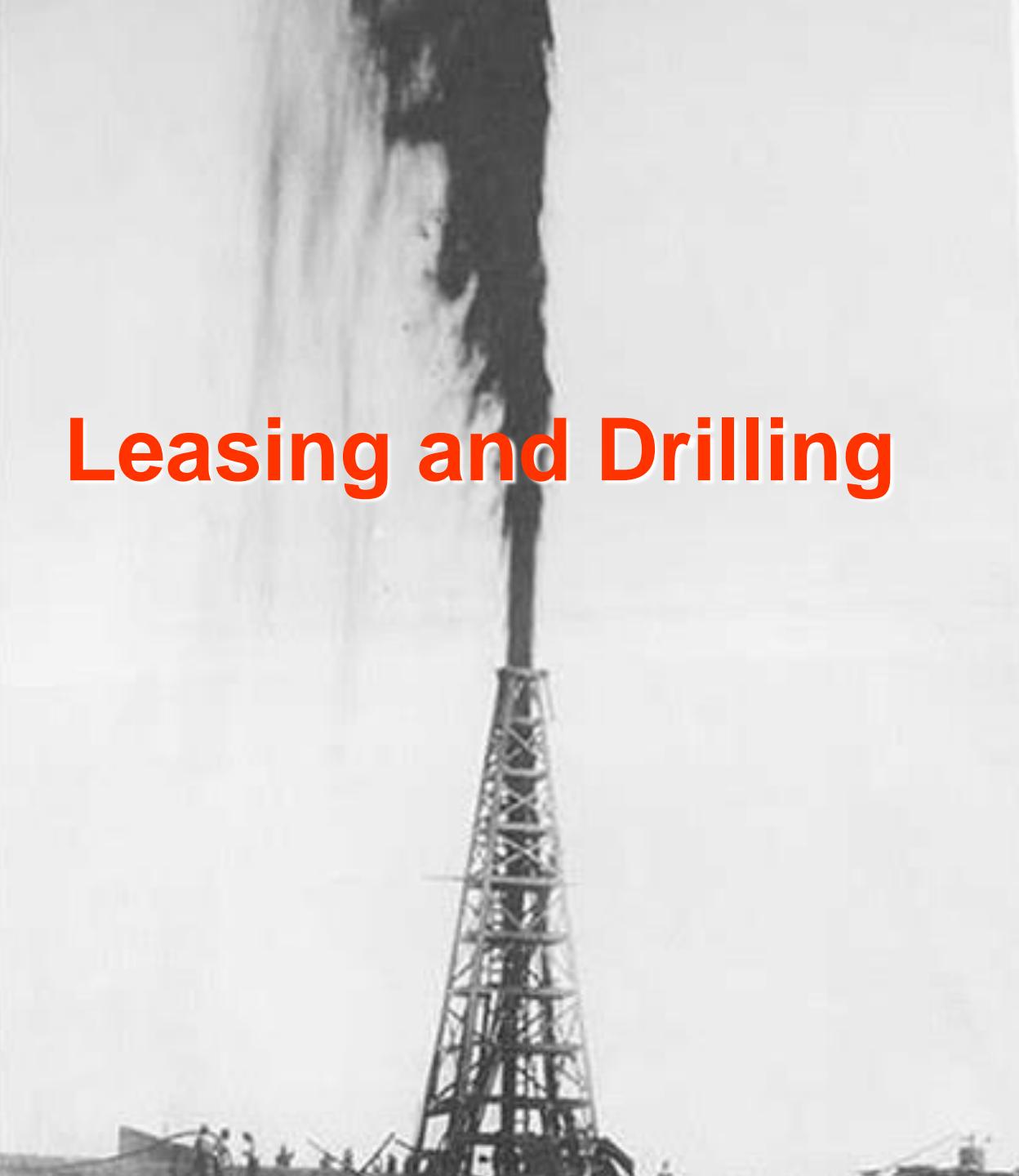


# Leasing and Drilling



# **Rights To Drill**

**Who can drill?**

**Who pays to drill the well?**

**Most importantly: Who gets the money?**

**Only the United States allows private ownership of mineral rights.**

**Throughout the rest of the world, the State owns all minerals, except in very remote areas where the gun controls who owns the resources.**

# **Land Ownership**

**Land in the United States is owned by individuals, companies, states, or the federal government.**

**In the United States land ownership is either surface or subsurface mineral rights.**

**Surface or subsurface mineral rights can be bought, sold, or leased, separately.**

# **Oil Leases**

**Oil lease: right to explore and develop oil and gas from landowner.**

**Leases are for specified surface areas and are unlimited vertically = they can drill as deep as they want.**

## **“Show me the money”**

**Signature bonus:** money the landowner receives at the time of signing the lease.

**Royalties:** fraction of the revenue from each barrel of oil or cubic gas sold (typically 1/8<sup>th</sup>), Government land (1/6<sup>th</sup>).

# So You Want To Be An Oil Baron

1979 oil royalties from oil lease on a 25 acre farm on Oklahoma

<u>Year</u>	<u>Month</u>	<u>Lease</u>	<u>Barrels</u>	<u>Tax</u>	<u>Net Value</u>	<u>Owner's account</u>
1979	1	448545	180.9	412.1	5404	4.82
1979	2	448545	0	36.13	473.92	0.42
1979	3	448545	393.1	448.4	5879.91	5.25
1979	4	448545	211.3	272.4	3598.04	3.21
1979	5	448545	178.2	244.2	3202.65	2.86
1979	6	448545	206.5	390.1	5104.05	4.44
1979	7	448545	207.1	392.3	5144.07	4.59
1979	8	448545	209	425.5	5580.22	4.96
1979	9	448545	0	3.7	48.56	0.04
1979	10	448545	278.2	410.3	5381.17	4.80
1979	11	448545	211.2	516.2	6769.85	6.04
1979	12	448545	0	7.48	98.11	0.09

Price of oil  
\$25/b

Total

1975

\$3559

\$46684.55

\$41.52!

# **Government Leases**

## **Onshore leases:**

**Awarded non-competitive bids on a first come first served basis**

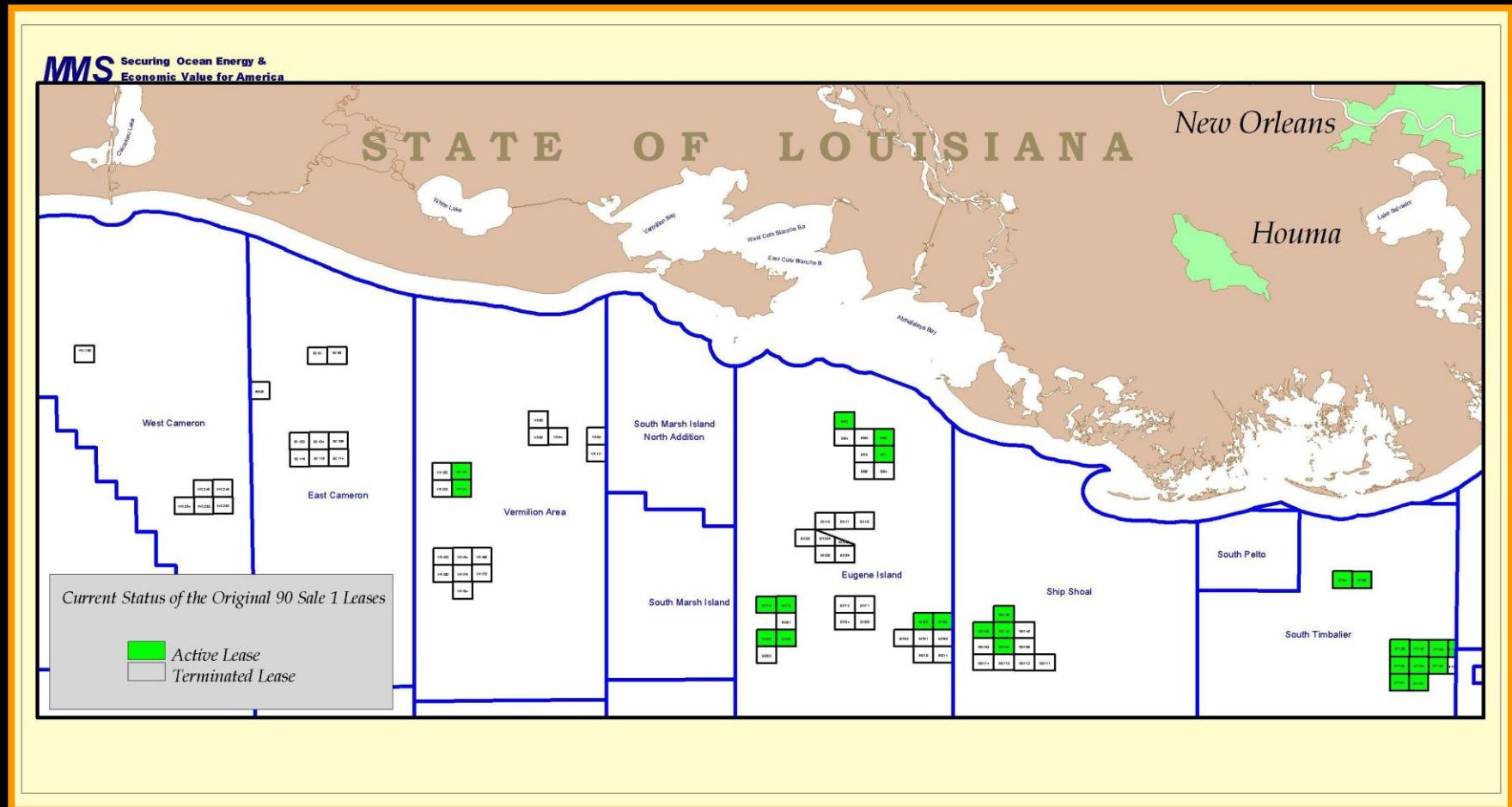
## **Offshore leases:**

**Area (parcels) usually fixed and not subject to negotiation.**

**Awarded by competitive bidding in areas of high interest = offshore.**

**May generate 100's millions of dollars of lease bonuses for the federal government.**

# Offshore Lease Sales

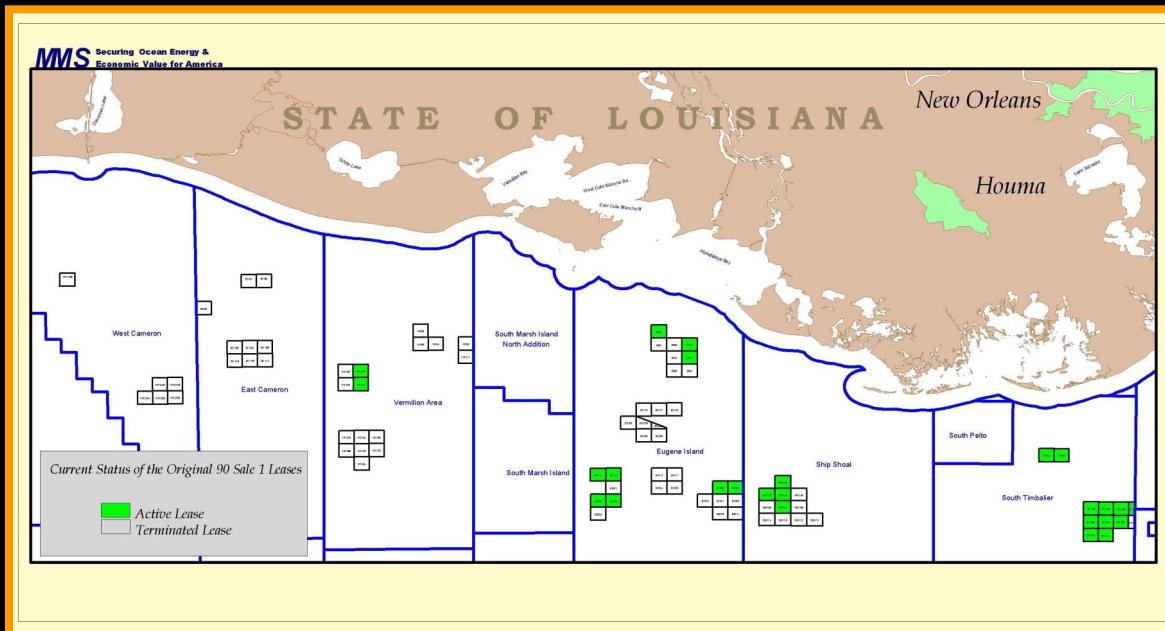


**Bid on parcels put up for lease either by state or the federal government.**

# Politicians Against Offshore Drilling Frequently Opine:

**Oil companies have millions of offshore acres that they haven't drilled. If they fail to drill these leased parcels, the leases should revert to the federal government.**

**What is wrong this statement?**



# **International Leases**

**Negotiated with the government of the country.**

**Leases vary between countries and depends on the needs of said country.**

# **International Petroleum Contracts**

## **Host country objectives and needs:**

**Expertise**

**Financial capital**

**Jobs: nationals vs. expatriates**

## **Operating company objectives:**

**Geologic potential**

**Fiscal terms**

**Political risks**

# **Types of Agreements**

## **Concession contracts:**

**Percentage of revenue.**

**Taxes on companies profits from production.**

## **Production-sharing agreements:**

**Profits are split between companies and country.**

## **Service contracts:**

**Company is paid on a \$/bbl basis to conduct operations.**

# **Nationalization of company assets by the host country**

# **Expropriative Tools other than Nationalization**

**Taxes increased on oil revenues.**

**Reference price for crude that is taxable is raised.**

**Production can be restrained.**

**Tariffs and license fees can be imposed.**

# **Political Factor**

**Operating company must never forget that the host government may come under extreme pressures to eject any foreign company that is perceived to be profiting excessively.**

An aerial black and white photograph showing a vast oilfield. The landscape is covered with a dense network of tall, thin oil derrick structures, many of which appear to be inactive or partially collapsed. A complex web of pipes and roads crisscrosses the area between the derricks. The terrain is flat and appears to be a mix of dirt and light-colored rock or sand.

**Early Abuse Resulted in  
Regulation of Drilling  
and Production of Oil**

# **Protecting Landowner's Rights**

**Rule of capture:** law that conveys title of oil and gas to whomever drills a well and produces it, even if the oil may have migrated from an adjacent property.

# **Closeology = No Control Of Well Spacing**

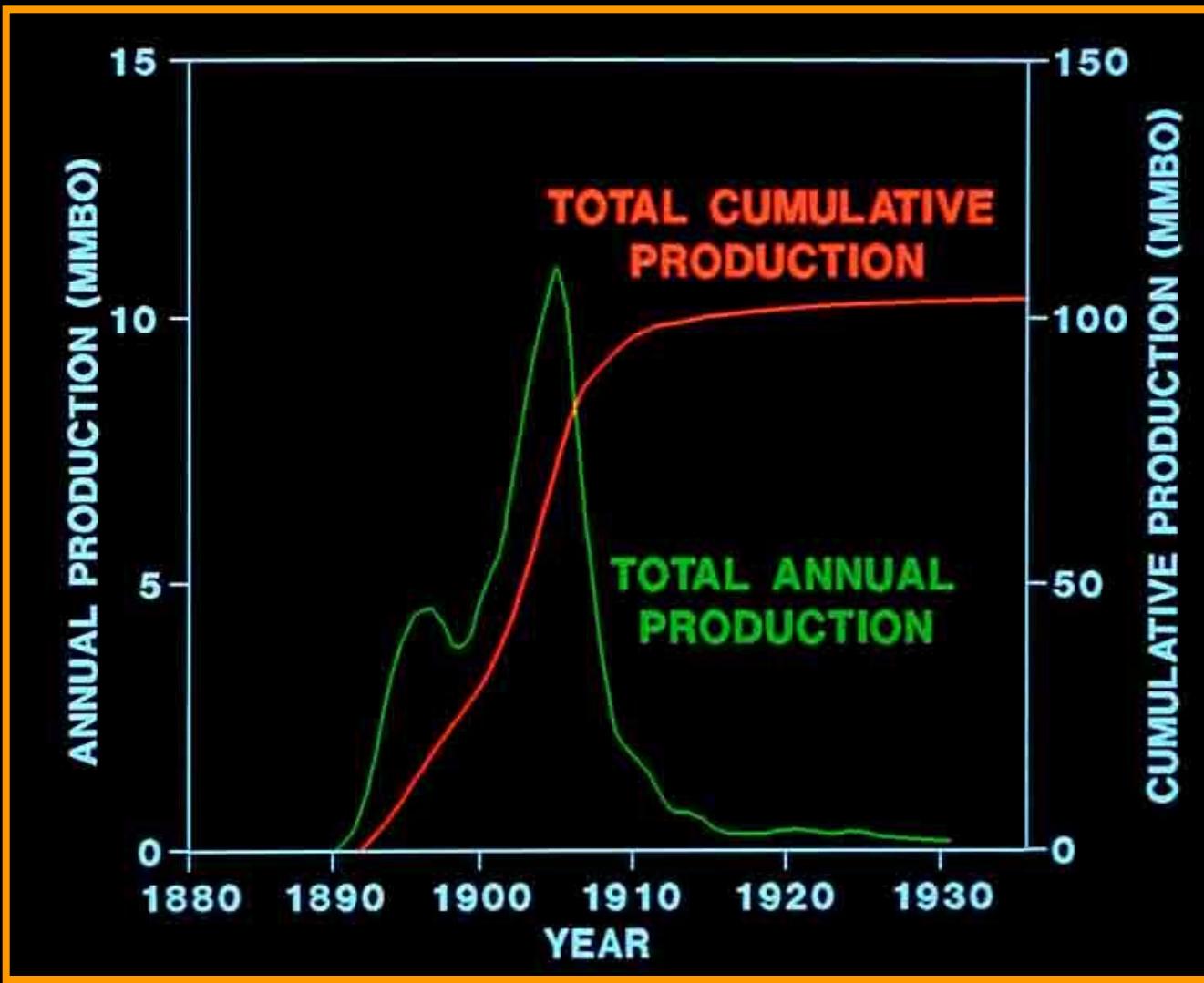


**Unregulated drilling:**

**Bad economics.**

**Very bad for long term production from the field.**

# The Sad History of the Trenton Field, Indiana



# **Regulatory Rules for Field and Well Production**

**Well spacing**

**Slant drilling**

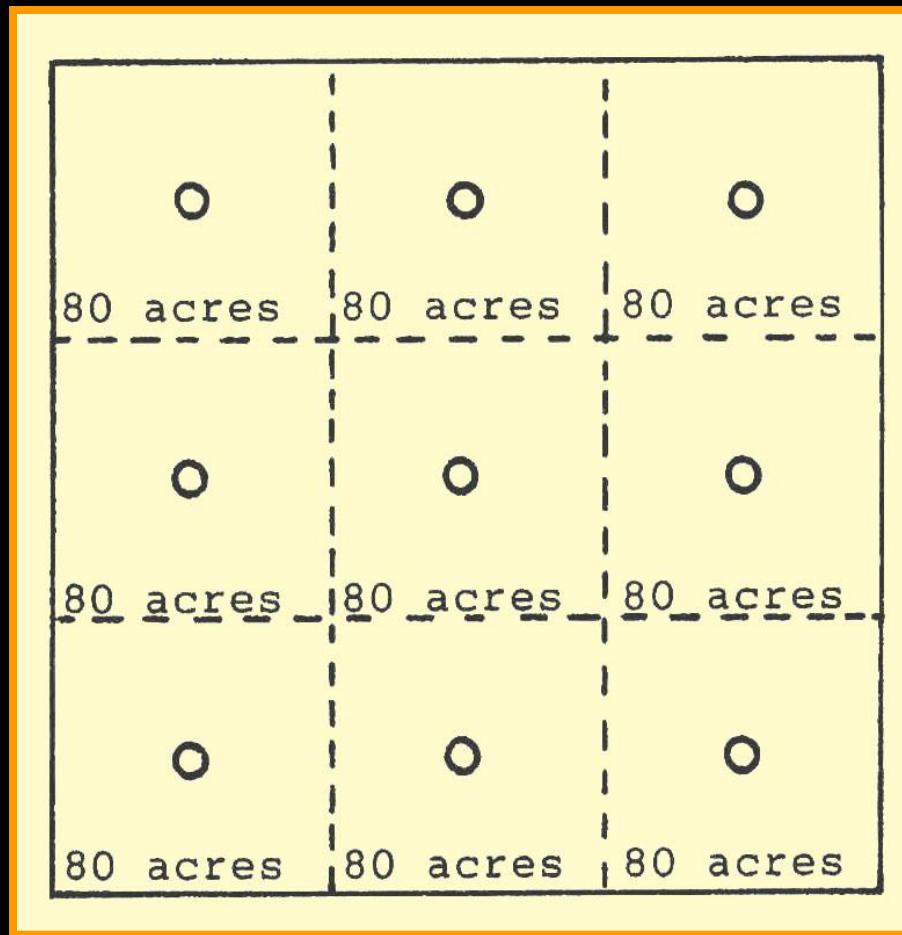
**Offset drilling rule**

**Minimum distance from property line**

**Well allowables**

**Proation (Texas Railroad Commission)**

# Well Spacing



Regulation of the number of wells per acre

# **Well Allowables**

**Well allowables is the maximum number of barrels a well can produce per day.**

**Well allowables protect oil field and maximize the recovery of oil by equalizing the drop in reservoir pressure throughout the field.**

**Avoid over production and collapse of oil prices.**

**Well allowables vary depending on the type of oil.**

# **Proation (Texas Railroad Commission)**

**Controls the amount of oil produced in Texas.**

**Limits the number of oil producing days in a month.**

**Proation is used to limit all out maximum pumping in order to reserve some amounts of oil = excess capacity.**

**Proation is a thing of the past in the United States.**

**All wells in U.S. are producing at maximum capacity.**

**We do not have excess capacity!**

# **Regulating Hazards to Health and Environment**

**Regulation of specific casing and cementing standards and abandonment procedures in order to protect freshwater zones.**

**Regulates gas flaring, drill cutting disposal, saltwater spill containment, and clean-up.**

**Sets safety standards for toxic gas, chemical handling, and safety controls.**

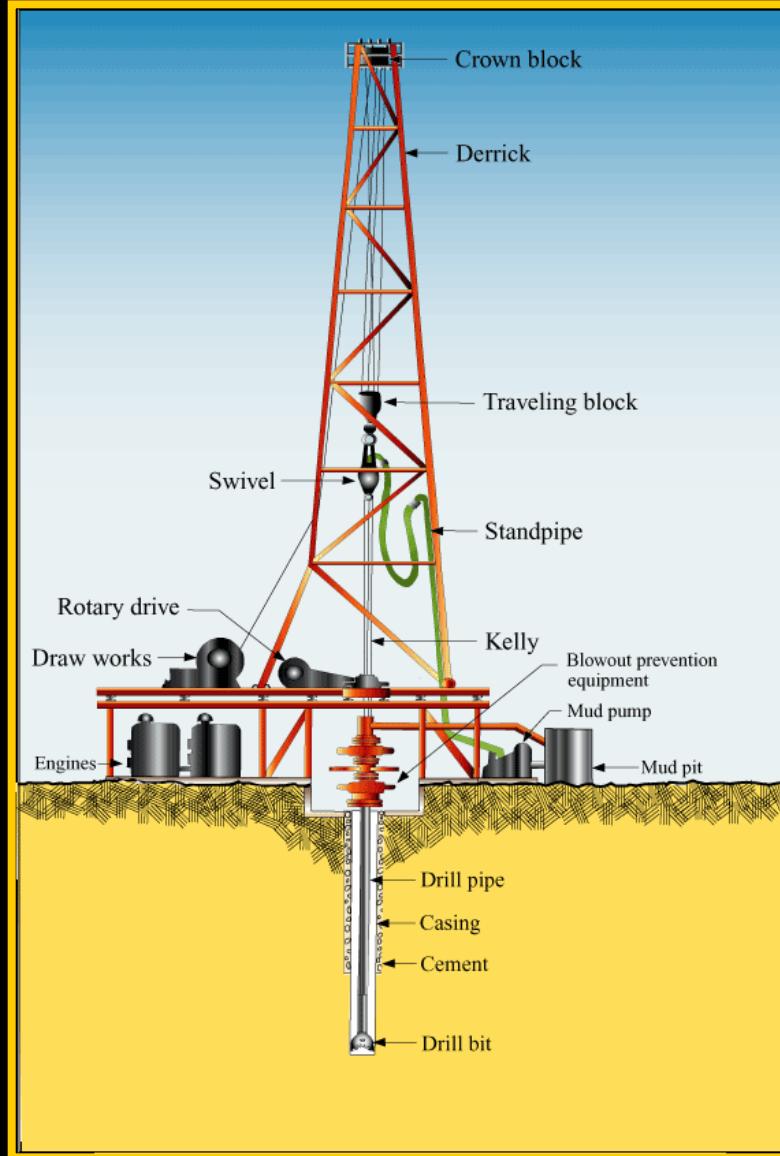
# Drilling



# Aerial View of Drilling Operation



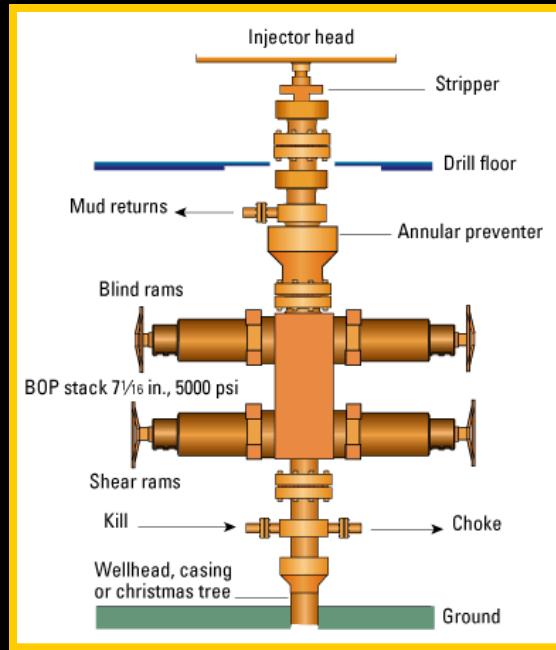
# Drilling Operation



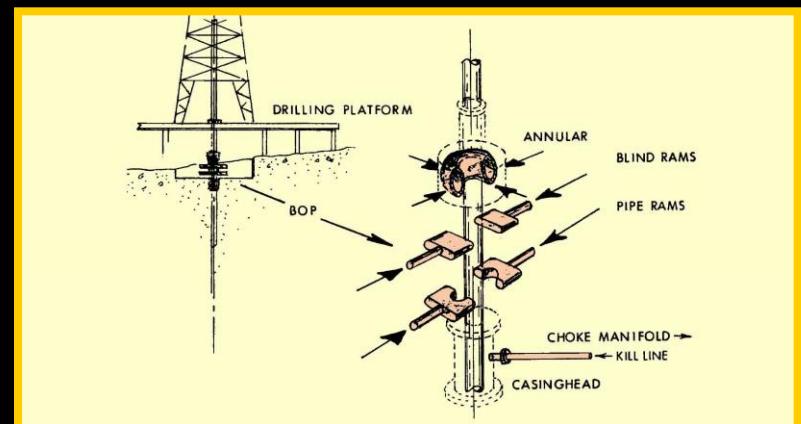
# Blowout Preventer



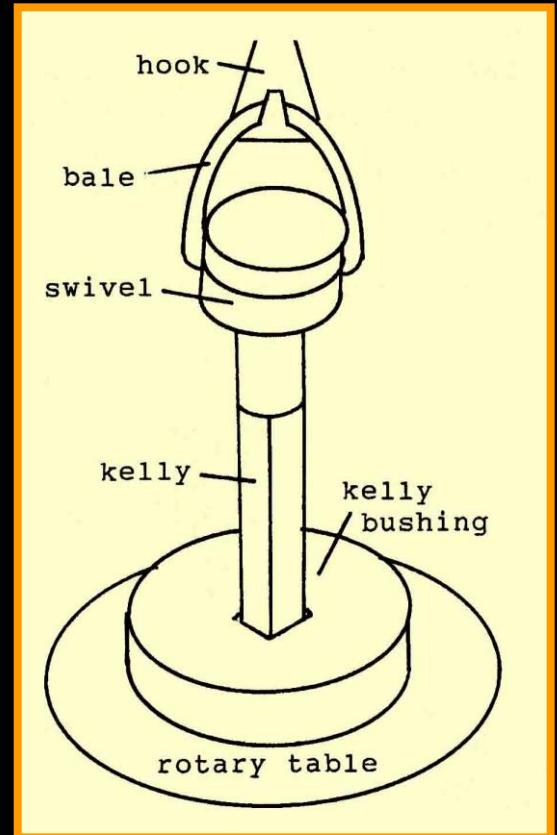
**Big and massive**



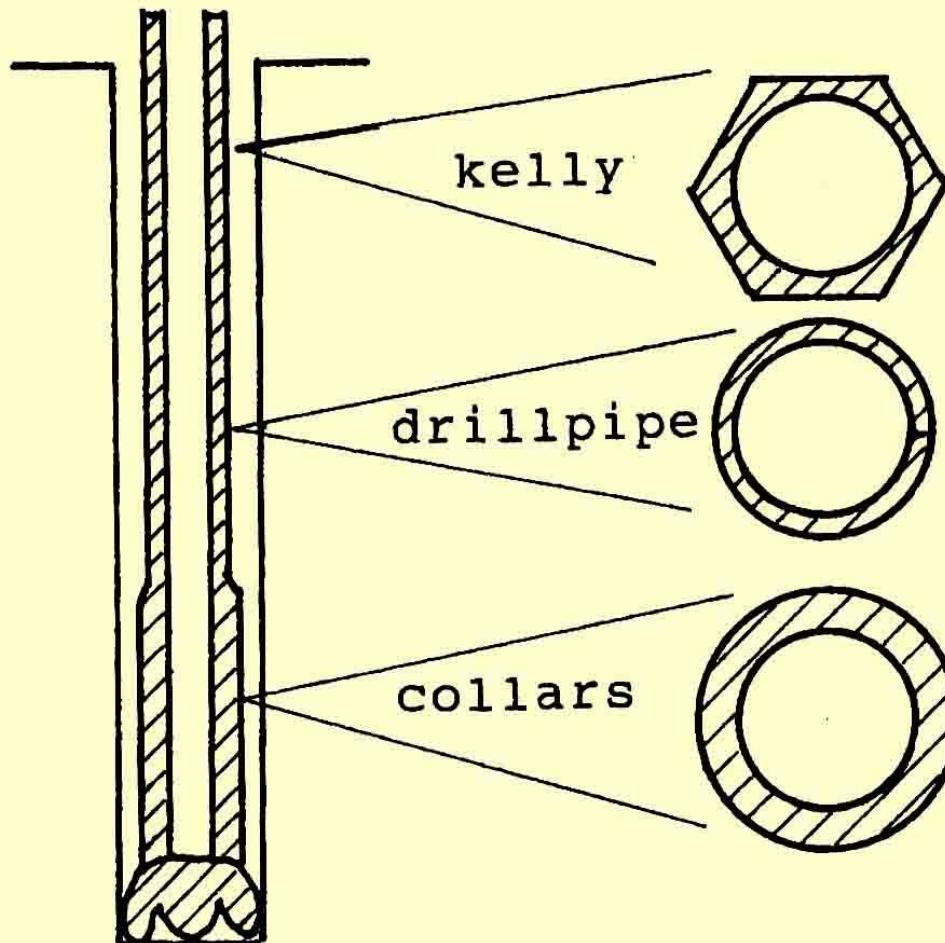
**Christmas Tree**



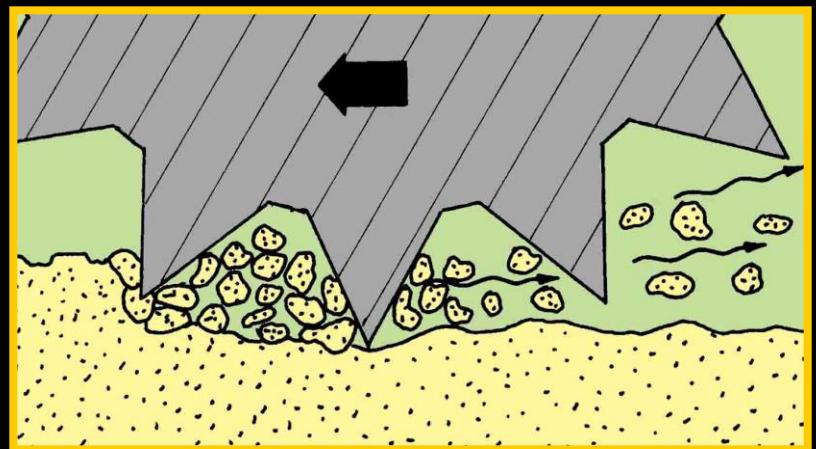
# Drilling Floor, Rotary Table and Kelly



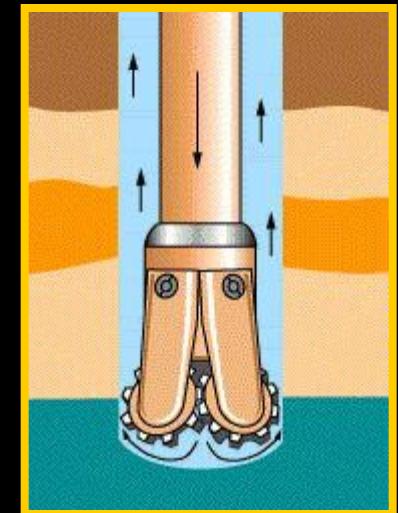
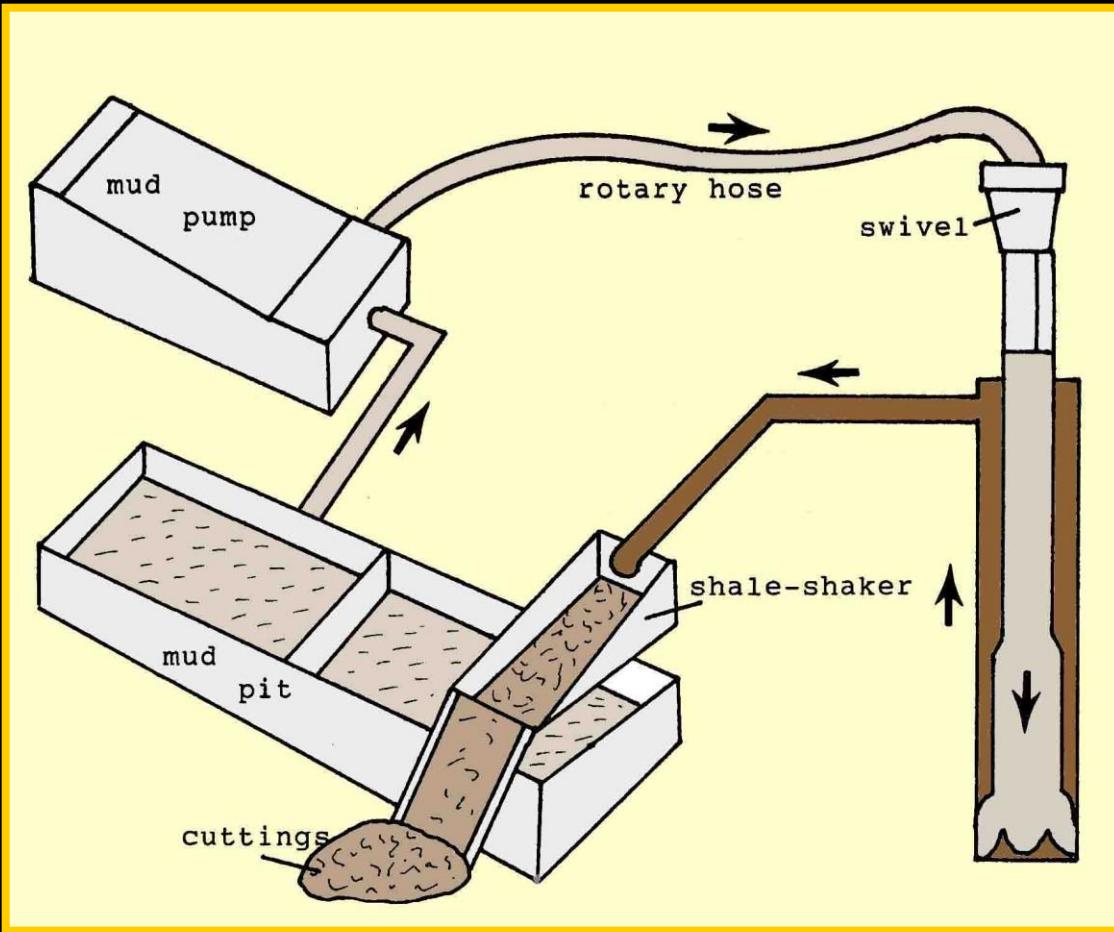
# Drill String



# Drill Bit



# Drilling Fluids (Mud)



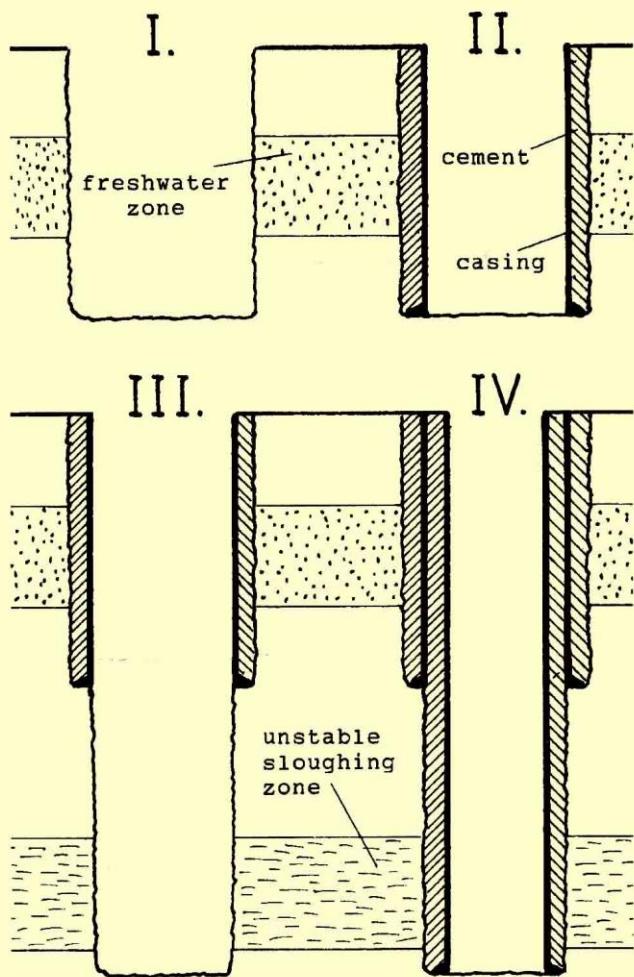
**Drilling mud circulation**

1. Keeps drilling bit cool
2. Removes drill cuttings
3. Prevents gas blow-outs

# More Depth, More Casing Added



# Casing



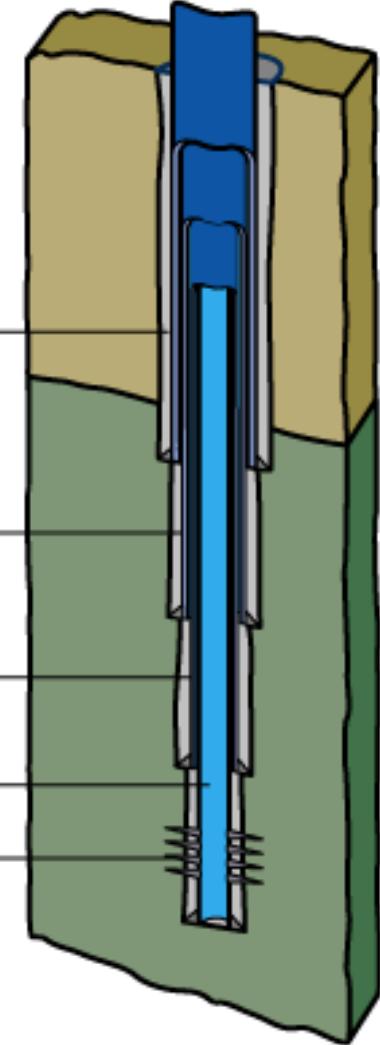
Conductor pipe \_\_\_\_\_

Surface casing \_\_\_\_\_

Intermediate casing \_\_\_\_\_

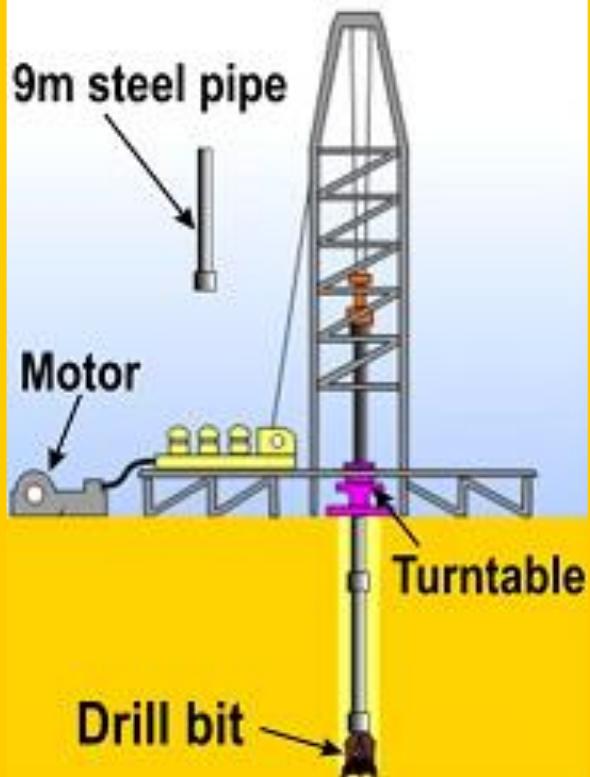
Production casing \_\_\_\_\_

Perforated interval \_\_\_\_\_

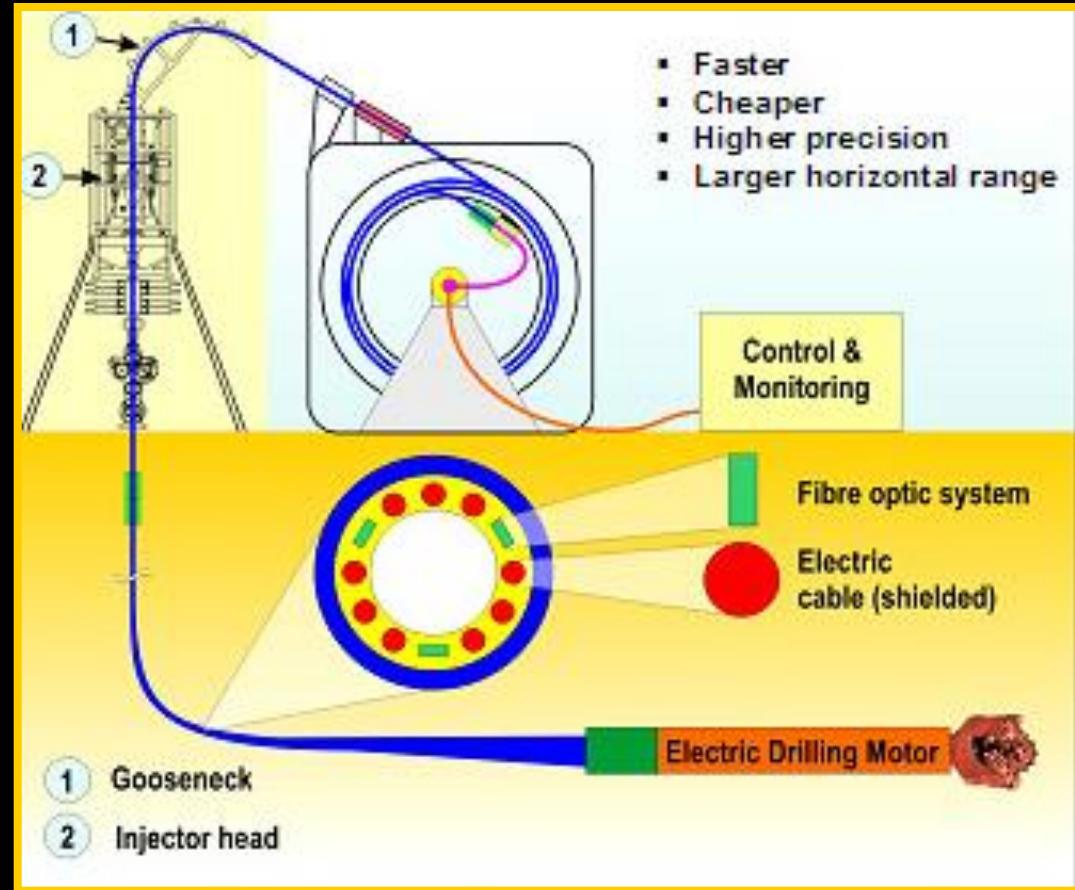


# New Drilling Technologies

Conventional drilling



Traditional vertical drilling



Continuous coil and horizontal drilling

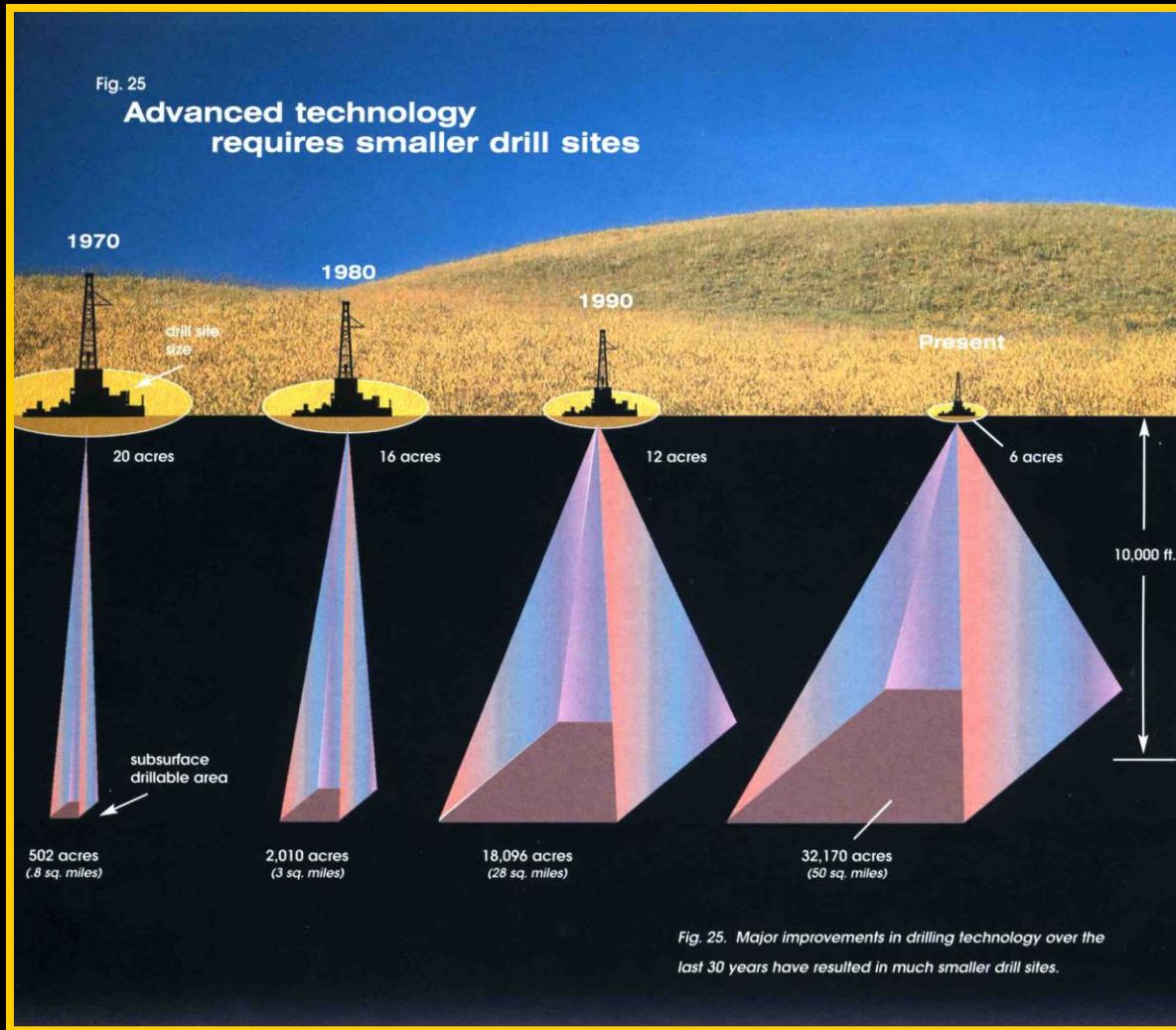
# Drilling in Stillwater, OK



**My wife's cousin owns the mineral rights to house lot (1/16<sup>th</sup> of an acre) she recently sold. Her first royalty check 3 months after the wells were completed was \$200.**

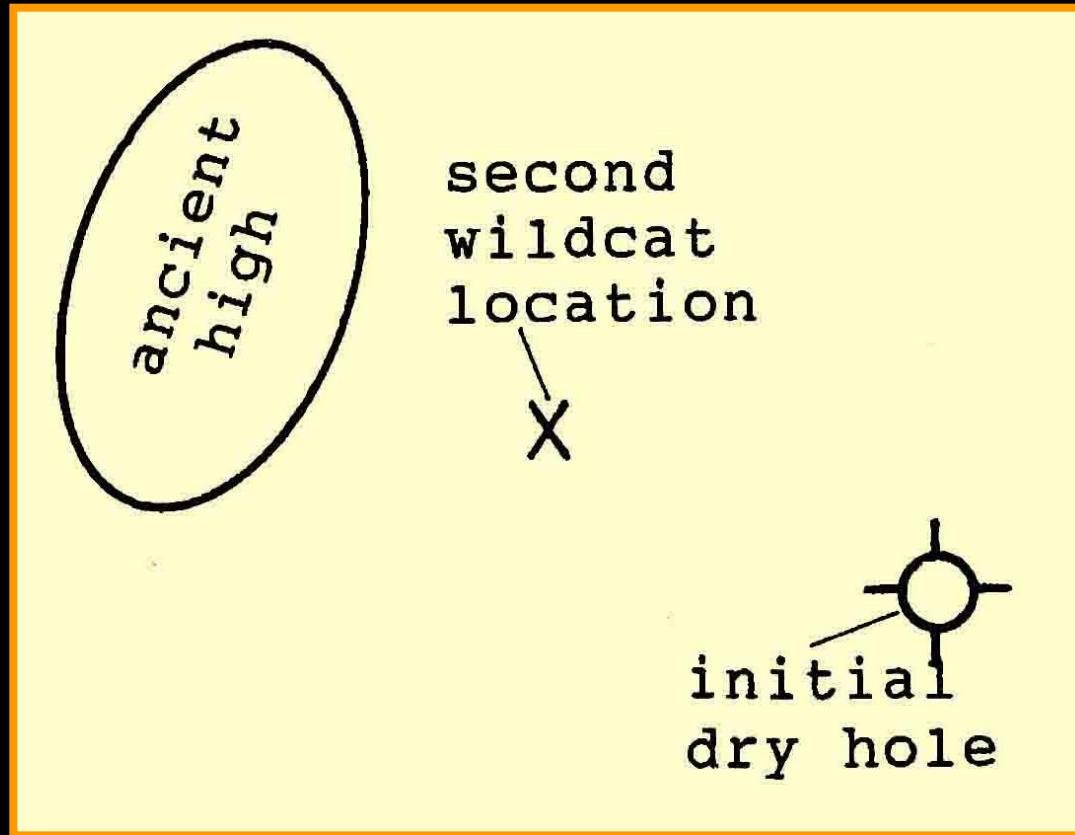
**Never sell the mineral rights!**

# New Technologies have Changed How We Drill for Oil and Gas



Greatly reduce drilling foot print

# Dry Hole What Now?



Pack-it-in or drill another well

**Jackpot!**



# **Reservoir Evaluation**

**Physical characteristics:**

**Thickness and aerial distribution of the pay zone = amount of oil present.**

**Evaluate the characteristics of the producing zone for porosity and permeability.**

**Quality of the oil.**

**Reservoir pressure.**

**Key to whether a field is brought into production:**

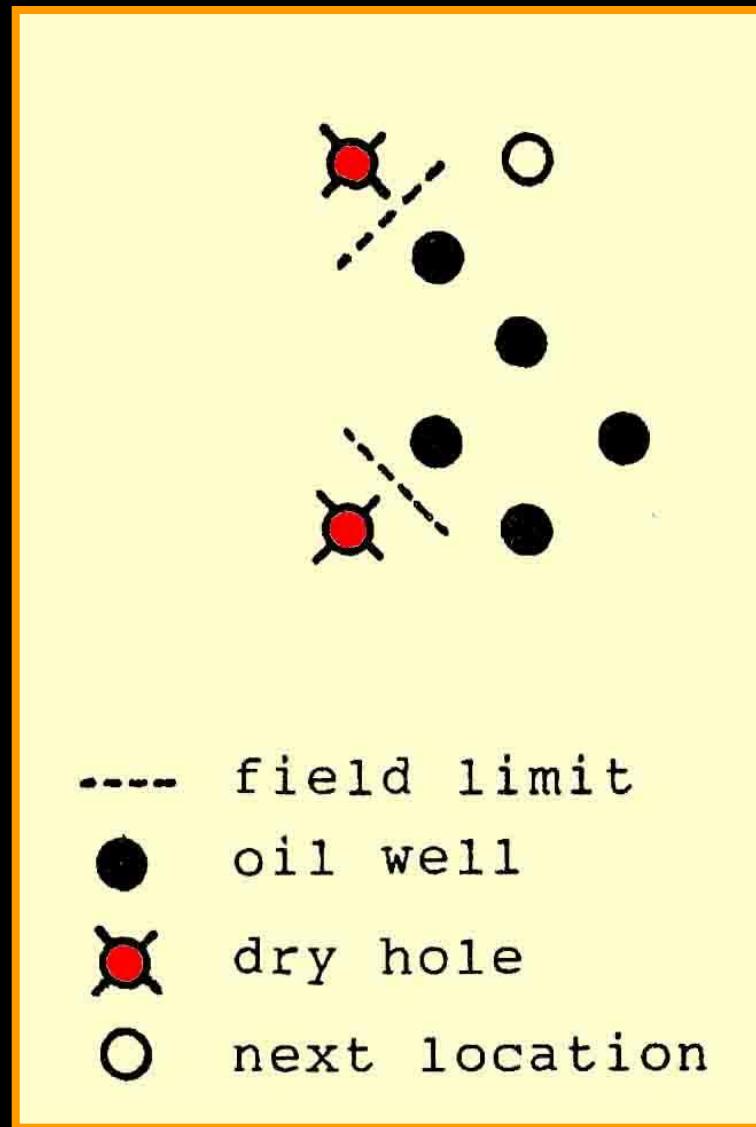
**Can they make a profit.**

**Profit depends on:**

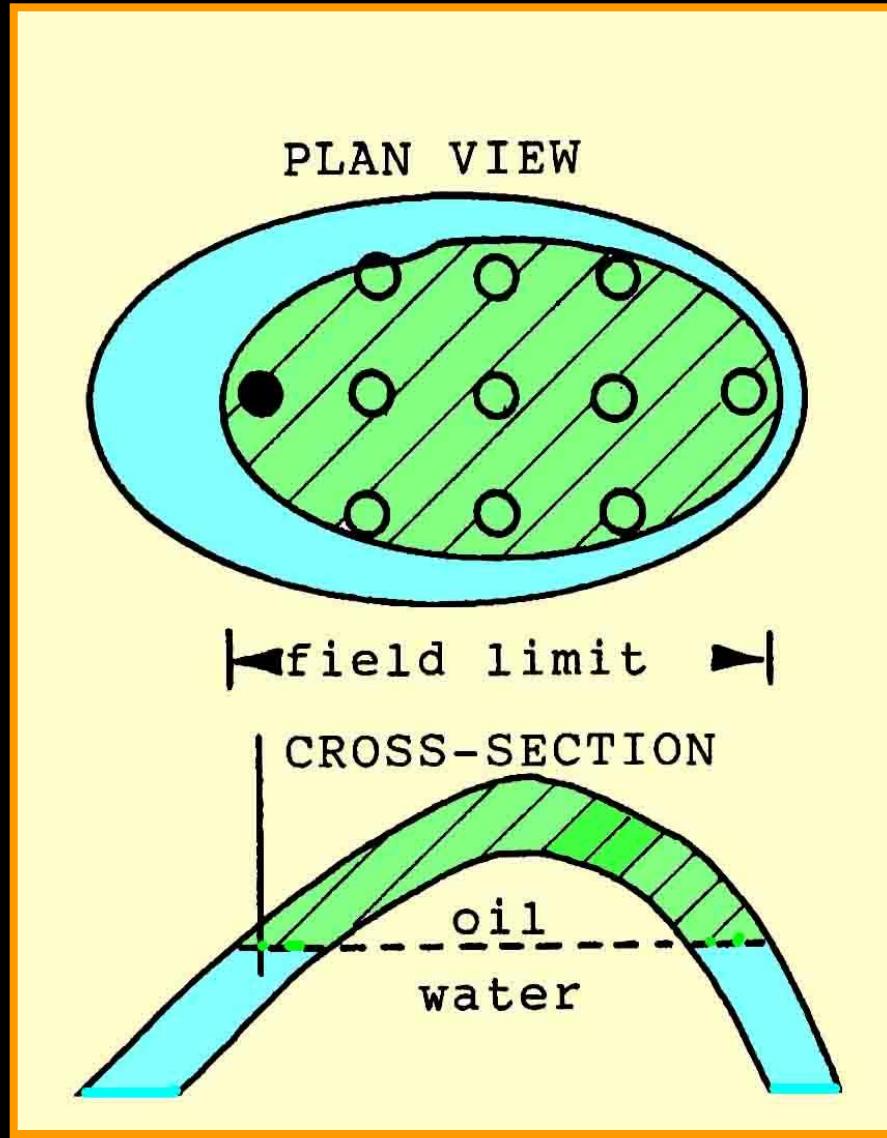
**Size of reservoir.**

**Type of oil produced.**

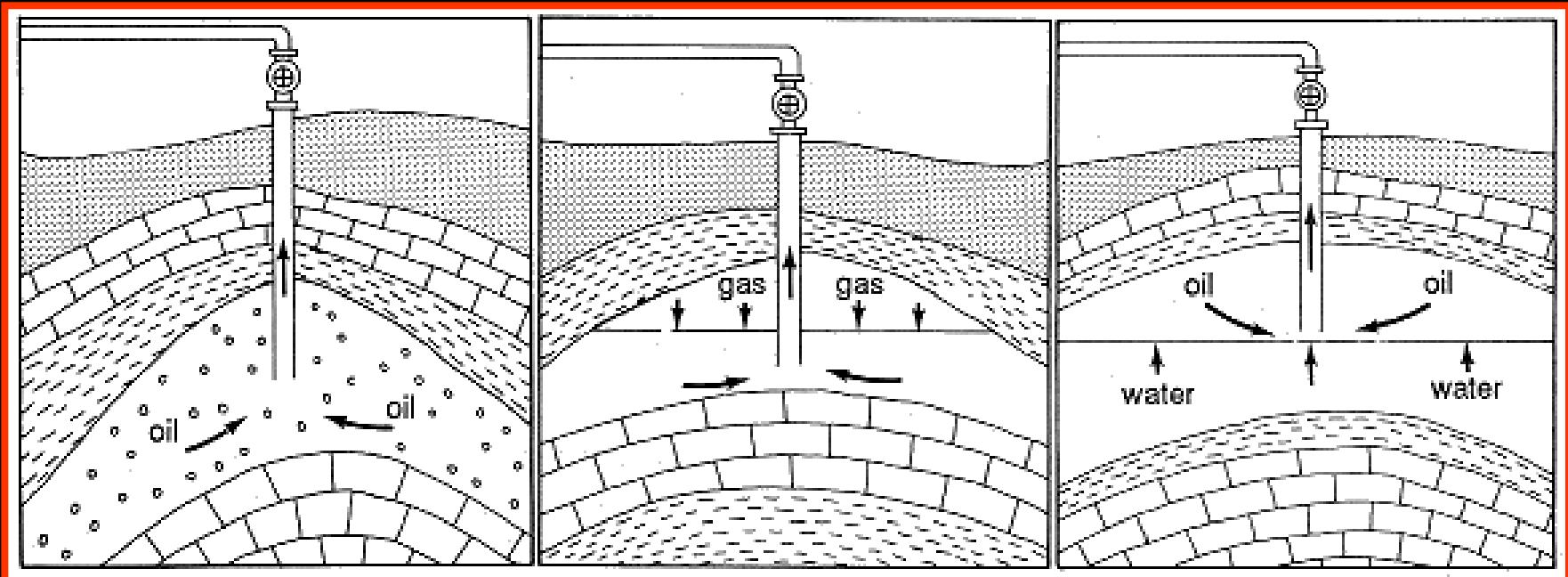
# Determining Field Limits



# Determining Field Limits



# Reservoir Driving Mechanism (Free Flowing Well)

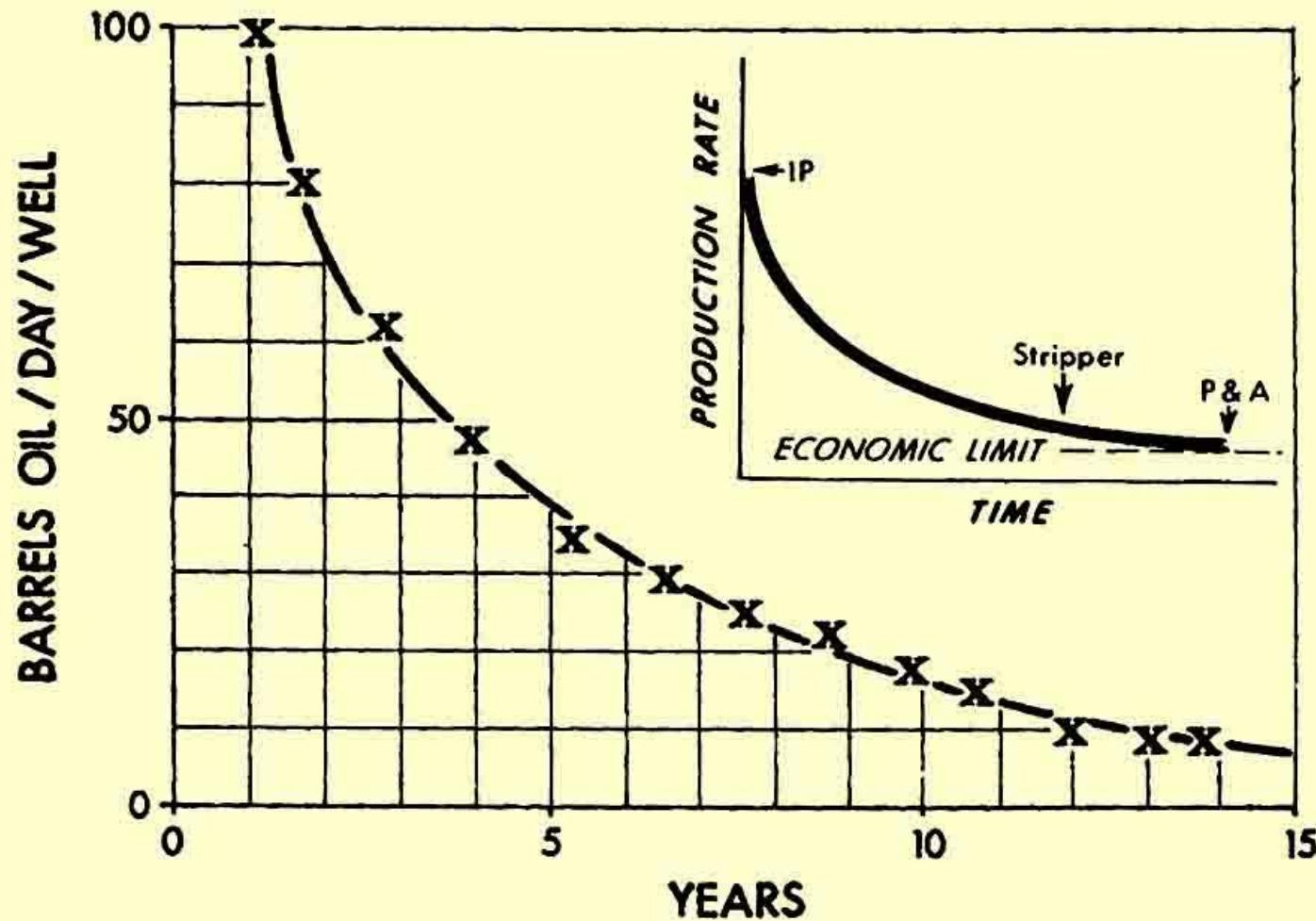


Dissolved gas drive

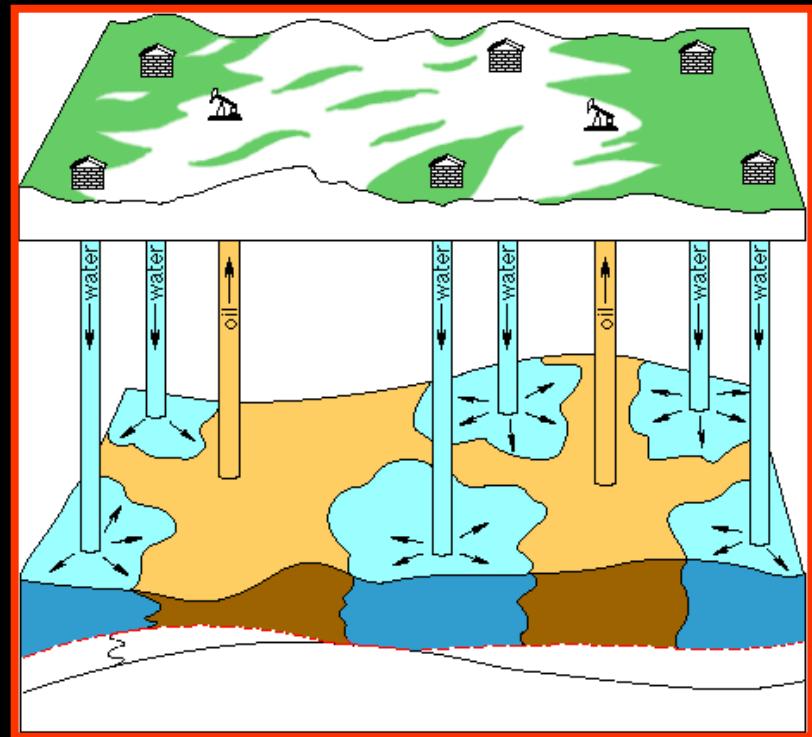
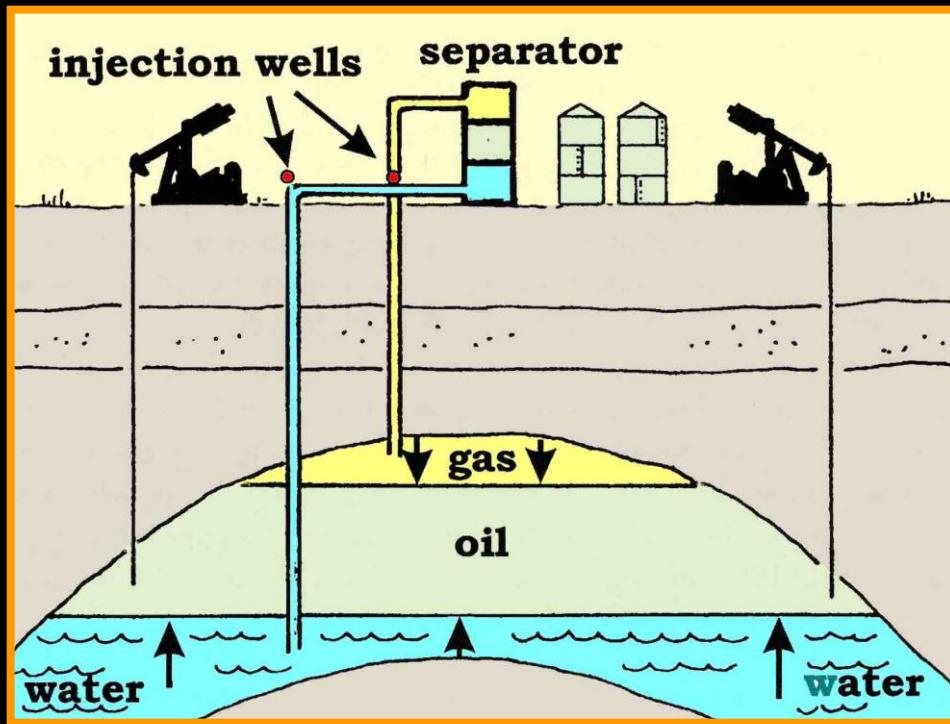
Gas –cap drive

Water drive

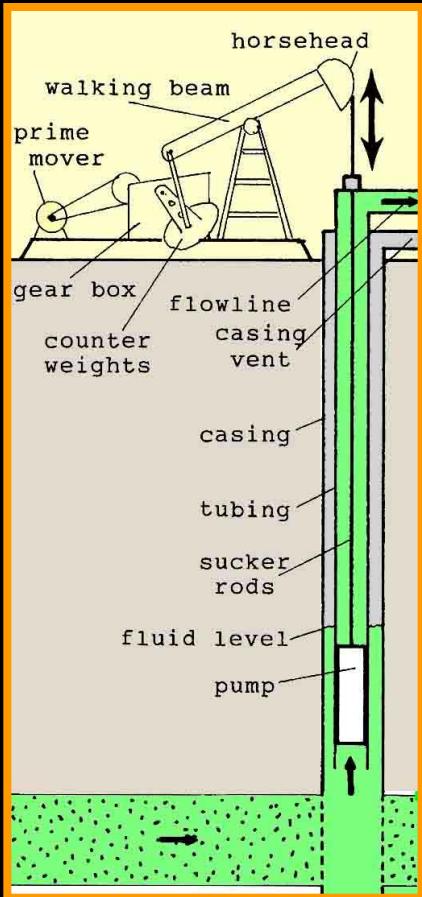
# Typical Production History



# Maintaining Reservoir Pressure Gas and Salt Water Injection



# Oil Pump Sucker-rod Pumping



Sucker-rod Pumping

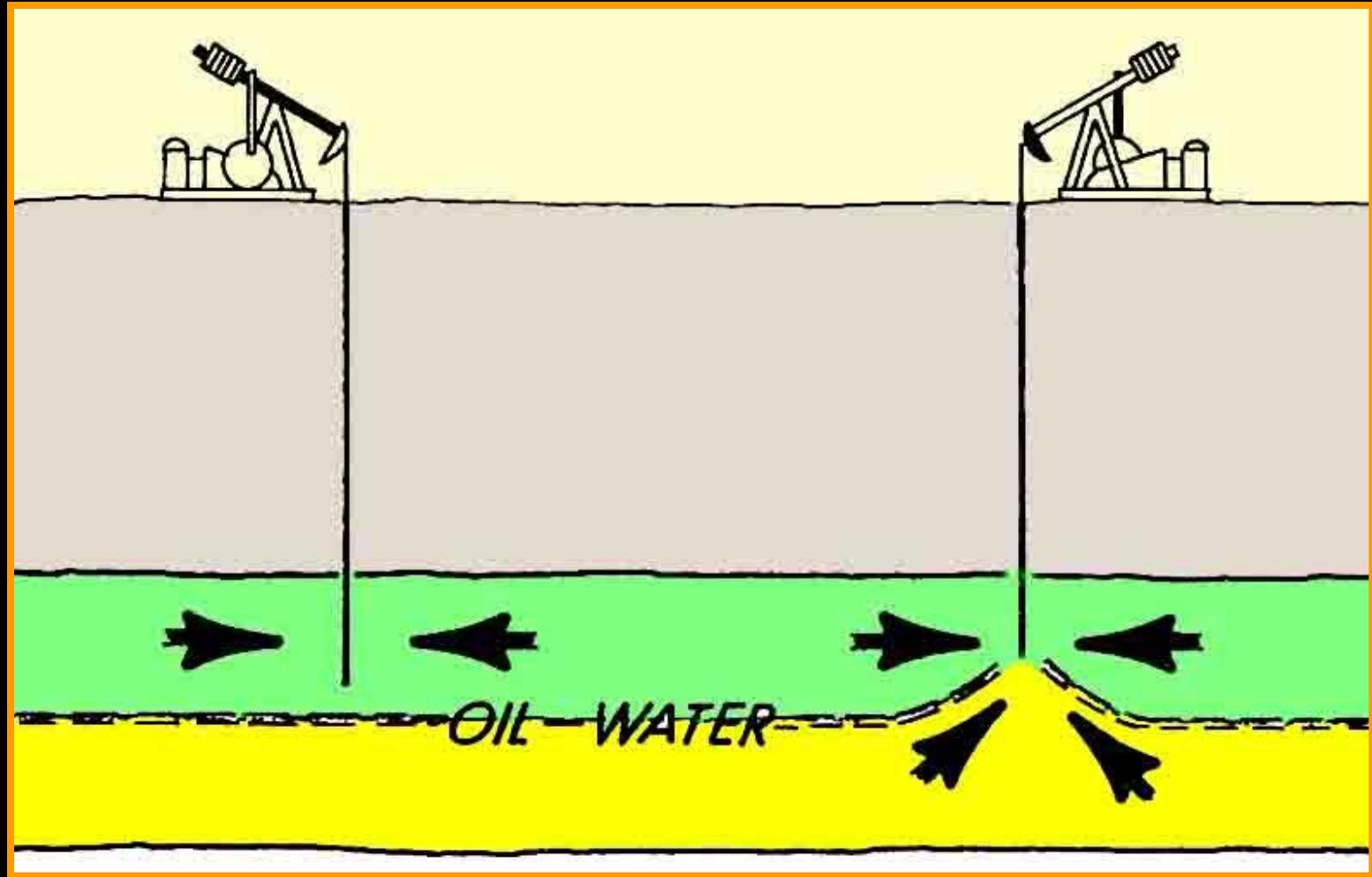


Drumright discovery well, drilled in  
1914

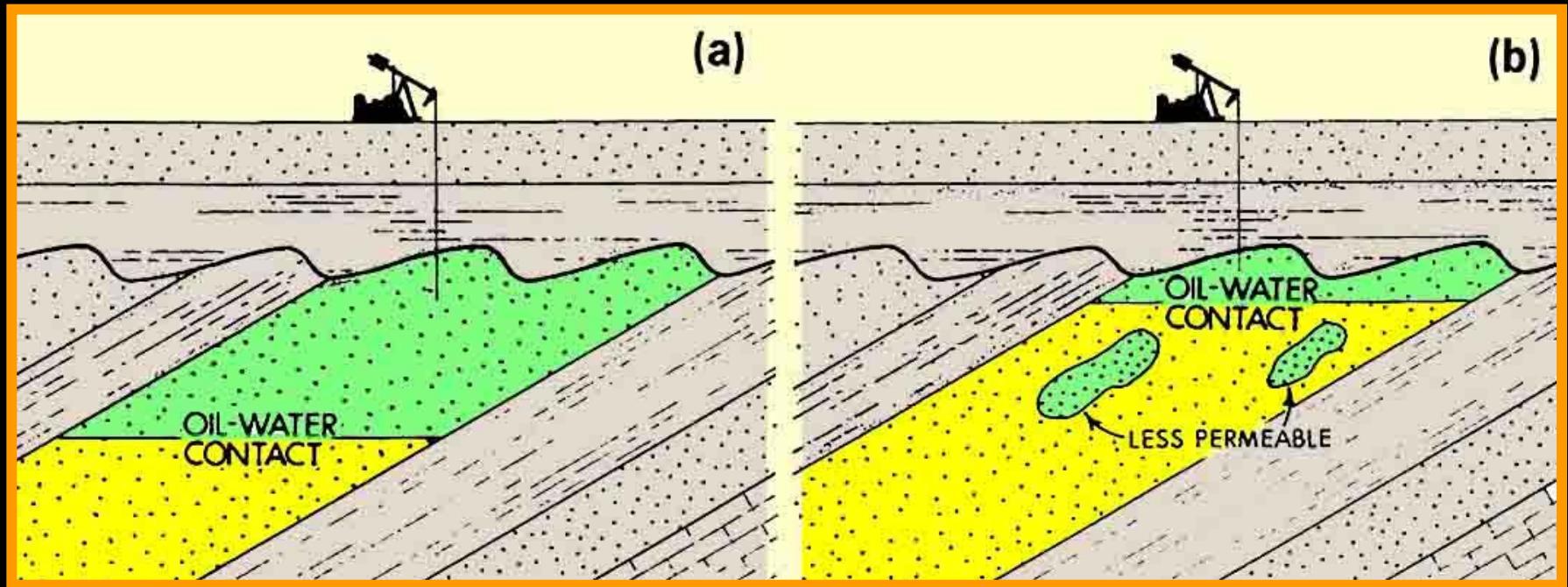


Early sucker-rod pumper

# Production and Reservoir Problems



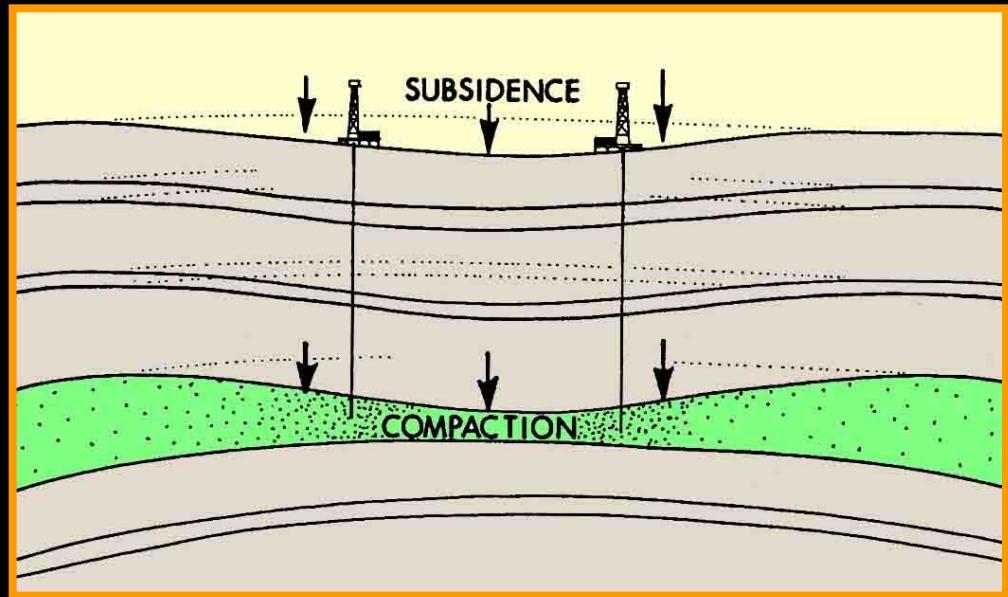
# Production and Reservoir Problems



# Production and Reservoir Problems

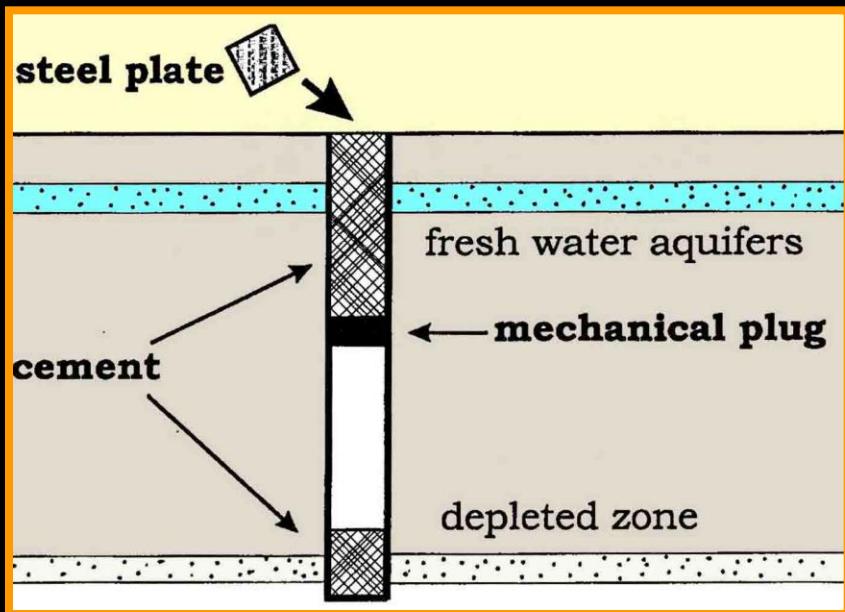


Poor dog has a problem,  
Long Beach, California



Subsidence

# Well Abandonment



Plugged wellhead

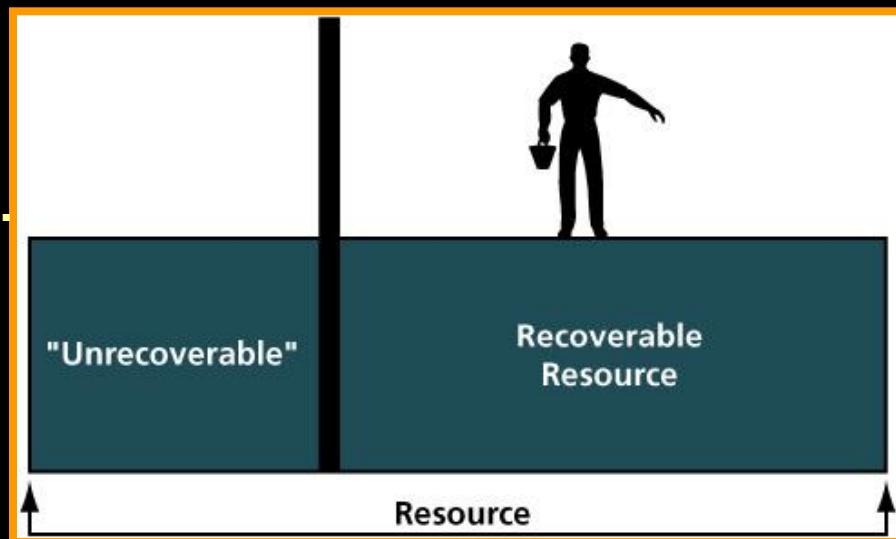


Plugged wellhead in the middle  
of Cimarron River

# Recoverable Oil in New Field (Reserves)

**Recoverable reserves:** identified resource that can be economically extracted using current technology to estimate the reserves at the current price.

**Unrecoverable reserves:** currently unrecoverable today or in the future with current technology, but may become recoverable with new technological innovations.



Each reservoir may be divided into unrecoverable and recoverable.

Each reservoir is different.

# **Reserves**

**Estimated amount of oil in a newly discovered field.**

**Resource companies need to continually find new reserves to replace the oil that they have produced.**

**Constantly looking for new reserves.**

# **Estimation Of Reserves**

**Somewhat subjective exercise, commonly a creative practice, not always guided by facts.**

**Reserves estimates are commonly seasoned with political expediency, economic ulterior motives, and self-serving objectives.**

# **Proved Reserves**

**Reserve estimates of 90% probability that quantities will equal or exceed the estimates in the reservoir is based on:**

- 1. Current economic conditions.**
- 2. Current technology**
- 4. Availability to get oil to market**
- 3. Governmental regulations.**

**Proved reserves is akin to having money in the bank.**

# Classification of Unproved Reserves

**Probable:** **50% chance** that the reserves will equal or exceed the sum of estimated proved, plus probable reserves.

**Possible:** **10% probability** that the quantities actually recovered will equal or exceed the sum of estimated proved, plus probable, plus possible reserved.

- In reality, a **creative guess** depending on what you want your reader to believe!

# **Reserve Growth**

**During the 20<sup>th</sup> century oil reserves “appeared” to have grown significantly.**

**Some studies have indicated that reserves had grown faster than the use of oil.**

**Has reserve growth during the 20<sup>th</sup> century been real or is it an illusion?**

# Wall Street & Reserve Growth

**Oil companies may under-report reserves of a newly discovered field.**

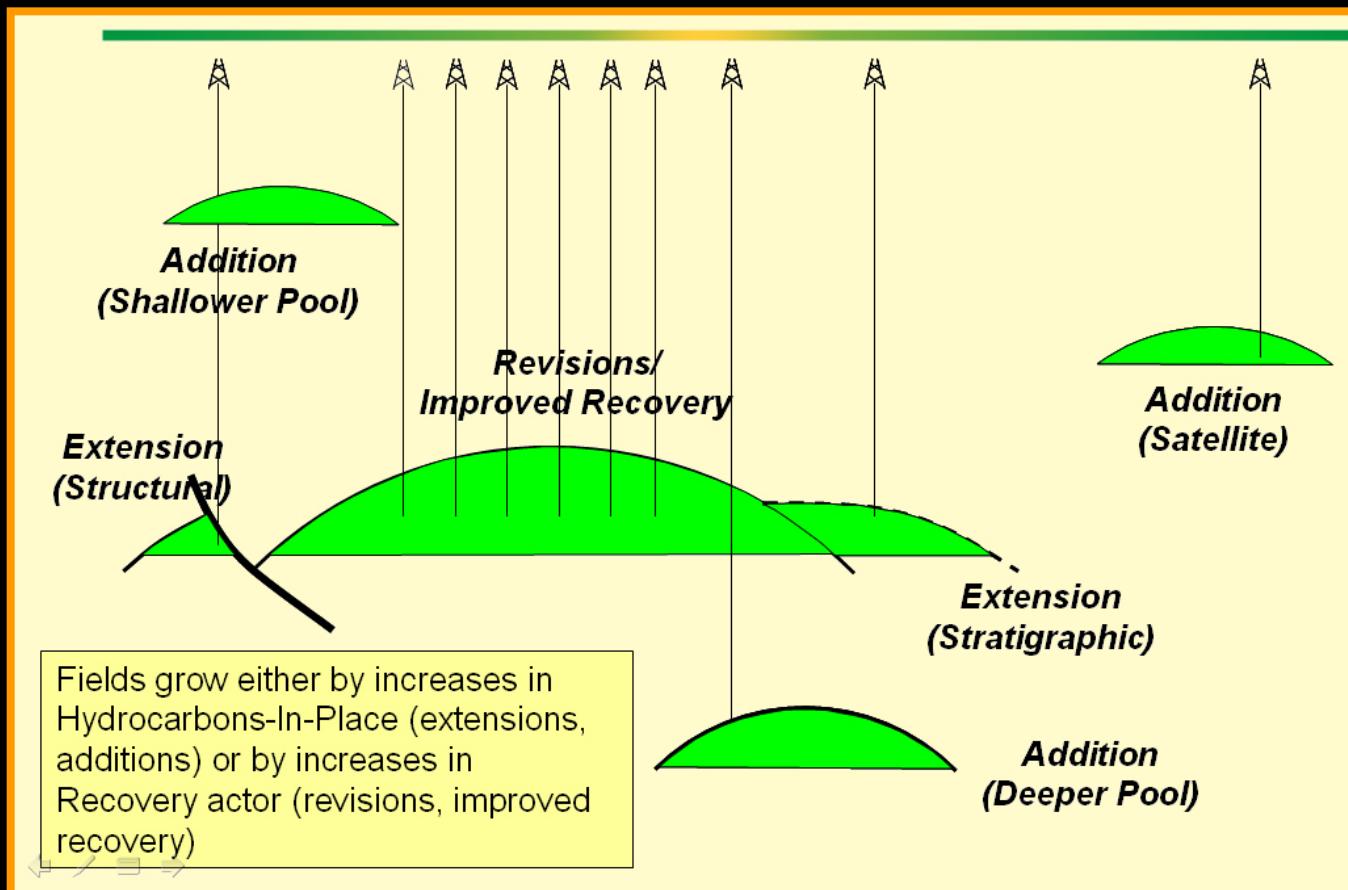
**Oil companies report reserves to meet strict Stock Exchange rules:**

- Designed to prevent fraudulent exaggeration.
- Smiled on conservative reporting.

**Discovery of under-reported reserves can be revised upwards later:**

- Comforting, but misleading, giving a false image of steady growth in discovery.
- No conspiracy, just simple commercial prudence.

# Sources of Field Reserves Growth



Increased knowledge and new drilling will limit growth in reserve