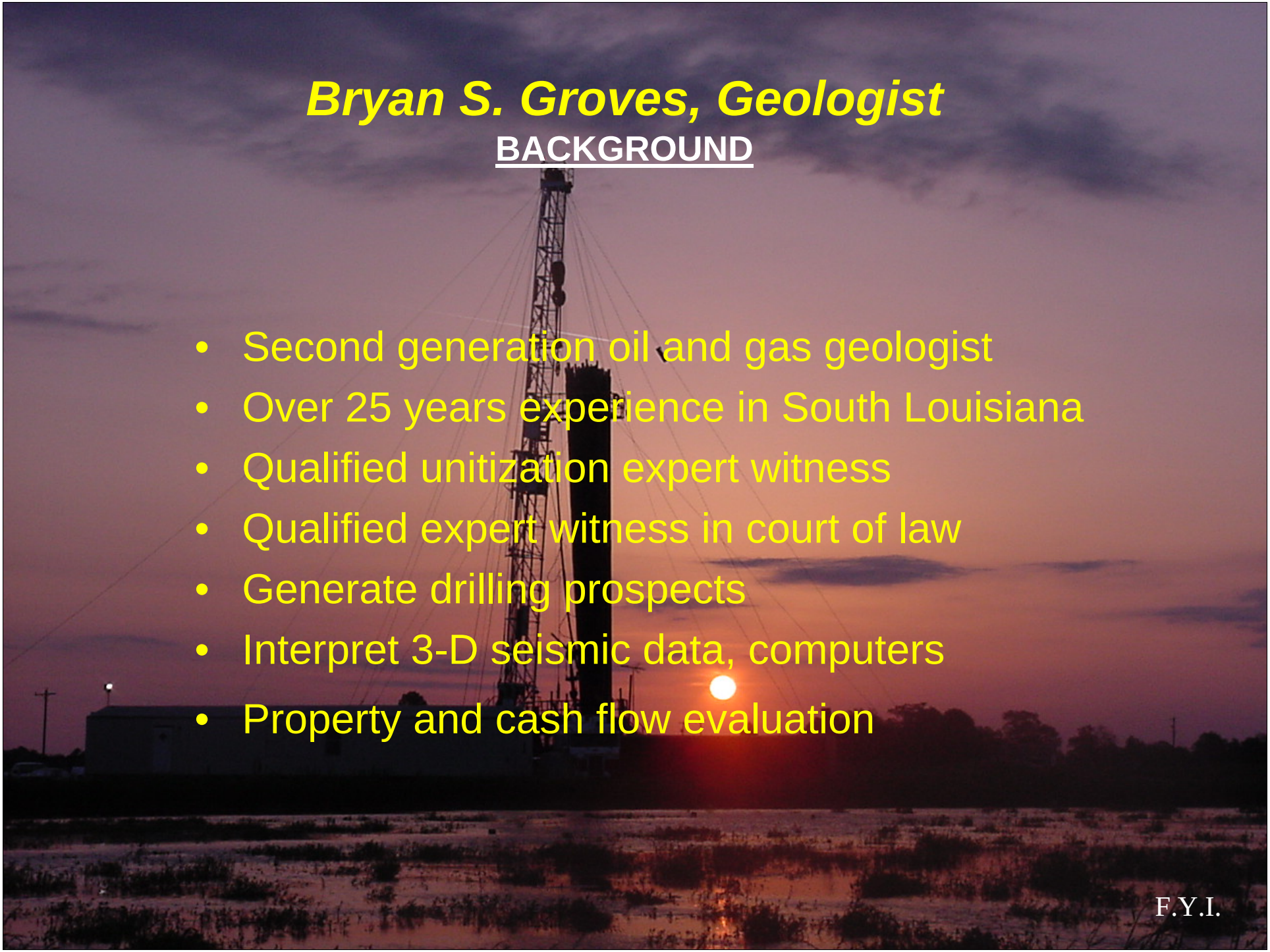

Mineral Geology for Beginners
Bryan S. Groves
Geologist
BACKGROUND



Bryan S. Groves, Geologist

BACKGROUND

- Second generation oil and gas geologist
- Over 25 years experience in South Louisiana
- Qualified unitization expert witness
- Qualified expert witness in court of law
- Generate drilling prospects
- Interpret 3-D seismic data, computers
- Property and cash flow evaluation

F.Y.I.


Mineral Geology for Beginners
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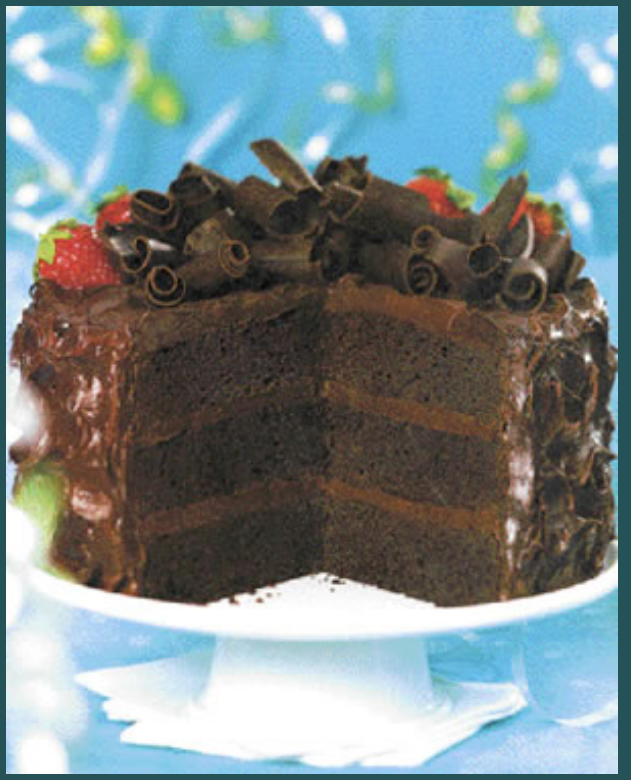
OVERVIEW



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Geologist

Mineral Geology for Beginners
OUTLINE

- Oil & Gas Geology
- Oil & Gas Mineral Lease
- Oil & Gas Unitization
- Information - Websites

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Mineral Geology for Beginners

OIL & GAS GEOLOGY

- Oil & Gas Basins of the United States
- Oil & Gas Producing Trends on Gulf Coast
- Oil & Gas Geology 101

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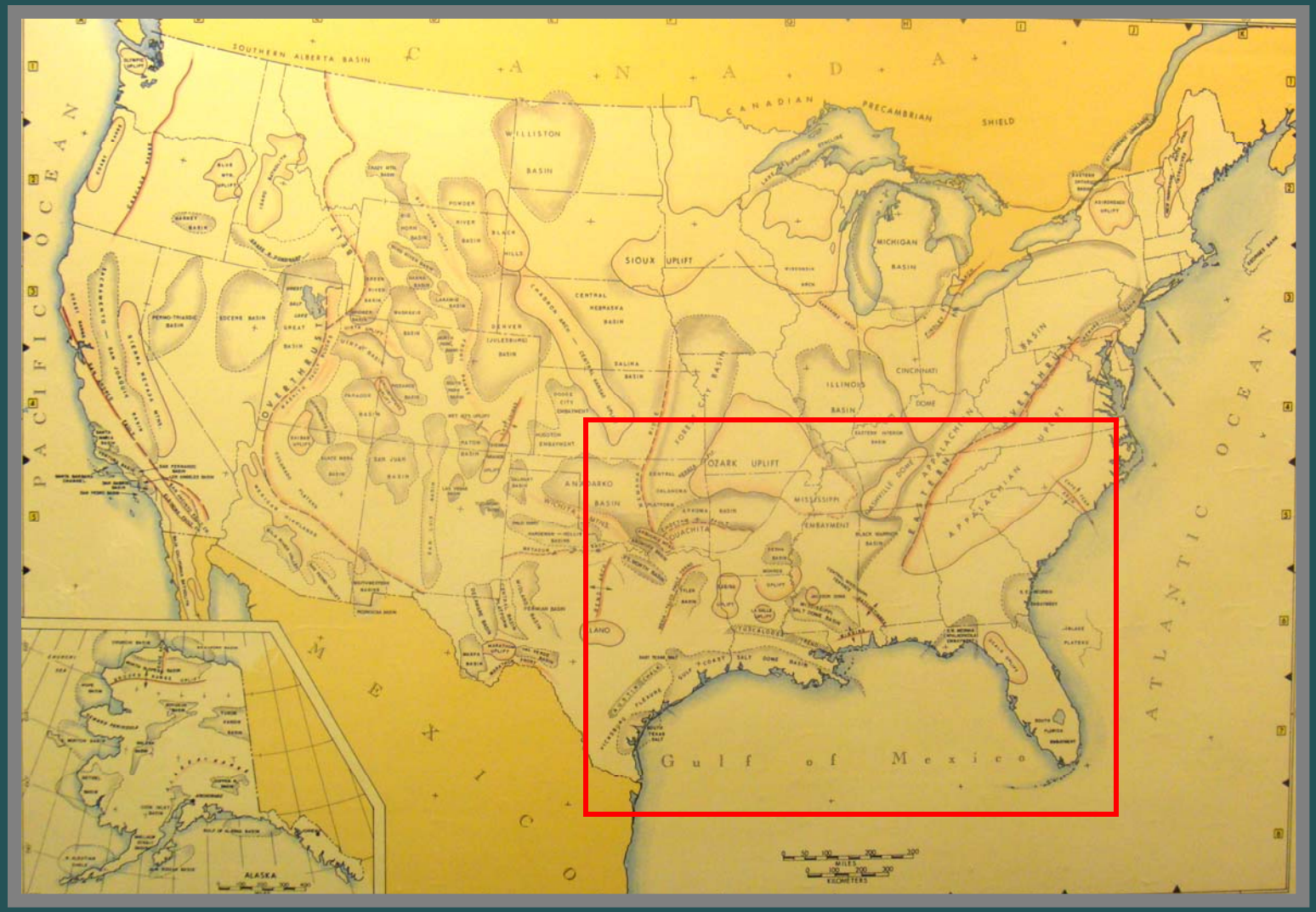
OIL & GAS BASINS OF THE UNITED STATES



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from PennWell maps

Mineral Geology for Beginners

OIL & GAS BASINS OF THE GULF COAST

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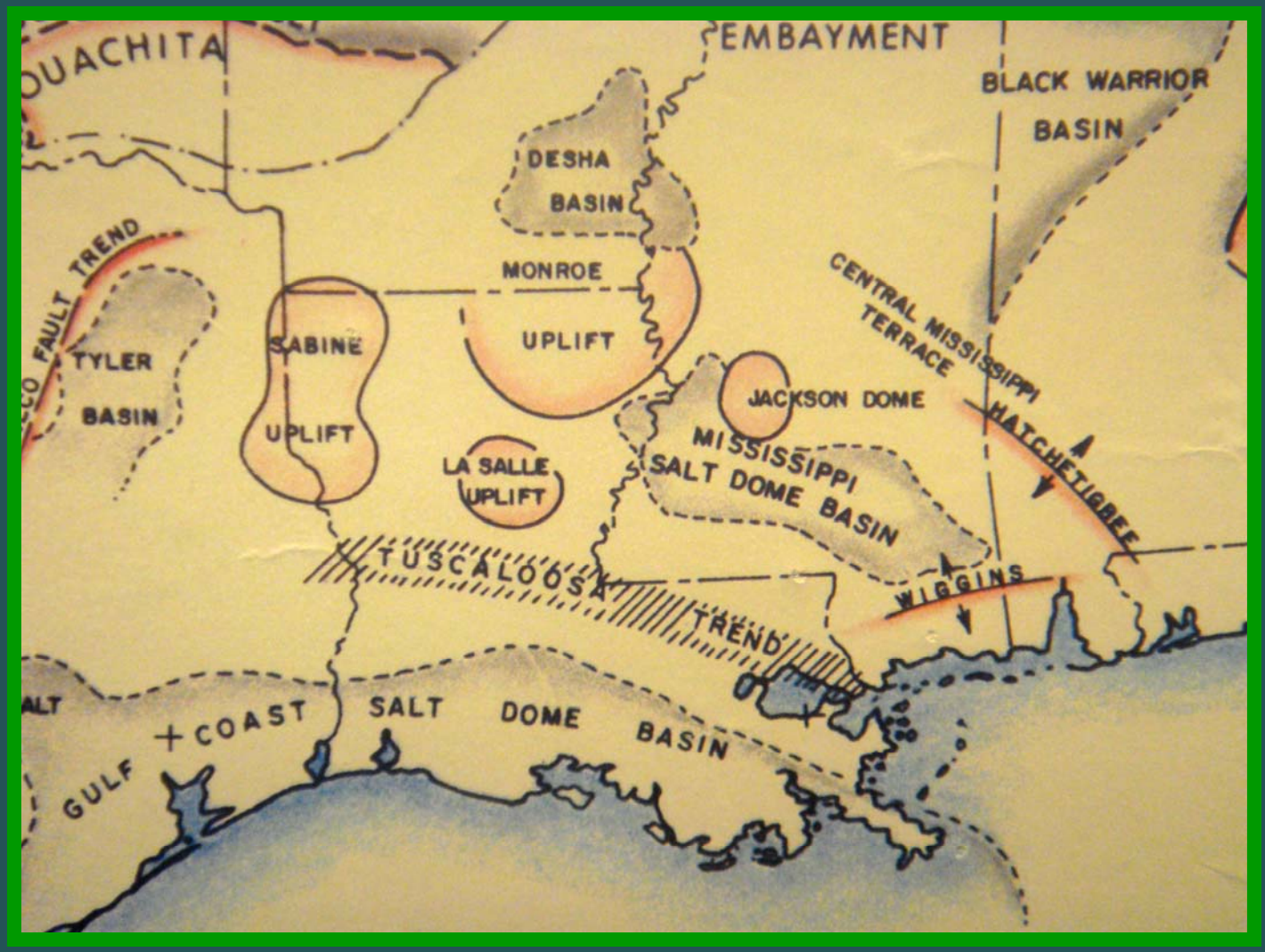
OIL & GAS BASINS OF THE GULF COAST



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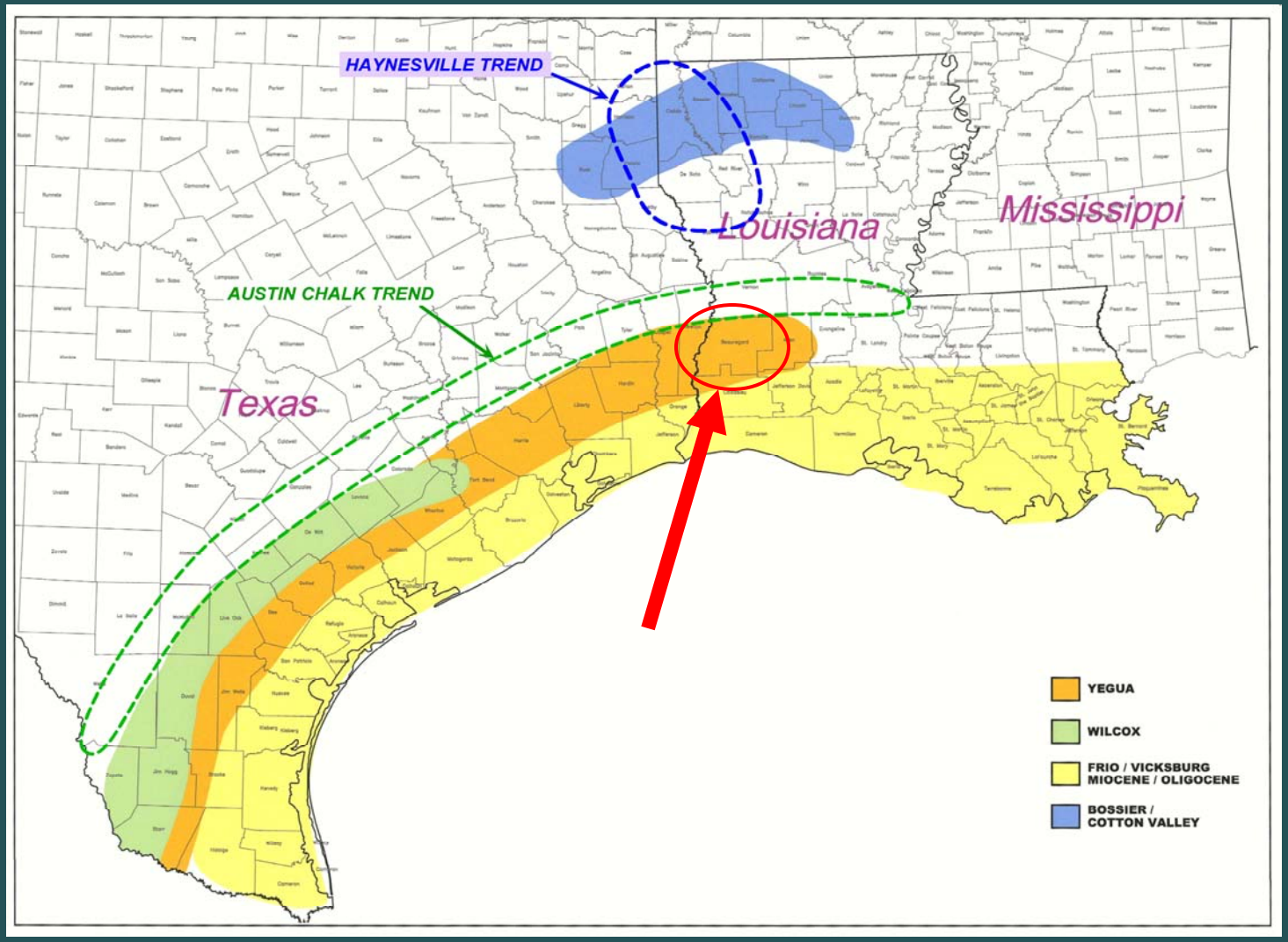
OIL & GAS TRENDS OF THE GULF COAST



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from PVA

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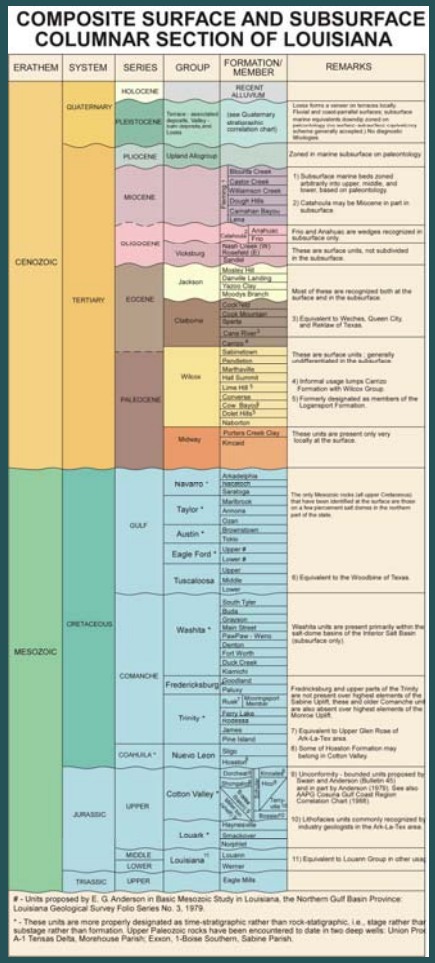
STRATIGRAPHIC COLUMN



+/- 5 million years ago

+/- 62 million years ago

+/- 135 million years ago

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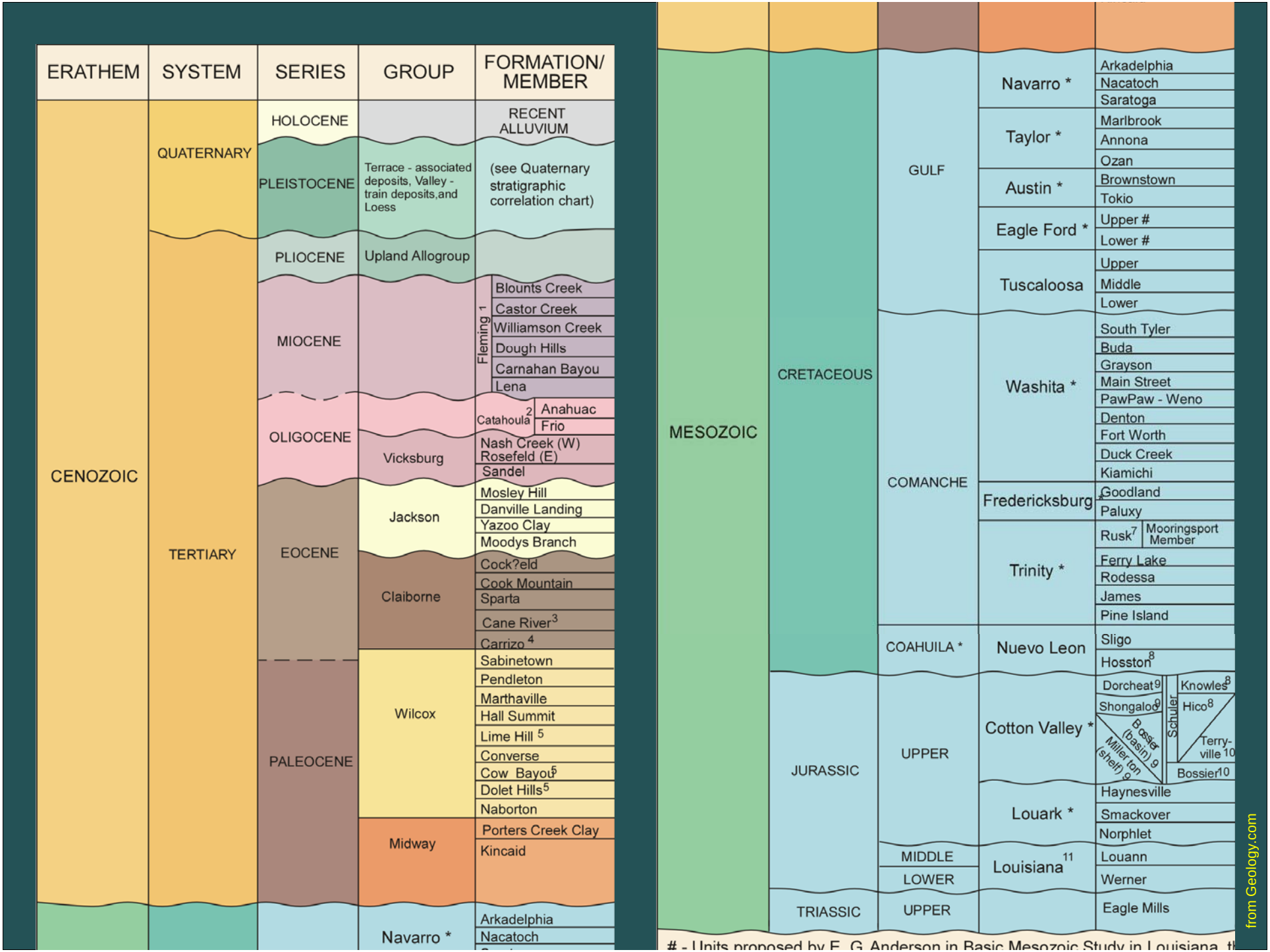
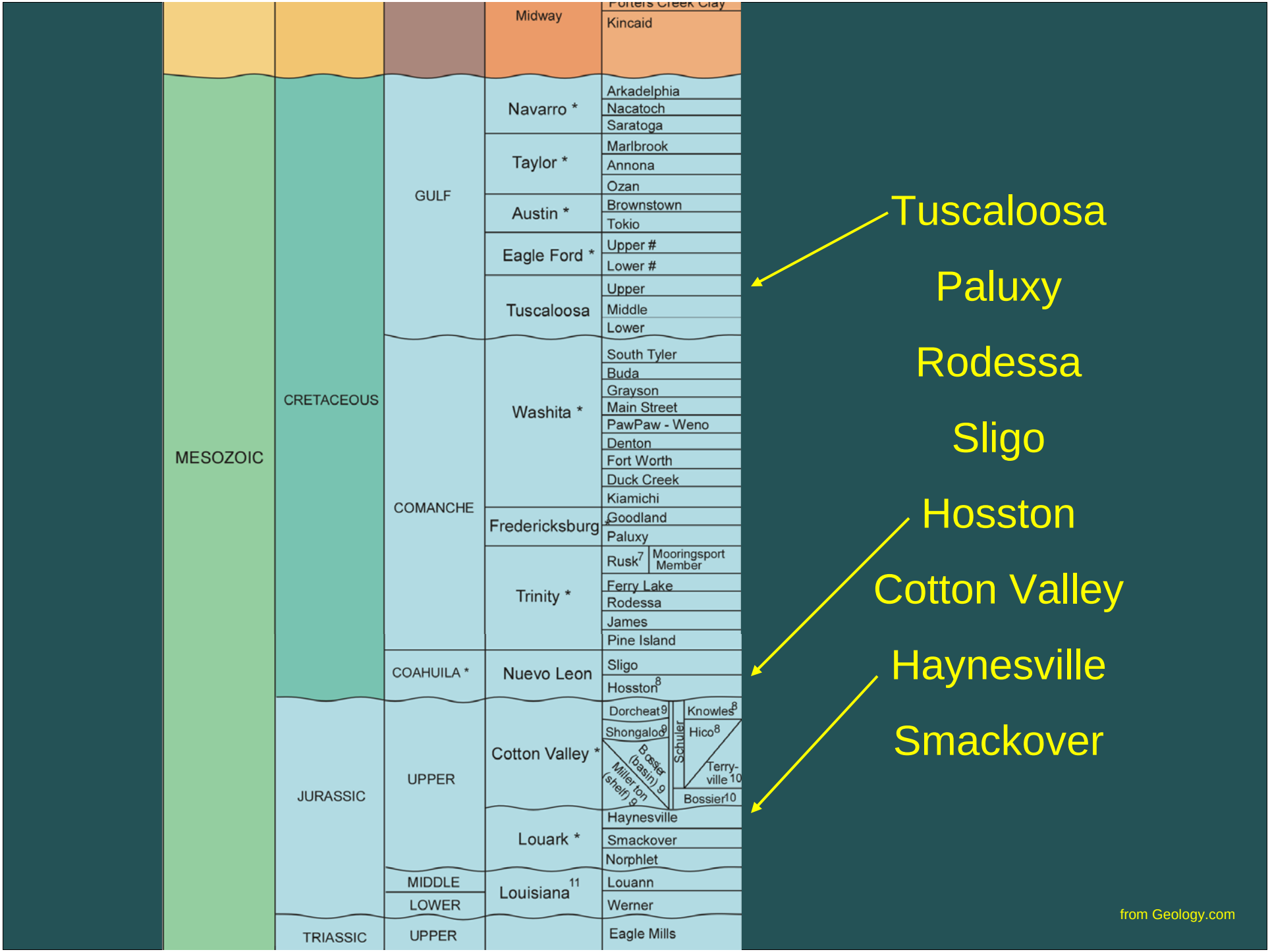
Geologist


ERATHEM
SYSTEM
SERIES
GROUP
FORMATION/ MEMBER
CENOZOIC
QUATERNARY
TERTIARY
HOLOCENE
PLEISTOCENE
PLIOCENE
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
RECENT ALLUVIUM
(see Quaternary stratigraphic correlation chart)
Terrace - associated deposits, Valley - train deposits,and Loess
Upland Allogroup
Fleming 1
Blounts Creek
Castor Creek
Williamson Creek
Dough Hills
Carnahan Bayou
Lena
Catahoula 2
Anahuac
Frio
Vicksburg
Nash Creek (W) Rosefeld (E)
Sandel
Jackson
Mosley Hill
Danville Landing
Yazoo Clay
Moodys Branch
Claiborne
Cock?eld
Cook Mountain
Sparta
Cane River 3
Carrizo 4
Wilcox
Sabinetown
Pendleton
Marthaville
Hall Summit
Lime Hill 5
Converse
Cow Bayou 5
Dolet Hills 5
Naborton
Midway
Porters Creek Clay
Kincaid
Navarro *
Arkadelphia
Nacatoch
MESOZOIC
CRETACEOUS
JURASSIC
TRIASSIC
GULF
COMANCHE
COAHUILA *
UPPER
MIDDLE
LOWER
UPPER
Navarro *
Taylor *
Austin *
Eagle Ford *
Tuscaloosa
Washita *
Fredericksburg *
Trinity *
Nuevo Leon
Cotton Valley *
Louark *
Louisiana 11
Arkadelphia
Nacatoch
Saratoga
Marlbrook
Annona
Ozan
Brownstown
Tokio
Upper #
Lower #
Upper
Middle
Lower
South Tyler
Buda
Grayson
Main Street
PawPaw - Weno
Denton
Fort Worth
Duck Creek
Kiamichi
Goodland
Paluxy
Rusk 7
Mooringsport Member
Ferry Lake
Rodessa
James
Pine Island
Sligo
Hosston 8
Dorcheat 9
Shongaloo 9
Bossier (basin) 9
Miller-ton (shelf) 9
Schuler
Knowles 8
Hico 8
Terry-ville 10
Bossier 10
Haynesville
Smackover
Norphlet
Louann
Werner
Eagle Mills
- Units proposed by E. G. Anderson in Basic Mesozoic Study in Louisiana, t
from Geology.com


Midway
Porters Creek Clay
Kincaid
MESOZOIC
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Paluxy
Rodessa
Sligo
Hosston
Cotton Valley
Haynesville
Smackover
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Mineral Geology for Beginners
Bryan S. Groves
Geologist
Terminology

Mineral Geology for Beginners

GEOLOGICAL TERMS

- Sand (beach or river)
- Shale (compacted clay)
- Erosion (cutting away rock)
- Deposition (putting down cut-up rock)
- Strata (layers of rock)
- Faults (crack/break in surface)

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EROSION IN MOUNTAINS

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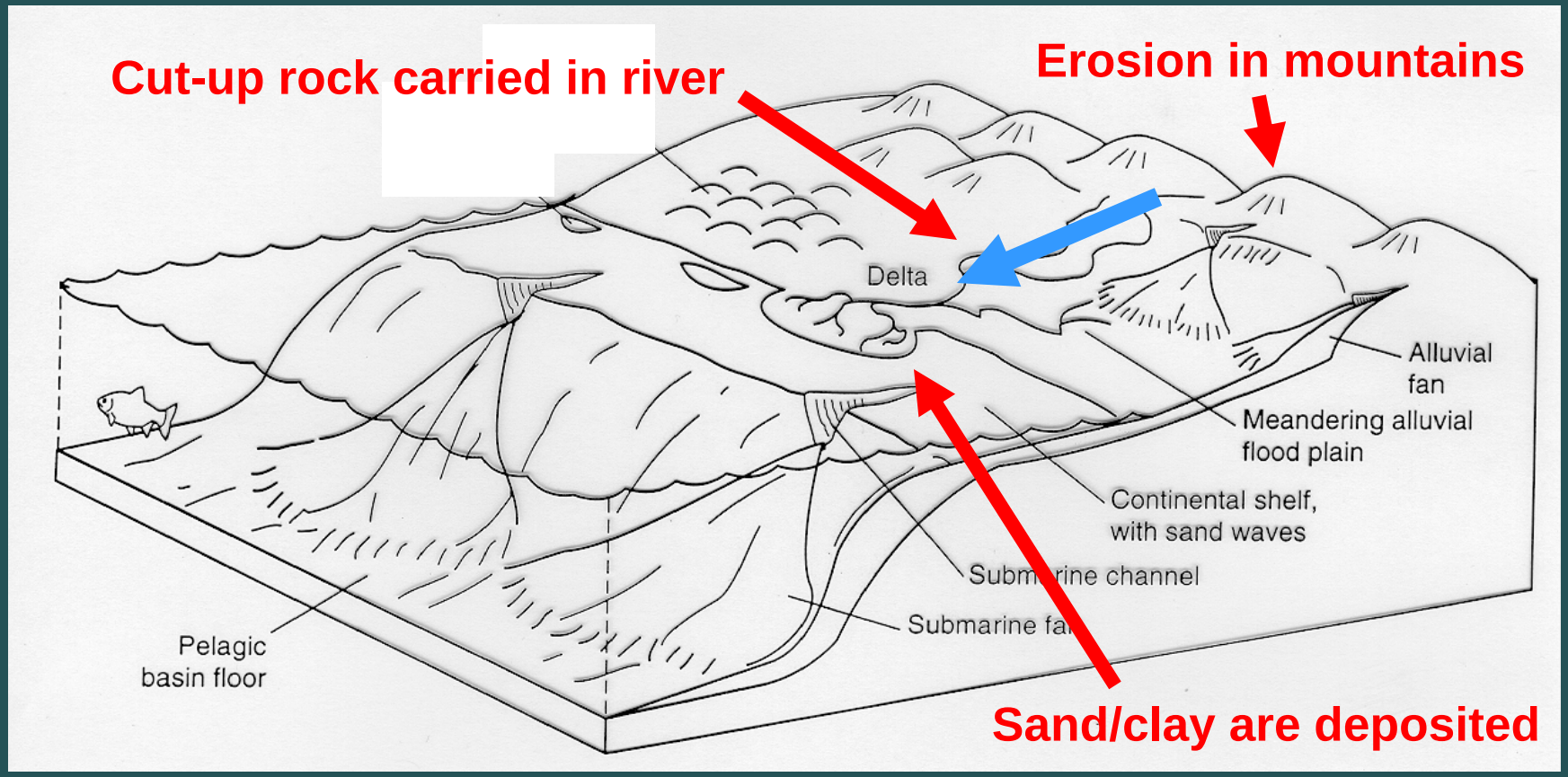
OIL & GAS TRENDS OF THE GULF COAST



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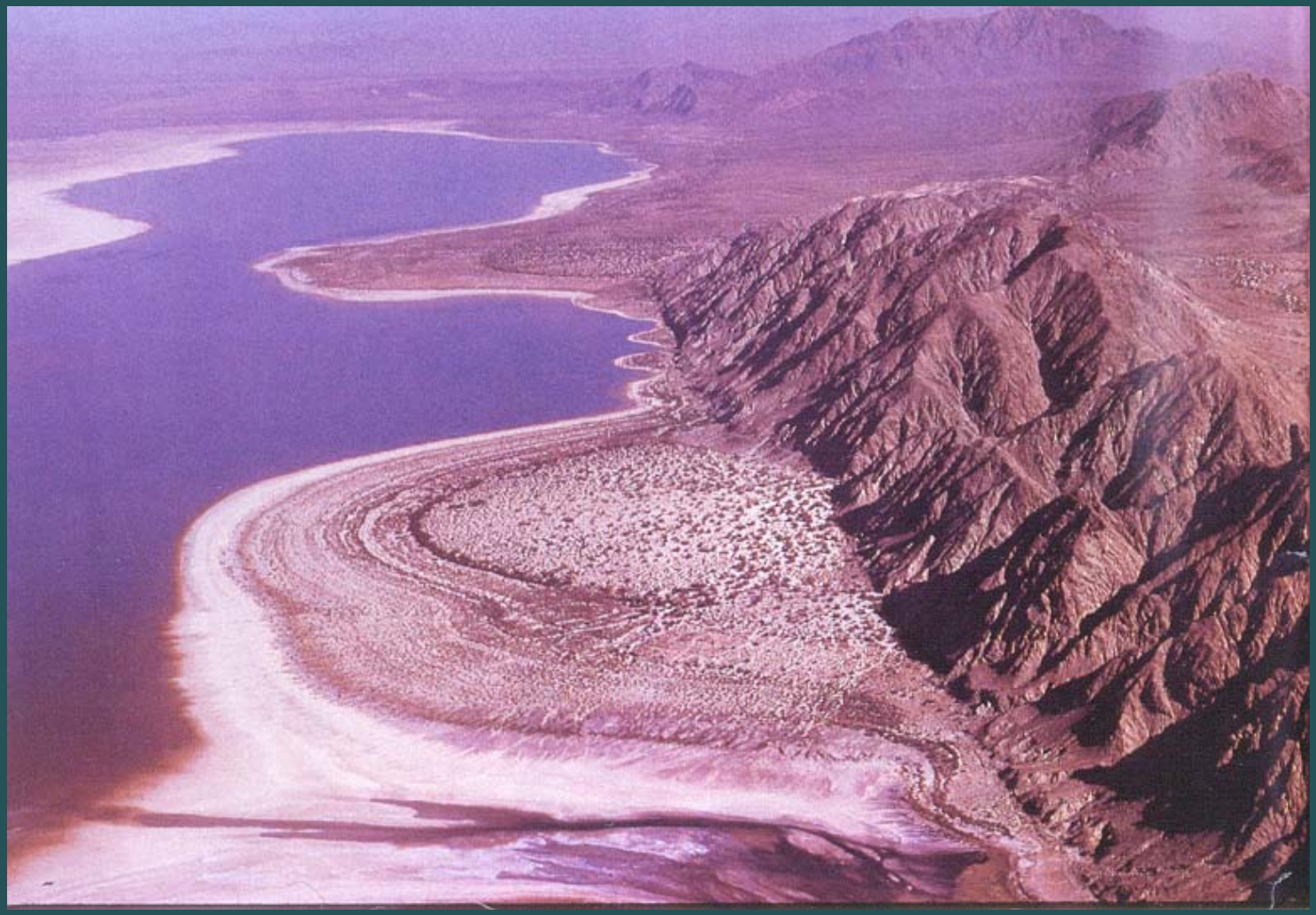
EROSION IN MOUNTAINS



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RIVERS CARRYING SEDIMENT

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RIVERS CARRYING CUT-UP ROCK

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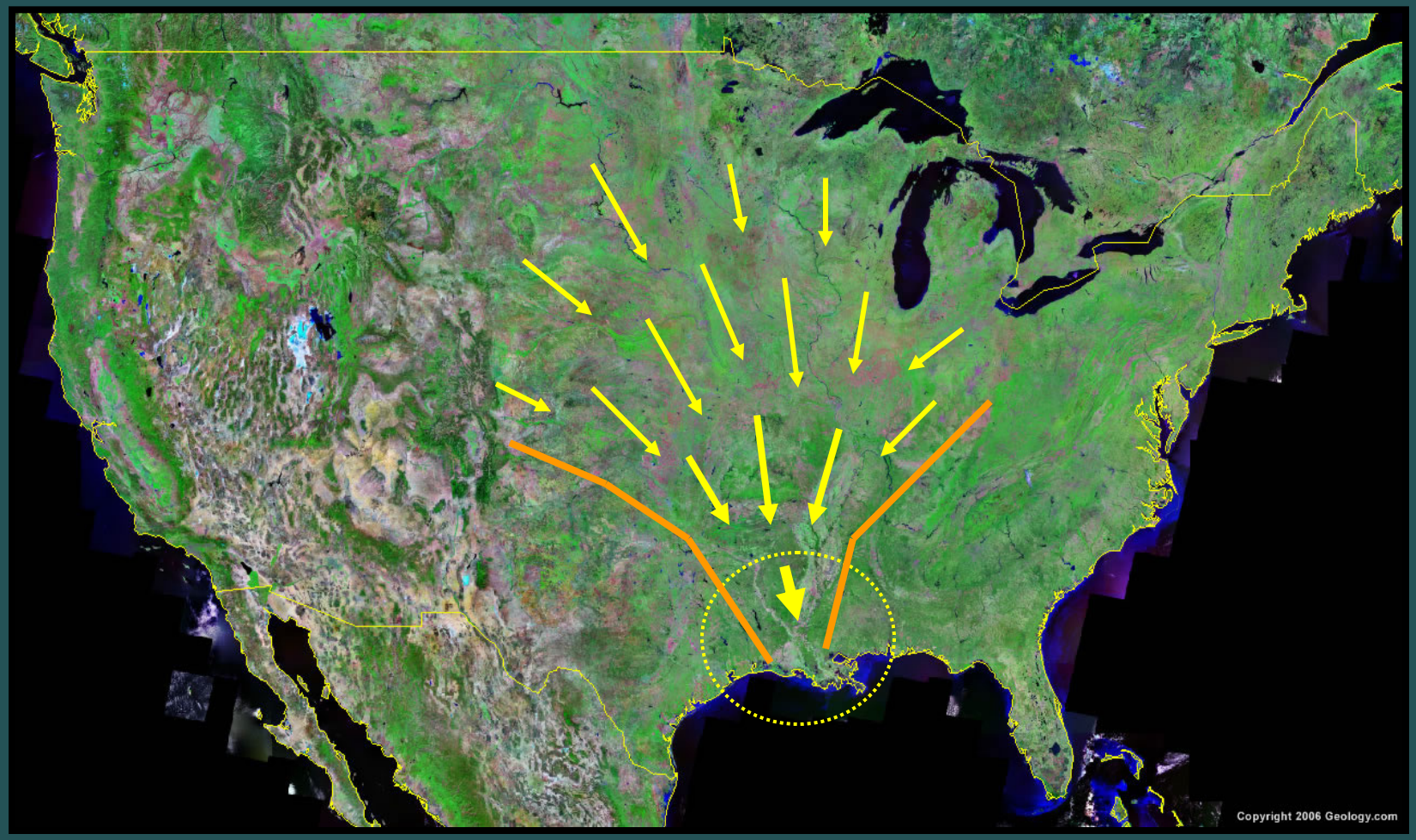
RIVERS CARRYING CUT-UP ROCK



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CUT-UP ROCK DEPOSITION (IN DELTAS)

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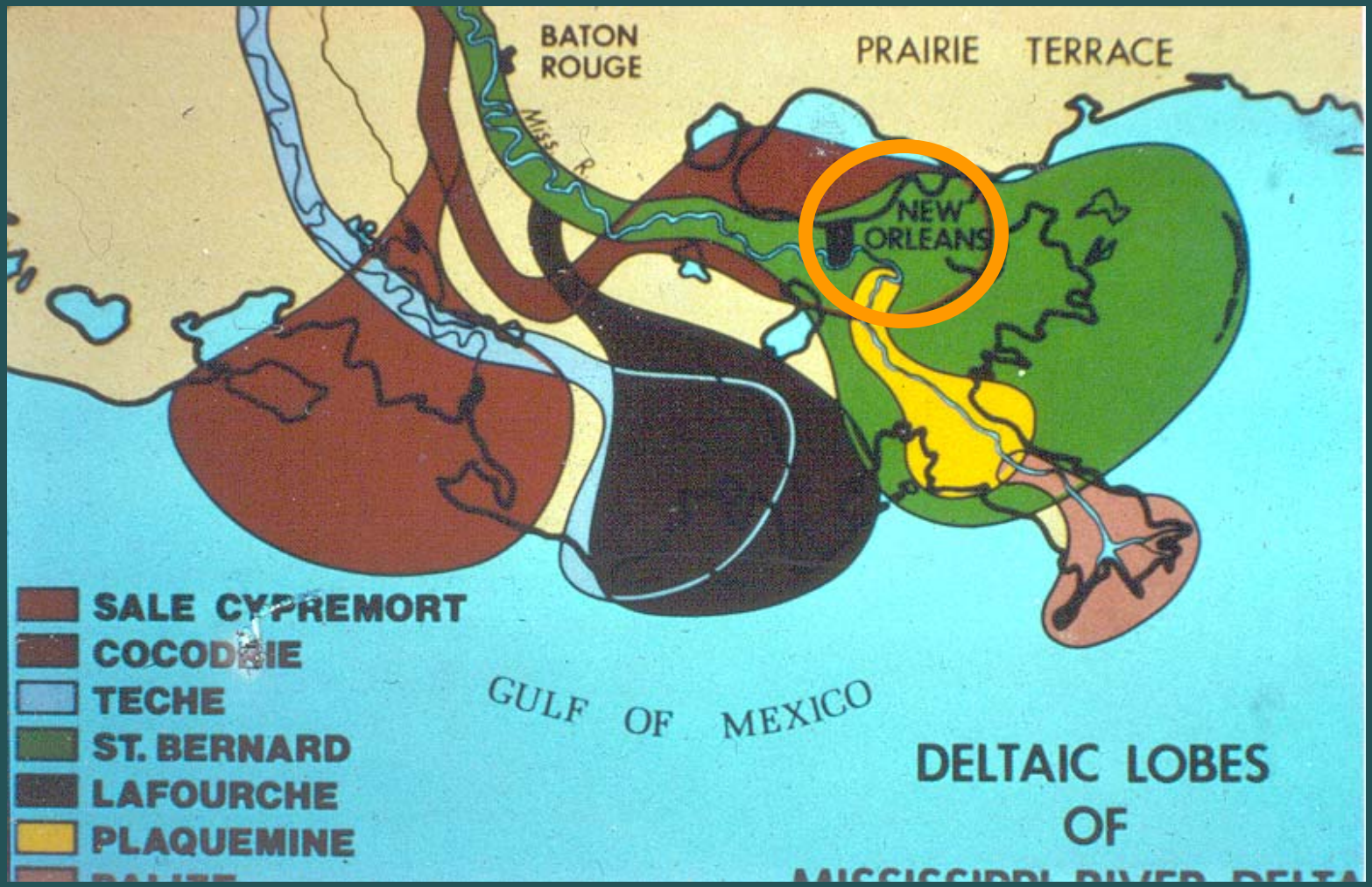
SAND / CLAY DEPOSITION IN DELTAS



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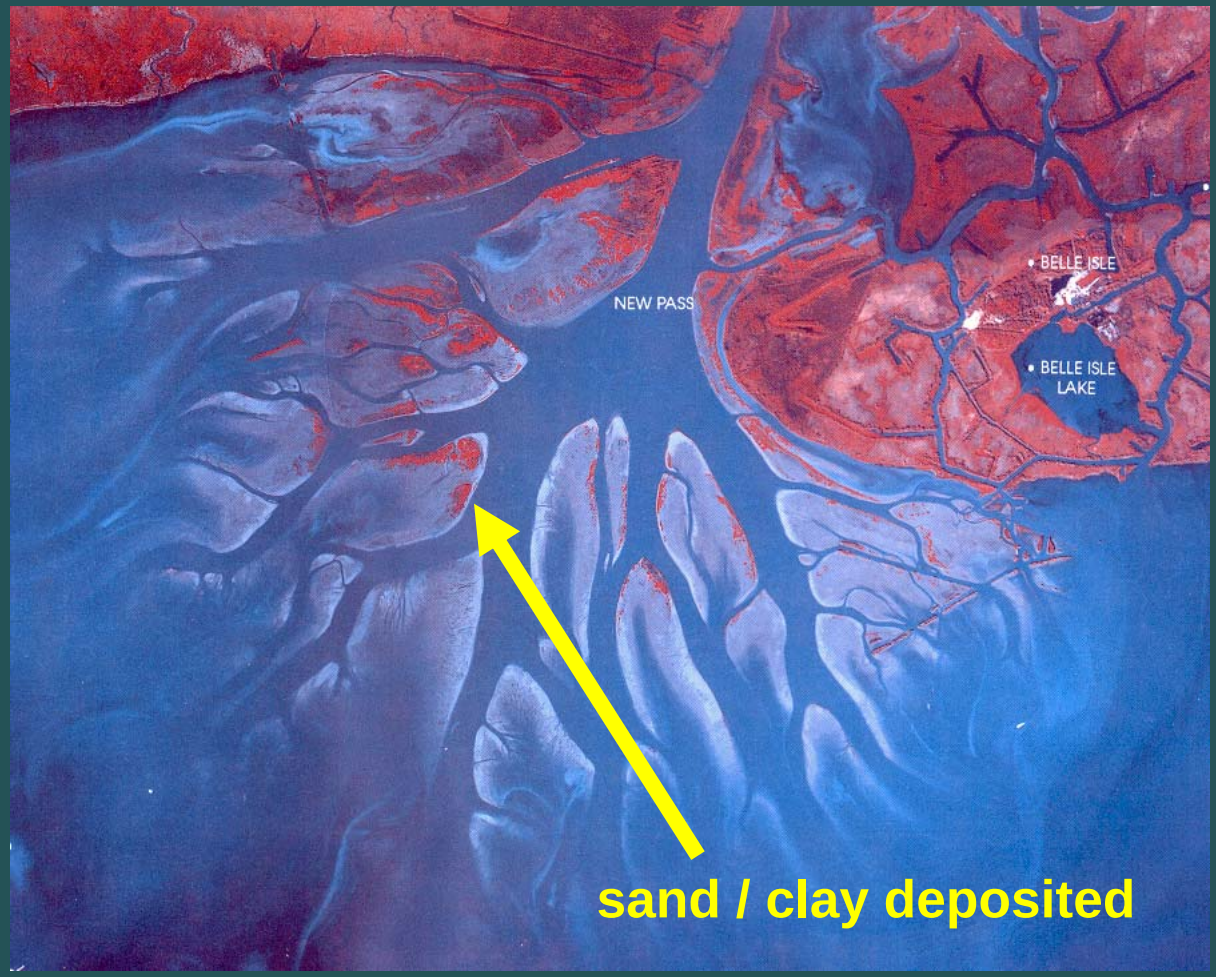
SAND / CLAY DEPOSITION IN DELTAS



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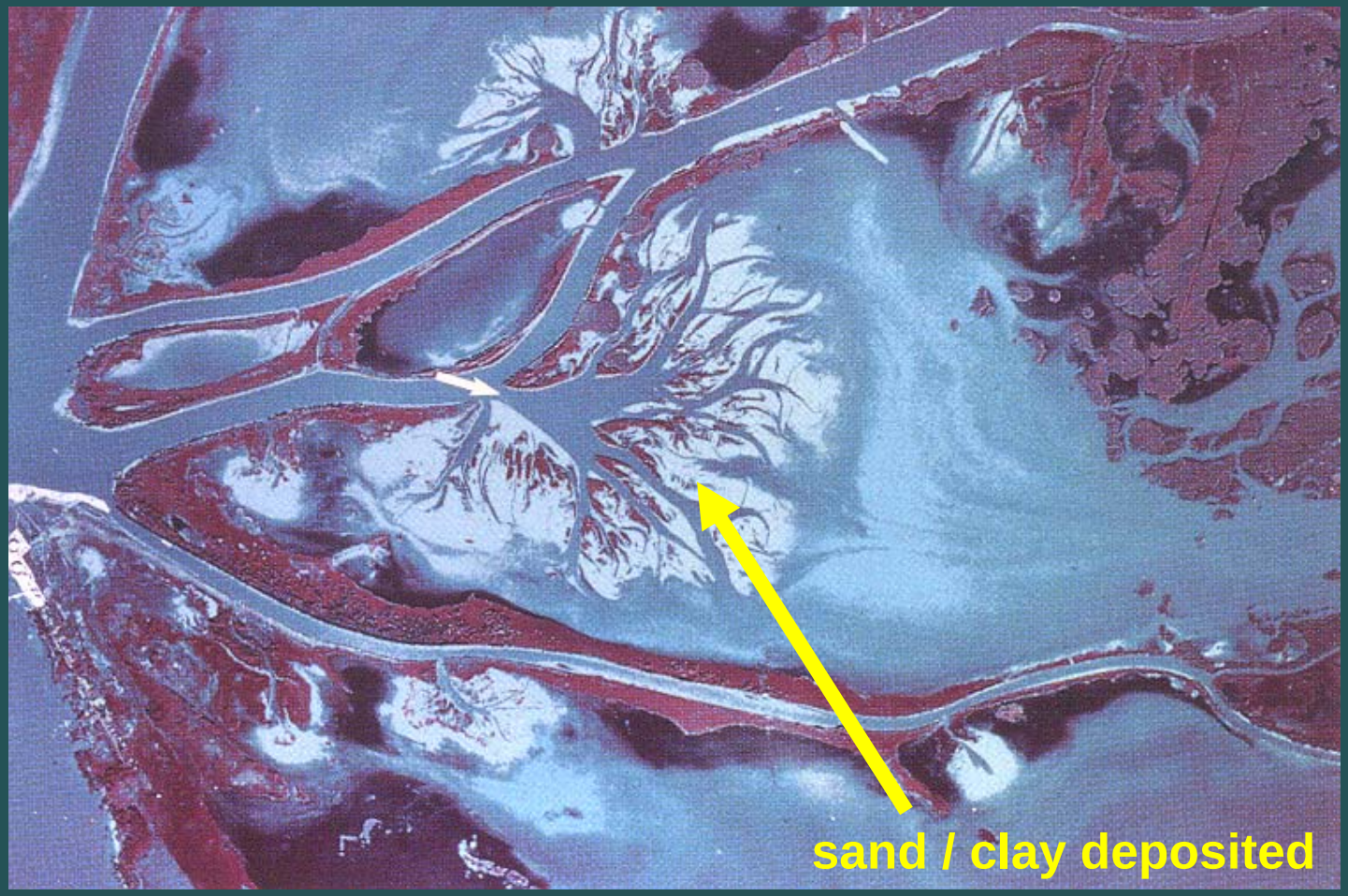
SAND / CLAY DEPOSITION IN DELTAS



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Faults / Traps
Strata / Layers
Oil and Gas Pools / Reservoirs

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OIL & GAS TERMS

- Sand (beach or river)
- Shale (compacted clay)
- Erosion (cutting away rock)
- Deposition (putting down cut-up rock)
- Strata (layers of rock)
- Faults (crack/break in surface)

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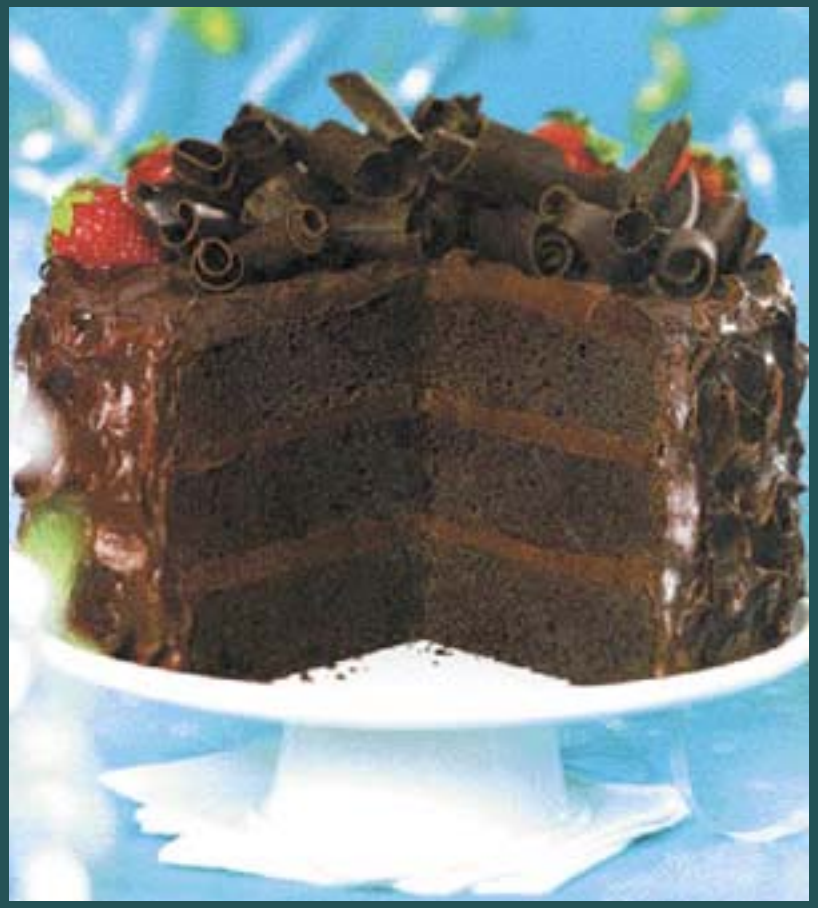
STRATA / LAYERS



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STRATA / LAYERS

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ORIGIN OF FAULTS

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ORIGIN OF FAULTS

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ORIGIN OF FAULTS

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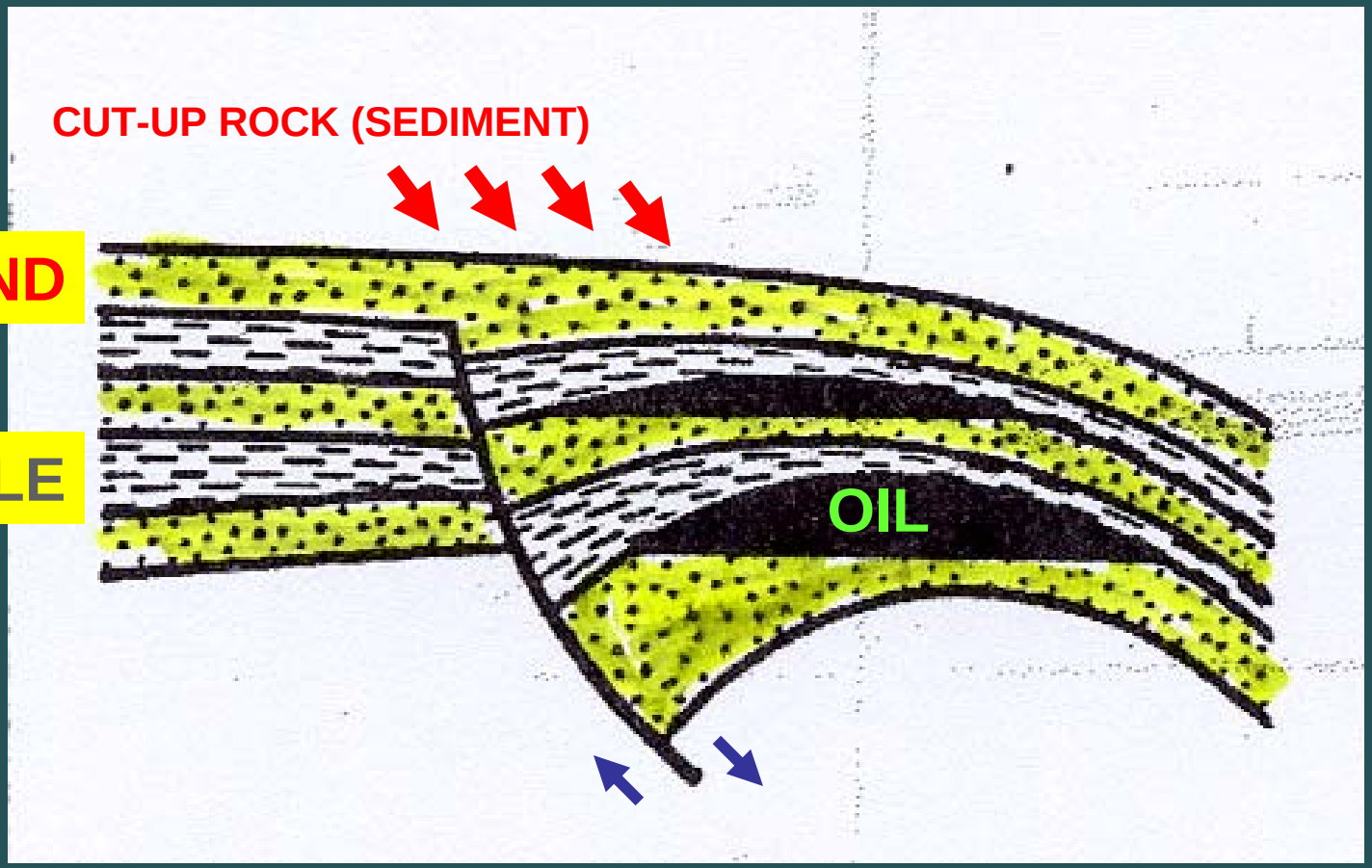
STRATA AND FAULTING



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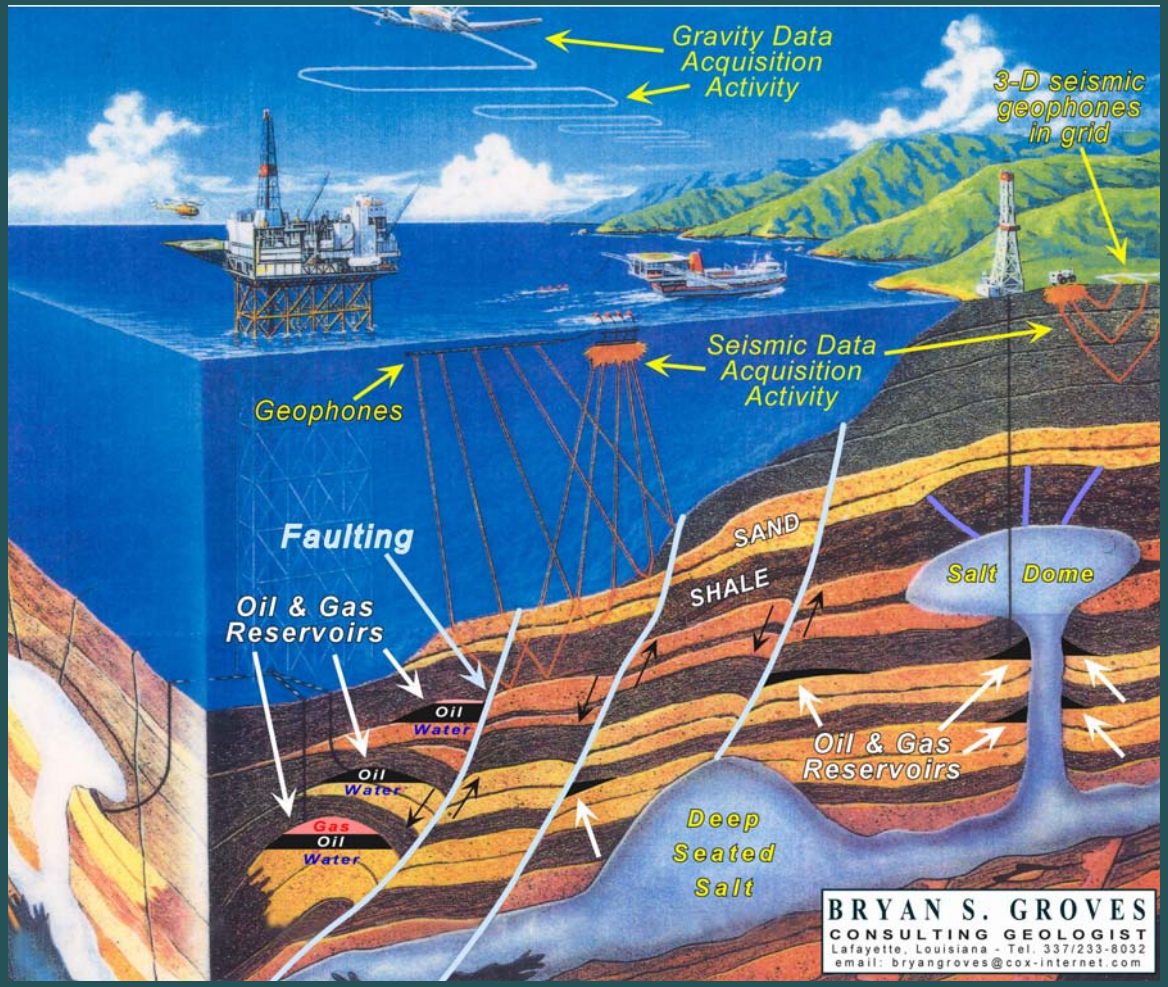
STRATA AND FAULTING



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WHERE'S THE OIL ! ? !

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OIL & GAS FLOAT ON WATER

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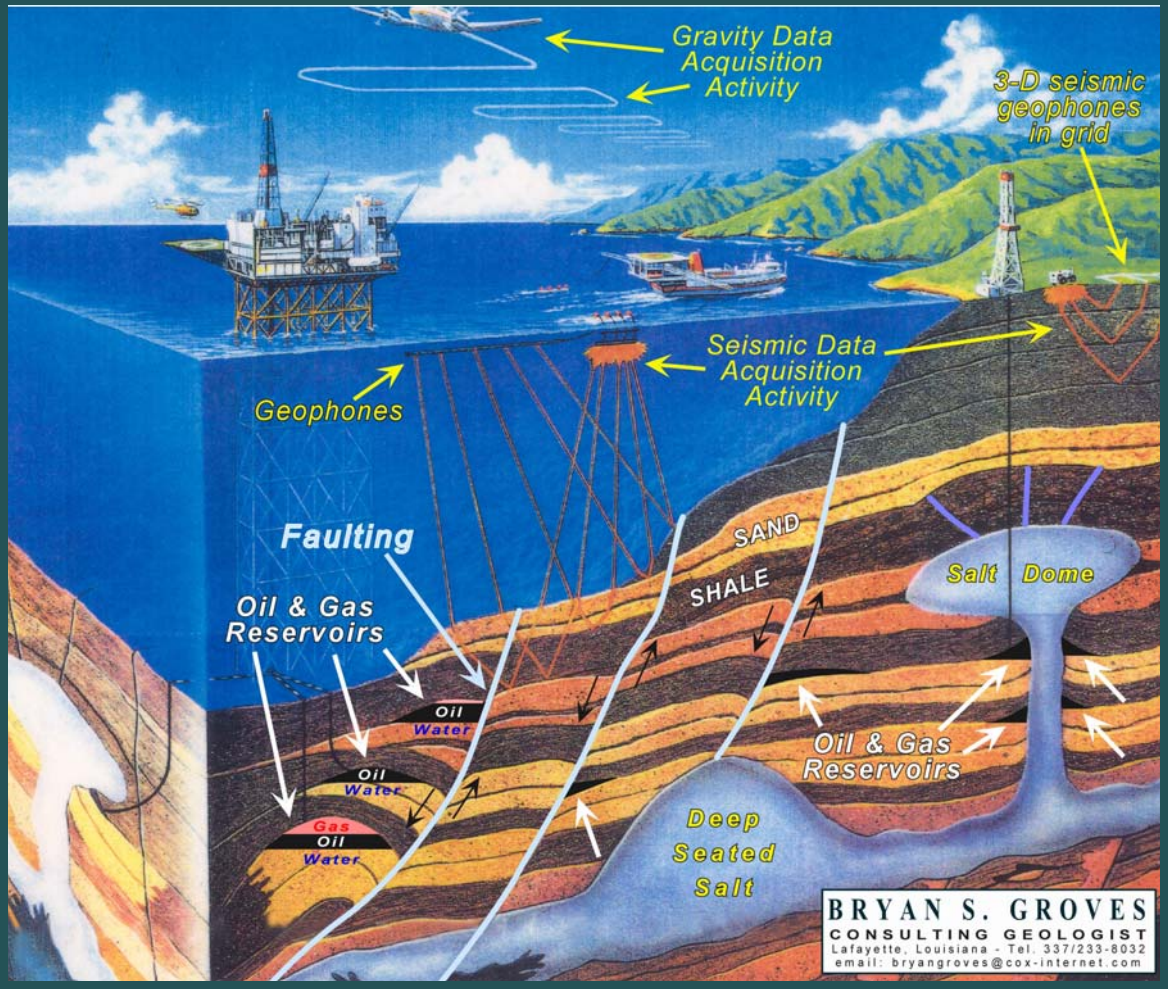
CONVENTIONAL RESERVOIRS, GULF COAST TRENDS



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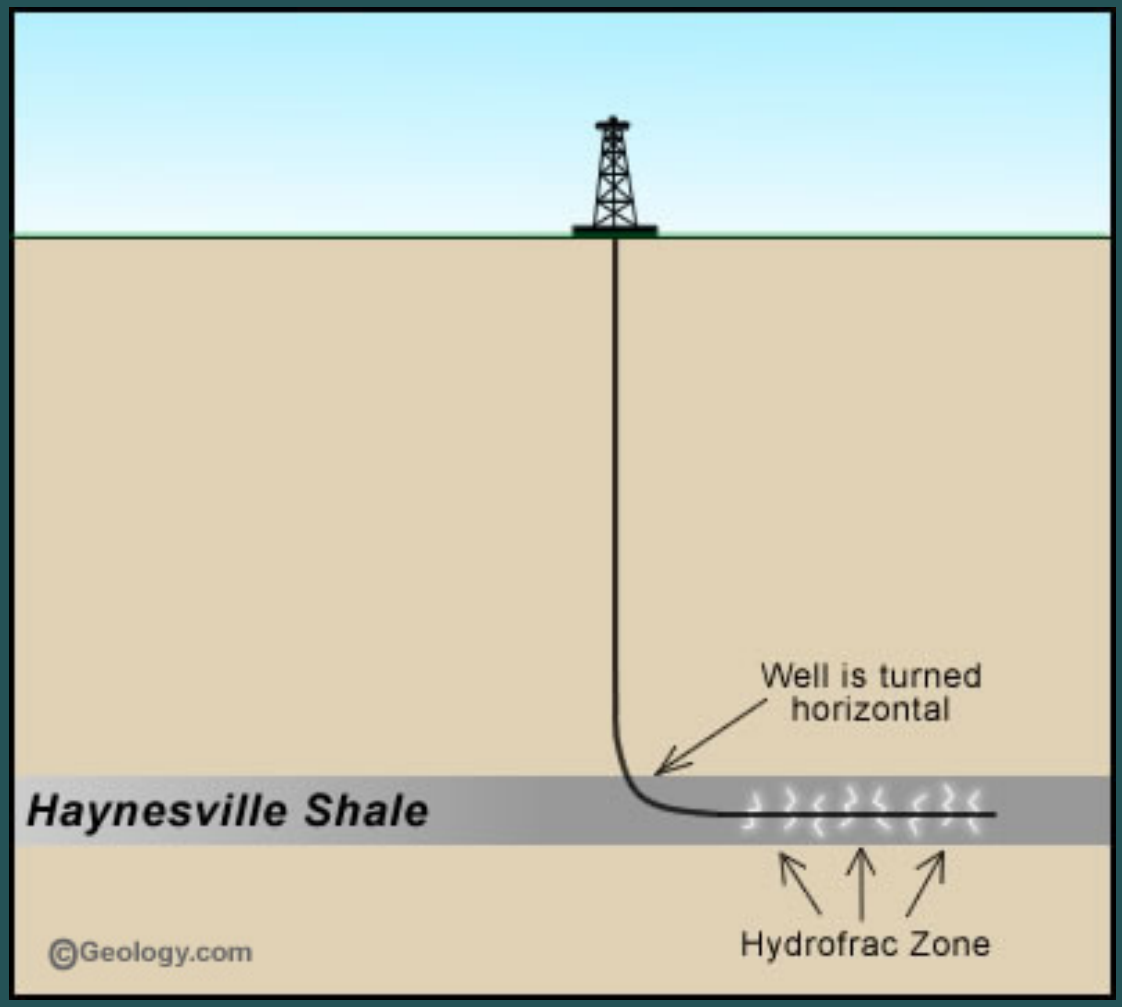
UNCONVENTIONAL RESERVOIRS, RESOURCE PLAYS



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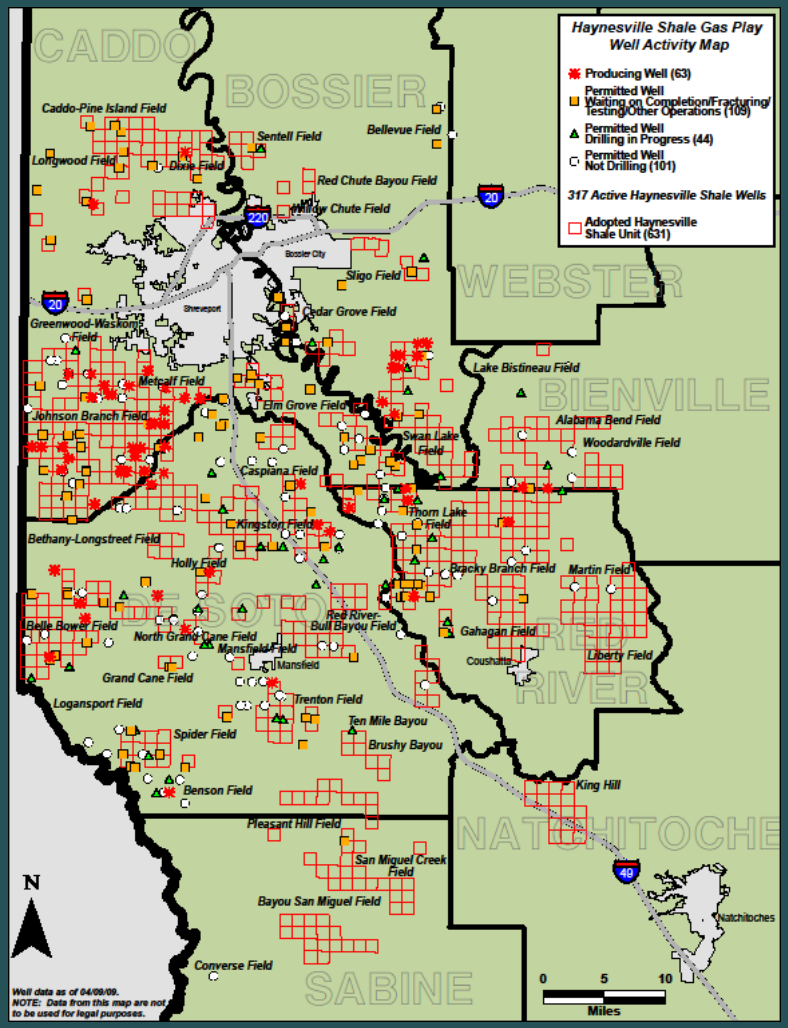
UNCONVENTIONAL RESERVOIRS, RESOURCE PLAYS



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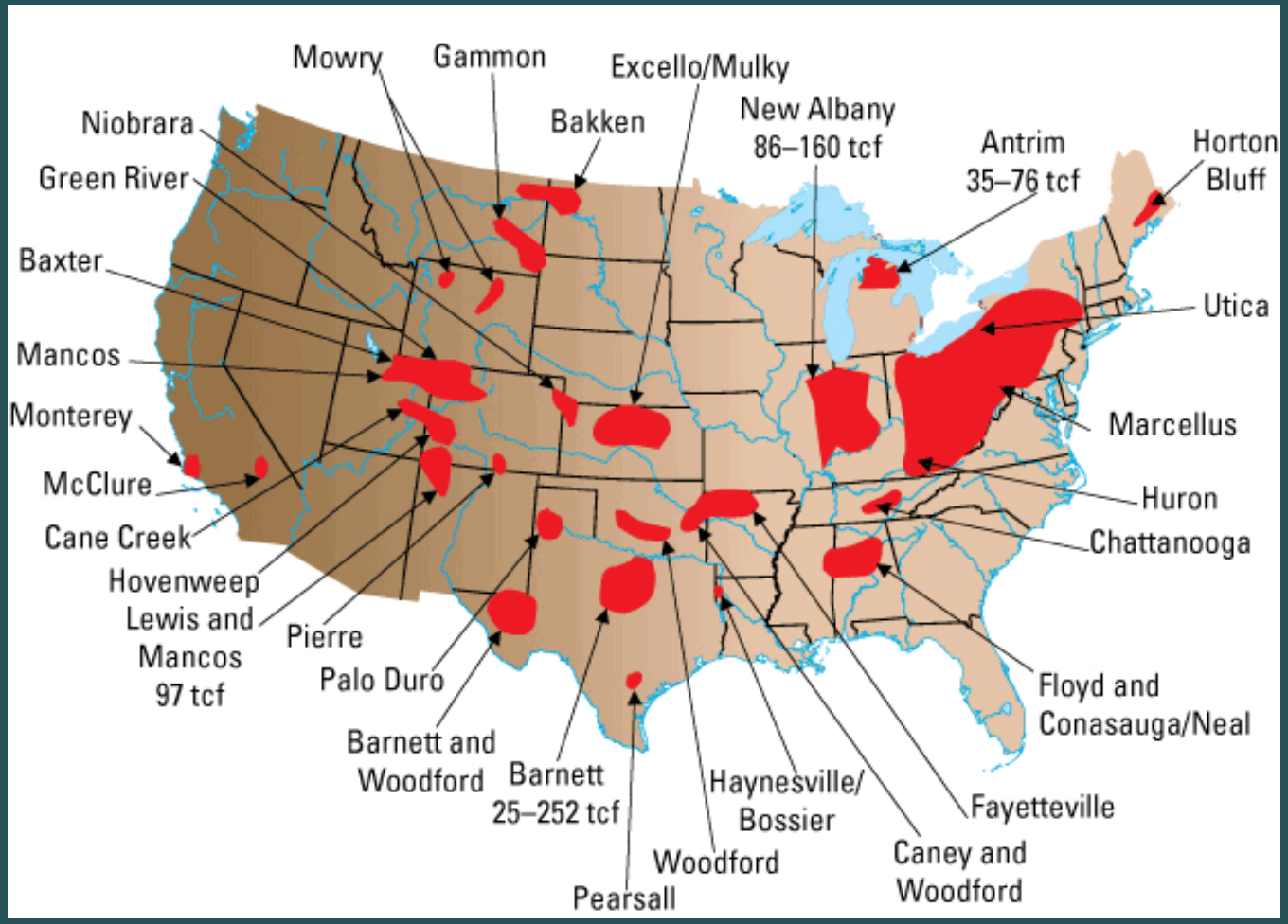
UNCONVENTIONAL RESERVOIRS, RESOURCE PLAYS



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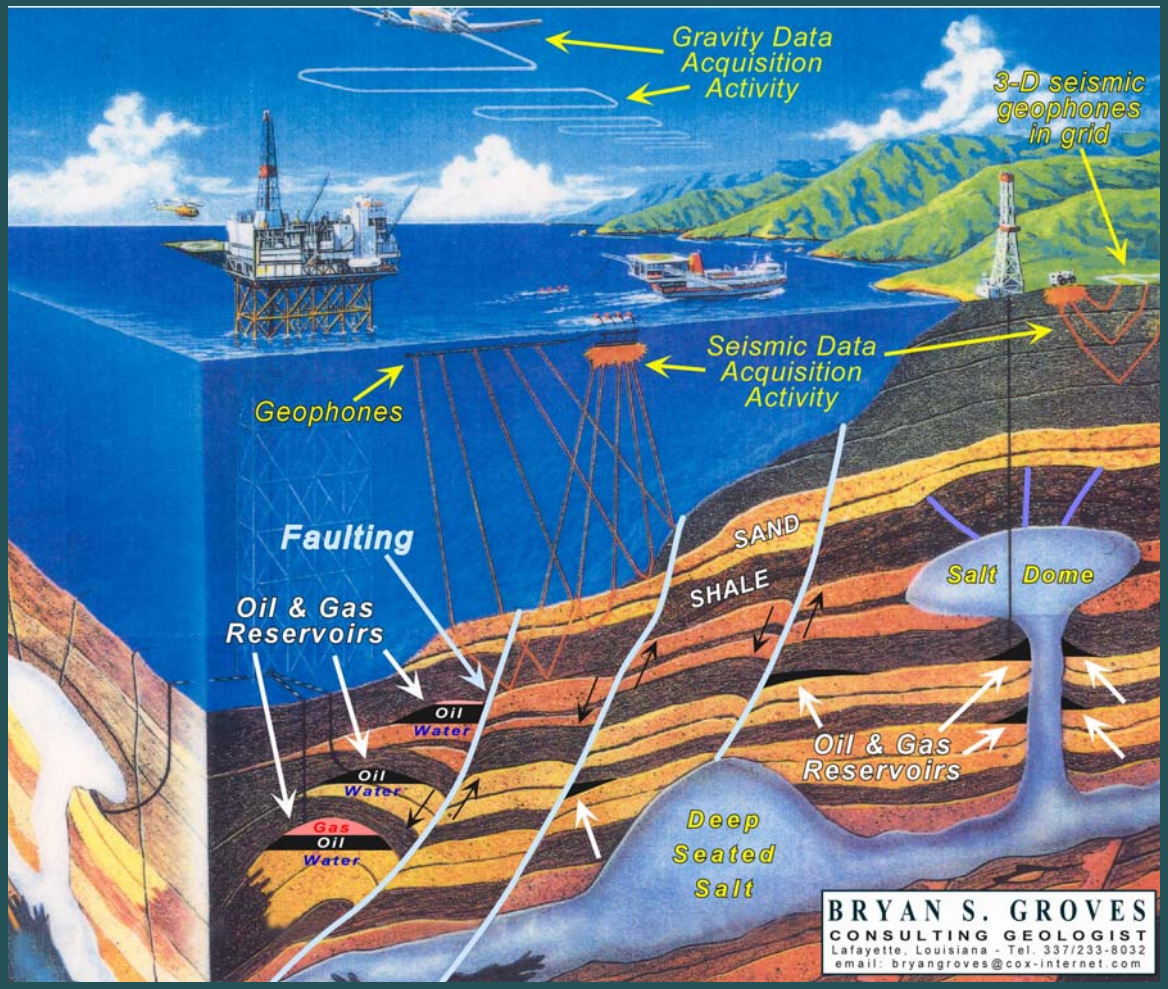
SEISMIC DATA



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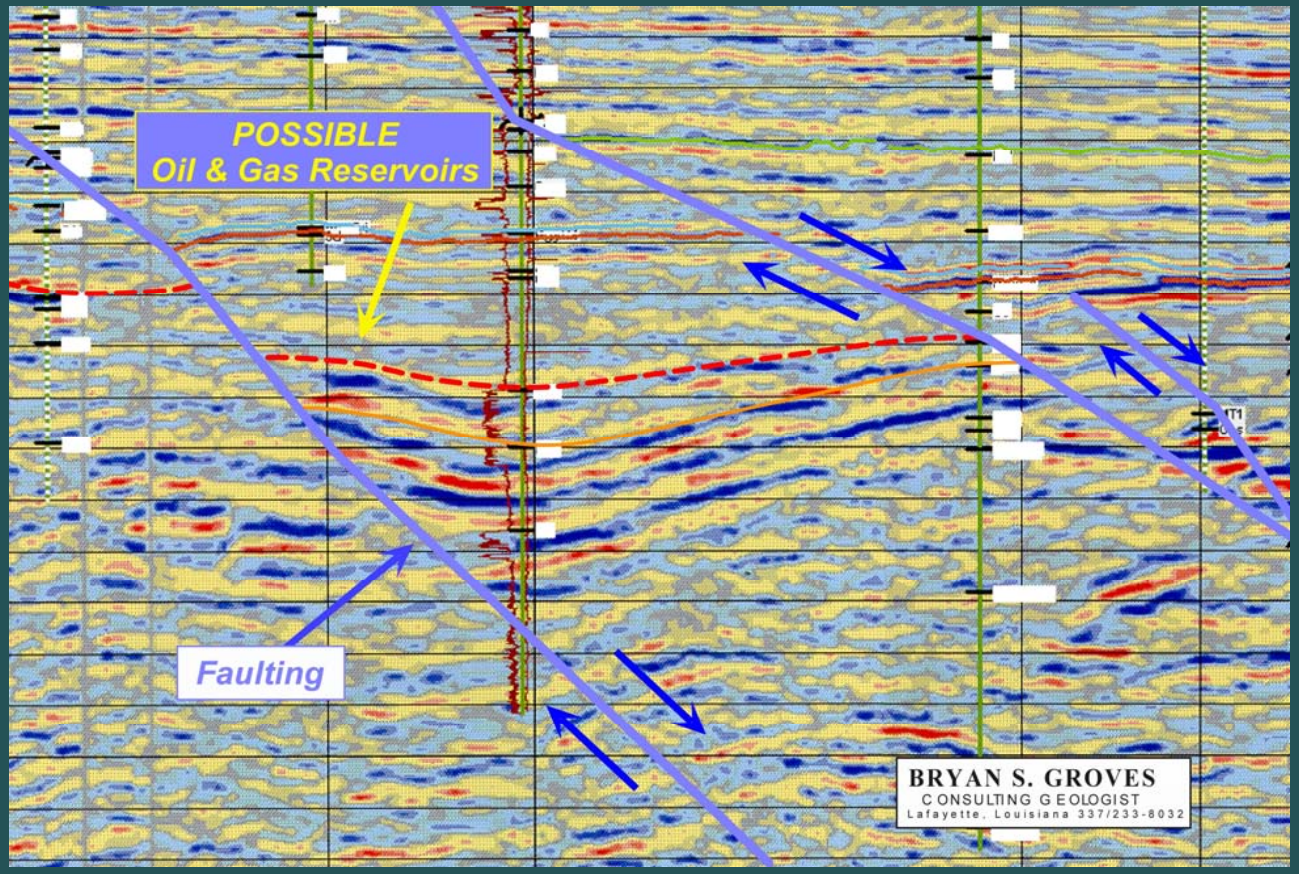
SEISMIC DATA PROFILE (SIDE VIEW)



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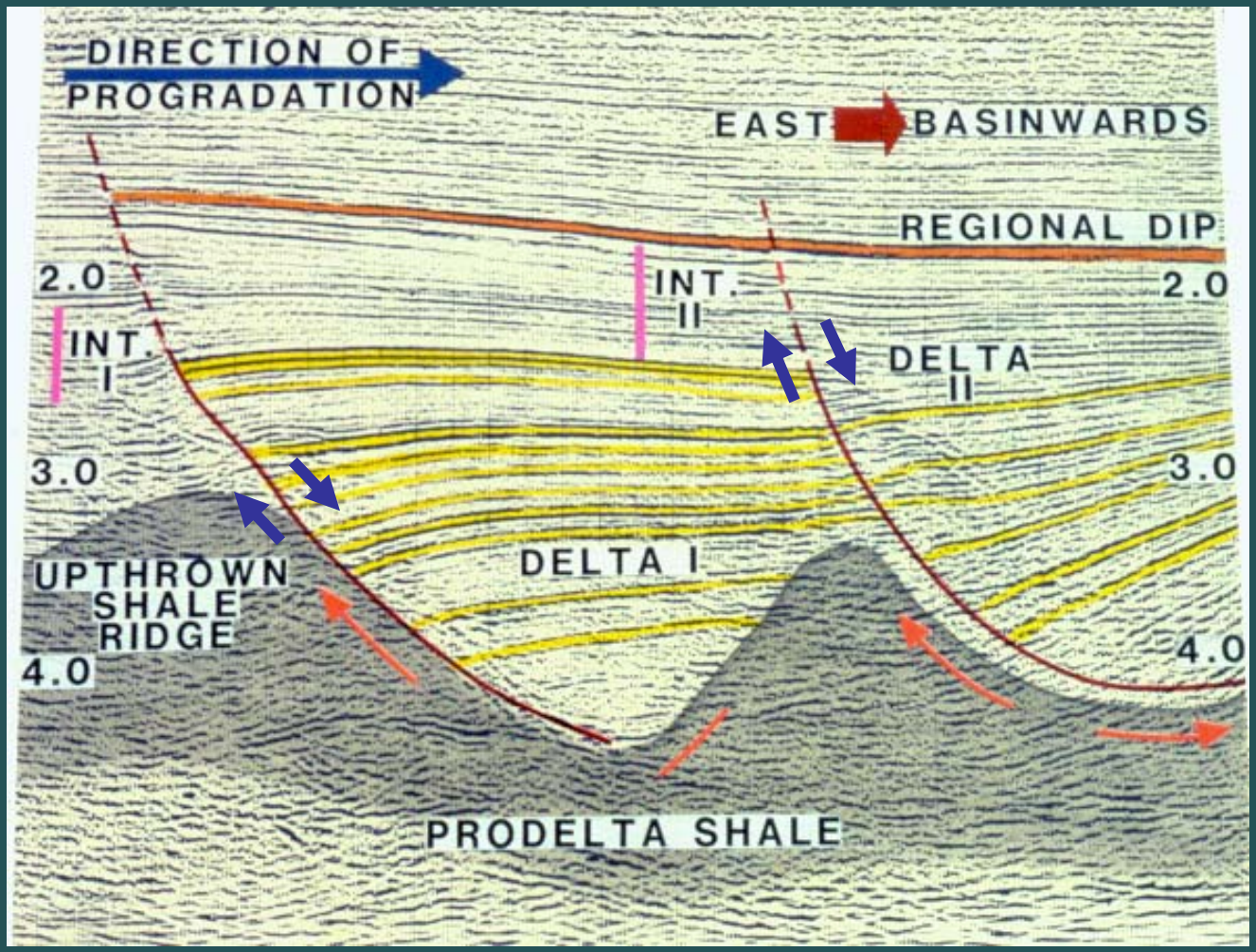
SEISMIC DATA PROFILE (SIDE VIEW)



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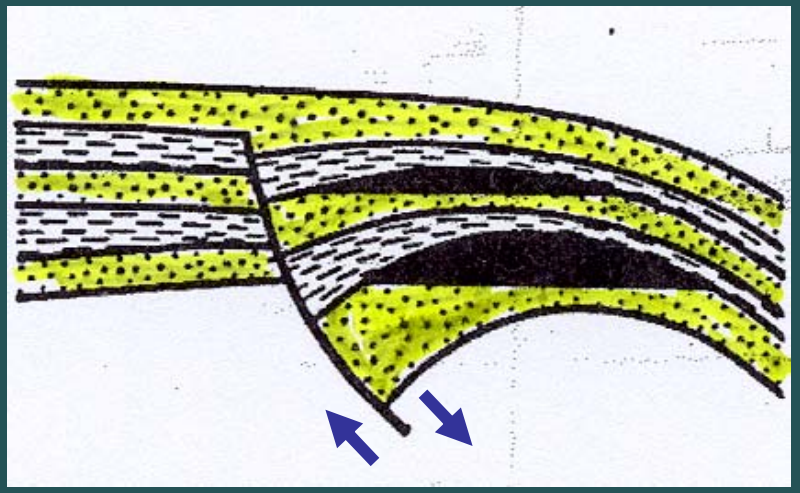
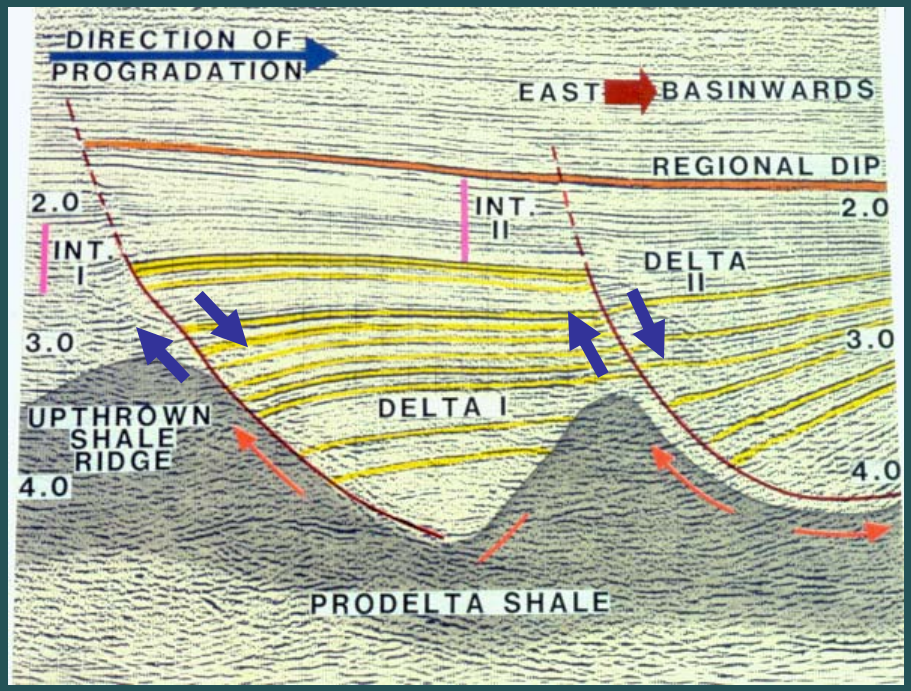
THEORY vs. REALITY





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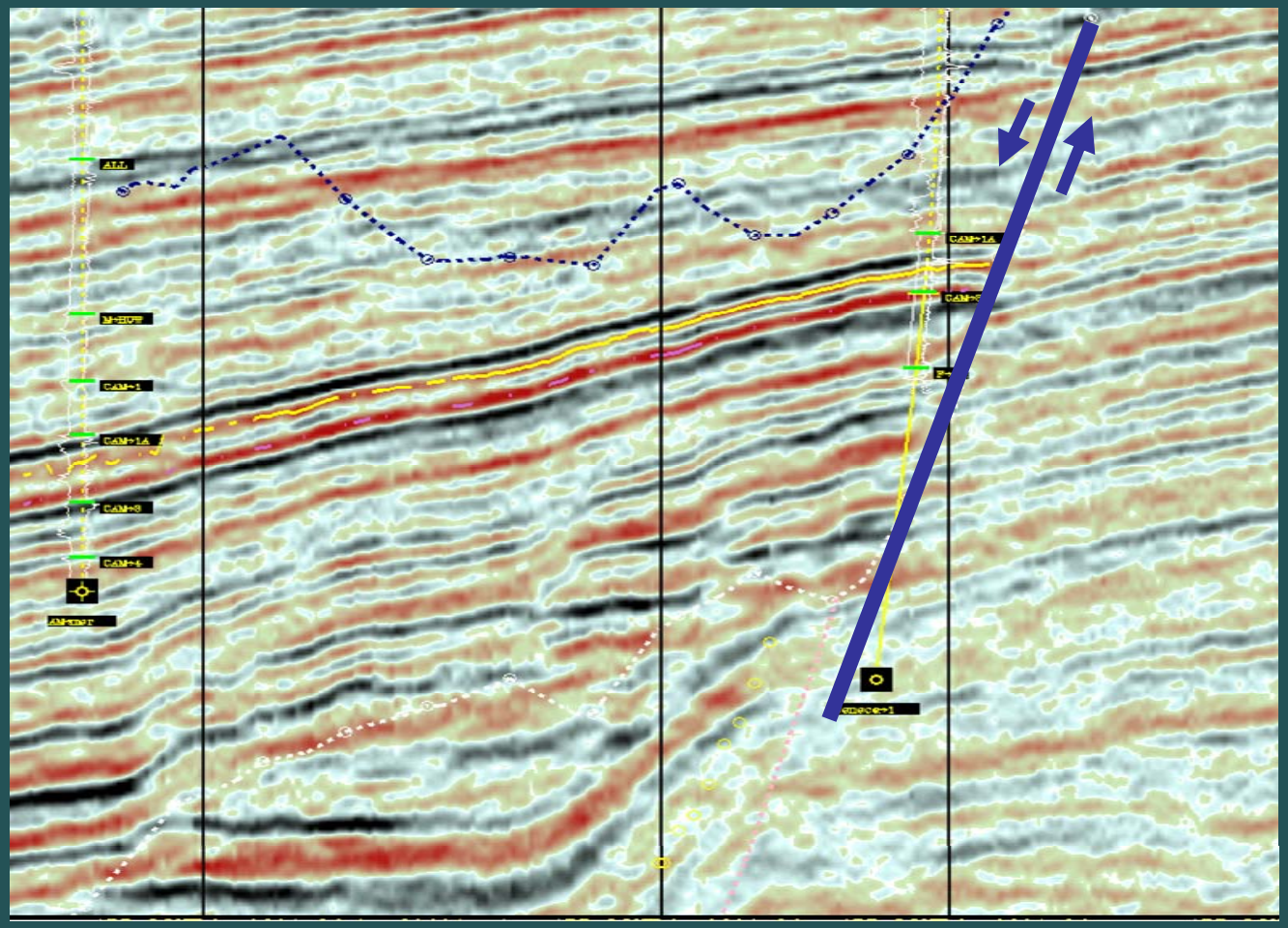
SEISMIC DATA, FAULT PICKING



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Geologist

MINERAL RIGHTS
OGML

Mineral Geology for Beginners

OIL AND GAS MINERAL LEASING

Q: What are mineral rights?

A: The term “mineral rights” generally refers to the right to explore and develop property for the production of oil, gas, and other minerals occurring naturally in liquid or gaseous form and to reduce them to possession and ownership.

Ownership of land does not include ownership of such minerals, but the landowner or owner of a mineral servitude has the exclusive right to explore and develop the property for the production of minerals.”.

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Geologist

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OIL AND GAS MINERAL LEASING

Q: What might happen if an exploration company is interested in leasing the mineral rights on my property ?

A: Typically, a landman offers a per-acre amount to lease the mineral rights and a percentage of royalties from any production that is realized.

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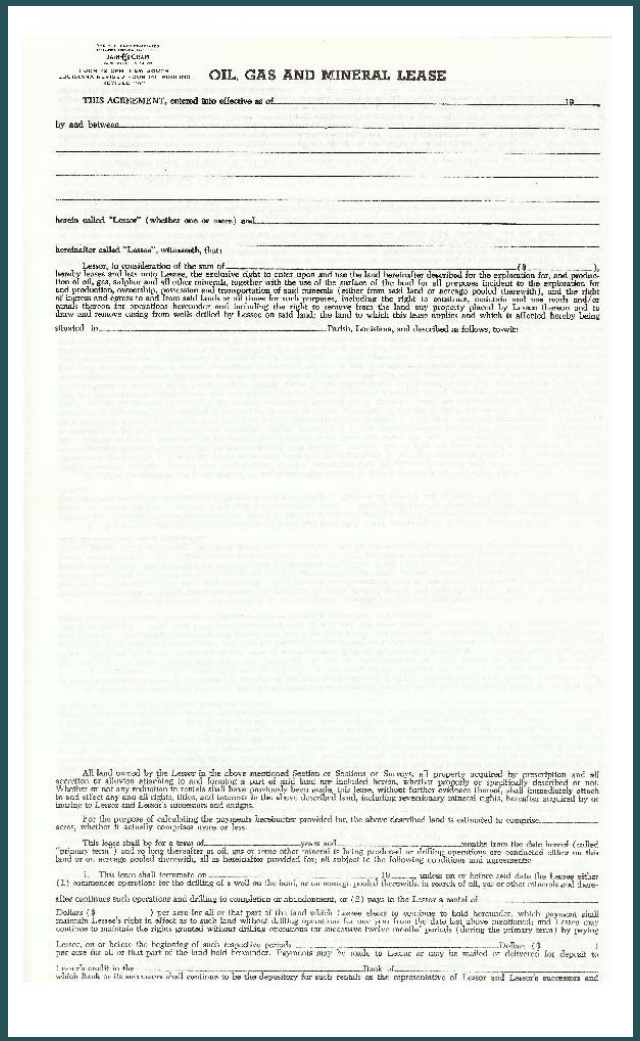
OIL AND GAS MINERAL LEASE FORM



OIL, GAS AND MINERAL LEASE

THIS AGREEMENT, entered into effective as of _____, 19____,

by and between _____

_____

_____

_____

hereinafter called "Lessee" (whether one or more) and _____

hereinafter called "Lessor", witnesseth, that:

Lessor, in consideration of the sum of _____ ($ _____), hereby leases and lets unto Lessee, the exclusive right to enter upon and use the land hereinafter described for the exploration for, and production of oil, gas, sulphur and all other minerals, together with the use of the surface of the land for all purposes incident to the exploration for and production, ownership, operation and transportation of said minerals (either from said land or acreage pooled therewith), and the right of ingress and egress to and from said lands at all times for such purposes, including the right to construct, maintain and use roads and/or canals thereon for operations hereunder and including the right to remove from the land any property placed by Lessee thereon and to draw and remove casing from wells drilled by Lessee on said land; the land to which this lease applies and which is affected hereby being situated in _____ County, Louisiana, and described as follows, to-wit:

All land owned by the Lessor in the above mentioned Section or Sections or Sub-part, all property acquired by prescription and all accretion or alluvion attaching to and forming a part of said land are included herein, whether properly or improperly described or not. Whether or not any exhibition to rentals shall have previously been made, this lease, without further evidence thereof, shall immediately attach to and affect any and all rights, titles, and interests in the above described land, including reversionary mineral rights, hereafter acquired by or inuring to Lessor and Lessor's successors and assigns.

For the purpose of calculating the payments hereinafter provided for, the above described land is estimated to comprise _____ acres, whether it actually comprises more or less.

This lease shall be for a term of _____ years and _____ months from the date hereof (called "primary term") and so long thereafter as oil, gas or some other mineral is being produced or drilling operations are conducted either on the land or on acreage pooled therewith, all as hereinafter provided for, all subject to the following conditions and agreements:

1. This lease shall terminate on _____, 19_____ unless on or before said date the Lessee either (1) commences operations for the drilling of a well on the land, or on acreage pooled therewith, in search of oil, gas or other minerals and thereafter continues such operations and drilling to completion or abandonment, or (2) pays to the Lessor a rental of _____

Dollars ($ _____) per acre for all or that part of the land which Lessee elects to continue to hold hereunder, which payment shall maintain Lessee's right to effect as to such land without drilling operations for one year from the date last above mentioned and Lessee may continue to maintain the rights granted without drilling operations for successive twelve months' periods (during the primary term) by paying Lessee, on or before the beginning of each respective period, _____ Dollars ($ _____) per acre for all or that part of the land held hereunder. Payments may be made to Lessor or may be mailed or delivered for deposit to Lessor's credit in the _____ Bank of _____, which Bank or its successors shall continue to be the depository for such rentals as the representative of Lessor and Lessor's successors and

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Geologist

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OIL AND GAS MINERAL LEASE FORM

OIL, GAS AND MINERAL LEASE

THIS AGREEMENT, entered into effective as of _____ 19____

Date

by and between

Mr. & Mrs. John Landowner (Lessor)

Oil Company (Lessee)

hereinafter called "Lessee" (whether one or more) and _____

hereinafter called "Lessor", witnesseth, that:

Lessor, in consideration of the sum of _____ ($ _____), hereby leases and lets unto Lessee, the exclusive right to enter upon and use the land hereinafter described for the exploration for, and production of oil, gas, sulphur and all other minerals, together with the use of the surface of the land for all purposes incident to the exploration for and production, ownership, possession and transportation of said minerals (either from said land or acreage pooled therewith), and the right of ingress and egress to and from said lands at all times for such purposes, including the right to construct, maintain and use roads and/or canals thereon for operations hereunder and including the right to remove from the land any property placed by Lessee thereon and to draw and remove casing from wells drilled by Lessee on said land; the land to which this lease applies and which is affected hereby being situated in _____ Parish, Louisiana, and described as follows, to-wit:

Legal Description of Land

Example:

North Half of Section 23, T6S-R3W

DON'T FORGET THE TERMS!

Mineral Geology for Beginners

OIL & GAS MINERAL LEASE TERMS

- **BONUS** (1st year): $ per acre
- **RENTAL** (2nd & 3rd year): $ per acre
- **ROYALTY**: 20%, 22.5%, 25%
- Primary Term, 3 years
- Other provisions in optional Exhibit “A”

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Geologist

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OIL & GAS MINERAL LEASE TERMS

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- Other provisions in optional Exhibit "A"

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UNITIZATION

Mineral Geology for Beginners

OIL AND GAS UNITIZATION

Q: What is unitization of wells?

A: Unitization of oil and gas reservoirs in the state is a critical activity achieved by industry and state government working together. It is important to mineral rights owners because of the economic gain once a well is produced. At the request of an applicant or operator, an oil or gas unit is established for a sand, a zone, or a shale or formation.

Unitization allows maximal recovery of the resource, prevents drilling unnecessary wells, and protects the rights of the mineral owners.

Bryan S. Groves
Geologist

after LDNR website

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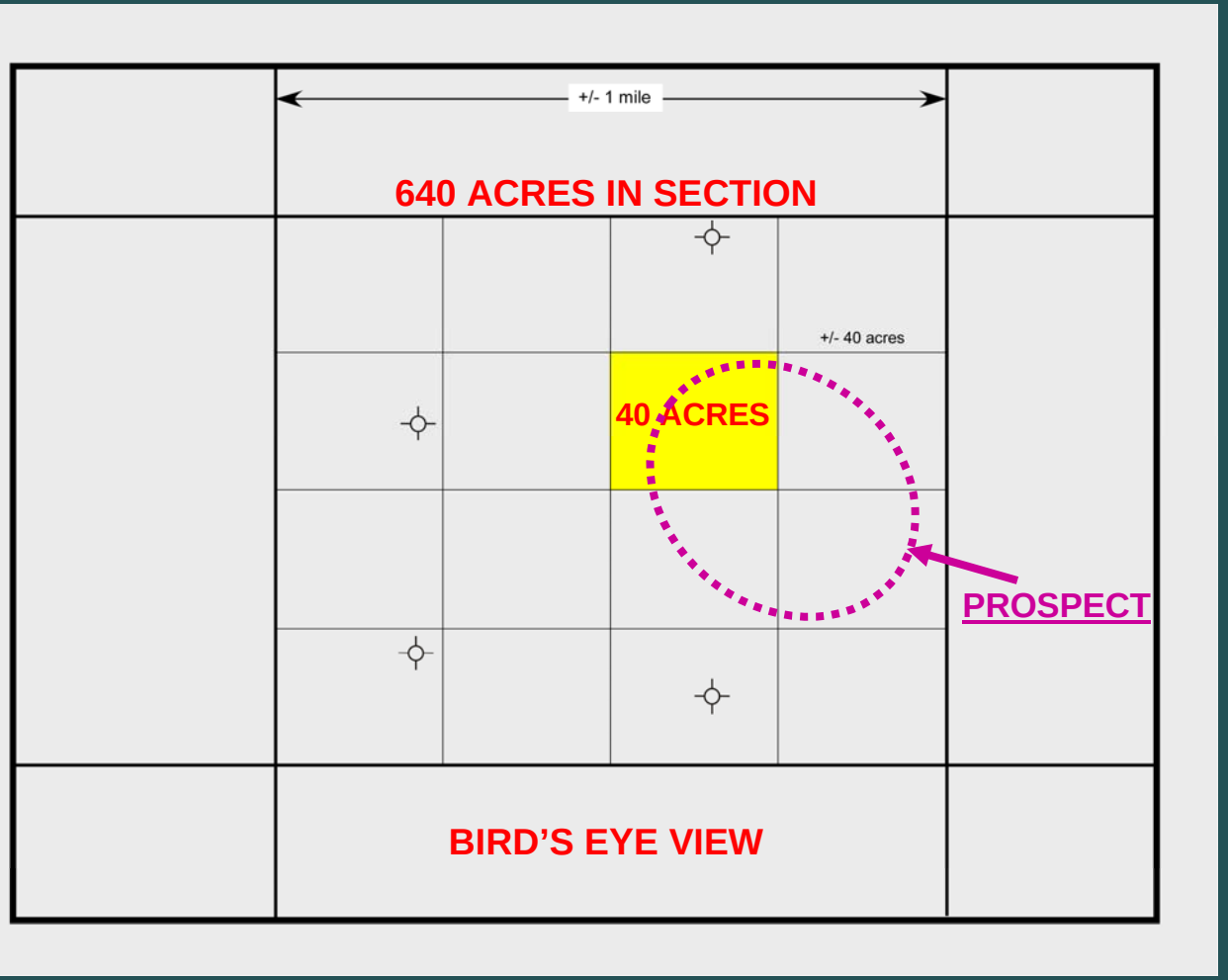
OIL & GAS UNITIZATION EXAMPLE



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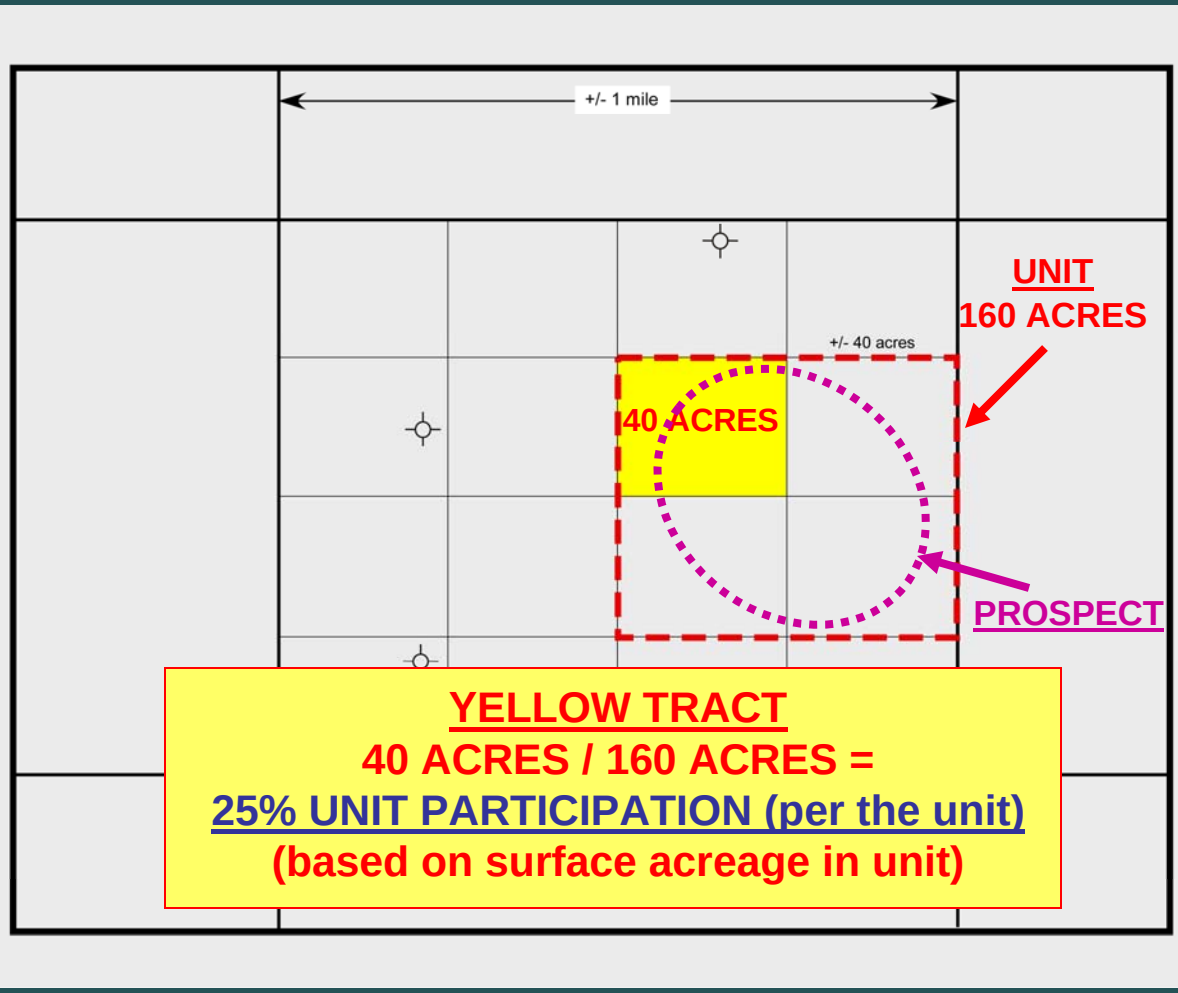

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OIL & GAS MINERAL LEASE TERMS (review)

- **BONUS** (1st year): $ per acre
- **RENTAL** (2nd & 3rd year): $ per acre
- **ROYALTY**: 20%, 22.5%, 25%
- Primary Term, 3 years
- Other provisions in optional Exhibit “A”

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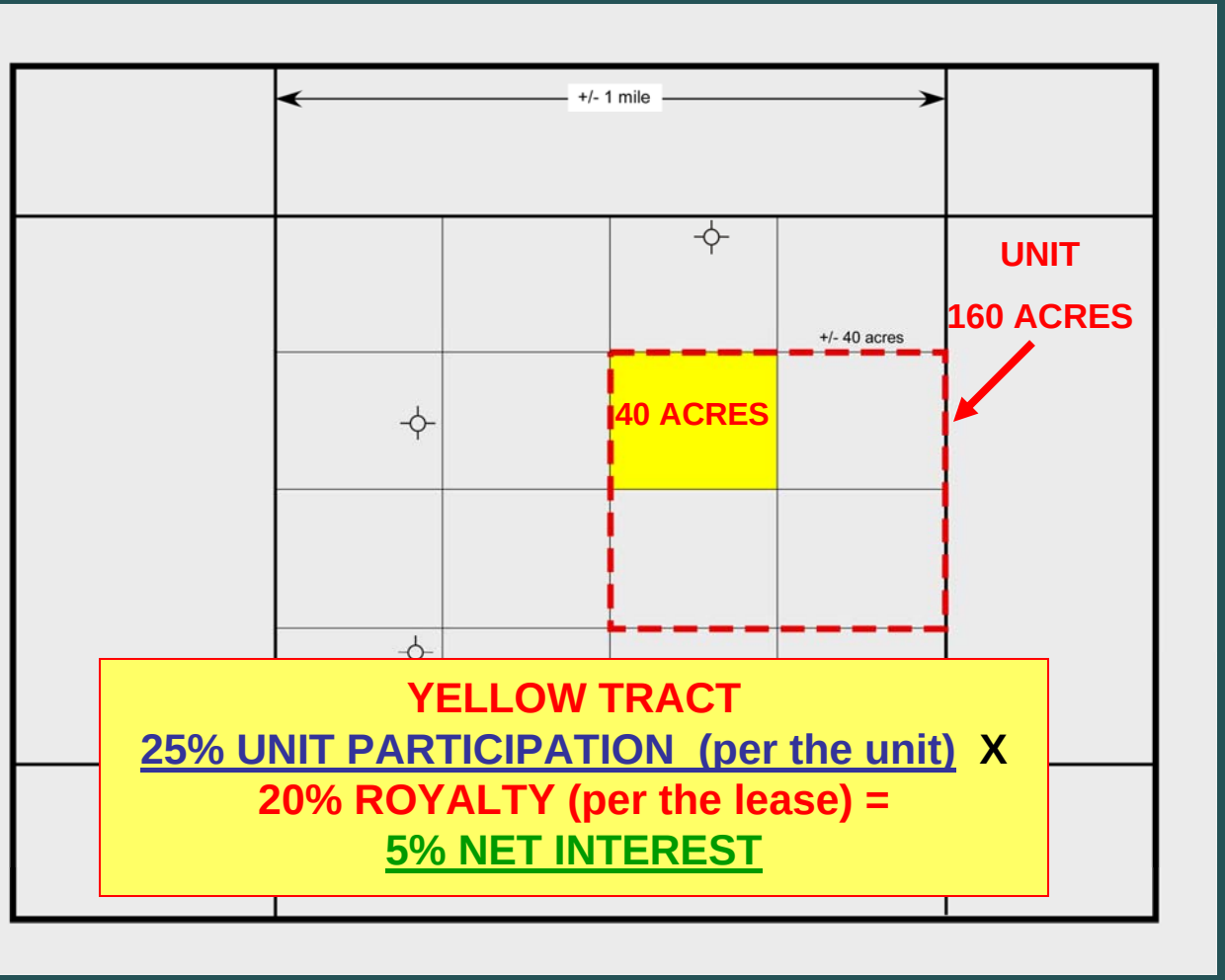

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OIL & GAS UNITIZATION PROCESS

Louisiana Department of Natural Resources, Office of Conservation

- Pre-Application Conference **Notice Letter**
- Pre-Application **Conference** (informal meeting to discuss proposed unit plans)
- **Application Letter** (docketed for hearing)
- **Hearing** (in Baton Rouge, LA)
- **Unit Order** signed by Commissioner of Conservation

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ENTIRE PROCESS TAKES APPROXIMATELY 90-120 DAYS

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INFORMATION

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INFORMATION - WEBSITES

- **LOUISIANA DEPARTMENT OF NATURAL RESOURCES, SONRIS O & G DATABASE**
  http://sonris-www.dnr.state.la.us
- **ENERGY INFORMATION ADMINISTRATION, U. S. GOVERNMENT O & G DATA**
  http://www.eia.doe.gov
- **LOUISIANA OIL AND GAS ASSOCIATION, ISSUES AFFECTING LA. O & G INDUSTRY**
  http://www.loga.la
- **CNN, OIL AND GAS PRICES**
  http://money.cnn.com
- **BAKER HUGHES, OIL AND GAS DRILLING RIG COUNT INFORMATION**
  http://gis.bakerhughesdirect.com

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Mineral Geology for Beginners
SUMMARY

- Oil & Gas Geology
- Oil & Gas Mineral Lease
- Oil & Gas Unitization
- Information - Websites

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ACKNOWLEDGEMENTS

MR. KEITH HAWKINS

WITH THE

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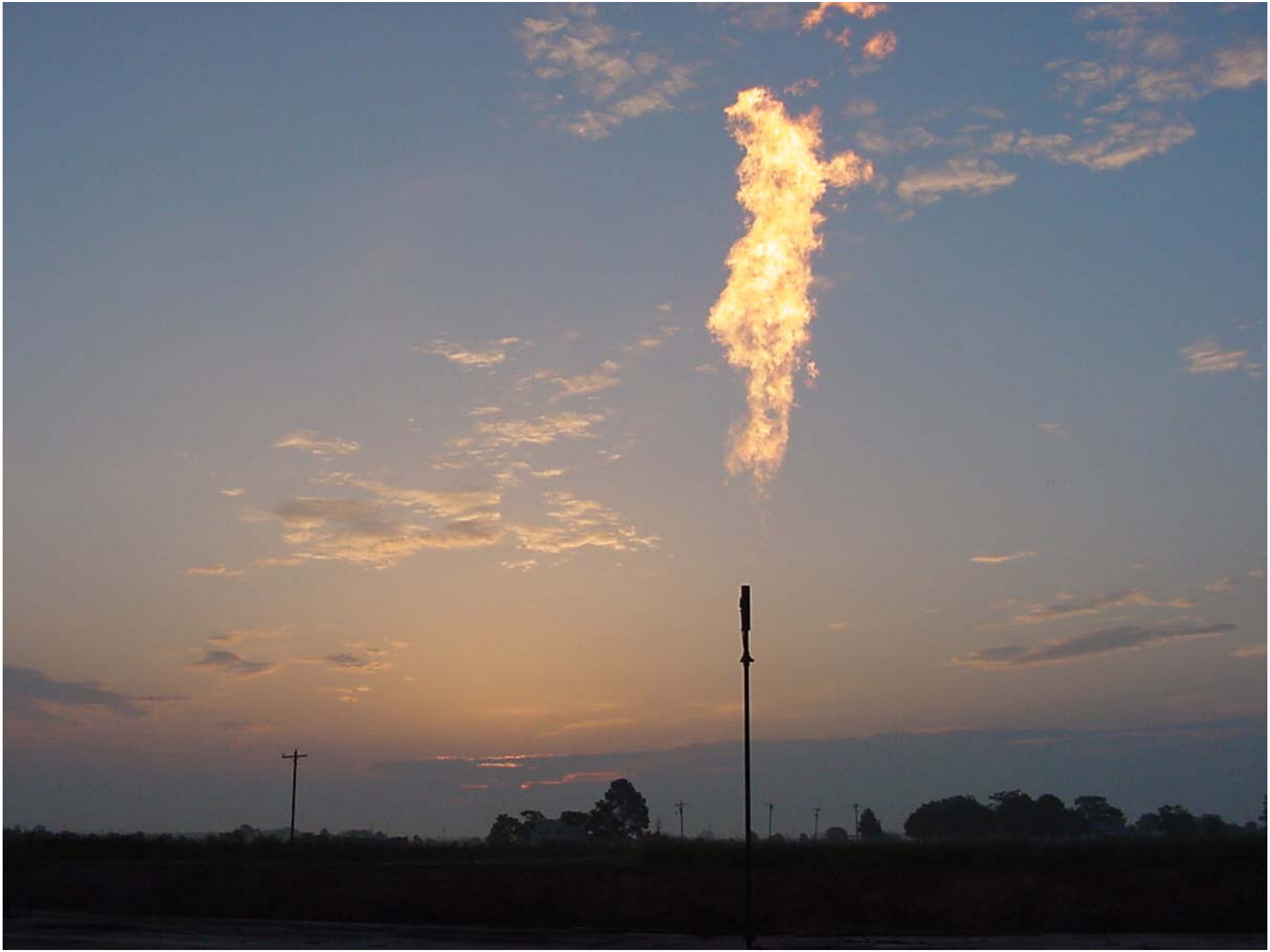
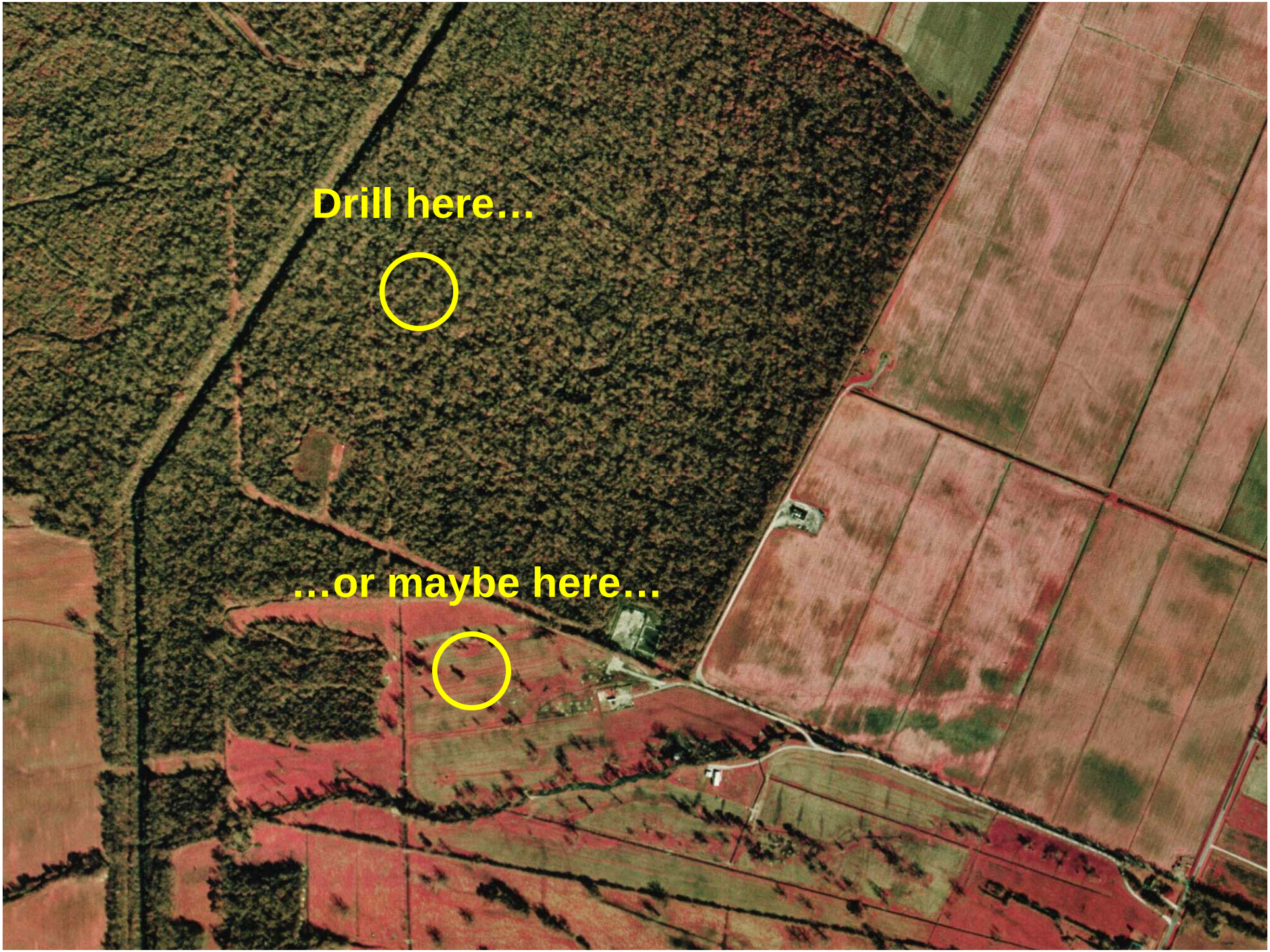
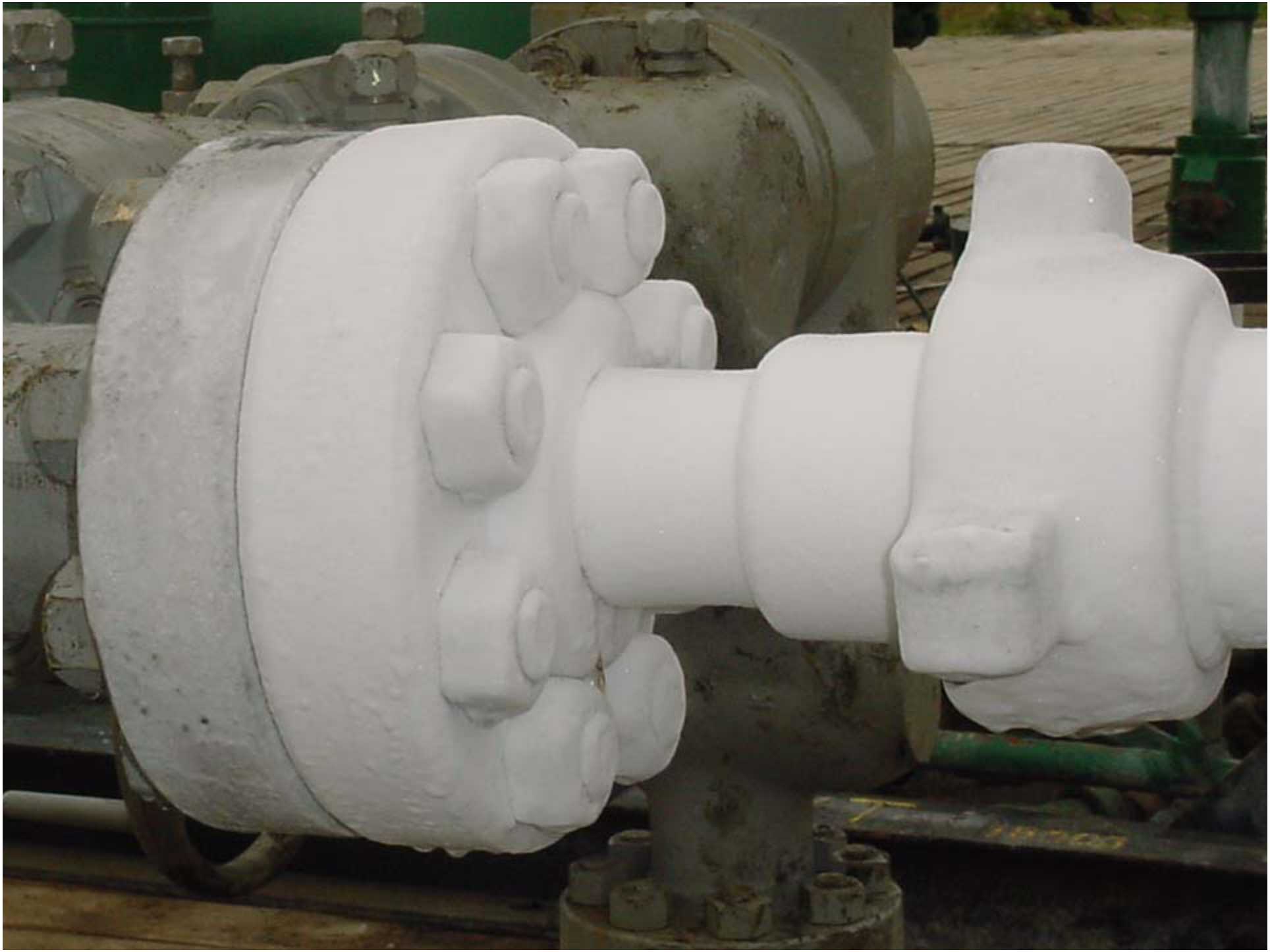



Drill here…
…or maybe here…


LAFAYETTE

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