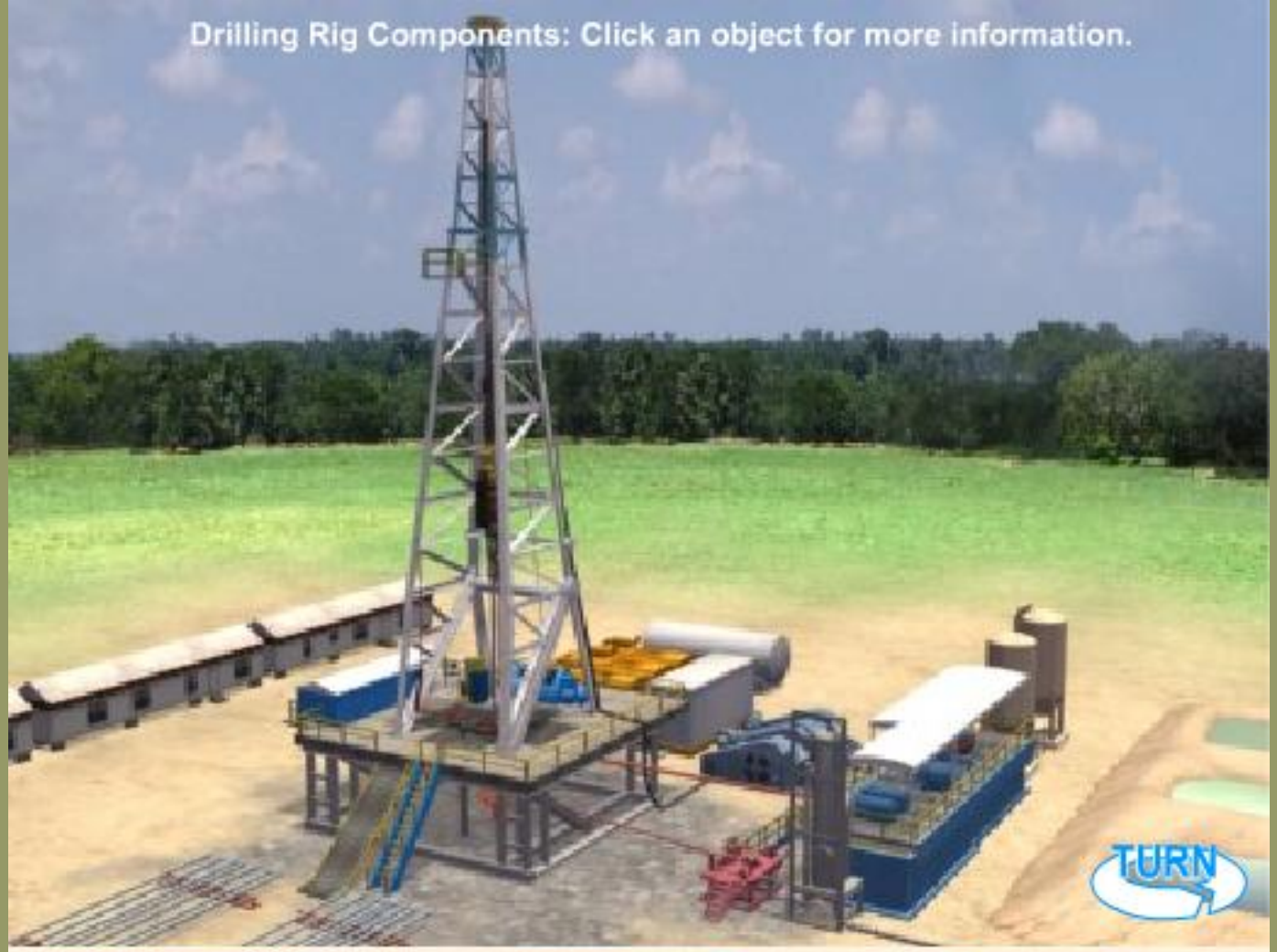
# Drill Rigs and Nomenclature




Drilling Platform

Rig Controls

Rig Floor

Choke Manifold and Seperator

Blowout Preventer

Mud Pumps

**Rig Controls:**

The driller can control the hoisting, pumping, and rotating operations from the control panel. The large round gauge to the right is the weight indicator that shows the weight suspended by the derrick. Below it are small gauges that show the pump pressure and pressure on other parts of the rig. The panel to the left controls the pump speeds, the transmission of the rig, the hoist speed, and the rotating speed. The other displays are connected to sensors on the rig that show the status of key components. The hoist is a large drum called the draw works that can spool in or pay out the drilling line. This is shown in the background as a blue cylinder with the drilling line coming out of the top.

Travling Block

RETURN

**Rig Floor:**

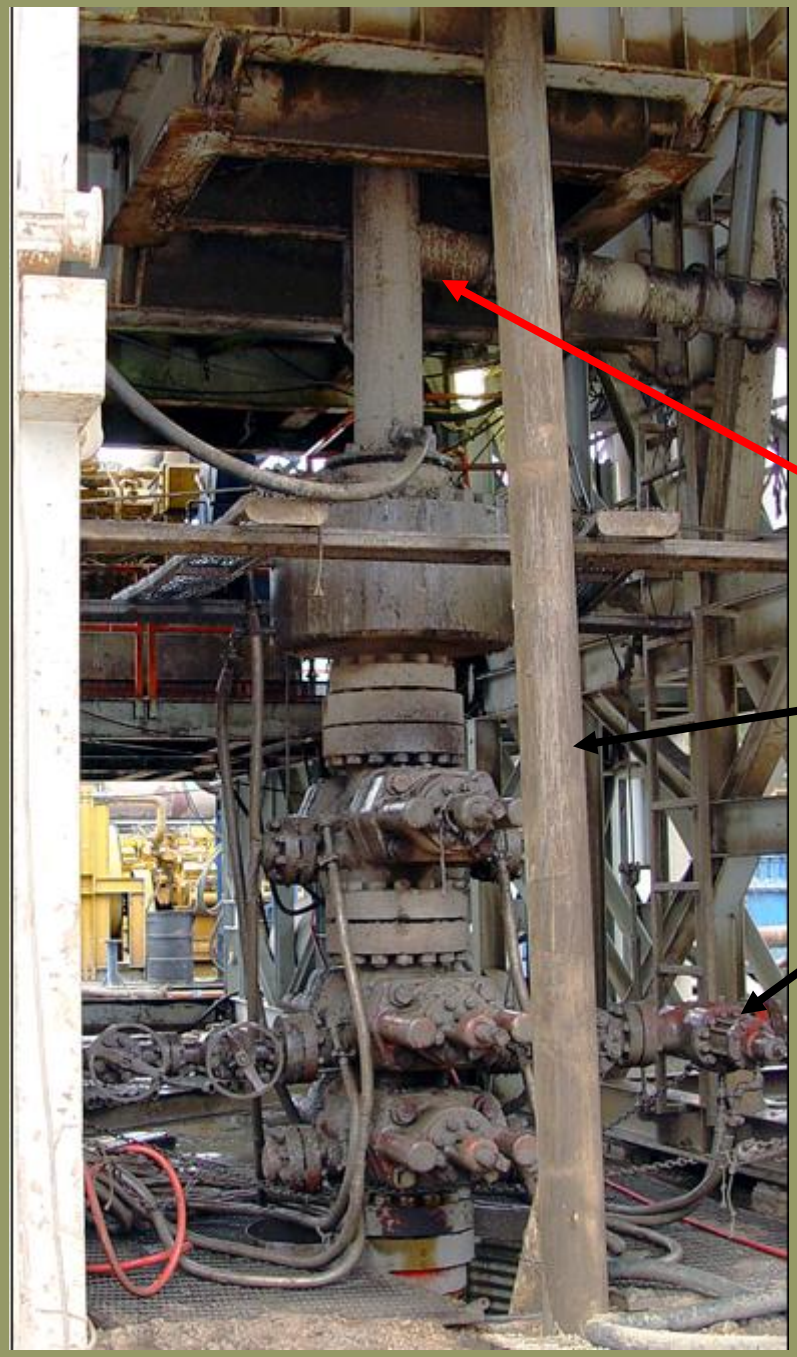
RETURN

This is the working space on the rig. The drill string is shown suspended by slips in the rotary table. When engaged, the slips allow the string weight to be suspended by the steel frame underneath the rig known as the “substructure”. The red tongs shown on the floor act like mechanical hands to screw together (make up) or take apart (break out) pieces of pipe. The top of the next section of pipe to be added is shown protruding from the “Mouse Hole”. Although not used on a Top Drive rig, the “Rat Hole” is shown in the right foreground. The Rat Hole would be used to store the Kelly when not in use. Both the Rat and Mouse Hole have a cover to prevent workers from stepping in them when they are not in use.

**Blow Out Preventers (BOPS):**

RETURN

The BOPS are a series of valves that can be closed around the pipe that is in the well or over the open hole if necessary to stop uncontrolled flow out of the well. Once the well has been shut in by the BOPS, the lower red pipe can be opened at the choke manifold to flow the well during engineered well control operations. The BOPS are secured to the surface casing that has been cemented into the ground. The upper red pipe is the normal flow path for mud returning to the mud tanks and exits the well out of the "Bell Nipple" shown as the top of the BOP stack. In the right foreground is the pipe that creates the "Mouse Hole" for the rig floor.

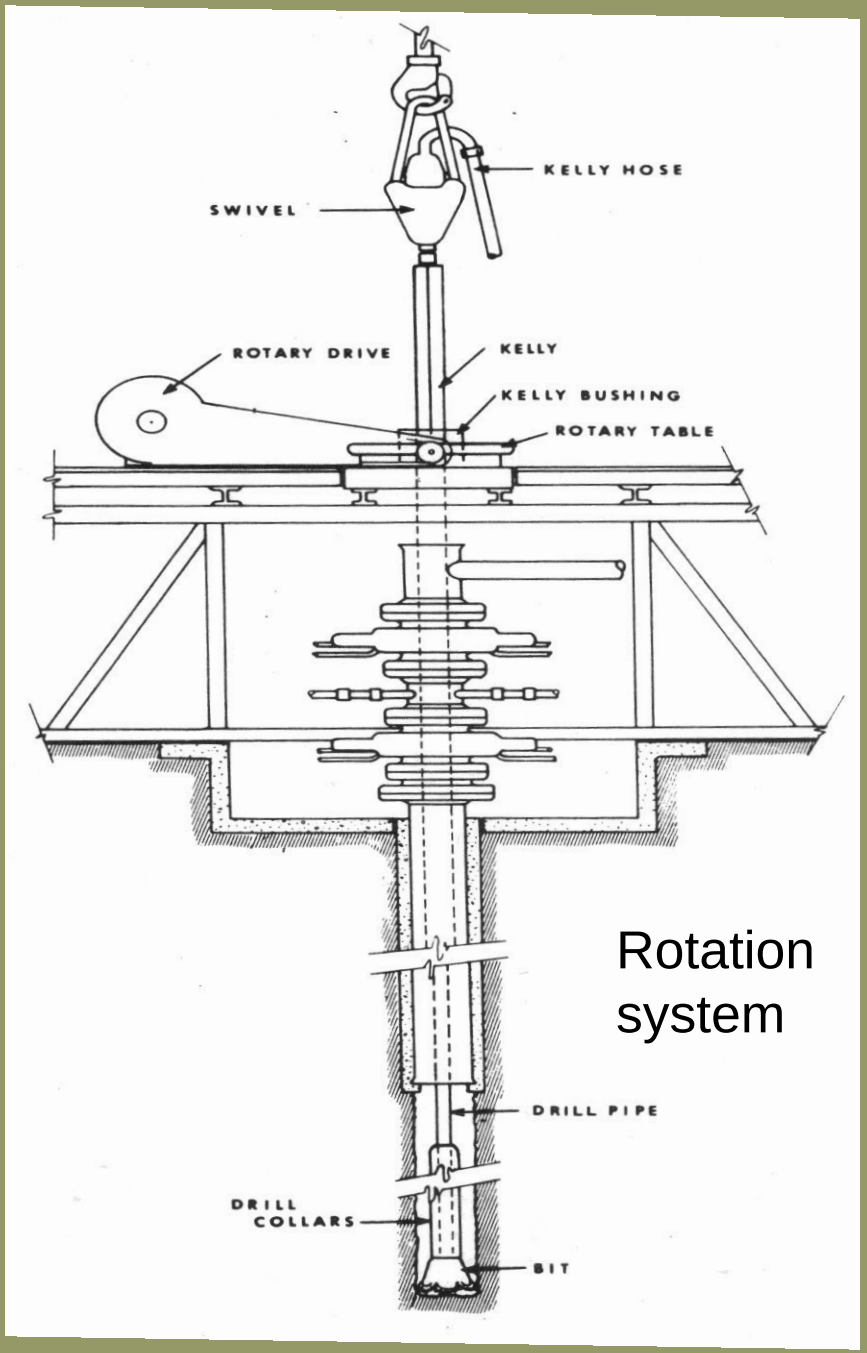


Blow out protectors (below drilling platform) showing:

bell nipple (to mud tanks)

mouse hole casing

choke manifold outlet.




Rotation system

**Choke Manifold and Gas Buster:**

The choke manifold provides a pathway and a flow control valve for flowing the well if the upper BOPS are closed. The gas buster is a separator that allows any gas in the mud to be separated and safely flared. The gas free mud is returned to the mud tanks. It is used only when the BOPS are closed and the well is being flowed through the choke manifold.

RETURN

**Mud Pumps and Mud System:**

The large blue pumps to the left provide the pressure to force the mud to flow from the surface to the drill bit at the bottom of the well and back to the surface.

The blue tanks contain the active mud system where the mud can have the solids removed by the “shale shaker” and the de-sander and de-silter hydrocyclones. The upper red pipe is the flow path for mud returning to the shale shaker from the well. In the background is the mud chemical storage and mixing area.

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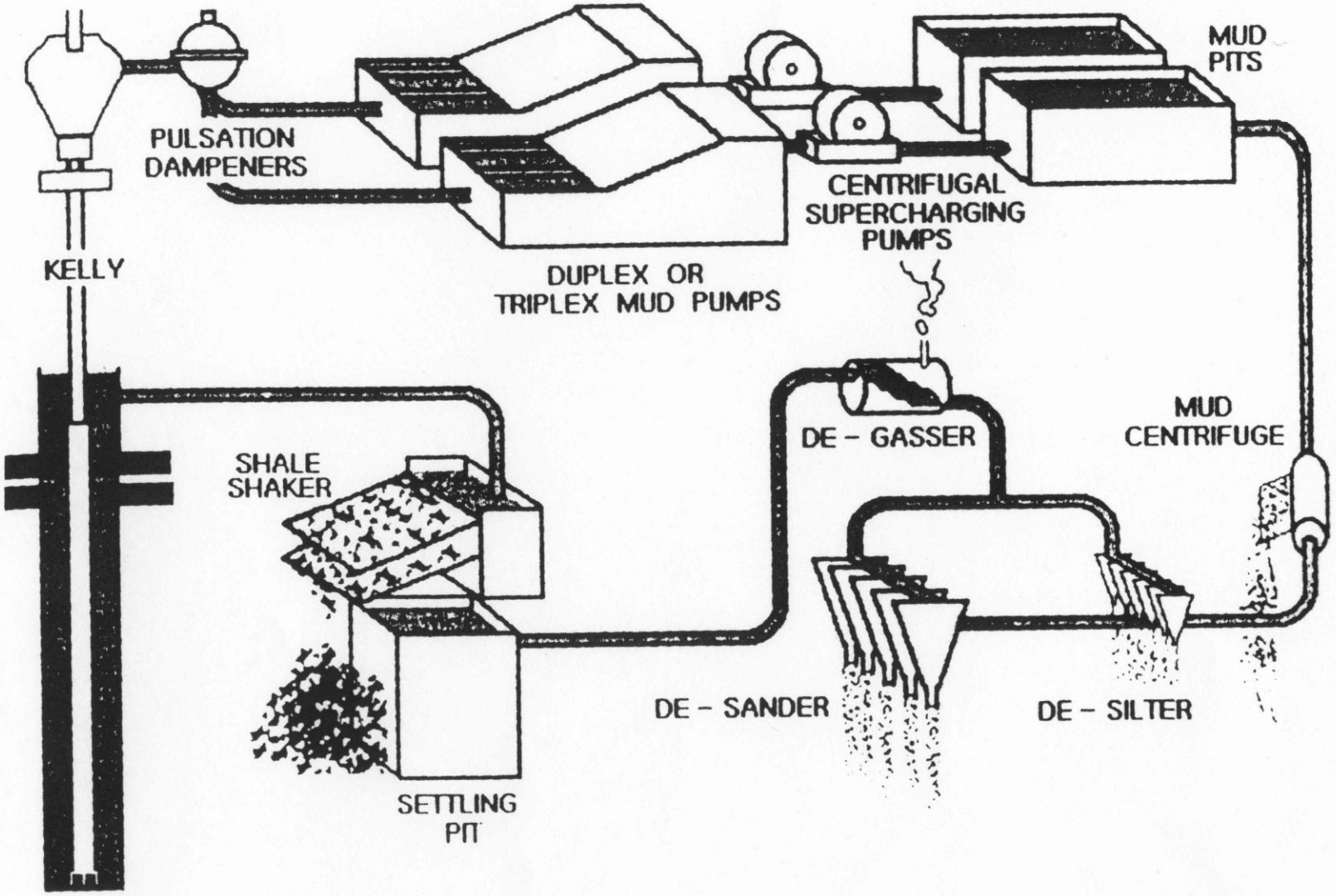
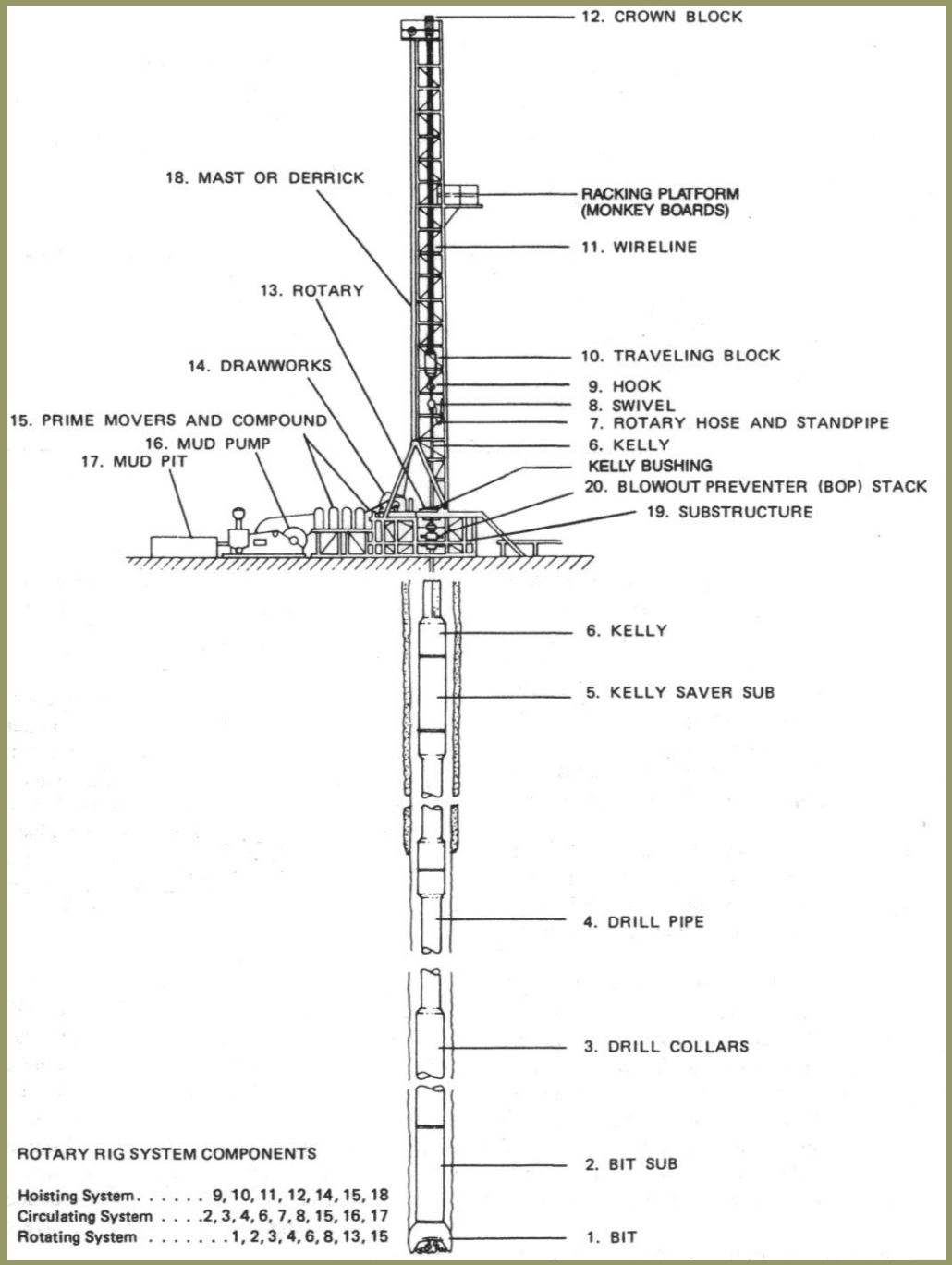



**Figure 2. Circulating system of a rig. (From Whittaker, 1985.)**


12. CROWN BLOCK
18. MAST OR DERRICK
RACKING PLATFORM (MONKEY BOARDS)
11. WIRELINE
13. ROTARY
10. TRAVELING BLOCK
14. DRAWWORKS
9. HOOK
8. SWIVEL
15. PRIME MOVERS AND COMPOUND
7. ROTARY HOSE AND STANDPIPE
16. MUD PUMP
6. KELLY
17. MUD PIT
KELLY BUSHING
20. BLOWOUT PREVENTER (BOP) STACK
19. SUBSTRUCTURE
6. KELLY
5. KELLY SAVER SUB
4. DRILL PIPE
3. DRILL COLLARS
2. BIT SUB
1. BIT
ROTARY RIG SYSTEM COMPONENTS
Hoisting System . . . . . 9, 10, 11, 12, 14, 15, 18
Circulating System . . . .2, 3, 4, 6, 7, 8, 15, 16, 17
Rotating System . . . . . .1, 2, 3, 4, 6, 8, 13, 15

# Drill Site/Rig Personnel

- Tool Pusher – responsible for all rig operations (rig manager). The boss around drill rigs.
- Driller – controls drilling process.
- Roughneck – drill floor people.
- Roustabout – general labors.
- Company man – usually the drilling engineer.
- Mud man – prepares, conditions, And monitors mud.
- Geologist – sample collection & interpretation; ID's reservoirs, coring and test horizons; mandates rig functions (circulate bottoms up, etc.), transmits this data to company supervisors.
- Mud logger collects drill cuttings, records mud gasses and prepares sample/mud log

# Small air drill-rig south of Tulsa Oklahoma

Pictures taken in Dec. 2007 by Rick Andrews


MACK
BALDOR
GENERATORS
22


CAUTION


CAUTION
-NO-
SMOKING

# Typical “big” drill rigs used on land and allied equipment


Davis #5 Drilling Rig

Blow Out Preventer

**Davis 5 Mud Pumps**

An extremely important part of the drilling operations, the mud pumps are used to pump "mud" under very high pressure down the hole thru the center of the drill string and out the bottom of the drilling bit, coming back up to the surface carrying the rock cuttings with it while cooling the bit and lubricating the hole as well....

**Davis 5 Shale Shakers**

This equipment sifts out cuttings from the mud (using a shaking motion )so they can be examined, the rest spills into the pits....


**Davis 5 Draw Works**

This is one of the main pieces of equipment on the rig, the draw works is basically a very large wench that is used to raise and lower the drill string (pipe) in and out of the hole....


**Davis 5 Rig Floor**

On the rig floor of the Davis #5....


Here we g

Running a survey.....


**Halliburton Frac job**


More "bluey" line

**The "bluey" line**

The "bluey" line is where all the air and cuttings come out....

# Cable Tool Drill Rigs

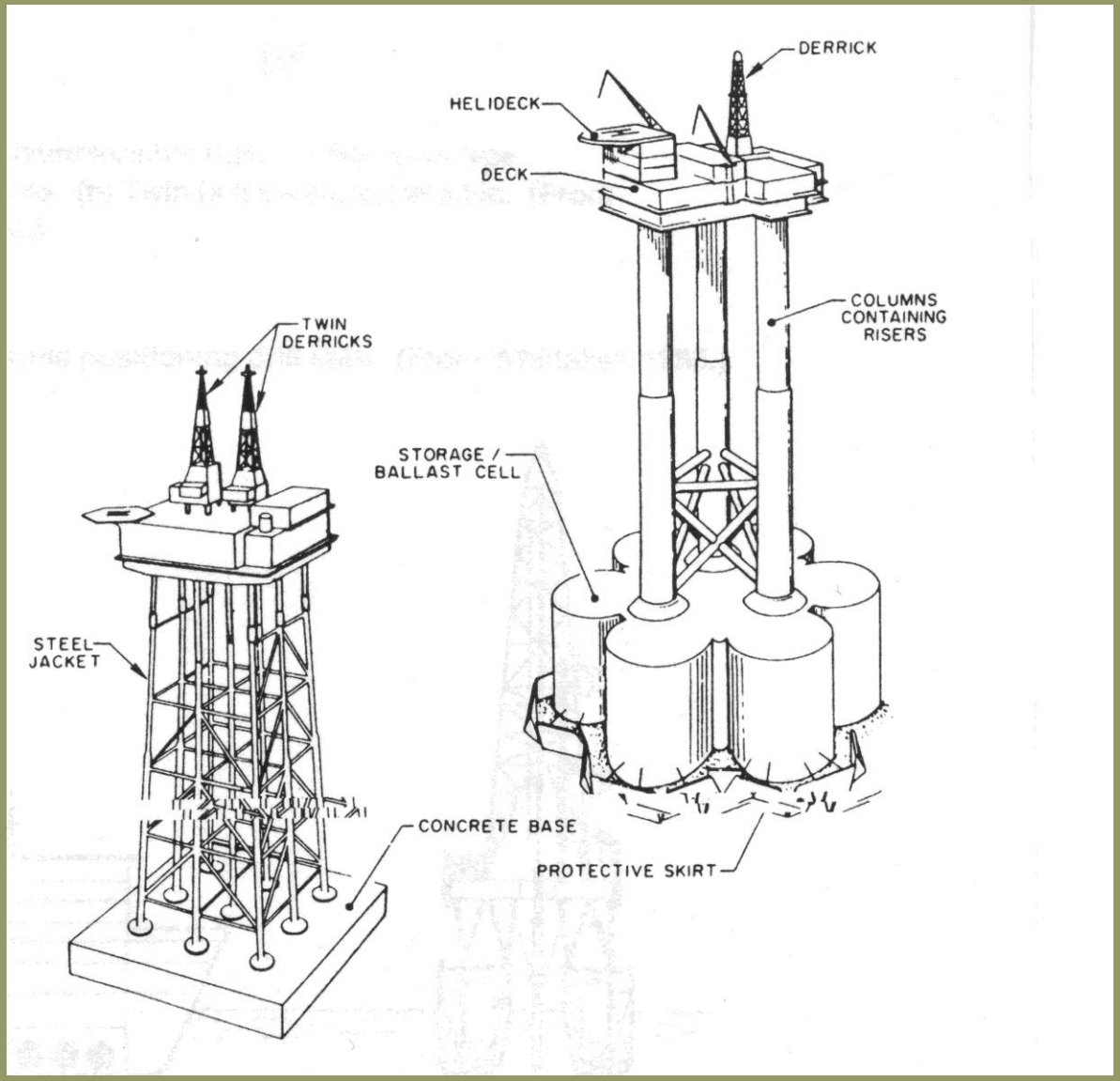
Commonly used before 1950

Old cable drill rig abandoned in Redden Oil Field in southern Oklahoma.

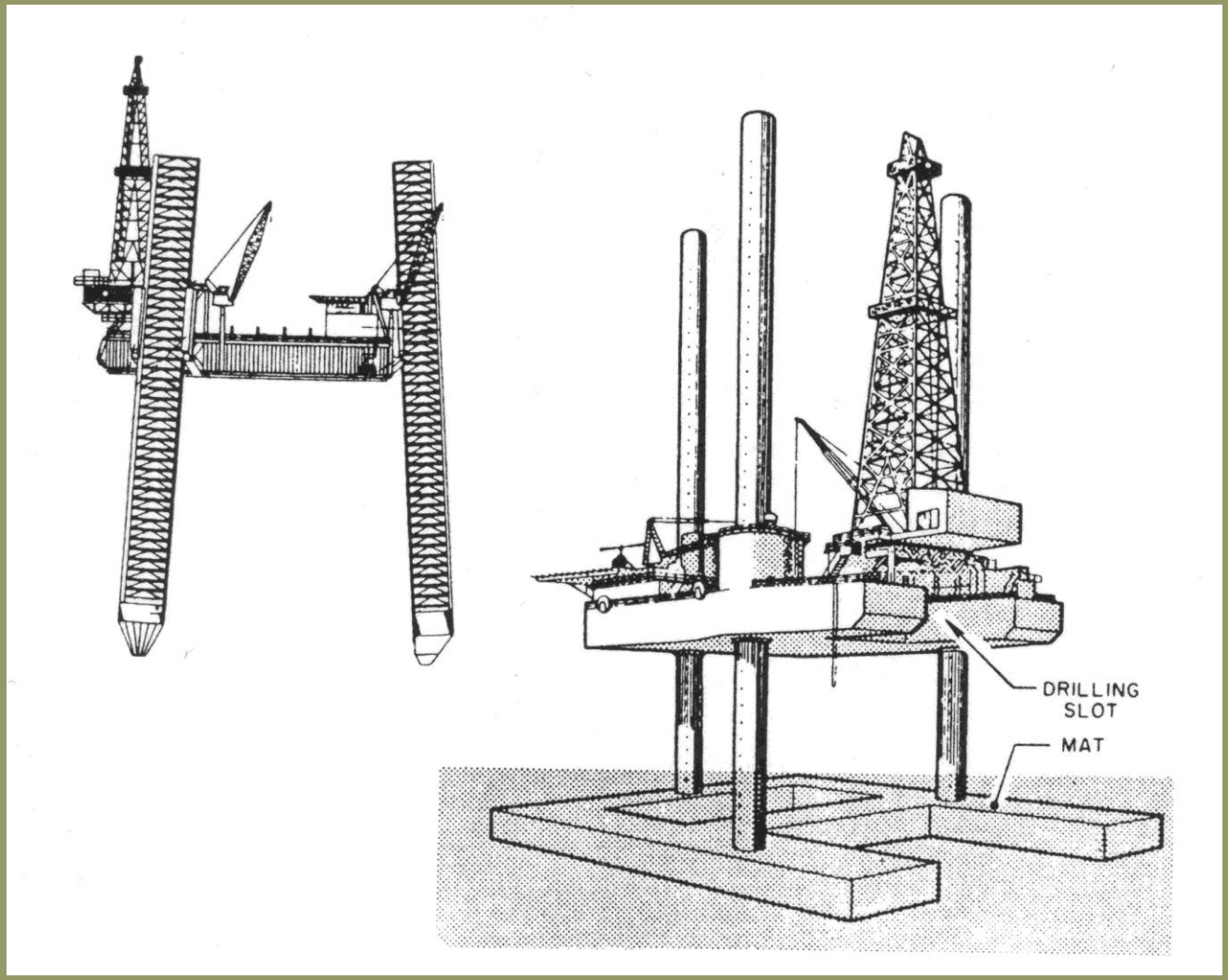
Draw-works of an old cable drill rig abandoned in Redden Oil Field in southern Oklahoma.

Greatly worn tip of cable tool bit. From the abandoned Redden Oil Field in southern Oklahoma.

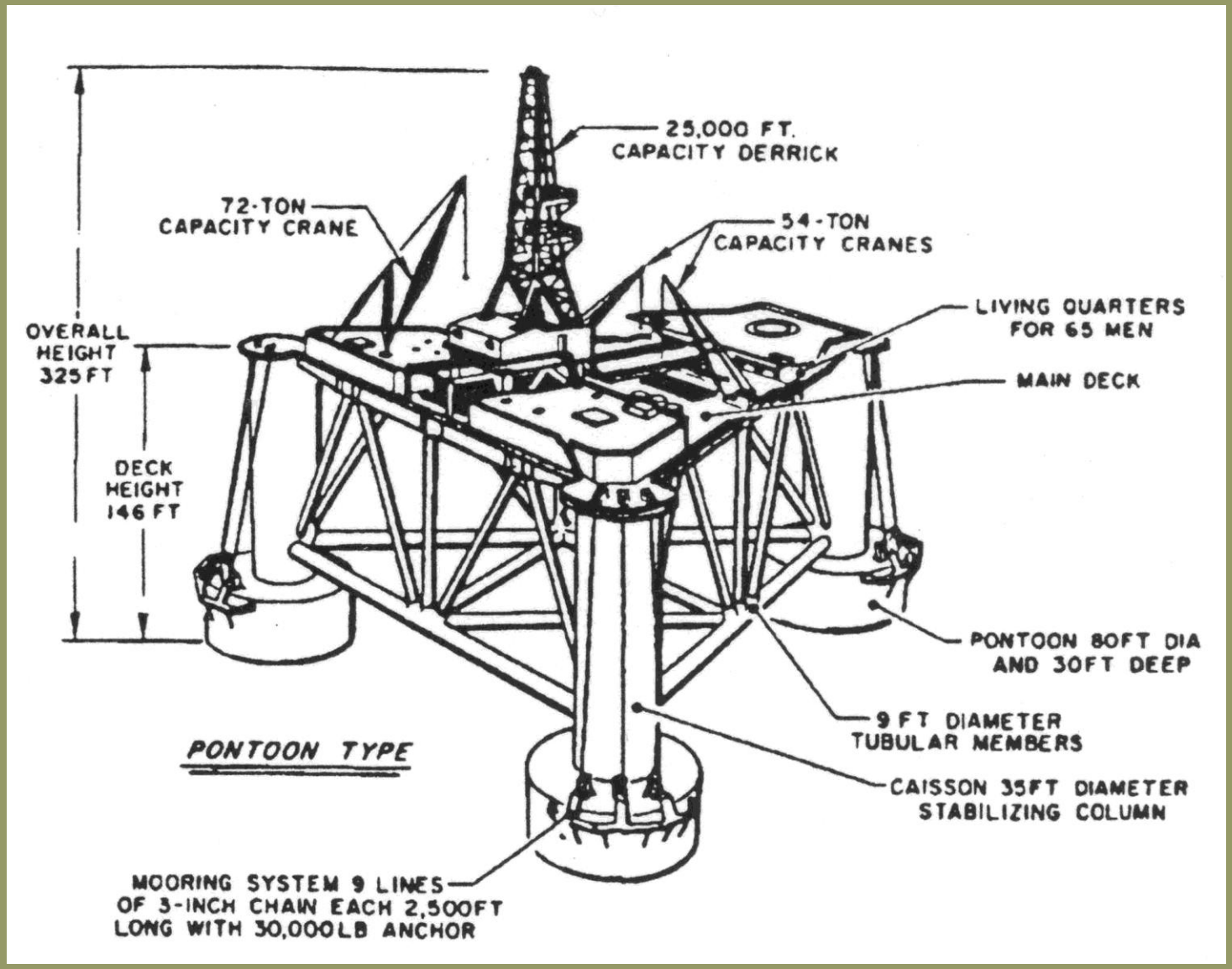
# Offshore drill rigs



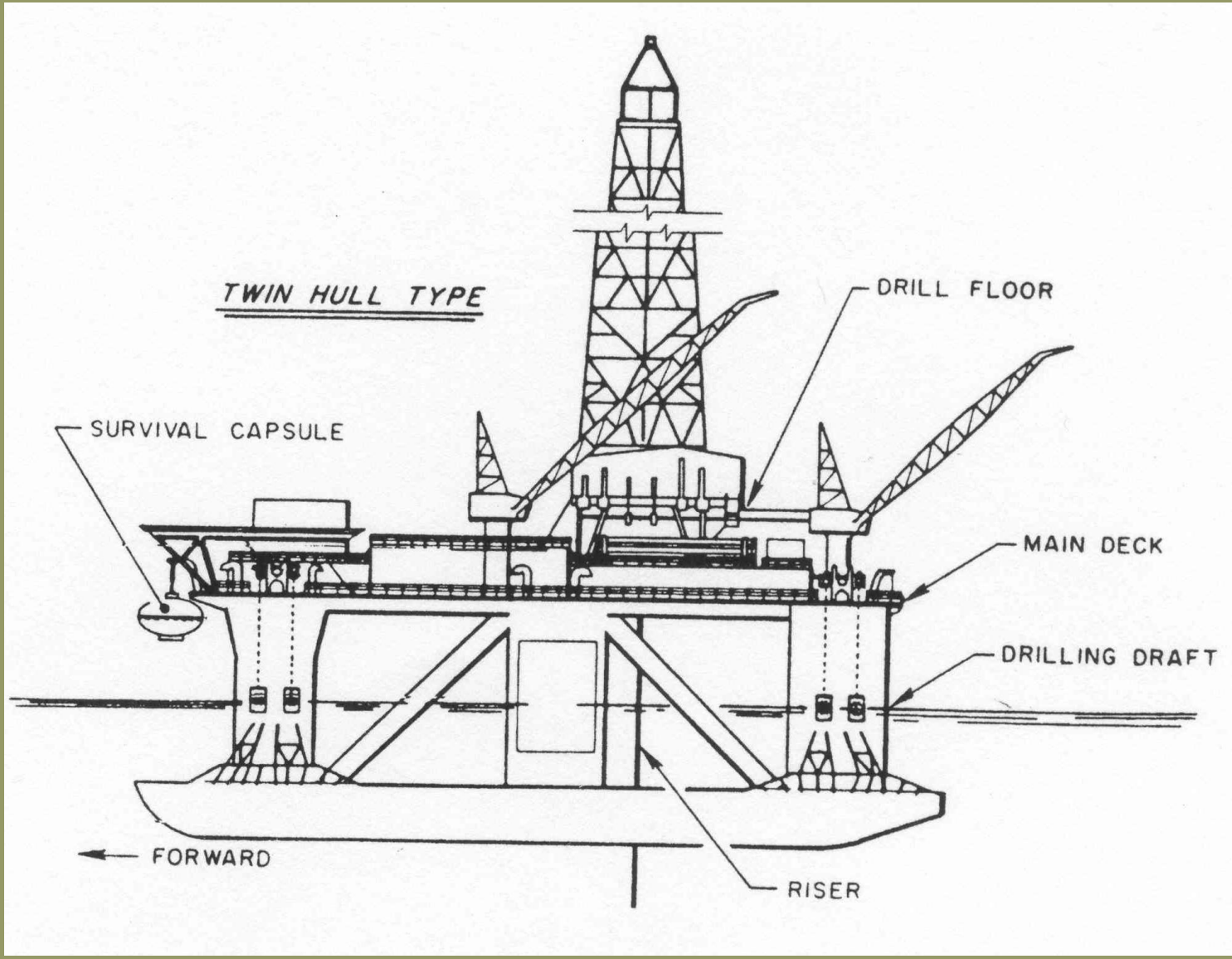

# Fixed production platforms



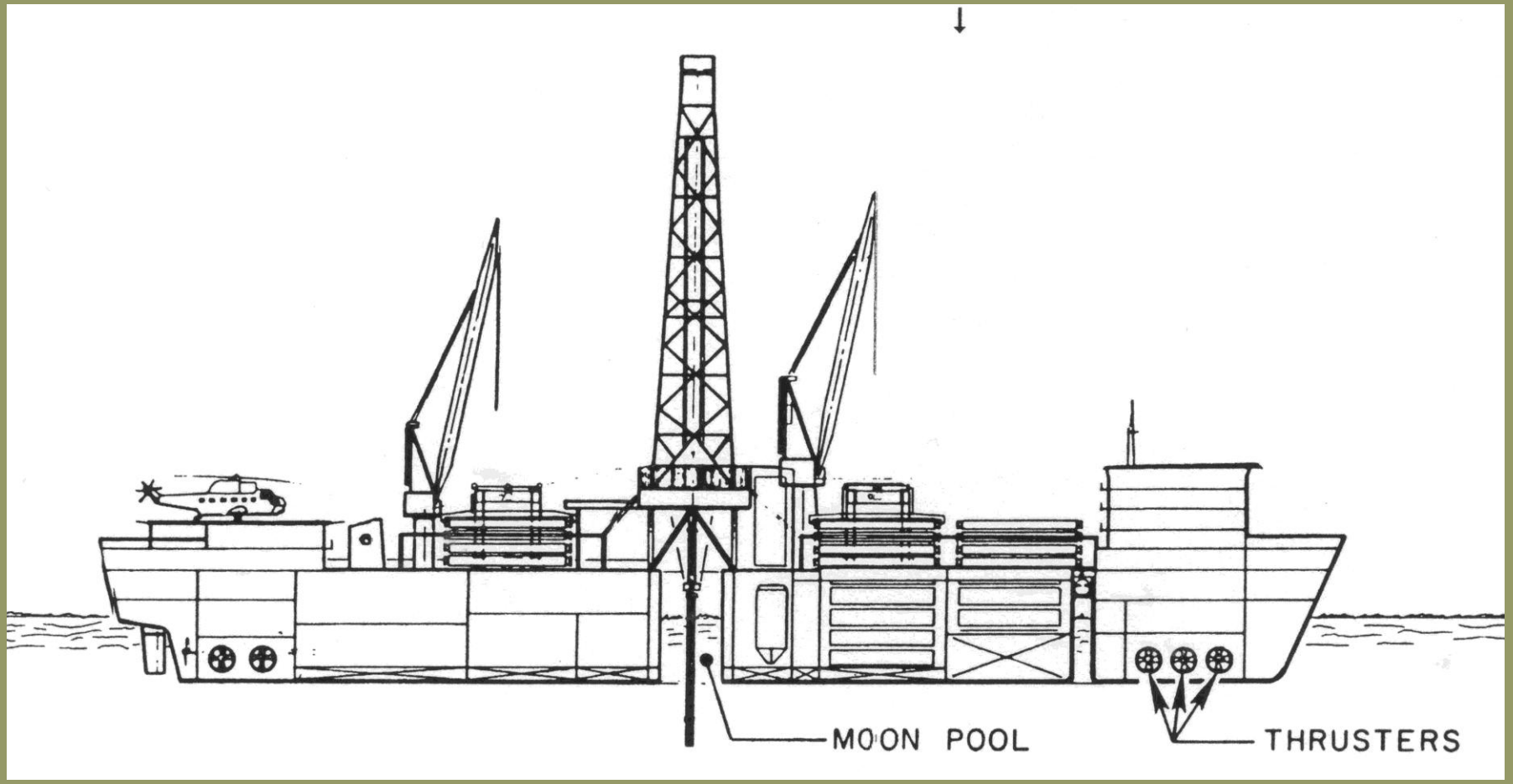

**Jackup rigs**



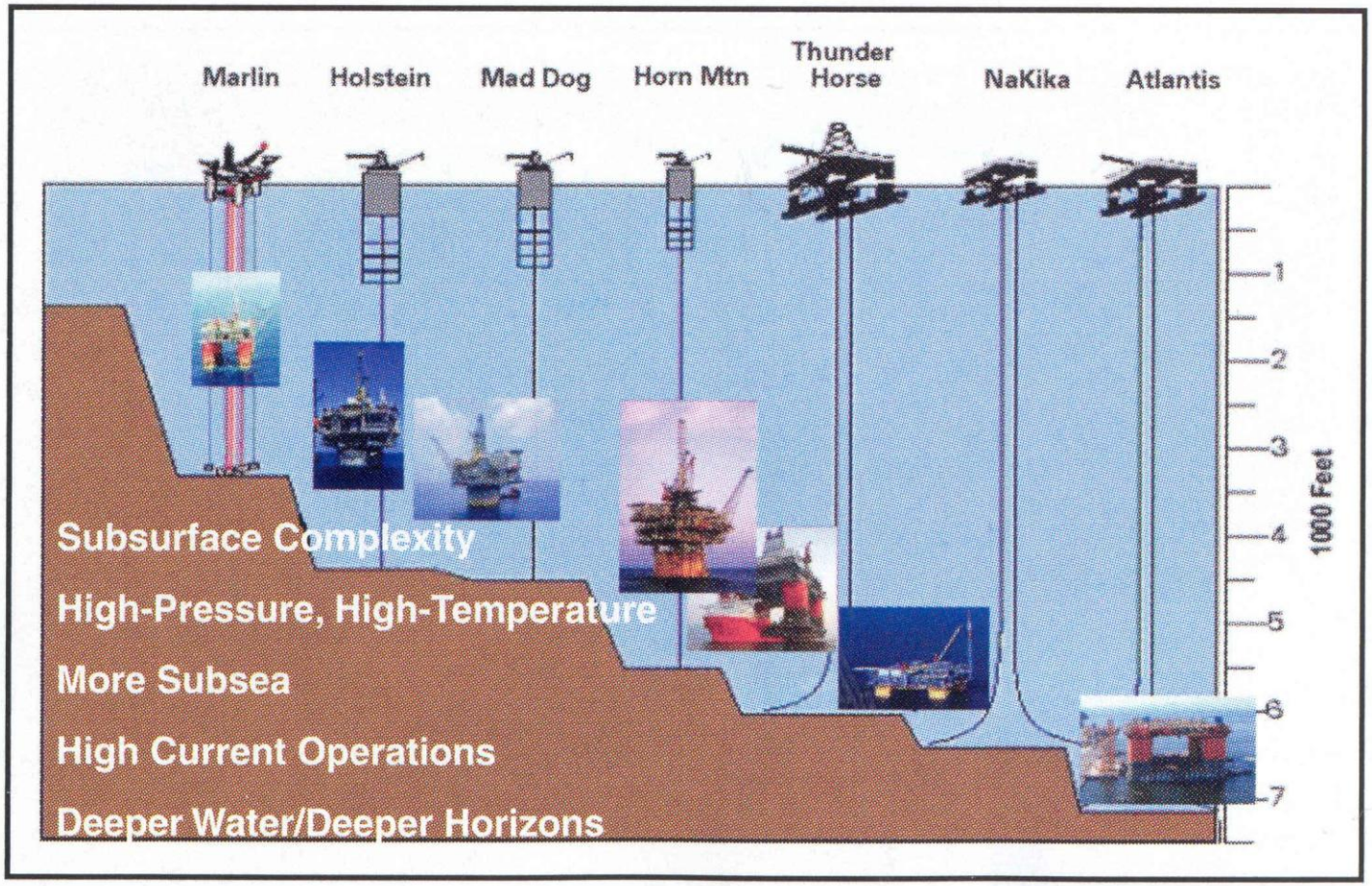

**Pontoon type semisubmersible rig**




**Twin hull semisubmersible rig**


MOON POOL
THRUSTERS

# Increasing Gulf of Mexico Water Depths/Technical Challenges



Semisubmersible rig sinking after being towed to site

**Semisubmersible rig blown under bridge during Katrina**

Jackup rig collapsing after hurricane in Gulf of Mexico