

# BASIC **WELL CONTROL**

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**Al-Ayen University**  
**Petroleum Engineering College**

## **Drilling Engineering II**

**Fourth Year**

**(( *Well Control – Blow out* ))**

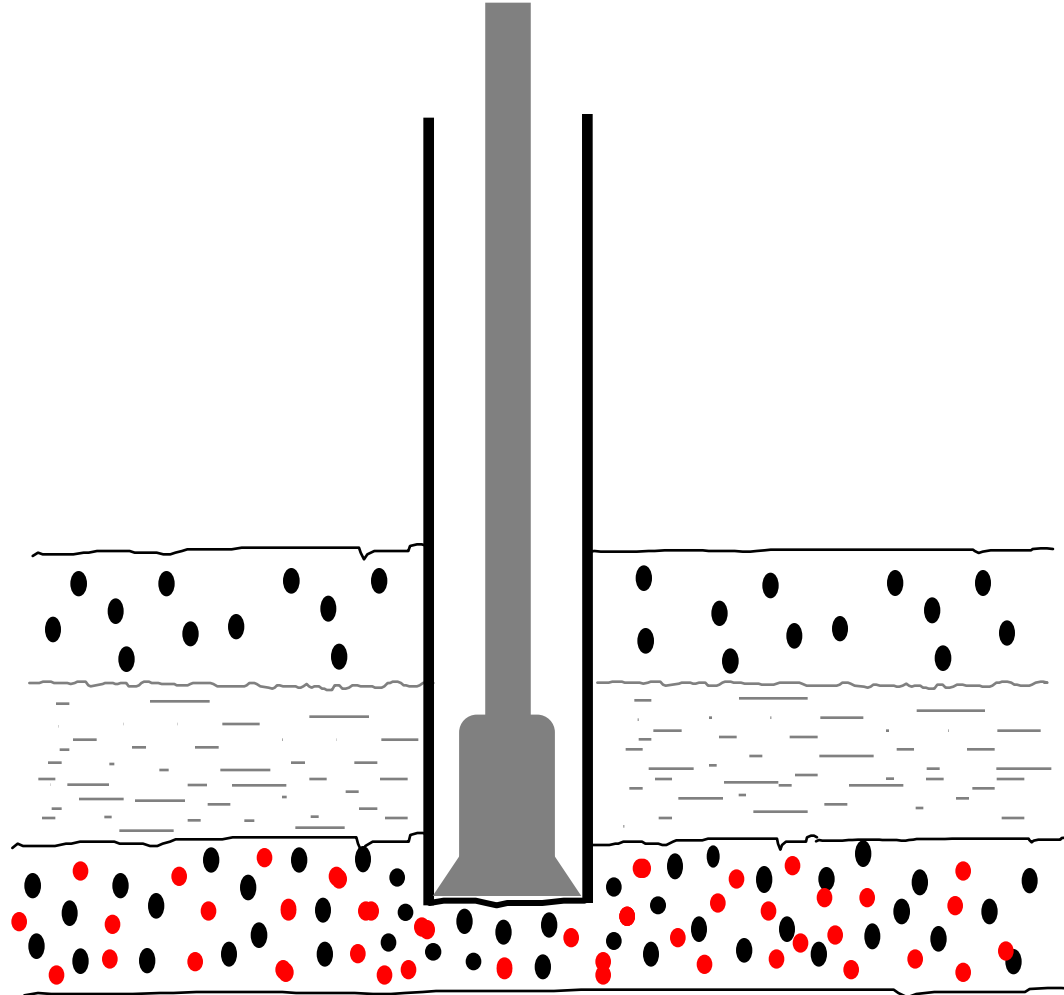
**Associate Prof. Dr. Najeh Yousef Alali**

**Lecture - 4**

# BASIC WELL CONTROL

## What Is A Kick?

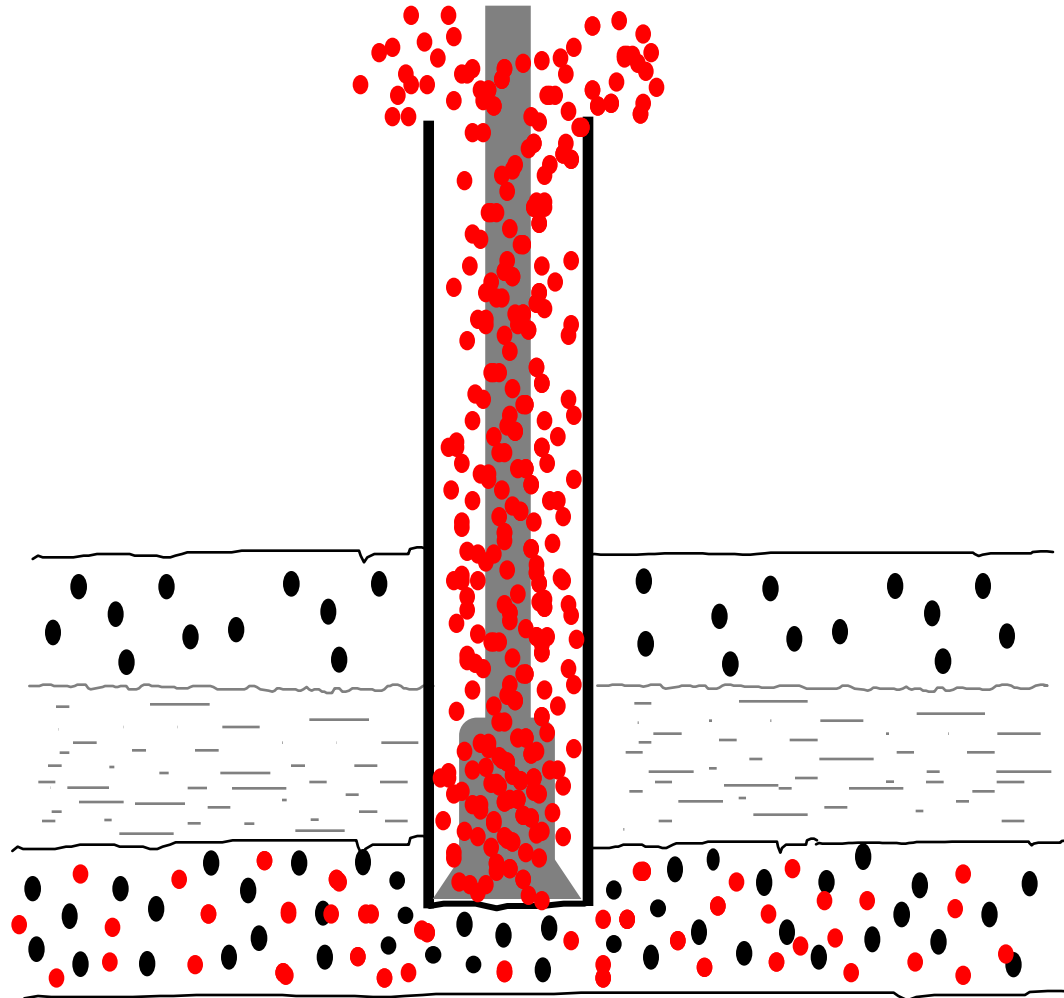
It Is An Influx Of Formation Fluid Into The Well.



# BASIC WELL CONTROL

## What Is A Blowout?

An Uncontrolled Exit Of The Formation Fluids At The Surface



# BASIC **WELL CONTROL**

## **There Are 3 Stages of Control to Stop Blowouts.**

- 1. Primary Control:**  
Pressure Exerted by Drilling Fluid to Hold Back the Formation Fluid.
- 2. Secondary Control:**  
Surface Equipment That Is Closed to Stop Any Further Entry of Formation Fluids.
- 3. Tertiary Control :**  
Techniques to Control a Blow-out Once It Is Taking Place.

# BASIC WELL CONTROL

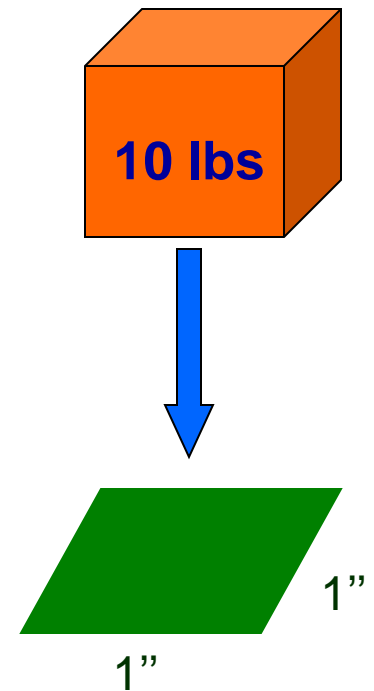
## What is Pressure?

Pressure Is Force Acting on a Unit of Area.

For Example:

10 Pounds Acting on One Square Inch

= 10 Pound /Square Inch ( PSI )



# BASIC WELL CONTROL

## What Is Hydrostatic Pressure ?

The Pressure Exerted by a Fluid That Is Not Moving

Hydro



Fluid



Static



Not Moving

# BASIC WELL CONTROL

## Fresh Water

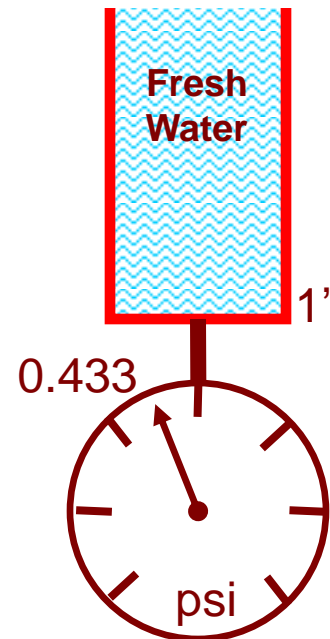
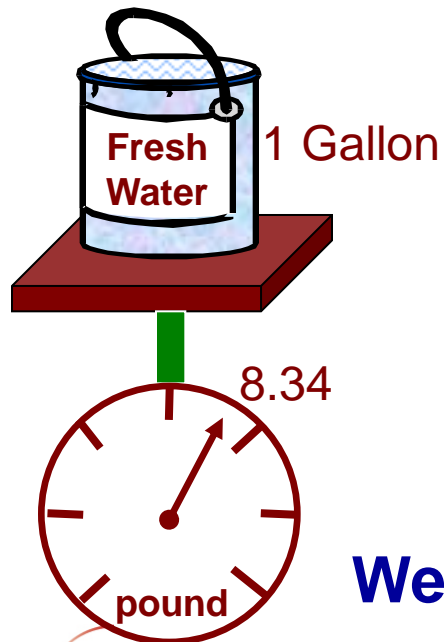
Density = 8.34 ppg

Pressure Gradient = 0.433 psi/ft

**TO CONVERT PPG TO PSI/FT Multiply PPG by CONSTANT**

$$8.34 \times 0.052 = 0.433$$

**Weight x Constant = Pressure Gradient**



# BASIC WELL CONTROL

## Salt Water

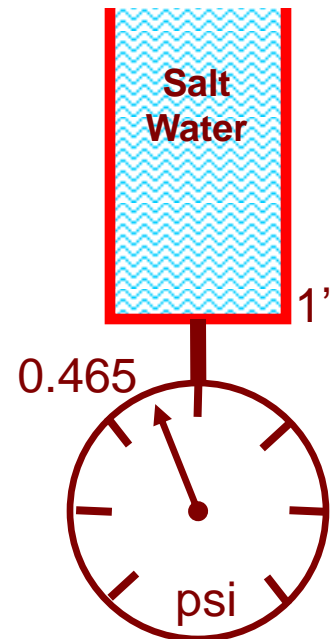
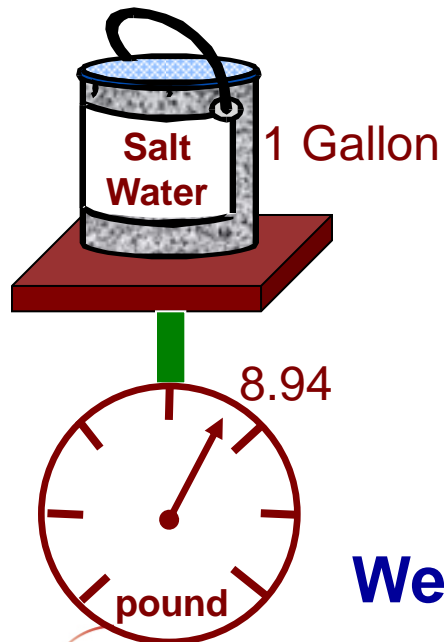
Density = 8.94 ppg

Pressure Gradient = 0.465 psi/ft

**TO CONVERT PPG TO PSI/FT Multiply PPG by CONSTANT**

$$8.94 \times 0.052 = 0.465$$

**Weight x Constant = Pressure Gradient**





# BASIC WELL CONTROL

## How Can You Calculate Hydrostatic Pressure?

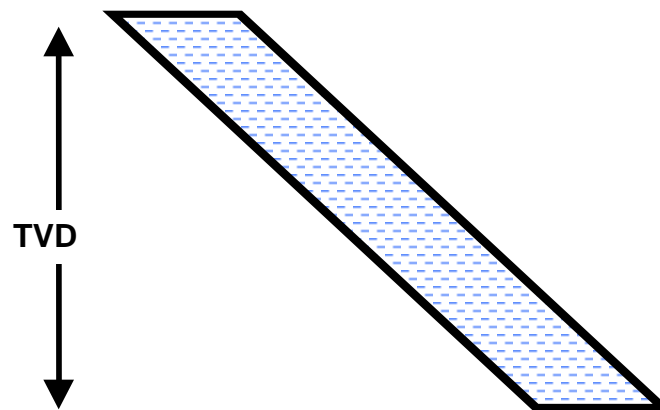
**Hydrostatic Pressure ( psi )**

**= Mud Weight X 0.052 X True Vertical Depth**

**= (ppg) X Constant X (ft)**

**= Pressure Gradient X True Vertical Depth**

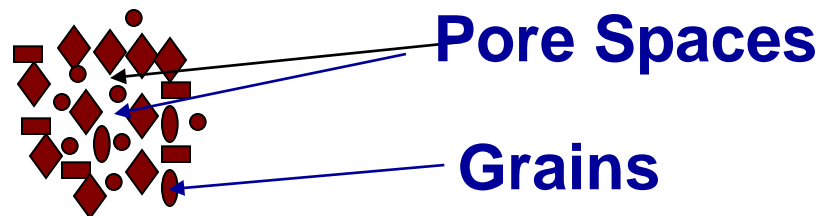
**= (psi/ft) X (ft)**



# BASIC WELL CONTROL

## What Is Formation Pressure?

- All Formations We Drilled Consists of Rock Grains and Pore Space.
- Formation Fluid Pressure Is the Pressure of the Fluids That Exist in Pore Space



# BASIC WELL CONTROL

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## **Balance:**

**Mud hydrostatic = Formation Pressure**

## **Over balance:**

**Mud hydrostatic **greater** than Formation Pressure**

## **Under balance:**

**Mud hydrostatic **Less** than Formation Pressure**

# BASIC WELL CONTROL

## Pressure Balance

