



## Well Stimulation & Logging Operation

**Course Duration** : 5 days

**Trainer** : Dr. Hussain Ahmed

### Summary:

“Completing a well” means installing equipment in the well to allow a safe and controlled flow of petroleum from the well.

This short course is designed to provide the trainees with fundamental concepts and methods of drilling and petroleum production engineering. It will also cover objectives and scope of drilling engineering & completion fluids. It will look into casing design principles including formation pressures and casing setting. In addition to the above it will cover all aspects related to

- Well completions.
- Objectives and scope of production engineering.
- Inflow performance modeling and causes of low productivity.
- Wellbore flow mechanics and well deliverability.
- Well productivity improvement.

### Objective:

This course is designed to help you:

- Understand and articulate fundamentals of the drilling ; well completion and work-over operations
- Understand and analyze well performance
- Work-over to remove any causes of low productivity
- Understand and perform basic design of well productivity improvement.

### Contents:



By attending and completing this 5-day course you will be able to have better understanding for

1. What is Well Completion
2. Setting Production Casing
3. Installing the Tubing
4. Installing the Christmas Tree
5. Types of Well Completion
6. Factors Influencing Well Completion Selection
7. Type of Flow
8. Completion and Workover Fluids
9. Workover activities
10. Perforating
11. Well Stimulation

#### **Training Methodology:**

- Pre and Post course test
- Workshops;
- Brain storming;
- Troubleshooting techniques;
- Problem solving skills;
- Group discussion;
- Sharing views;
- Exchange experience;
- Video clips;
- Calculations;
- Group analysis;
- Assessments;
- Questions and answer

#### **Daily Program:**



## DAY1- Open-hole logging; principles of open hole logging

- Open-hole logging, also known as well logging is the practice of making a detailed record (a *well log*) of the geologic formations penetrated by a borehole.
- Open hole logs are run before the oil or gas well is lined with pipe or cased
- A well log is a record of certain formation data versus depth.
- The appropriate downhole logging tools instrument called 'sonde', about 3.5 inches in diameter is lowered into mud-filled hole on logging cable.
- This tool will measure the electrical, acoustic, and radioactive properties of the formation.
- The result will be analyzed to determine which of the layers are porous and permeable, and likely to contain hydrocarbon.
- A depth calibration wheel records the length of cable in the hole.
- Survey is normally done from the bottom up. As the sonde is pulled up the hole, a continuous measurement signal is sent to the surface where the data is processed and recorded as a curve.

## DAY 2- Open hole - Electrical log

- Can be divided into two main types:
  - I. Measurement of natural electrical current in the rock (SP Log)
  - II. Measurement of induced electrical current (Resistivity Log and Induction Log).

### Open hole ; SP LOG

- Also known as Self Potential Log.
- SP Log record weak electrical currents that flow naturally in the rock next to



the wellbore (natural electricity).

- The log shows the boundaries and thickness of each layer of rock, especially permeable (sandstone) and impermeable (shale).

### Day-3

- Generally uses a proppant to keep fractures open. Fine-grained sand commonly used.
- Delivery fluids:
  - Water-based
  - Polymer (reduce friction) = slick water fracs
  - Cross-linked polymer = changes viscosity
  - Air
  - Foam
  - Gas (nitrogen)
  - Acid gel
- Reasons to stimulate
- Stimulation treatments
  - Matrix acidizing
  - Hydraulic fracturing
- Stimulation candidates
- Effects of skin factor on pressure

### Day 4- Stimulation Reasons

- Increase production efficiency or flow capacity
  - Overcome formation damage
  - Enhance production from low permeability wells
- Connect with natural fracture system
- Increase effective drainage area
- Produce complex reservoirs (e.g., discontinuous sand bars)
- Increase wellbore stability (minimize drawdown)

### DAY 5- Stimulation treatments



- Matrix treatments
  - Near-wellbore region
  - Chemicals such as acids, surfactants and inhibitors
- Hydraulic fracturing
  - Acid fracturing
- Proppant fracturing