Petro Management Group Ltd.

Water Management

Course Objective:

This course offers full coverage on all the aspects water management. Water is a vital part of our daily life and also an important component for many industries, including oil and gas industry, manufacturing, mining etc. Since water is an important resource, it is essential to learn how to protect fresh/drinking water whether it is at surface or subsurface. Also a review of various water disposal options of waste water, will be disused. Further, the concept of water recycling/reclaiming will cover the common techniques to preserve water resources and reduce the operating costs of different activities of the oil business, including hydraulic fracturing and Enhanced Oil Recovery. The rules and regulations set by the of regulatory agencies regarding water disposal will also be covered. A course hand-out which is an excellent reference will be provided.

Who Should Attend:

This course is aimed all personal dealing with water handling, disposal and reclamation for most industries and domestically.

Course Instructor:

Mr. Saad Ibrahim, P. Eng. - president of Petro Management Group Ltd.. Mr. Ibrahim has over 35 years of diversified experience in the oil and gas industry and known a worldwide highly recognized engineering consultant and a distinguished instructor. He also completed a post-graduate program with the University of Calgary in Chemical and Petroleum Engineering. The focus of Mr. Ibrahim's experience lies in the area of reservoir management, well test planning/analysis, and water management. Mr. Ibrahim is a member of APEGA and SPE.

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Course Agenda:

Day 1:

➢ Background on water significance & health issues

- Water resource distribution in the world and usage
- Largest man-made river; 8th wonder of the world!
- Definition of fresh water
- Description of purified, filtered, alkaline, and recycled water

➢ Water Usage in Oil Industry:

- Drilling and well completion
- Hydraulic fracturing
- Enhanced oil recovery (EOR)
- How to mmaintain the integrity of the structure and wellbore (case study)
- Solution mining and Salt dome caverns for gas storage (Video)

➢ Water Disposal Options:

- Regulatory agencies on Water Disposal
- Methods of water disposal; surface, subsurface, and water reuse
- Costs of different water disposal options (Wyoming - Powder River Basin)
- Categories of injections wells and usage
- Surface water separation facilities and disposal
- Does subsurface disposal causes earthquakes?!
- Case study on evaluation of disposal options

Day 2:

➢ Water chemistry & frac chemical:

- Scaling tendency problems; diagnoses and remedy
- Total dissolved and suspended solids
- Sour gas and oil contamination in water
- Water compatibility laboratory tests
- Frac fluid composition
- Acceptable Water Quality Standards for disposal water

➢ Water Recycling/reclaiming

- Benefits of water recycling/reclaiming
- Water Treatment Techniques including:
  - Distillation
  - Reversed Osmosis (video)
  - Autoflot Induced Gas flotation (video)
  - Mobile MULTIFLO™ Softening Technology (video)
- Closing the loops on frac water treatment
- Domestic grey water recycling (video)
- Selection of water filters (domestic and oil industry) – Case study

➢ Regulatory requirements/monitoring of water disposal wells:

- Wellbore construction of water disposal wells and injection volume control
- Tests to determine formation frac pressure (step-rate test and DFIT)
- Ceiling limit of injection pressure
- Limitation on pressuring up disposal zones (case study)
- Cap rock integrity for CO_2 sequestration

➢ Closing remarks and a question period