N985: Introduction to the Science and Technology of Water Management

Format and Duration
Classroom - 3 Days

Instructor(s): John Walsh

Summary

Application of the learnings of this course will empower participants to develop a fundamental understanding of the science, technology and strategies in water management in the upstream segment of the oil and gas industry, with particular emphasis on hydraulic fracturing operations for unconventional resources. The fundamental mechanisms behind various water treatment processes are presented. Management strategies are presented together with practical experience from dozens of fields.

Learning Outcomes

Participants will learn to:

1. Gather data required to make planning and management decisions.
2. Develop a water management plan that covers the entire field life.
3. Develop a design basis for water handling.
4. Analyze and characterize water.
5. How to interpret the results of water characterization in order to make decisions about water handling and management.
6. Select appropriate equipment for the particular water characteristics.
7. Identify the processes required for the different water types.
8. Identify the processes available for different stages of operation (mobile, modular, and industrial)
9. Develop a conceptual design and cost model for a water treatment process.
10. Troubleshoot existing water treatment systems.

Training Method

This is a three-day classroom-based course that includes theory, applications, and worked examples.

Who Should Attend

The course is designed for graduates in production geosciences, and chemical, mechanical, reservoir or petroleum engineering disciplines. Essentially no experience or formal training in water treatment or oil and gas processing is required.

Course Content

The course covers the science of oil / water and solids / water separation and applies that science to the selection of equipment and processes across a wide range of water types encountered in the oil and gas industry, with emphasis of high suspended solids typically encountered in hydraulic fracture flowback. This fundamental and practical knowledge is applied to the planning, decision making and management processes over the entire life cycle of a field.

Management Strategies: What decisions need to be made at what stage in development? What information is required to make those decisions? What planning processes are recommended for water handling and management? What is the impact of late decisions or lack of planning for water management?

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Water Economics: What are the options for sourcing water, disposal, recycle and reuse? What specifications are required for each and what are the costs? What are the typical water production profiles that that are encountered over field life as a function of rock type.

Characterization of oil/water/gas for water treatment: What is unique about hydraulic fracture flow back water, and produced water? How should we sample and analyze to get reliable results? What characteristics make one water type more difficult to treat than another? How do we interpret the analytical results? What do the analytical results tell us about design and troubleshooting?

Equipment selection and performance: What equipment is available? How does it work? How well does it work? What are its limitations? Which equipment should be used for which type of water? What equipment should be used in the different stages of development (isolated wells = mobile equipment, clustered wells = modular equipment; established well support infrastructure = industrial water treating equipment).

Chemical treatment: Scale and biological control are critical to preventing impairment. What are the options? What can be measured and adjusted in the field to ensure adequate treatment? How can reservoir souring be prevented?

Operations, monitoring and surveillance: To what extent do operating practices contribute to problems? How can problems be overcome by improved practices?

Troubleshooting: There are many things that can go wrong, how can we figure out what is causing problems? How can we fix the system in the fastest and more cost effective way?