

OILFIELD WATER PROCESSING AND RECYCLING



CLASS SUMMARY

This four-hour online course will introduce equipment and processes used to clean oilfield produced and frac water. Injection in disposal wells, discharge to waterways, and recycling for different purposes will be discussed. Limitations imposed by salinity, regulations, economics, and need to dispose of waste products will be considered. The class ties together information that is usually presented as bits and pieces.

LEARNING GOALS

Goals for the participants include:

- Understand water quality needed for irrigation of different crops and to avoid crop damage
- Recognize limitations imposed by salinity and by waste product disposal
- Recognize the function of equipment and processes used in oilfield water processing
- List the order of removal of contaminants from water
- State the main idea of Stoke's law with regard to size and density of particles
- Distinguish between the two federal regulations UIC and NPDES
- Recognize micron sizes of particles and oil droplets
- Relate end uses for recycled water, such as drilling mud, to the required water quality
- Discuss differences between produced and frac flowback water
- Recognize the cause of earthquakes related to water injection

WHO IS THE CLASS FOR?

- People looking for options for oilfield water management
- Stakeholders with operations downstream of oilfield discharge points
- Industrial water plant operators seeking to understand oilfield operations
- Regulators seeking to understand field operations
- Academics researching practices and processes
- Equipment and chemical suppliers seeking to understand the oilfield market

COST

The four-hour course is \$150 per person. Two of the modules are available separately at \$25 each. Those modules are **Oilfield Water Disposal Wells (Underground Injection Control or UIC)** and **Discharge of Oilfield Produced Water to Streams and Rivers (NPDES)**. To enroll, go to <http://www.oftrain.com/> and click on "[Sign Up/Log In](#)". The class can also be taught as a live seminar.

PREVIEWS!

The classes can be previewed for free, without creating a login, by going to the website <http://www.oftrain.com/> and navigating to the "Free Class Examples." This button will take you directly to previews.

A small green arrow  starts the video. Creating a login on the site will allow you to access "Resources," such as recommended limits for irrigation water, and the micron charts that I've created for different equipment, without signing up for the class.



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MORE DETAILS...

The class consists of video modules, featuring examples with actual data. A set of curated “resources” is provided for additional study, for example:

- Papers detailing the water quality achieved by specific recycling plants
- Examples of permit requirements for NPDES discharges to streams and rivers
- Irrigation water quality requirements that customers might require
- Videos showing facilities such as injection wells
- A list of chemicals added in a water plant
- Charts showing micron sizes of contaminants, and the equipment used to remove the contaminants

The “resources” are not required reading as this would make the class lengthy.

10 DRILLING "MUD" Drilling mud report

NUMBER OF DRILLING DAYS	2	TO TOTAL DEPTH
MAKUP WATER	300	CL-ppm
PORE AND LAYER SIZES		80 Ca-ppm
NATIONAL		
SP-40		
1.5 X	6.25 IN.	

13 MORE STOKES

80 to 100 ppm of calcium is the range for drilling mud. Using this flowback water would require extra chemical and be...

9 WE NEED TO CLEAN THE WATER

- Many fields use some form of water injection
- Examples are fracturing, waterflood and steamflood

17 PRODUCED WATER - COMPLEX PLANT

First stage separation (primary) → Second stage separation → Third stage separation → Sols Removal → INJECTION WELLS

RO-PLANT → Salt Removal → RO-PLANT → RO-PLANT → Hardness → Calcium and Magnesium Removal

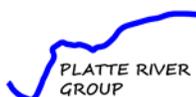
*FWWO = Free Water Knock Out

Upon completion, the student has the option to print a certificate of completion.

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INSTRUCTOR

Lee Denke started off by getting a bachelor’s in electrical engineering from the University of Wyoming, then took a job cementing, acidizing and fracturing wells with Schlumberger in Worland, Wyoming, and has worked in California, North Dakota, and the Rocky Mountain area. Additional jobs included both subsurface and facilities engineering, as well as project management for Texaco, Aera and Berry. Lee understands the contract side of the business as well, having worked for the consulting firms TJ Cross, Ken Small, and Processes Unlimited. Lee currently works as a consultant in downhole and facilities operations and is licensed as a mechanical engineer in Wyoming and Colorado.



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