cmsprodex

TRAINING

Training - Knowledge Transfer

The crucial activity of CMS Prodex, since its foundation, has been the training of industrial personnel on production optimization and energy saving of petroleum energy system. CMS Prodex offers both open and in-house courses to petroleum production and process engineers and to the others interested in optimizing the petroleum systems. The combination of theory and practice makes the courses appropriate for those who want to learn about software simulators for solving practical problems of oil and gas well operations, as well as to increase efficiency of downstream plants.

We have always believed in revealing its latest technological findings in the form of technical papers at conferences and/or various industry and academic meetings and symposiums.

CMS Prodex knows the value of training and how it should be performed. We know what differences the training can make to all aspects of organizational and individual vitality, efficiency and effectiveness.

Best practices and lessons learned are the inputs for improving the company knowledge capacity, increasing productivity, reducing number of repeated mistakes and duplicating initiatives and impacting the key performance indexes directly to a company and its people.

CMS Prodex will give you, through its courses, the best practical knowledge how to handle all your future activities and solve any current problem you meet.

WHY CHOOSE ONE OF OUR COURSES?

The only and the best reason is that the training will enable you to follow the industry trends, technology and demands.

Our courses are conceived to be intensive, sharply focusing on practical working results through interaction, discussion and exercises rather than abstract academic theories in petroleum business.

Participants are given the opportunity to test how much they have learned and measure their progress and success throughout the course. We provide feedback and encourage the participants to learn from mistakes, so to improve future performance.

We take notes of feedback from you and constantly develop, enhance and refine our courses to ensure that they meet the ever-changing needs of the petroleum profession. Learning together will give a group of participants a shared experience and enable them to talk in the same language.

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RESERVOIR ENGINEERING

Basic Reservoir Engineering

ABOUT THE COURSE

The intent of Basic Reservoir Engineering is development of a more complete "understanding" of the characteristics of oil and gas reservoirs, from fluid and rock characteristics through reservoir definition, delineation, classification, development plan, and production. Data collection, integration and application directed toward maximizing recovery are stressed. Basic reservoir engineering equations are introduced with emphasis directed to parameter significance and an understanding of the results.

DESIGNED FOR

Geologists, geophysicists, reservoir and production engineers working with reservoir definition, development and production.

YOU WILL LEARN

- The fundamentals of fluid flow in porous media
- How reservoirs are characterized by fluid type and drive mechanisms
- The basis for reservoir fluid distribution
- About oil and gas well performance and pressure buildup analysis
- About oil displacement and optimizing reservoir performance
- The basics of enhanced oil recovery
- How oil and gas in place can be estimated and recovery predicted

COURSE OUTLINE

- Reservoir fluid properties
- Fundamental of rock properties
- Fundamentals of reservoir fluid flow
- Reservoir fluid distribution
- Reservoir classification
- Reservoir drive mechanisms
- Oil and gas well performance
- Oil displacement concepts
- Estimation of oil-in-place and gas-in-place
- Recovery techniques

RESERVOIR ENGINEERING

Basic Well Test Analysis

ABOUT THE COURSE

Well test interpretation, which is the process of obtaining information about a reservoir by analyzing the pressure transient response caused by a change in production rate, plays a very important part in making overall reservoir-management decisions. Well tests have a basic significance, allow to determine the state of reservoirs and wells and help to optimize production and recovery.

Well testing is a surface/downhole operation affecting one or several wells. It consist in flowing a well and recording the downhole pressure changes corresponding to the surface flow rates. When a reservoir is submitted to changing production conditions, the reservoir pressure changes are monitored and analyzed. The results, associated with other sources of information are used to build well/reservoir models. The quality of the interface between the well and the reservoir (SKIN) is indicative of the possibility to improve the well productivity. Well Testing is the only dynamic way to access this information.

Results obtained from Well Test Analysis (WTA) are permeability thickness product, reservoir heterogeneities, initial or average pressure, shape and distances to boundaries. WTA results permit to calculate well description parameters such as productivity index (PI), skin factor (S) and well geometry.

This course has a goal to introduce participants with basics of well testing, objectives of a well test, role of well test in describing a reservoir and information obtained from a well testing analysis.

DESIGNED FOR

This training course is designed for engineers who want to understand well testing principles and interpretation techniques to design, analyze, report, evaluate results or participate in the well testing process.

YOU WILL LEARN

- Principles and objectives of Well Testing
- The method – to be able to describe the conventional and modern methods to find a well/reservoir model and the corresponding results
- Wellbore conditions – to be able to identify wellbore conditions responses using derivative approach
- Double porosity reservoirs
- Boundaries – to be able to identify reservoir limits, type, geometry and distances and extract the corresponding results
- Test design
- Analyze drawdown and buildup tests in oil and gas wells
- Identify flow regimes using the log-log diagnostic plot

COURSE OUTLINE

- Introduction to Well Testing
- Development of the diffusivity equation
- Data used in Well Testing
- Radial flow and radius of investigation
- Characterizing damage and stimulation
- Wellbore storage
- Type curve analysis
- Manual log-log analysis
- Flow regimes and the diagnostic plot

RESERVOIR ENGINEERING

Practical Reservoir Simulation

ABOUT THE COURSE

Dynamic reservoir models are important when investigating reservoir behavior, optimizing reservoir performance, designing complex wells, estimating uncertainties and providing the basis for risk management. The course is designed to give an introduction to the practical aspects of reservoir simulation with the basic concepts of numerical simulation without complicated mathematics. You will learn about data gathering for simulation models, how to construct the dynamic flow model and how to perform a simulation study and will be introduced to the general approaches to modelling including history matching of field data and forecasting future performance.

DESIGNED FOR

This training course is designed for reservoir engineers, geologists, geophysicists, or anyone who regularly uses, reviews, or supervises the construction of reservoir models by a comprehensive overview of the key topics and practical aspects.

YOU WILL LEARN

- What is reservoir simulation
- Why reservoir simulation
- Main objective
- What can a reservoir model answer
- Other analysis methods
- Examples of beneficial applications
- The significance of data quality checks and requirements in simulation models
- The entire simulation life cycle and workflows

COURSE OUTLINE

- General overview
- Modeling concepts
- Steps in preparing a model study
- Model design check list
- Preliminary design
- Data collection and input data preparation
- Conducting the model study
- Description of simulation model
- Simulation features
- Data requirements
- Simulation input file sections
- Building the model
- Grid construction and features
- Geological model development/upgrading & upscaling
- Defining initial conditions/model initialization
- History matching
- Prediction
- Review of simulation model

OIL & GAS PRODUCTION TECHNOLOGY

Petroleum Production Engineering

ABOUT THE COURSE

Production engineering is a complex of various disciplines included in a well life cycle and/or well network on the field. Planning of field development is closely connected with good knowledge of all production system components, processes and occurrences, all defining both economic and operational limits. Starting with well characteristics, through problem analysis, to the final solutions (operative methods on field, workovers, stimulations, etc.), with all necessary risks and economic analyses, the course participants would gain complete overview and knowledge useful for any subsequent specialized course in respective disciplines.

DESIGNED FOR

Petroleum engineers with academic and practical experience, field operating engineers and geoscientists in the petroleum and natural gas industries.

YOU WILL LEARN

- How to analyze oil and gas production system
- Nodal concept and theory
- How to collect, evaluate and use production data to predict future system behavior
- What is required to recognize problems in petroleum system

COURSE OUTLINE

- The basic principles of oil and gas production
- Introduction to integrated production system
- Well completion effects on well inflow characteristics
- Well performance modeling
- Methods and procedures for production data analyzing (decline, reciprocal productivity index, time series analysis)
- System analysis principles
- Petroleum problem analysis methodology
- Methods for solving production problems
- Workover planning, operation and control
- Reservoir rocks chemical treatment basic principles
- The basics of hydraulic fracturing of reservoir rocks
- Introduction to risk and economic analysis of production system

OIL & GAS PRODUCTION TECHNOLOGY

Problem Analysis in Production Engineering

ABOUT THE COURSE

It is a well known fact that data, used for analysis of oil and gas well and reservoir performance (pressure and production data, etc.) are not the data registered in short period of time, but are everyday, weekly or monthly data. When they are registered, the response has to be prompt, because even the smallest delay in analyst's reaction inevitably leads to loss of control over the wells' and reservoirs' performance. New registered data is always a new time signal that has to be directed in timely manner to corresponding location for the purpose of analysis. Well history data, and primarily production data, are recorded and stored on daily basis, and include "hidden" information on potential problem causes that have led to oil production decrease. Selection of well candidates for performing certain works (workover and/or stimulation) requires knowing general well working characteristics and a number of specific requirements in well performance, as well as different parameters that allow establishment and development of different correlations. The prioritization of well candidates in which production enhancement is possible (i.e. which production characteristics could be enhanced), includes an integral approach, which recognizes the reservoir and well characteristics, respectively. Frequency of a problem class occurrence and works, applied to solve the problems, as well as the fact that oil and gas production is basically a time sequence in which certain signals (e.g. oil/water/gas production) or phenomena (paraffin scaling in tubing, inorganic scaling at injection, pump damage, etc.) oscillate in time with typical frequency and phases, allowing establishment of qualitatively new functional relations conditionally called production learning curve.

DESIGNED FOR

Production, reservoir and field personnel involved with gathering and interpreting data. Completion and field personnel actively engaged in well completion and services.

YOU WILL LEARN

- How to organize data, information and knowledge to perform well problem analysis
- To apply problem analysis methodology
- To recognize symptoms and diagnose a problems
- To define the bottleneck in and petroleum system
- How handle wells producing having problems

COURSE OUTLINE

- Formation and near wellbore damage
- Forces, mechanisms and processes that produce various types of damages
- Sources and causes of damages
- Formation and near wellbore damage types
- Location of damages
- Reservoir problems
- Special problems in wellbore and surface surface equipment
- Special problems in artificial lift wells
- Problem analyses in production engineering methodology
- Gather & review data and job hystory
- Well selection
- Workover planning and types

OIL & GAS PRODUCTION TECHNOLOGY

Continuous Gas Lift Application

ABOUT THE COURSE

The course is structured to enable full understanding of the continuous gas lift principles and process. Starting with gas lift components (downhole and surface) through total system analysis of single well and network, course ends with design methods, stability analysis and troubleshooting diagnosis. The participants will be introduced with the latest advances in gas lift technology. Using the software will contribute to full understanding of the mostly frequent used optimization and design procedures and methods.

Strong emphasis is given on the appropriate balance between the rigorous modeling of various phenomena and the approximations that are justified considering many uncertainties associated with the oil production in general and gas lift operations in particular.

DESIGNED FOR

Engineers responsible for the design and optimization; production operation engineers involved with daily monitoring and trouble analysis; field supervisors and others who install, or operate gas lift systems.

YOU WILL LEARN

- Continuous gas lift principle and process
- Gas lift components (down hole and surface equipment)
- System analysis of continuous gas lift
- Design methods
- Regulation, measurement, troubleshooting and stability

COURSE OUTLINE

- Generalities
- Basics of the two phase flow
- Inflow performance analysis
- Gas laws as applied to gas lift
- Gas lift valve mechanics
- Continuous flow gas lift unloading sequence
- Continuous flow gas lift design (IPO, PPO & fixed mandrels design)
- Mandrel spacing and gas lift valve sizing (coherent approach possible only using the software)
- Optimal lift gas allocation to a group of wells
- Surveillance, diagnostics and troubleshooting

Each section includes exercises tailored for better understanding of various concepts.

OIL & GAS PRODUCTION TECHNOLOGY

Intermittent Gas Lift Application

ABOUT THE COURSE

Intermittent gas lift is an artificial oil producing method, mostly applied on the low productivity wells at mature fields. The course provides the comprehensive knowledge for optimizing, designing and trouble analysis. The unique approach, developed through many years of practical work on intermittent gas lift application, leads to the development of powerful software suite called **Glip** (Gas Lift Intermittent Program) and it will be used during the course. The evaluation of problems in intermittent gas lift application is based on the recognition of symptoms sourced from two-pen chart diagrams. Simulation of downhole conditions is possible by using just information from two-pen diagram (casing and tubing pressure). The participants will be educated to perform full sensitivity analysis to define the optimum parameters (duration of cycle, number of cycle per day, gas injection rate, intermittent performance curve etc.) of intermittent gas lift operation.

DESIGNED FOR

Operation engineers involved in every-day activities. Field supervisors and engineers responsible for design and optimization of intermittent gas lift, technicians responsible for monitoring and data selection.

YOU WILL LEARN

- The principles of intermittent gas lift operation
- How to design intermittent lift wells
- To analyze and diagnose the problems of well operating by intermittent lift
- Practical recommendation to manage intermittent wells
- To use effectively the unique software suite for intermittent well operation (Glip) developed by CMS Prodex

COURSE OUTLINE

- Intermittent gas lift operation
- Intermittent gas lift theory and model
- Design methods
  - Spacing factors
  - Percent load
  - Opti-flow
- Unloading of intermittent gas lift installations
- Practical examples of well unloading
- Post trouble analysis
- Quantitative two-pen chart analysis model
- Qualitative two-pen chart analysis
- Trouble matrices
- Two-pen chart library
- Case studies
- Downhole pressure and temperature surveys
- Flowing pressure and temperature procedure
- Field cases of intermittent pressure surveys
- Optimization based on pressure surveys

OIL & GAS PRODUCTION TECHNOLOGY

Sucker Rod Pump Application

ABOUT THE COURSE

Sucker rod pumping (SRP) is widely used artificial lift method for oil production. To manage sucker rod pump system, engineers and technicians should be charged with good knowledge of the corresponding principles and applied equipment. Also, having knowledge to optimize and design sucker rod pumping system is the main request for a successful application. To know how to analyze the sucker rod system and identify the operating conditions are the key prerequisites for efficient operation of SRP system. Special attention is directed towards acquiring the practical knowledge to make a troubleshooting diagnoses using qualitative and quantitative interpretation of recorded dynamograms. Detailed explanations of sucker rod mathematical model provide enough knowledge to understand the application of real time pump-off and SCADA systems.

DESIGNED FOR

Production engineers who already have basic knowledge of sucker rod application, as well as technical personnel involved in maintenance, control and monitor of the SRP system.

YOU WILL LEARN

- The principles of sucker road pumping system operation
- To select the best equipment according to well and surface conditions
- How to apply system analysis methodology for designing and sensitivity study of SRP system
- To design SRP system and select the most appropriate operation parameters
- To recognize the problems and to diagnose problem in SRP operation using surface and down-hole dynamo-graph cards

COURSE OUTLINE

- Sucker rod pumping system
- Sucker rod installation
  - Downhole equipment
  - Surface equipment
- Load and stresses in sucker rod system
- System analysis
  - Sucker rod system analysis procedure
  - System analysis example
- Sucker rod pump system modeling
  - Pumping unit kinematics model
  - Wave equations of sucker road system
- Design methods
  - Combined analytic/empric method
  - API design method
  - Design examples
  - Design using our in-house software (Sucker Rod Comprehensive Design, Optimization and Trouble Analysis)

- Sucker rod pump system diagnosis using dynamometer cards
- Qualitative analysis of surface dynamometer cards
- Surface dynamometer cards library
- Quantitative surface dynamometer card interpretation
- Downhole dynamometer cards
- Trouble shooting procedure and analysis

OIL & GAS PRODUCTION TECHNOLOGY

Electrical Submersible Pump Application

ABOUT THE COURSE

Electrical submersible pump training course is designed to ensure that field specialists and engineers are trained on a structured program having enough flexibility to fulfill the most of requirements to handle ESP operation successfully.
Course program stresses the developing of technical understanding of ESP components and operation.
A developed training program integrates various needs (service and/or operation companies), specific and well recognized technology and technical solutions in ESP business, as well as a full integration of all production system components.
With this vision, a training program is focused on the three most important goals: equipment, design and implementation.

DESIGNED FOR

Production engineers who already have basic knowledge of ESP application, as well as technical personnel involved in maintenance, control and monitor of the ESP system.

YOU WILL LEARN

- Principles of ESP operations
- Down-hole and surface equipment needed for operation
- How to install and prepare wells equipped with ESP for stable operation
- How to use data about ESP failure analysis and run life to predict the future run life
- To understand some fundamentals of the reservoir and production engineering concepts required for ESP analysis and design
- To apply system performance analysis to generate system performance graph and define design criteria
- To demonstrate how changes in reservoir, well and surface conditions, impact pump performance and sensitize the ESP design accordingly
- To size and select an ESP equipment
- Demonstrate, using software how to select an ESP equipment at various conditions; basic fixed speed design, viscous and gassy applications
- Demonstrate how to optimize ESP operation using downhole and surface date
- To design ESP equipment and select the optimum parameters of operation
- To perform a troubleshooting analysis using available information (real time and history data)

COURSE OUTLINE

- Basic principles of ESP operation (ESP system, selection, completion scheme)
- ESP components
  - Downhole (pumps, motors, protectors, gas separators, cables, sensors, shrouds)
  - Surface equipment (switchboard, VSD, etc.)
- System performance analysis (concept, data required, well performance, well system curve, pump performance and system graph, sensitivity analysis)
- Design and final equipment selection
- Using software for system analysis and design for various cases (effects of viscosity, high GOR, changes in well performance and the impact on the ESP operation
- ESP system installation and servicing
- Control of ESP operation and optimization
- Trouble analysis methodology (qualitative and quantitative approach)
- Selected case studies

OIL & GAS PRODUCTION TECHNOLOGY

Plunger Lift Application

ABOUT THE COURSE

Plunger lift is a simple, very efficient and economic artificial lift method suitable especially in high gas liquid ratio (GLR) oil wells, gas wells with loading problem and inefficient application of intermittent lift due to high liquid fallback and gas slippage. The problems, such as paraffin and gas hydrate, can be solved successfully. During the course the attendants will be introduced with the most important details in plunger lift operation. Knowing the specific conditions in wells and surface, and using knowledge gained on the course, the participants will be able to select the suitable completion scheme, to select downhole and surface equipment for optimal operation, and finally, to optimize and design plunger lift. Answers to the questions regarding to inefficient plunger operation and troubles are the main objectives in many cases. The subject of the case studies analysis session will be how to manage plunger lift operations.

DESIGNED FOR

Production engineers, technical personnel involved on fields where plunger lift is applied or where it will be applied.

YOU WILL LEARN

- Why is plunger lift required in your wells
- Which equipment you need for specific conditions in your well
- How to install, monitor and optimize plunger lift operation
- To do sensitive study of well producing with plunger lift
- To use effectively the unique software suite for intermittent well operation (Glip) developed by CMS Prodex to design properly a plunger lift operation

COURSE OUTLINE

- Introduction to plunger lift operation
- Application- where and when?
- Downhole equipment and completion
- Surface equipment and monitoring
- Dynamic models
  - Hydrodynamic model
  - Mechanical model
  - Model for specific applications
- Design & Optimization
  - Intermittent gas lift
  - Gas and high GLR wells
- Case studies

OIL & GAS PRODUCTION TECHNOLOGY

Workovers and Completions Best Practices

ABOUT THE COURSE

In meeting the challenges of today's economics, operating companies are investigating the possibilities of using various completion techniques to reduce the cost of developing reserves. The proper selected completion scheme can reduce the expenses and time to finalize the started operations in the well.

Any subsequent operations for preparing well for long production life are referred to well completion and workover. However, changes might occur in the reservoir, nearwellbore zone and the completion equipment itself could be damaged. Therefore it becomes necessary to service or workover the well so to maintain/ improve oil and gas production or performance of injection well.

During the course the deep dive into well completions and workovers will be used for better understanding of various factors on selection the best completion models and workover operations. The integrated approach will be used to involve a wide variety of operations that often are required to resolve a specific problem and to propose the required solutions.

Numerous technology workflows bring at glance the best practices for each workover operations and direct a user through all phases of well completion and workover operations (well candidate selection, planning, execution, monitoring/real time control and post job evaluation.

DESIGNED FOR

Production, reservoir and field personnel involved with gathering and interpreting data. Completion and field personnel actively engaged in well completion and services.

YOU WILL LEARN

- Completion models for various type of well geometry
- Completion and workover best practices methodology
- Workover types/categories
- Detailed workflows for various workovers

COURSE OUTLINE

- Well completions objectives
- Factors influencing on well completion- geological, fluid properties, reservoir performance, mechanical and economical constraints
- Completion design considerations and design workflow
- Material selection for downhole and surface equipment
- Tubing/Packer Movement, Forces and Stress Analysis
- Workover types and classification
- Gather & Review data, well selection for workover and job planning
- Post workover job analysis
- Evaluation workover efficiency using various KPI

OIL & GAS PRODUCTION TECHNOLOGY

Solving Liquid Loading Problems in Gas & Gas Condensate and High GOR Wells

ABOUT THE COURSE

The course provides you with a basic understanding of gas well liquid unloading, including the use of standard artificial lift technology to assist in unloading and in alternative foaming agent methods. You use practical examples to enhance your understanding of the gas well liquid unloading processes.

Liquid loading in low production gas wells is a nuisance for production engineers and the most controlling factor in the abandonment of mature pressure-depletion gas and gas-condensate reservoirs. The course provides a comprehensive approach for recognizing and modeling liquid loading (load-up) process, when it will occur and which method and technology should be used to assure a well production without liquid load up at the bottom and/or in wellbore. It is essential to maintain gas wells free of liquid, otherwise, the production will be severely reduced by backpressure of the accumulated liquids, and by reduced relative permeability of the gas in the near-wellbore zone and during the course these pheromones will be supported by numerous cases. The proper selection of the tubing diameter is the crucial for providing flow conditions without liquid loading.

The proper selection means to select tubing diameter such that natural energy in the reservoir will give a gas velocity sufficient to lift liquids from the sand face and reservoir through the wellbore to the surface. Depending of dynamic conditions in the reservoir, well and surface the optimum tubing diameter varies through the well production life.

DESIGNED FOR

Operation engineers involved in every-day activities. Field supervisors and engineers responsible for optimization of gas and gas condensate wells having liquid loading problem, technicians responsible for monitoring and data selection.

YOU WILL LEARN

- How to recognize liquid loading in gas, gas condensate and high GOR wells
- Modeling liquid loading process
- Use software tools to identify well load-up problems
- Application various methods for solving problems

COURSE OUTLINE

- Overview of liquid loading problems
- Symptoms of load up process, how to recognize it and influencing factors
- Liquid loading sequences and modeling downhole and wellbore effects
- Critical gas rate and velocity
- System analysis of liquid loaded wells
- Multicriteria method for selecting the best unloading method
- Methods for solving liquid loading problem (velocity string, foam agents, intermittent operations with and without plunger, various artificial lift method, wellhead compressors, downhole water separation, etc)

OIL & GAS PRODUCTION TECHNOLOGY

Advanced Well Performance Analysis and Production Optimization by Nodal Analysis

ABOUT THE COURSE

Production optimization using system analysis approach became one of the most important tools to engineers who are responsible for finding the optimum operating parameters of oil and gas wells. Production optimization, considering the integrated petroleum production system has an important and, in many cases, key role for making operating decisions, production management and decreasing of total production costs. The course will provide an outstanding of system (NODAL) analysis, so the participants can use collected knowledge for practical problem solving. The course is designed to provide comprehensive approach, including the practical solving of the number of practical problems. The participants of this course will be able to apply optimization programs available on the market with full understanding and efficient use. Current oil Inflow Well Performance for various well type (vertical, slant and horizontal wells) for multizone reservoirs is be based on zone properties defined by PLT, Transient well test and production test.

DESIGNED FOR

Petroleum engineers with academic and practical experience; field operating engineers and geoscientists in the petroleum and natural gas industries.

YOU WILL LEARN

- How to analyze oil and gas production system
- Nodal concept and theory
- How to collect, evaluate and use production data to predict future system behavior
- What is required to recognize problems in petroleum system

COURSE OUTLINE

- The basic principles of oil and gas production
- Introduction to integrated production system
- Well completion effects on well inflow characteristics
- Hydrodynamic characteristic of oil and gas flow through perforations
- Well inflow performance relationship (IPR) for any well geometries and fluid type
- Comparative analysis of vertical, slant and horizontal well performance
- Gas condensate IPR using transient well test data
- Methods and procedures for production data analyzing (decline, reciprocal productivity index, time series analysis)
- Building of multilayer well flow performance model using all available data from the production and stimulation history, 3D simulation study, PLT and pressure gradient survey data
- Composite IPR of commingled production

- Fluid flow dynamics in well
- Composite model of fluid flow through the wellbore
- Well control and regulation-choke flow performance
- Oil and gas wells system analysis by using NODAL approach
- Network wells system analysis
- Artificial lift method selection
- Introduction to risk and economic analysis of production system
- Well performance modeling using analytical IPR models

FLOW ASSURANCE & WATER HANDLING

Flow Assurance

ABOUT THE COURSE

Flow assurance is considered as the ability to produce fluids economically, from the reservoir to a production facility, over the life of a field and in any environment. Flow assurance topics target all important issues enabling smooth flow of oil and gas from reservoir to the topside facilities.

This course establishes a foundation of knowledge regarding asphaltene and wax deposition, hydrates formation, formation of inorganic scales, emulsions and corrosion.

Flow assurance depends on a variety of factors, including reservoir fluid properties, p-T conditions, fluid flow pattern, etc. Understanding the fundamentals of these elements is the key to designing a management strategy.

Flow assurance strategy requires integrated prevention/removal strategy and you will learn how to recognize the problem and how to design a management strategy.

Emphasis will be placed on understanding type of problems and you will be able to apply the knowledge you gained to propose solutions.

All chapters include case studies and examples.

DESIGNED FOR

This training course is designed for engineers, operators and technical managers who are responsible for completions, production and development; technical staff needing a foundation in principals, challenges and solutions for flow assurance.

YOU WILL LEARN

- Identify the components of a complete flow assurance study and understand how they relate to the production system design and operation
- Interpret and use laboratory testing results of fluids relative to flow assurance
- How to participate in creation of an integrated monitoring and control program to select and to apply appropriate monitoring and control techniques
- Evaluate and compare mitigation and remediation techniques for: gas hydrates, paraffin (waxes), asphaltenes, emulsions, scale, corrosion

COURSE OUTLINE

- Wax and asphaltenes
  - Chemistry and basics of organics, i.e. wax and asphaltene precipitation and deposition
  - How to predict organic deposition
  - Factors affecting deposition and how to handle deposition
  - Case studies

- Gas hydrates
  - Definition, formation and types
  - Formation prediction
  - Prevention
  - Case studies
- Emulsions
  - Definition and formation conditions
  - Production aspects of emulsion presence
  - Methods of emulsion breaking
  - Guidelines of emulsion treatment and demulsifies selection and injection rate optimization
  - Case studies
- Corrosion
  - Definition and types
  - How to estimate corrosion
  - Corrosion control methods and monitoring techniques
  - Case studies
- Scale
  - What common scales we are dealing with and how do they form
  - How to estimate water scaling potential
  - Scaling control methods and monitoring techniques
  - Case studies

FLOW ASSURANCE & WATER HANDLING

Water in Oil and Gas Production

ABOUT THE COURSE

Operators usually consider formation water an undesirable byproduct of oil and gas production. Water production can significantly reduce the value of a hydrocarbon asset. It can accelerate equipment damage and increase water handling and disposal cost.

However, samples and analysis of that same water can provide vital information for the field development plan, including optimization of completion design, materials selection and hydrocarbon recovery. Water properties contain a wealth of information that can be used to impact field economics. Formation water analysis plays a role in dynamic modeling of reservoirs, quantifying reserves and calculating completion costs, including both subsurface and surface equipment–capex. Water analysis also helps operators estimate operating costs–opex, such as the cost of chemicals used to treat water.

This course establishes a foundation of knowledge regarding water sampling, water chemistry and water analysis tools.

The chemistry of the main water related problems of mineral scales, corrosion, bacteria, and oily water will be reviewed both from the theoretical and practical aspects.

You will learn how to participate in creation of an integrated monitoring program to select and to apply appropriate monitoring techniques.

Water injection and disposal systems and typical water quality specifications will be reviewed as well. Emphasis will be placed on understanding type of samples, possible problems in conducting analysis and you will be able to apply the knowledge you gained to propose solutions.

DESIGNED FOR

This training course is designed for chemists, lab stuff, managers, engineers, and operators needing to understand water related problems in oil and gas production and their solutions.

YOU WILL LEARN

- The basics of oilfield water chemistry
- Water sampling and analysis
- Fundamentals on formation of inorganic scales, corrosion, emulsions
- How to monitor corrosion, scale, and bacterial growth in produced water and water injection/ disposal systems
- What is considered under injection water quality
- Fundamentals on water treatment chemicals
- How to carry out analyses to select treatment chemicals and totest performance/effectiveness of treatment chemicals
- Laboratory safety responsibilities

COURSE OUTLINE

- Water chemistry fundamentals
- Water sampling and analyses
- Scale formation
  - Common scales
  - Prediction of scale formation
  - Prevention of scale formation
  - Case study
- Corrosion
  - Theory of corrosion
  - Corrosion rate prediction
  - Control methods
  - Monitoring
  - Case study
- Discharge and injection
  - Factors affecting water quality
  - Injection water quality requirements- how good must injection water quality be
  - Water quality control and its importance in water flooding operations
  - Treating chemicals
    - Most common oilfield chemicals
    - Chemicals selection
    - Monitoring of chemical performance efficiency
  - Data gathering and presentation of results
  - Monitoring
  - Case study
- Laboratory safety responsibilities

FLOW ASSURANCE & WATER HANDLING

Water Handling in Oil and Gas Production

ABOUT THE COURSE

The goal of this training is to provide the participants with vision, tools and knowledge of the main water handling systems typically encountered in upstream (E&P) production operations.

As oil fields mature, more water is produced. In addition to produced water, large quantities of seawater and water from other sources is treated and injected in waterflooding and other EOR projects. Therefore, water handling represents one of the biggest operating challenges and significant costs for most oilfield operators.

The course covers treating system designs of water handling projects - from produced water disposal to waterflooding and EOR projects. The theoretical and practical aspects of the main water related problems of suspended solids, mineral scales, corrosion, bacteria, and oily water will be reviewed. During the course participants will be introduced with basic theoretical and practical aspects of water quality requirements, quality control and monitoring.

As water production increases, more chemicals are used to maintain production. The course includes methods to determine the need for chemical treating, how to select the proper chemicals, and how the testing for chemical compatibility with the formation is and other chemicals performed. The course will include how the usage of chemicals can prevent problems, improve production and economics, and extend the life of the system.

DESIGNED FOR

Facilities, research and development, production and operations engineers, managers, chemists, field supervisors- personnel involved with some aspects of a new or existing water disposal, waterflooding or other EOR projects and need to understand water related problems and their solutions, and those responsible for project implementation and monitoring.

YOU WILL LEARN

- The basics of oilfield water chemistry
- How to identify problems like suspended solids, oil, scale, bacteria and corrosion in water handling operations
- How to propose system design for long-term production, injection and disposal system life cycles
- How to identify, monitor and control system problems
- How to collect data to detect potential problems before system damage occurs
- To select and apply treating chemicals - scale inhibitors, corrosion inhibitors, H2S and oxygen scavengers, water clarifiers, biocides, etc.

COURSE OUTLINE

- Water chemistry fundamentals
- Scale formation
  - Common scales
  - Prediction of scale formation
  - Prevention of scale formation
  - Case study
- Corrosion
  - Theory of corrosion
  - Corrosion rate prediction
  - Control methods
  - Monitoring
  - Case study
- Produced water subsurface discharge/disposal
  - Water disposal requirements
  - Water treatment technology principles
  - Treating chemicals
  - Monitoring
  - Case study
- Waterflooding
  - Water source selection
  - Factors affecting water quality
  - Injection water quality requirements- how good must injection water quality be
  - Water quality control and its importance in water flooding operations
  - System design
  - Data gathering and presentation of results
  - Monitoring
  - Case study
- Water treatment for EOR (polymer flooding, steam injection, hot water injection, alkaline flooding)
  - Water quality requirements
  - Typical problems in water quality maintenance
  - Monitoring aspects
  - Review of case histories