

N976: Mature Field Production Operations and Reservoir Management

Format and Duration
Classroom - 5 Days

Instructor(s): John Davies and Pete Smith

Summary

There is often a lack of coherence in the management of mature fields in production; operations staff take various measurements and various predictive models are built and studies undertaken, by reservoir/subsurface staff, with limited interaction between the two groups. This course will look at areas of improvement targeted at maximizing the economic benefit of these fields that are coming to the end of their productive lives. Moreover, this course provides a synopsis of oil field operations, equipment, practices and terminology as well as a well, reservoir and field management framework that is the first step in focusing future activity. It covers equipment from the reservoir to the point of sale, discussing function and malfunction, routine operations and day-to-day activity. The course also covers potential profitable methods for extending and enhanced recovery including infill-drilling, repeat seismic and increased compression.

Learning Outcomes

Participants will learn to:

1. Validate the purpose of well, reservoir and field management.
2. Critically analyse the principal technical and commercial features of oil and gas properties.
3. Evaluate the role of risk and uncertainty when making reservoir depletion decisions.
4. Assess all aspects that appertain to reservoir management, including resource size, resource location and reservoir production support mechanism.
5. Gauge the impact of field development choices on future work programs.
6. Develop a set of key tools to make optimum decisions based upon available information and uncertainties.
7. Characterise how a field development project is managed through key stage gates.
8. Analyse well performance from naturally flowing, gas lift and artificial-lift systems.
9. Assess the importance of multiphase flow correlations, formation damage and mitigation, sand management and control and sand face completion design to the optimization of production.
10. Verify important considerations in well completion specifically completion and production fluids, pressure and temperature, safety valves and well head design.
11. Appraise the range of surface facilities available, specifically oil and gas separators and water disposal systems.
12. Evaluate different artificial lift systems and illustrate how and why certain types are used.

Training Method

Five-day classroom based, with worked examples, exercises and discussion.

Who Should Attend

This course is designed for experienced reservoir/petroleum/production engineers, geoscientists, and well test analysts.

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Course Content

The course relies heavily on interactive learning modules and team and individual exercises and has the following elements:

1. Introduction- mature reservoirs what is possible and when we should to stop.
2. The concept of value – discounted cash flow, net present value and rate of return.
3. Commercial Evaluation/Fiscal Regulations - the implication of fiscal arrangements, common tax regimes and the implications to the phasing of the development plan.
4. Risk and Uncertainty - the statistical treatment of uncertainty with emphasis on a practical appreciation with typical data sets and some of the tools available for use.
5. Resource Uncertainty - estimating the distribution of resource size using provided software and interpreting the software results.
6. Well Productivity - estimating the initial well productivity, inflow performance, tubing performance and minimum wellhead flowing pressures along with the outflow well curves
7. Secondary Recovery - well injection capacity for water injection schemes, pressure maintenance and water flood operation. Artificial lift with down hole pumps and gas lift techniques
8. Additional production issues - sand production, deviated holes, high temperature and high pressure, extremely viscous crudes, subsea completions.
9. Making Decisions - who makes decisions, how to optimise them and how uncertainty is incorporated and decision trees to help make and exemplify decisions.
10. The value of Information - value of study, cost of delay, opportunity cost.
11. Frequency of data acquisition and required accuracy such as:
 - Pressure data: wellhead, downhole (flowing), downhole (shut-in)
 - Flow data - frequency of well tests, multi phase flowmeters – problems with remote test separators
 - Sampling – oil and water
15. E-production – downhole telemetry: flow, pressure, temperature
16. Designing for future problems – water and sand production?
17. Production logging.
18. Data acquisition requirements changing through the life of the field i.e. formulated during appraisal/development but not necessarily updated as the field depletes, water cut increases, gas production changes.
20. Optimising artificial lift.
21. Monitoring and optimising water injection and subsequent breakthrough.
22. Optimising completions in general and tubing sizes extending to (a) horizontal wells, (b) multi-laterals and (c) horizontal multi-laterals.
24. The value of intervention - intervention planning and flexibility.
25. Project planning - project life cycle, benefits of a project planning methodology, common processes for each phase of the project cycle, the triple constraint-scope, schedule and cost, project control and closeout.
26. Risk planning - risks to delivery, effective communication to all stakeholders risk planning processes.

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