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## N944: Shale Gas and Shale Oil Completions Using Multi- Staged Fracturing and Horizontal Wells

Format and Duration  
Classroom - 2 Days

Instructor(s): George King

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### Summary

The course introduces basic shale candidate selection using petrophysical, geochemical and petroleum engineering information, then adds detailed practical knowledge of well planning, construction, stimulation, production and finally environmental conservation. It provides explanations, theory and practical understanding designed to recognize and build commercial completions and uses gas and oil play case histories from five commercial North American shales: Barnett, Eagle Ford, Gothic, Horn River and Marcellus.

### Learning Outcomes

Participants will learn to:

1. Assess general gas and oil production potential of candidate shale reservoirs.
2. Select limiting factors in shale hydrocarbon production such as faults, regional fractures, fluid saturations, natural fractures and frac barriers.
3. Estimate potential for initial production and decline rates.
4. Formulate a shale gas development plan using multi-well pads and simple facilities.
5. Design a well completion suitable for pressure containment and multi-stage fracturing.
6. Select frac stages from logs and locate perforation clusters for effective hydraulic diversion.
7. Design and execute a fracture stimulation.
8. Develop flowback limits to effectively recover load fluids and preserve well energy for unloading water.
9. Select the basic production equipment for the well.
10. Supervise effective water use and flow back management.

### Training Method

This is a two-day classroom course consisting of classroom lectures, construction examples and group exercises with field frac examples.

### Who Should Attend

The course is designed for mid level engineers and managers.

### Course Content

Shales are the most abundant sedimentary rock and many, but not all, contain commercial quantities of gas and/or hydrocarbon liquids. Shales offer thousands of tcf of gas and hundreds of millions of barrels of oil as reserves, but they require careful selection and special stimulation methods to achieve commercial production and returns. The role of technology is critical in improving recoverable fluids.

### Topics Covered

1. Assess General Gas and Oil Production Potential and Select Limiting Factors in Shale Hydrocarbon

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### Production

2. Estimate Potential for Initial Production and Decline
3. Geologic Impacts – Mapping – From Macro to Micro
4. Formulate Shale Development – Multi-Well Pads & Facilities
5. Design A Well Completion - based on life of well containment
6. Completion Type
7. Select Frac & Perf Stages from Logs, Set Hydraulic Diversion
8. Design a Frac Stimulation, Identify Pressure Trends & Flags
9. Pumping the Frac
10. Necessary Chemicals
11. Special Frac Topics
12. Flowback Strategy
13. Production
14. Develop an Effective Water Use and Recycling Strategy
15. Shale Frac Risk
16. Air Emission Reductions