UPSTREAM AND MIDSTREAM OIL AND GAS

Duration: 2 Days
Format: Live or Virtual

This course covers operations and key commercial arrangements in both the upstream and midstream sectors of the oil and gas industry. It includes a bit more-detailed coverage of the upstream sector than in our 1-day Upstream Oil and Gas course. The content can be adjusted to include offshore activities. It can also be adjusted to include more-detailed coverage of liquefied natural gas.

Course Content

1) Structure of the Industry

- Production Components:
  - Gases (types of gases, characteristics, market uses, wet/dry gas, condensate, contaminants, gas gathering/processing and NGL)
  - Crude Oil (composition, API gravity, sulfur and value) (examination of crude oil specimen in live courses)
  - Oil and gas measurement units
- Sectors of the industry (upstream, midstream and downstream and key activities in each)
- Industry participants (public and private O&G companies, integrated vs. independent, national oil companies, midstream operators and contractors/suppliers)
- Varying operational capabilities of national oil companies and how they limit global opportunities
- Crude oil exporters, importers and OPEC
- US unconventional activities (synopsis of changes brought by unconventional development)
- Current focus of U.S. drilling activities

2) Petroleum Geology and Exploration

- Organic source of oil and gas
- Explanation of clastic, mineral and biological sedimentary rocks important to oil and gas
- Lithification and how sedimentary basins are formed (examine rock samples with magnifiers in live courses)
- Oil and gas formation, migration and traps
- Examples of conventional exploration trap types and how formed
- Differences between conventional vs. unconventional (shale and tight rock) targets
- Porosity, permeability, and why unconventional development requires horizontal drilling and hydraulic fracturing
- How the earth changes over geological time and why it is important to oil and gas
- The “total petroleum system” (brings it all together and distinguishes tight rock from shale)
- Video overview of exploration methods and tools
- More on seismic (how acquired and 2D vs. 3D)
- Exploration economic considerations

3) Mineral Rights and Leasing

- Mineral estate ownership in the U.S. vs. other nations
- The US rectangular survey system and metes and bounds method
- US mineral estate distribution (private, state and federal ownership)
- Severance of the mineral estate from the surface estate and rights of the mineral estate owner
- Joint mineral estate ownership (multiple owners in the same estate)
- Rule of capture (rights of a mineral estate with respect to oil and gas)
- State regulation of oil and gas activities (including a Texas horizontal well spacing example)
- Why leasing is common and key terms of a lease (bonus, royalty, primary term, etc.)
- Overview of other types of mineral interests (overriding royalty, non-participating royalty, net profits, and farmouts)
- Pooling and unitization (why critical with horizontal drilling)
- Federal leasing procedures
- Title opinions and division orders

4) Drilling and Completion

- We produced the industry's most-comprehensive drilling video and use several segments that show rig-floor activities as well as animations of downhole activities. Topics covered include:
  - Well planning, design elements, site preparation, and rig mobilization
  - Drill string components and spudding
  - Rig structure and functions (hoisting, rotating and circulating)
  - Casing and cementing
  - Drilling fluids (mud), mud logging and logging while drilling
  - Directional drilling in the curve and lateral sections
  - Well stimulation, flowback and completion (tubing, packer and Christmas tree)
  - Batch drilling and simul-frac techniques
- Example of a drilling permit
- Overview of well costs and tangible vs. intangible

5) Development and Production Operations

- Example of a discounted cash flow analysis used in a development decision
- Overview of potential well-evaluation techniques (logging, coring and drill stem tests)
- Example of reservoir behavior and natural reservoir drives
- Overview of artificial lift (may be needed to bring fluid to the surface)
- Processing facilities and animated tour of a modern production site
- Enhanced oil recovery techniques
- Oil and gas reserves

6) **Joint Operations**

- Reasons for joint operations
- Model-form joint operating agreements (JOA)
- Review of key provisions in the AAPL model form JOA
- Operator duties, partner approvals and AFEs
- JOA accounting procedure
- Direct costs, operator overheads and joint interest bills (JIBs)
- JV auditing process

7) **Gas Gathering and Processing**

- Gas composition
- Gas gathering arrangements
- Pipeline quality standards and why processing may be required
- Gas processing (animated tour of a gas processing plant)
- Gas processing contracts and examination of a plant statement
- Fractionation
- Overview of liquefied natural gas (LNG)

8) **Measurement and Transportation**

- Oil measurement
  - Standard volume conditions
  - Gravity and gravity adjustment to standard temperature
  - Tank sale method using strapping table
  - Tank sale procedures (live course demo using thief, thermometer, plumb bob and tape)
  - Sample gravity using thermohydrometer and BS&W analysis
  - Run ticket and volume calculation
  - LACT meter sale method and meter ticket
- Gas measurement
  - Standard volume conditions
  - Information needed for gas measurement
  - Orifice meters
  - Gas sampling, chromatography, and Btu value
- Transportation
  - Oil and gas transportation methods
  - Pipelines
    - Video showing stages of pipeline construction
    - Pipeline operation and SCADA
    - Pipeline transportation arrangements
    - North American crude oil pipeline network and hubs
    - U.S. gas pipeline network and hubs
    - Offshore pipeline construction
    - Gulf of Mexico offshore pipeline network
  - Crude oil tankers
  - Crude by rail