



A Course By

DANIEL JOHNSTON & Co., INC.

CONSULTANTS TO THE PETROLEUM INDUSTRY WORLDWIDE

daniel@danieljohnston.com

www.danieljohnston.com

(603) 525-9330

International Exploration Economics and Risk Analysis Daniel Johnston

Course Description

(1) This is a basic course on “Exploration Economics and Risk Analysis”. It is not an “advanced” course BUT delegates must be familiar with basic present-value theory and the meaning of the term “Internal Rate of Return”. The course covers all basic elements of economics and risk analysis:

- Theory and practice, terminology, formulas, etc
- Detailed economic modeling and sensitivity analysis
- Expected Value theory and Decision tree analysis
- Monte Carlo simulation

This course prepares delegates to comfortably discuss with other professionals all economic, financial, accounting and risk aspects of international exploration and development projects.

(2) This is a computer-based course. We use an Excel™ spreadsheet model. Each delegate must bring a laptop or have classroom-access to a computer. Economic modeling software is provided which consists of simple cash flow model that allows users to model basic production sharing contracts and royalty/tax systems. Delegates are taught how the models work and how to use them for a variety of situations:

- Exploration economics, scoping economics, threshold field size analysis
- Field development feasibility studies
- Production economics
- Sensitivity analysis
- Various exercises

The delegates should have a working understanding of how an Excel™ spreadsheet works. However, this is not absolutely mandatory because it does not take long to learn how to use the model because it has already been built.

(3) Group exercises are the heart and soul of this course. This course uses numerous “hands-on” group exercises to evaluate practical every-day situations/decisions that require economic modeling and quantification and characterization of risk.

After the course the delegates will keep the software and associated documentation provided by Daniel Johnston.

Course Outline

Economic Modeling – Discounted Cash Flow Analysis

A basic economic model (Excel Spreadsheet) is provided for each delegate. It is theirs to keep and to use throughout the course on their laptop computers. They will be taught how the model works and how to use it and will be provided with documentation for the program.

I. Introduction

- 1) Exploration history – particularly the last 25 years

II. Present value theory

- 1) Basic theory and industry practice
- 2) Cost of capital (WACC) Cost of equity (CAPM)
- 3) Internal rate of return (IRR), mid-year discounting etc

III. Economic modeling/analysis

- 1) Art/Science – how to check and trust an economic model
- 2) Price assumptions, crude quality, gas, netbacking, etc
- 3) Cost assumptions
 - (a) Capex, Opex, timing
- 4) Technical assumptions
 - (a) Basic volumetric analysis and decline curve analysis
 - (b) 80/20% Rule
 - (c) Peak production/Total reserves (P/R)
- 5) Fiscal terms
 - (a) Government take
 - (b) Effective royalty rate
 - (c) Entitlement
 - (d) Savings index

IV. Decision theory

- 1) Determination of Chance factors (or estimates of probabilities)
- 2) Expected value – Expected monetary value
- 3) Decision tree analysis
 - (a) Swanson's rule
 - (b) Utility theory
 - (c) Value of information
 - (d) Evaluating bids (The Government perspective)

V. Deterministic vs. stochastic (Probabilistic) modeling

- 1) Monte Carlo simulation
- 2) Arithmetic, terminology, theory, practice
- 3) Reserve reporting “Booking barrels”

VI. Exploration threshold field size analysis

VII. Development threshold field size analysis

- 1) Breakeven success rate, success capacity, etc

VIII. Commercial success vs. economic success vs. technical success

IX. Group Exercises:

- 1) Competitive bidding
 - (a) bonus bidding
 - (b) work program bidding
 - (c) everything is biddable
 - (d) value of information exercise
 - (e) evaluating bids (Government perspective)
 - (f) farm-in/farm-out evaluations