# Reservoir Geology for Non-Geologists, Colorado and Utah (G061)

## Tutor(s)

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## Overview

The course investigates world-class outcrops to introduce engineers to a wide spectrum of stratigraphic and structural features commonly found in exploration and production. An active learning technique encourages participants to make initial observations and interpretations before group discussions. Lectures and exercises provide awareness of reservoir architecture while outcrops demonstrate field- and reservoir-scale heterogeneities. Depositional environments studied include deltaic, eolian, fluvial, turbidites, tidal and coastal plain with emphasis placed on understanding flow characteristics (i.e. connectivity, Kv, Kv/Kh).

## Duration and Logistics

7 days; a mix of classroom lectures (10%) and field exercises (90%). The course begins and ends in Grand Junction, Colorado, and visits outcrops in Utah and Colorado.

## Level and Audience

**Fundamental**. The material is presented with minimal jargon so that engineers get the full benefit of the course.

## Exertion Level

This class requires a **MODERATE** exertion level. Scrambling over rock outcrops and steep sections will be required, but most hikes would be considered moderate. The longest walk is approximately 4.8km (3.2 miles). Outcrops are at elevations of 1200–2500m (4000–8200 ft). Weather conditions in NW Colorado and eastern Utah can vary from warm and dry to cold and wet, with an early fall temperature range of 5–23°C (41–73°F). Transport will be in SUVs on black-top and unpaved roads.

## Objectives

You will learn to:

1. Appreciate the differences between a range of depositional settings, their facies and related reservoir architecture.
2. Use geologic knowledge to reduce reservoirs into flow units.
3. Gain a better understanding of major events that influence deposition and help to understand reservoir geometries and scale.
4. Evaluate the impact of modeling stochastic properties versus organized trends.
5. Understand the dangers of upscaling and if it makes geologic sense.
6. Use detailed sector models to understand how to capture subtle variations in the geology.
7. Appreciate how to use the geology to make upscaling decisions by building detailed sector models to understand the impact of upscaling decisions.

## Course Content

### Day 1: Arrive in Grand Junction

Classroom:

- Course introduction and safety briefing

*Overnight in Grand Junction.*

### Day 2: Alluvial systems

Fieldwork:

- Stop 1 Introduction to depositional models
- Stop 2 Introduction to clastics and discontinuous sand bodies
- Stop 3 Basics of eolian depositional processes
- Stop 4 Introduction to formations, eolian stratigraphy
- Stop 5 Braided fluvial

*Overnight in Grand Junction.*

### Day 3: Shallow Marine Systems

Fieldwork:

- Introduction to depositional models
- Stop 6 Wave dominated delta – facies and grainsize
- Stop 7 Coal and deposition
- Stop 8 Meandering fluvial (Brazos sand body exercise)
- Stop 9 Shoreface reservoir geometries and simple flow model exercise

*Overnight in Grand Junction.*

### Day 4: Deltas

Fieldwork:

- Stop 10 Scenic overview – review stratigraphy of layers
- Stop 11 Fluvial dominated delta (delta lobe exercise)
- Stop 12 Fluvial dominated delta – growth faults
- Stop 13 Review Ferron Reservoir distributions

*Overnight in Green River.*

## Day 5: Eolian Systems

Fieldwork:

- Stop 14 Shallow water turbidites
- Stop 15 Volume exercise
- Stop 16 Eolian sands; Relay ramps
- Stop 17 Normal fault with deformation bands
- Stop 18 Introduction to mechanical stratigraphy and clay smear

*Overnight in Green River.*

## Day 6: Sequence Stratigraphy

Fieldwork:

- Stop 19 Shoreface reservoirs
- Stop 20 Introduction to unconformities and incised valley fill
- Stop 21 Recognition of sequence boundaries and incised valley fill
- Stop 22 Review shoreface sandstones and incised valley fills

*Overnight in Grand Junction.*

## Day 7: Departure

*Departure and travel home.*