CSPG Field Trip

The Structure Stratigraphy and Development of the Moose Field, a TCF sized gas field in the Alberta Fold and Thrust Belt

Leaders: Andrew C Newson B.Sc P.Geol, Folded Thrust Geology Ltd., and Debbie Sanderson M.Sc P.Geol

Date: Saturday, June 18th, 2022 | 9:00am – 5:00pm (MST)

Location: Canyon Creek, Moose Mountain

Cost: CSPG Member - $100.00
Non Member - $200.00

Course Overview

The surface expression of the Moose Dome in the southern Alberta Foothills is a Paleozoic carbonate outlier surrounded by Mesozoic aged sediments consisting of interbedded sandstone, shale and coal. It is a prominent topographic feature and examining it in outcrop provides insight into many of the other large oil and gas fields located in the Rocky Mountain Foothills of Alberta.

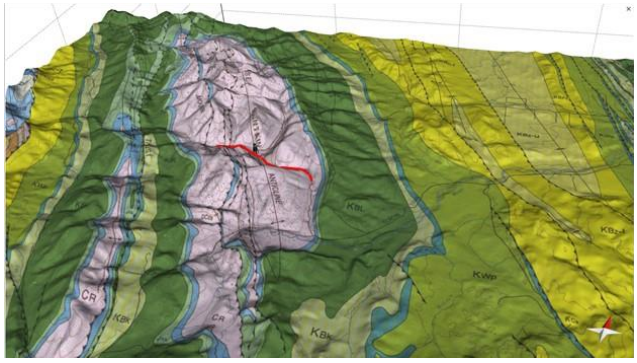

Figure 1: Looking NW over Moose Dome, the lilac-coloured Rundle Group shows the outcrop pattern for the doubly plunging anticline. Red line is the 5km route along Canyon Creek. Map by McMechan, M E, GSC, Map 1865A.

This one-day field trip will traverse the southern end of the Moose Mountain anticline, the surface expression of the large Moose oil and gas field, shown in Figure 1. The 5km long hike will follow along an E to W creek section through a well exposed Paleozoic aged succession of the Rundle Group carbonates. The surrounding cliffs, which can be up to 500m high, provides a spectacular back drop from which to explain the structural geology in three dimensions and the reservoir stratigraphy for the underlying Moose oil and gas field.

During the field trip we will examine exposures of the Mount Head, Turner Valley, Shunda, Pekisko and Banff formations of the Mississippian Rundle Group. We will relate the surface exposures to the equivalent productive reservoir intervals at depth in the Moose oil and gas field. We will also discuss the three-dimensional surface geometry of the formations as they relate to the overall geometry of the Moose anticline

and the underlying oil and gas field using a cross section drawn parallel with the traverse.

Margo McMechan's 1995 geological map sheet covering the field trip area can be downloaded from https://doi.org/10.4095/204897

Recommended References:

• Bamber, E. W. Macqueen, R. W., and Ollerenshaw, N. C., 1981. Mississippian Stratigraphy and Sedimentology, Canyon Creek (Moose Mountain), Alberta. In, Thompson, R.I. and Cook, D.G. (Editors)Field Guides to Geology and Mineral Deposits, Calgary '81, GAC, MAC, CGU, p.177-194.

• Fermor, P; 1999. Aspects of the three-dimensional structure of the Alberta Foothills and Front Ranges; GSA Bulletin, v111 no 3, p. 317-346.

• McMechan, M E; 1995. Geology, Rocky Mountain Foothills and Front Ranges in Kananaskis Country, Alberta; Geological Survey of Canada, Map 1865A, scale 1:00,000.

• Mundy, D, Widdowson, R., and Sabo, D., 1997. Stratigraphy, Sedimentology, Structural History and Exploration History of the Mississippian at Moose Mountain, Southwestern Alberta Foothills. CSPG-SEPM 1997 Joint Convention, Sedimentary Events and Hydrocarbon Systems, 92 p.

Objectives

The field trip objectives are to provide the explorationist with an over view of the stratigraphy, structure and history of development of a typical field in the Alberta Fold and Thrust Belt.

1) Stratigraphy: The Rundle, Turner Valley formation is dolomitized carbonate reservoir that was formed in a shallow water to tidal flat environment. It has been tectonically fractured by the Laramide orogeny. During the field trip we will be able to see first hand the geology of the Rundle Group in outcrop.

2) Structure: The Moose Mountain structure is a duplex of Paleozoic aged rocks with a total shortening of 46k. It carries up to 3 separate repeats of the reservoir rock that have been drilled by some of the deeper wells. The bigger picture structure will be evidenced in the towering peaks around us. Maps and cross sections will be used to relate these views to the overall structure.

3) Timing of development: Exploration of the Moose structure started in 1929 with the drilling of Moose Oils No1. Following that a further 40 wells were drilled with varying amounts of success. In 1959 the first deep gas well was drilled which lead to commercial development of the Rundle A and B pools, based on 180 Bcf of gas in

place. Another successful well was drilled in 1991 that resulted in the discovery of the Rundle C oil pool. Subsequent drilling between 1995 and 2007 resulted in additional reserves being added in the Rundle D, E, F, G and H pools. The gas in place reserves are now in the order of 800 Bcf. Some of these wells will be sen on the field trip, but it will be interesting to speculate how the reserve additions were a function of the change in understanding of the structural style of Moose Mountain.

Who Should Attend?

Geologist, Geophysicist and Engineers with some geological background. Mid level managers working with teams exploring and developing oil and gas in Fold and Thrust Belts internationally and domestically.

Previous Attendee Testimonial

Response the Moose Mountain field trip run on June 26th 2021

Did the field trip fulfill your expectations: "Yes, very informative and well planned. Excellent Experience" The field trip was rated excellent and very good by this geologist with 16 years experience.

Did the field trip fulfill your expectations: "Yes. Great to see the field that I have heard and read about, the Moose Mt Field" Overall ranking was excellent by this geophysicist with 5 years experience.

Biographies

Andrew has many years of experience in the geological and geophysical evaluations of overthrust belts. He is a Professional Geological Consultant registered in the province of Alberta. Since graduating from London University he has worked as a structural geologist specializing in the exploration and exploitation of hydrocarbon prospects in fold and thrust belts around the world.

He started work in New Zealand in the Taranaki basin. Later, he moved to Canada to work on projects in the folded and thrusted Foothills of Alberta, British Columbia, Yukon and NWT. Since then he has worked domestically and internationally and has develop an international reputation for evaluating these complex deformation styles.

Andrew has a well proven ability to combine a wide range of data types with his experience in analogue structure. This has resulted in numerous successes as an employee of oil and gas exploration companies. In this role he was responsible for discoveries in the folded and thrusted structures of the Taranaki basin of New Zealand,

the Alberta Foothills and the BC Foothills.

As a consultant, Andrew has been involved with numerous projects for clients among the major, independent and junior oil and gas companies. These consulting projects have involved work in the fold and thrust belts of many different countries. In the last five years these have included Albania,
Kurdistan, Morocco, PNG and Turkey. In addition he is currently works on domestic Canadian plays by actively assisting in drilling horizontal wells into the folded Cardium Formation of the Alberta Foothills.

Through his companies he teaches in-house workshops on fold and thrust play evaluation techniques and regularly leads field trips for industry. He is closely involved in developing balanced cross section and dipmeter analysis software packages to assist in the structural interpretation of thrust and fold plays.

Logistics

Participants will be requested to drive in their own vehicles to a meeting point about 1.5 hours drive SW of Calgary. They will then be admitted through a locked gate to a restricted access area at 9am. Except in emergencies, participants will not be able to leave the area until the end of the field trip at 4pm. Full details will be made available to registered members close to the field trip