

Unconventional Gas Reservoir Outcrop Studies: A Deep Basin Example

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Abstract

Shell Canada's Deep Basin asset is a stacked series of Cretaceous age tight clastic reservoirs, each with distinctly different geological and petrophysical properties. In order to better-understand and focus drilling and completion choices (and therefore improve rate and production volumes from these reservoirs), Shell embarked upon an intensive data collection, analysis and training program in 2007. This program has continued to deliver benefits to our subsurface appraisals and operations, and has thus expanded to develop training courses and inclusion of people from other Shell regions. It has three basic components: dynamic data from pilot development wells; static data from detailed core analyses paired with advanced wire-line logging; and paired study and training conducted on surface outcrops of the reservoir rocks. This presentation focuses on the outcrop work, but we will show how this is integrated by design with the other aspects, and how international training events have been developed from it.

The reservoir outcrops that we studied and used to train our staff are near Grande Cache, Alberta, not far from the Deep Basin producing areas. The exposed strata have provided important information on depositional setting, reservoir architecture, mineralogy, structural geology – and helped us to understand the impact of these subsurface elements on effective well placement and completions. The outcrop studies are staffed by a combination of technical specialists and the people who have identified and asked the technical questions at the office workstation. This ensures asset ownership, guarantees real-time learning and knowledge dissemination where it is needed – and ensures direct connection between the fieldwork, the asset staff and their field development plans and operations. As the program expanded, we included lab-studies and MSc students, as well as staff from other regions working similar issues elsewhere. The library of insights that grew from the program, naturally developed into the building blocks for multidisciplinary field courses and bespoke field visits/studies, that we have used to improve cross-discipline dialogue (e.g. on seismic processing and interpretation, drilling and fracture optimization, thin bed pay evaluation, reservoir connectivity and other topics). This in turn formed the basis for an international training course that we run annually in Grande Cache.

In conclusion, we have seen true benefits to our organisation in creating this integration space for different disciplines to work together on common issues and development of the training courses for knowledge transfer to others working similar issues elsewhere in our organization.