

Update on the Midale Unit CO₂ Miscible Flood Expansion Project

Bob McKishnie¹

The Midale Unit is located on the northeastern margin of the Williston Basin, approximately 155 km southeast of Regina. The field was discovered by Shell in 1953, with subsequent drilling of some 300 wells on 80-acre spacing. In 1962, the Midale field was unitized and a full scale inverted nine-spot waterflood was implemented. Over the years, the field has been aggressively infill drilled with both vertical and horizontal wells but it was recognized that there was a significant remaining oil target for CO₂ flooding. In 1984, a CO₂-flood pilot was initiated and provided information that was instrumental in justifying the larger scale Midale CO₂ Demonstration Project (six patterns) that began operations in 1992 and continued until 1999. In 2000, Apache acquired Shell's assets in Midale and took over as operator of the Midale Unit, and commenced the expanded Midale Unit CO₂ project (the second largest CO₂ flood operation in Canada) in October 2005. 25 MMcf/d (1350 tonnes per day) of CO₂ purchased from the coal gasification plant in Beulah, North Dakota, are being injected along with all recycled CO₂. Injection in Phase 2 commenced in mid-2008 and is currently occurring in 18 of a total of 42 projected EOR patterns. An incremental 45 to 60 million barrels of oil are expected to be recovered from the CO₂ project. The presentation focuses on the results thus far from Phase 1 of the CO₂ project.

¹ Apache Canada Ltd.

Bob McKishnie is a Reservoir Engineer for Apache Canada Ltd. whose responsibilities include the management of the Midale CO₂ flood. He has over eight years of industry experience on a variety of topics including CO₂ flooding, reservoir simulation, waterflooding, thermal recovery and naturally fractured reservoirs. He graduated from the University of Calgary in 2002 with a B.Sc. in chemical engineering and a minor in petroleum engineering. He is a registered professional engineer in Alberta (APEGGA) and Saskatchewan (APEGS) and is a member of SPE and the Canadian Petroleum Society.