Oil and Gas Exploration and Development Activity in Ontario in 2005

T.R. Carter

Chief Geologist, Petroleum Resources Centre, Ministry of Natural Resources

INTRODUCTION

Drilling activity in Ontario continued at the same levels as in 2004. World oil prices were strong throughout the year due to continuing concerns about world oil supplies, political instability in major petroleum producing regions in the Middle East and Africa, supply disruptions in the Gulf of Mexico due to hurricane damage to production facilities, low inventory levels of refined petroleum products in the United States, and strong demand growth in China. Natural gas prices remained at higher levels than long-term averages as in 2004 despite healthy inventories of natural gas in storage reservoirs.

Despite high commodity prices drilling and production activities in Ontario continued at historically low levels. Preliminary production figures compiled from annual production reports submitted to the Petroleum Resources Centre indicate annual oil production declined 10% to 137,582 cubic metres valued at $58.6 million in 2005, compared to 153,048 cubic metres valued at $48.4 million the previous year. Production of natural gas totaled approximately 346,554 10^3m^3 valued at $134.8 million compared to 359,448 10^3m^3 valued at $98.9 million the previous year. These declines are directly related to reduced levels of drilling activity both in 2004 and 2005 such that there is insufficient new production to replace reserves produced from existing wells.

EXPLORATION ACTIVITY

A total of 92 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 2005, compared to 89 in 2004. An additional 15 licences were issued for plugging of orphan wells, 60 existing wells were licensed for oil production from historical oil fields and 10 existing wells were licensed for production as private gas wells. At the time of writing, drilling of new wells was reported to be complete at 75 wells consisting of 16 exploratory wells, 48 development wells, and 11 service wells. Horizontal drilling accounted for only 7 of the wells drilled in 2005. The 2005 exploratory drilling resulted in 5 wells reported as gas producers (Table 1, Figure 1) with no wells completed for production of oil. Development drilling was very successful, with 8 wells reported to be oil producers, 24 as gas producers, and 6 as private gas wells. Successful oil wells were completed in Ordovician targets and in a Guelph reef, while completions in Silurian sandstone reservoirs in Norfolk, Haldimand and Elgin counties and offshore Lake Erie dominated the gas-producing wells. Of the 23 wells drilled offshore Lake Erie in 2005, 17 wells were reported as gas producers.

Cambrian Play: Two exploratory wells were drilled to test Cambrian targets for oil and natural gas potential in 2005. Metalore Song No.9 was reported to be completed as a gas producer.

Ordovician Play: Drilling was reported to be complete at 1 exploratory well and 7 development wells testing Ordovician targets in 2005. In exploratory drilling GGOL #69 Blenheim 2-19-XI was reported by Greentree Gas & Oil as a potential gas producer. The Ordovician development drilling resulted in 7 new oil producers for Talisman Energy. Successful oil wells were completed in the Rochester 5-12-IV EBR, Mersea 3-4-IV, Mersea 3-6-V, and Gosfield North 2-21-VI pools. All seven of these wells were drilled horizontally in the reservoirs.

Silurian Sandstone Play: The interest in Silurian sandstone targets continued in 2005 in response to high natural gas prices. A total of 9 exploratory and 37 development wells tested Lower Silurian sandstone targets in 2005. Five

of the exploratory wells, including one private gas well, were completed as gas producers in exploratory extensions of known pools.

Twenty-nine of the development wells were reported as active or potential gas producers. Successful gas wells were drilled in 4 different pools: Bayham, Houghton 5-8-ENR, Welland and the Lake Erie-Maitland pool. Six of the 37 wells were completed as private gas wells in parts of the Lincoln, Welland, and Haldimand gas fields.

Silurian Carbonate Play: There were 3 exploratory tests of Silurian Guelph Formation reef and/or Salina Formation structural trap targets in 2005. All of these wells were plugged and abandoned shortly after drilling.

There were 4 development tests of Silurian Guelph–Salina targets in 2005. Reef Resources completed one well as an oil and gas producer in the Stephen 4-10-XXII gas pool, and Talisman reported 1 well as a gas producer in the Lake Erie Silver Creek pool.

Devonian Play: One exploratory well was drilled to test Devonian targets and was plugged and abandoned shortly after drilling.

EXPLORATION TRENDS

Ordovician reservoirs are still the focus of exploration directed at discovery or development of oil reservoirs. Exploration for new pools has declined in this play in the past four years with a focus on extension or development drilling of known trends. Essex County and southern Kent County are still the most attractive onshore locations but exploration will have to expand to the north and east if oil production is to be maintained. There is considerable remaining untested potential for natural gas in this play beneath the eastern basin of Lake Erie and onshore east and north from Kent County to the Niagara Escarpment. A recent reassessment of potential in this play by Golder Associates in a study funded by the Targeted Geoscience Initiative of Natural Resources Canada indicates potential remaining undiscovered resources totalling 240 bcf of natural gas and 17.2 million barrels of oil (www.ogsrlibrary.com). There also may be potential for trapping of natural gas in sandy facies of the Ordovician Shadow Lake Formation over the crest of the Algonquin Arch.

If natural gas prices remain high the economics of all the gas plays in Ontario are greatly enhanced. There has already been an increase in drilling in the Lower Silurian sandstone play both onshore and offshore, and the platform reef play. There is potential for discovery of Cambrian gas or oil pools along the pinch-out edge of the Cambrian sandstone in the subsurface, or in fault-controlled structures. There may be considerable unrealised potential in fault-related structural traps in the Salina A-1 and A-2 Carbonate units in Kent, Elgin and Middlesex counties.

There is conceptual potential for a new and potentially very large unconventional gas play in the black shales of the Kettle Point Formation, analogous to the very successful Antrim shale play in Michigan and the Ohio shales in Ohio. Shows of natural gas have been reported in the Kettle Point Formation in Ontario and natural gas occurs in water wells in areas underlain by the Kettle Point Formation. The Kettle Point has never been targeted for modern exploration and no scientific studies of its potential have been completed. The Antrim Formation in Michigan has produced in excess of 2.2 Tcf of natural gas from stratigraphically-equivalent shales with similar geological features. Other organic-rich shales in Ontario include the Marcellus Formation, the Collingwood Formation and basal organic-rich shales of the Blue Mountain Formation.

Table 1. Successful exploratory wells in southwestern Ontario, 2005. See Figure 1 for well locations.

Well #	Well Name	Results	Target	TD	Latitude	Longitude	TD Date
1	Metalore Song No.9, Houghton 4- 5 - V	GP - ACT	CAM	1142.3	42.61962222	-80.62071389	2005-10-25
2	Echo 49, Bayham 8 - 8 - II	GP - CAP	CLI	433.5	42.67159722	-80.82335556	2005-01-10
3	Echo 55, Bayham 7 - 2 - III	GP - CAP	CLI	441.0	42.69298611	-80.85186667	2005-07-26
4	TLM East, Lake Erie 86 - H - 2	GP - ACT	CLI	518.0	42.56533333	-79.79620000	2005-08-20
5	Metalore No. 91, Charlotteville 14 - 4 - A	GP - ACT	CLI	394.5	42.66995556	-80.38749444	2005-12-19

Figure1. Successful exploratory wells in Ontario in 2005.