OZARK UPLIFT PROVINCE (057)

By Joseph R. Hatch

INTRODUCTION

The Ozark Uplift Province covers approximately 53,000 sq mi in eastern and southern Missouri (76 counties) and northern Arkansas (10 counties). The province is bounded on the north by the Iowa Shelf Province (052), on the east by the Illinois Basin Province (064), on the south by the Arkoma Basin Province (058), and on the west by the Cherokee Platform (060) and Forest City Basin (056) Provinces. The major structural element in the province is the domal Ozark Uplift, from which sedimentary rocks have been eroded, leaving approximately 350 sq mi of Precambrian granite exposed in the core area.

The sedimentary cover in the Ozark Uplift Province averages less than 2000 ft and primarily consists of dolomites and sandstones of Cambrian and lower Ordovician age. A generalized stratigraphic column for the province is shown in figure 2. In the western part of the Ozark area, Mississippian rocks overlap lower Ordovician rocks, and Middle Ordovician, Silurian, and Devonian rocks are absent. Middle Ordovician, Middle Devonian, Mississippian, and Pennsylvanian rocks are generally present in the counties north of the Missouri River (Adler and others, 1971).

One conventional hypothetical play has been defined for this province, Middle Ordovician (Champlainian) Play (5701).

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CONVENTIONAL PLAYS

5701. MIDDLE ORDOVICIAN (CHAMPLAINIAN) PLAY (HYPOTHETICAL)

The hypothetical Middle Ordovician (Champlainian) Play in the Ozark Uplift Province is based on (1) current hydrocarbon production from age-equivalent rocks in the adjacent Illinois Basin and Forest City Basin Provinces (064 and 056); (2) the presence of potentially good to excellent hydrocarbon source rocks in the Middle Ordovician section; and (3) the presence of potential sandstone and porous dolomite and limestone reservoirs. The area of the Middle Ordovician Play in the Ozark Uplift Province is the area underlain by Middle Ordovician rocks (fig. 1; modified from Thompson, 1991, fig. 33) which includes the eastern and northern parts of the province. Here Middle Ordovician rocks are divided into (oldest to youngest) Everton Formation, St. Peter Sandstone, Dutchtown Formation, Joachim Dolomite, "Pecatonica" Formation, Plattin Group, Decorah Group and Kimmswick Limestone (fig. 2; compiled from Adler and others, 1987).

In provinces adjacent to the Ozark Uplift Province, oil is produced from Middle Ordovician rocks. In the Forest City Basin Province to the west, oil is produced from fields associated with small faulted and folded structures. Production is from porous sandstones in the Simpson Group (St. Peter Sandstone, Dutchtown Formation, Joachim Dolomite equivalents) and (or) from intercrystalline and vugular porosity in the Viola Limestone (Kimmswick Limestone equivalent) (Adler and others, 1971). In the Illinois Basin Province (064) to the east, oil is produced from the limestone and dolomite of the Galena Group ("Trenton"; Kimmswick Limestone equivalent) in fields associated with structural highs (Bristol and Buschbach, 1973).

Source Rocks: Potential hydrocarbon source rocks for this play are shale partings in the Guttenberg Limestone Member of the Decorah Group. Decorah Group rocks are present over part of northeastern Missouri. Although analyses of potential hydrocarbon source rocks are not available from the play area in the Ozark Uplift Province, they are available for Middle Ordovician rocks from adjacent provinces. Armon and Rees (1960) list an organic carbon content of 4.5 percent for a sample of the Middle Ordovician shale from Calhoun County, Ill., just east of the Mississippi River. To the north in Washington County, Iowa, Hatch and others (1987, 1991) list organic carbon contents ranging from 0.1 to 41.4 percent for 17 samples of the Guttenberg Limestone Member.

Organic matter in the Decorah Group rocks in the Ozark Uplift Province is likely to be immature to marginally mature with respect to petroleum generation. This conclusion is supported by (1) low thermal maturities (R_o = 0.45 - 0.51 percent (n = 3); and T_{max} = 424 - 434¡C (n = 9) Hatch and others, 1984) of Pennsylvanian coals and shales overlying the Decorah Group rocks in northern Missouri, (2) low thermal maturity (R_o < 0.5) of organic matter in the Late Devonian New Albany Group just to the east in western

Illinois (Barrows and Cluff, 1984) and (3) by the marginally mature level of organic matter (lowest T_{max} value = 442¡C) in the Guttenberg Limestone Member from southeastern Iowa (Hatch and others, 1991).

Reservoir Rocks/Traps: The most likely reservoir rocks in the Middle Ordovician section are the St. Peter Sandstone and the Kimmswick Limestone.

Resource Potential: If hydrocarbon accumulations are to be found in this play, they will likely resemble the structural trap at the Florissant field in northern St. Louis County, Mo., on the border between the Ozark Uplift and the Illinois Basin Provinces (057 and 064). Here, oil is produced from coarsely crystalline Kimmswick Limestone from a somewhat circular structure developed on a long northwest-southeast trend on the downthrown side of a fault. Production from the 400 acre field to date is about 1 MMBO of 35¡ gravity oil. The Florissant field is on the same trend as the Dupo Field (2.8 MMBO) in St. Clair County, Ill. (Adler and others, 1971). Caprock at the Florissant field is the Upper Ordovician Maquoketa Shale. Unfortunately, over much of the area of the Middle Ordovician play, the Maquoketa Shale is absent. The absence of this caprock shale is a major factor in limiting the potential for undiscovered hydrocarbon accumulations in the Kimmswick Limestone for this play (Adler and others, 1971).

UNCONVENTIONAL PLAYS

There are no unconventional plays described in this province report. However, unconventional plays listed in the surrounding provinces may include parts of this province. Individual unconventional plays are usually discussed under the province in which the play is principally located.

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SYSTEM	SERIES	UNIT
PENNSYLVANIAN	Desmoinesian	Marmaton Group Cherokee Group
MISSISSIPPIAN	Chesterian	Vienna Limestone Tar Springs Sandstone Glen Dean Limestone Hardinsburg Formation Golconda Formation Cypress Formation Paint Creek Formation Yankeetown Sandstone Renault Formation Aux Vases Sandstone
	Meramecian	Ste. Genevieve Formation Saint Louis Limestone Salem Formation Warsaw Formation
	Osagean	Keokuk Limestone Burlington Limestone
	Kinderhookian	Chouteau Group Hannibal Formation Louisiana Limestone
DEVONIAN	Upper	Saverton Shale Grassy Creek Shale
	Middle	Calloway Formation
	Lower	Bailey Formation
SILURIAN	Upper	Bainbridge Formation
	Lower	Sexton Creek Formation Edgewood Group
ORDOVICIAN	Cincinnatian	Maquoketa Shale
	Champlainian	Kimmswick Limestone Decorah Group Plattin Group Joachim Dolomite Saint Peter Sandstone Everton Formation
	Canadian	Cotter Dolomite Jefferson City Dolomite Roubidoux Dolomite Gasconade Dolomite
CAMBRIAN	Upper	Eminence Dolomite Potosi Dolomite Derby–Doe Run Dolomite Davis Formation Bonneterre Formation Lamotte Sandstone
PRECAMBRIAN		Granite