SALINA BASIN PROVINCE (054)
AND
SEDGWICK BASIN PROVINCE (059)

By Stephen E. Prensky

PROVINCE DESCRIPTION

The Salina Basin Province, covers an area of about 45,000 sq mi, consisting of the eastern half of Nebraska and the north-central portion of Kansas. The basin lies between the Cambridge Arch-Central Kansas Uplift Province (053) on the west, the Nemaha Uplift Province (055) to the east, the Sioux Arch Province (032) to the north, and a poorly defined structural saddle, separating the Salina Basin and the Sedgwick Basin Province (059), to the south. In addition to the structural boundaries, the basin is further defined by the zero isopach of Mississippian rocks.

Most of the Salina Basin is nonproductive. Maturity of potential source rocks (Simpson, Chattanooga) decreases in a northwest direction from the Forest City Basin. Although large areas of the Salina Basin remain untested, 600 wildcat wells have been drilled in the nonproductive portion, and despite numerous oil shows, there has been no commercial discovery in over 60 years of exploration. The lack of an organic-rich facies (due to thinning of the Simpson westward from the Forest City Basin towards the Central Kansas Uplift) and lack of sufficient burial depth or local heat source in most of the Salina Basin suggests little to no hydrocarbon potential. Only Saline and Dickinson Counties, Nebr., at the extreme southern end of the basin have significant production. Production in the southwest corner of Osborne County, (Natoma and Ruggels fields) is properly assigned to Cambridge Arch-Central Kansas Uplift Province (053), while production in Clay and Geary Counties is assigned to the Nemaha Uplift Province (055).

The Sedgwick Basin, a broad south-plunging shallow embayment of the Anadarko Basin covers an area of about 8,500 sq mi in south-central Kansas encompassing 9 counties. It is bounded by the Central Kansas Uplift to the west, the Nemaha Anticline to the east, and the Anadarko Basin to the south. The northern margin is the poorly defined structural saddle dividing it from the Salina Basin. A series of narrow anticlines that are subparallel to the Nemaha Anticline provide the primary traps.

Exploration in both provinces is in the mature stage, most of the larger accumulations were discovered in the 1930s and 1940s using magnetics and core-drilling techniques, and all plays are nearly exhausted. Stacking of reservoirs is common and structural relief appears to increase with depth. The southward plunge of the Sedgwick Basin results in increasing depth to productive horizons towards the south. However, because of the relatively thin stratigraphic section, about half of the many exploratory wells have tested the entire stratigraphic section to the Cambrian.

Plays in the Salina Basin Province are extensions of those in the adjacent Sedgwick Basin Province (059), to the south, and are combined in the following play descriptions. The geographic play boundaries for the three plays described below are identical. The plays, all conventional, are Lower Paleozoic Combination Traps Play (5901), Mississippian Combination Traps Play (5902), and Pennsylvanian Combination Traps Play (5903).

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CONVENTIONAL PLAYS

5901. LOWER PALEOZOIC COMBINATION TRAPS PLAY

Locally sourced (Simpson) oil and gas is trapped in Lower Paleozoic reservoirs that are (1) situated on low-relief (tens of feet) anticlinal closures and noses (for example, Boggs, Grant, Greenwich, Lindsborg, Olsson, and Salina fields), or (2) trapped by the stratigraphic pinchout underlying either the pre-Pennsylvanian or the pre-Chattanooga unconformities (for example, Gillian, Lerado, O.S.A., Rhodes, and Zenith-Peace Creek fields). Stratigraphic variations which provide porosity and permeability development are strongly controlled by paleostructure. Reservoirs consist of dolomites and sandstones of the Simpson Group (oil and gas), carbonates of the Ordovician Viola Limestone and Maquoketa Shale (oil), and carbonates of the Siluro-Devonian "Hunton Group" (oil). The Simpson sandstone reservoirs are best developed in paleolows while reservoir porosity in the Viola dolomite is best developed on paleohighs where karst developed. The Misener Sandstone (Upper Devonian-Lower Mississippian) is erratic in its development and where present, may be productive (for example, Valley Center and Voshell fields).

Exploration status and resource potential: The potential for undiscovered reserves depends on identification of new anticlinal structures. However, because of the long and extensive exploration history, this is unlikely and the potential for significant undiscovered resources is extremely low. The largest accumulations include Burrton, Greenwich, Hollow-Nikkel, Lindsborg, Ritz-Canton, Salina, Voshell, and Zenith-Peace Creek fields. Median depth is 3,917 ft. The last significant discovery was Scully field (1982) with a known oil volume of 0.95 MMBO and an ultimate size of 2.7 MMBO.

5902. MISSISSIPPIAN COMBINATION TRAPS PLAY

Migrated (Devonian Woodford) oil and gas is trapped in basal Mississippian sandstone ("Misener"), Mississippian carbonates (Warsaw and Salem Limestones) and chert ("chat"), on low-relief anticlinal structures. Stratigraphic control over porosity development includes updip facies changes (for example, pinchout at the basal Pennsylvanian unconformity) or in the case of the chert, by paleotopography and paleostructure that control changes in porous and nonporous chert. Most Mississippian production occurs just below the sub-Pennsylvanian unconformity. Exposure to prolonged subaerial erosion and to freshwater diagenesis resulted in the development of residual cherts ("Mississippi chat") and reworked cherts ("Pennsylvanian basal conglomerate") and in the development of secondary porosity in underlying limestones. Porosity development is related to subaerial erosion and weathering which produced fracturing of the chert and saccharoidal porosity as much as 30-50 feet below the "chat."

Exploration status and resource potential: The largest accumulations include (1) oil, Burrton, Lost Springs, Ritz-Canton, Spivey-Grabs-Basil, Welch-Bornholdt fields and (2) gas, Aetna Gas Area, Boggs,

Hardtner, Medicine-Lodge Boggs fields. Median depth of oil reservoirs is 3,656 ft and for gas reservoirs is 4,434 ft. The last significant discoveries were (1) oil, Meairs field (1983), 0.055 MMBO known, and Stead South field (1984), 1.05 MMBO known, and (2) gas, Garlisch SW (1976), 0.50 BCFG known.

As with Play 5901, few new anticlinal structures can be expected. Undiscovered reserves, generally small, will probably come from discovery of new stratigraphic accumulations where secondary porosity has developed in the chat. Little significant potential remains.

5903. PENNSYLVANIAN COMBINATION TRAPS PLAY

Locally sourced (Pennsylvanian) and migrated (Woodford?/Simpson?) oil and gas is trapped in Pennsylvanian sandstone and carbonate reservoirs, primarily within the Lansing-Kansas City Group, on anticlinal closures with stratigraphic controls (for example, Alameda field). Pure stratigraphic traps are uncommon (for example, Abbyville). Multiple pay zones are common. Primary reservoirs are Des Moinesian (Cherokee and Marmaton Group) sandstones and limestones; Missourian (Lansing and Kansas City Groups) limestones; Virgilian (Shawnee and Wabaunsee Groups) limestones and (Douglas) sandstones; Permian Wolfcampian (Admire Group) sandstone.

Stray sandstones and carbonates in the Wabaunsee, Shawnee, Douglas, Marmaton, and Cherokee Groups may be productive in the Sedgwick Basin, particularly where they pinchout updip (for example, Whelan field) or at abrupt facies changes occurring on anticlinal flanks (for example, Sun City and Rhodes fields). Stray Burgess (Cherokee) sandstones have produced trivial amounts of oil in the Salina Basin in Dickinson and Riley Counties, from now-abandoned Ash Grove, Bonaccord, and Yaege fields.

Exploration status and resource potential: Largest accumulations are (1) oil, Dubois, Rosedale, and Rainbow Bend fields, (2) gas, Harding, ILS, Sullivan East fields. Median depth of oil reservoirs is 3,172 ft and for gas reservoirs is 3,654 ft. Last significant discoveries are (1) gas, Walta North (1981), 12 BCFG known recoverable; (2) oil, Spivey-Grabs-Basil field (1964) 1.4 MMBO known.

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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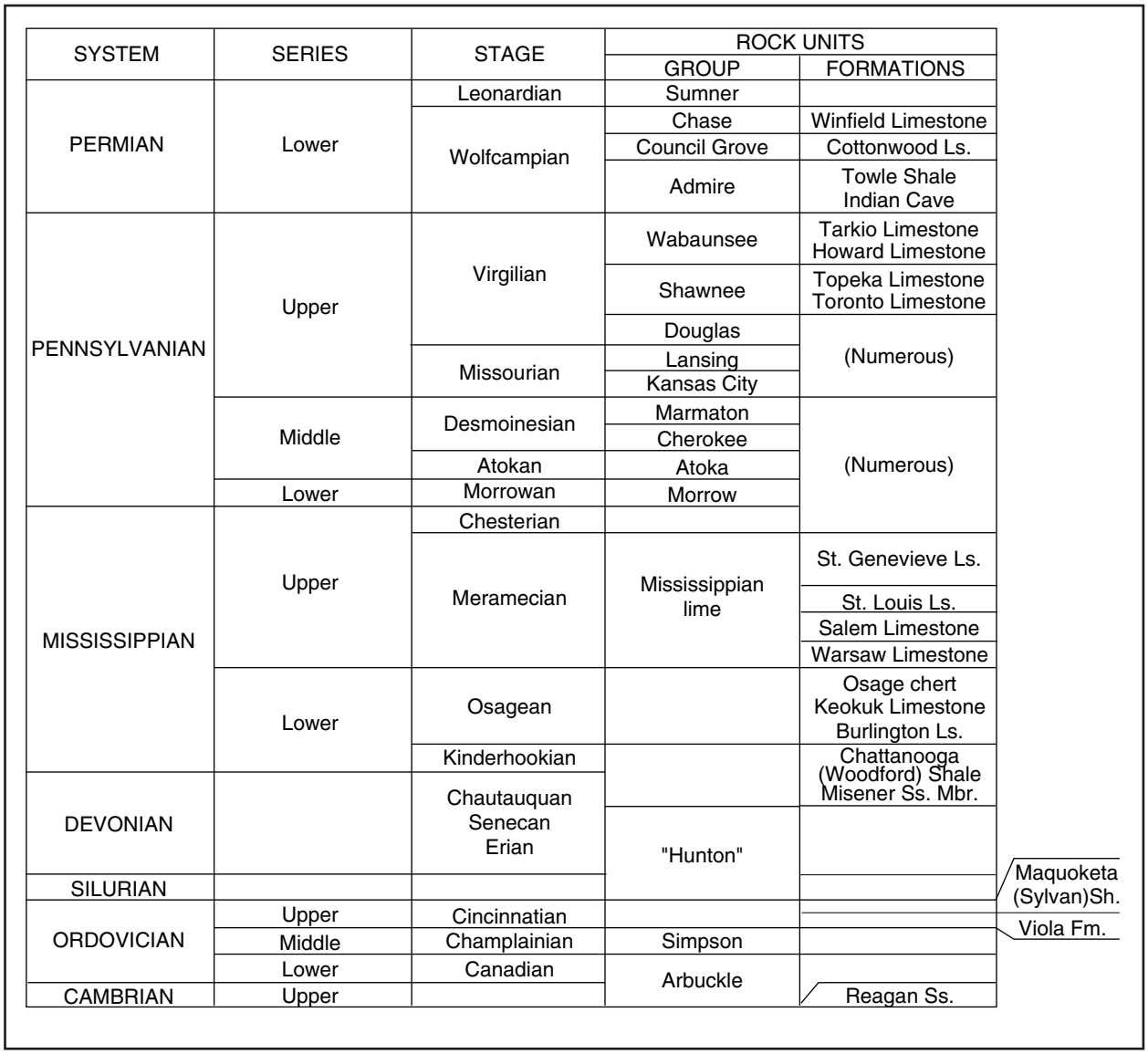
SYSTEM
SERIES
STAGE
ROCK UNITS
GROUP
FORMATIONS
PERMIAN
Lower
Leonardian
Sumner
Wolfcampian
Chase
Winfield Limestone
Council Grove
Cottonwood Ls.
Admire
Towle Shale
Indian Cave
PENNSYLVANIAN
Upper
Virgilian
Wabaunsee
Tarkio Limestone
Howard Limestone
Shawnee
Topeka Limestone
Toronto Limestone
Douglas
(Numerous)
Missourian
Lansing
Kansas City
Middle
Desmoinesian
Marmaton
Cherokee
Atokan
Atoka
Lower
Morrowan
Morrow
MISSISSIPPIAN
Upper
Chesterian
Meramecian
Mississippian lime
St. Genevieve Ls.
St. Louis Ls.
Salem Limestone
Warsaw Limestone
Lower
Osagean
Osage chert
Keokuk Limestone
Burlington Ls.
Kinderhookian
Chattanooga (Woodford) Shale
Misener Ss. Mbr.
DEVONIAN
Chautauquan
Senecan
Erian
"Hunton"
Maquoketa (Sylvan)Sh.
SILURIAN
Viola Fm.
ORDOVICIAN
Upper
Cincinnatian
Middle
Champlainian
Simpson
Lower
Canadian
Arbuckle
CAMBRIAN
Upper
Reagan Ss.