Stratigraphic Traps III, Treatise of Petroleum Geology, Atlas of Oil and Gas Fields

Edited by **Norman H. Foster and Edward Beaumont**, 1992, ISBN 0-089181-587-2; AAPG, Tulsa, 1992; 445 p., $24.00.

Review by **Christopher G. Kendall**

The purpose of this atlas is to help exploration and development geologists become more efficient by increasing their awareness of the ways in which oil and gas are trapped. It should also serve as a reference to the petroleum geology of the fields which are the focus of the book. This book consists of 18 papers, and each describes a series of fields in terms of their location; history of the discovery and post-discovery; the discovery method; the structure and tectonic history of the regional structure; local structure of the field; the stratigraphy of the field; a general description of the trap, the reservoirs and the sources; and the exploration concepts involved. The editors have selected papers on the basis of two main criteria - trap type and the geographic distribution.

Fields described in the book include the Arun Miocene reef from the backarc basin of North Sumatra with its shale seal discussed in a paper by Cliff Jordan and Mardhan Abdullah and the Aneth field is described by Peterson. This is a major Pennsylvanian carbonate algal mud mound reservoir in the Paradox foredeep basin, sealed by shales back from the edge of the basin. The Rojo Caballoos South Field of the Delaware Basin in Texas is a stratigraphic trap created in the central basin by gravity sliding masked by overlying limestones beneath a faulted anticline (Hanson and Guinan). Oil production is from the Delaware Mountain Group while gas production is from the Mississippian, the Pennsylvanian, the Devonian and the Ellenburger. The Chicontepec Field (by Busch) is in the Tampico-Misantla basin. It is a sandstone reservoir associated with submarine canyon turbidite fill in the Eocene. The field area lies updip from the offshore Golden Lane Fields. Its stratigraphy was determined by very careful analysis of the recycled sediment which contained faunas from the Upper Jurassic, Paleocene and Eocene. The key to the evaluation of this formation was the construction of a series of stratigraphic cross sections. The adjacent Upper Jurassic oil fields presumably leaked Jurassic oil into the lenticular sands of the Chicontepec. The trap is the multiple lenticular sandstones that pinch out updip and onlap the canyon walls. The Pacos slope field from the Permian Basin in New Mexico is presented in a paper by Bentz. Its reservoirs are in fluvial sandstone and the trap is a mixed wedge-out of fluvial clastics, coupled to fractures induced by the tectonic style of the region. The seal appears related to a meandering channel facies. The Glenn-Pool field of North Eastern Oklahoma platform (by Kuykendall and Matson) is trapped by an updip pinch out of thick Pennsylvanian aged multistoreyed sandstones. There is some discussion of the relationship of reservoir heterogeneity to the sandstone reservoirs. The MeneGrande field of Venezuela from the Maracaibo basin (by Luisa Alcala) is located in a porosity pinchout in Miocene channel and crevasse splay sandstones and anticlinal traps in the Eocene sediments. The Elk-Poca field from the Appalachian basin of West Virginia (by Pachen, Bruner and Heald) is trapped by an updip sandstone pinchout, though the southern end of the field is broadened by the presence of an anticline. The reservoir is in Devonian sands. The Tertiary Red Wash field from the Unitah basin, Utah (by Kelley and Castle) is a multiple pinchout of sandstones in a broad anticlinal nose. Masterson and Eggertt discuss the Cretaceous Kuparuck field from north slope of Alaska. This field is trapped in an anticline cut by two unconformable truncations, one which onlaps and another which pinches-out. The reservoir of the Cretaceous Dauletabad-Donmez field from the Amul-Dar'ya basin of Turkmenstan/Uzbekistan (by Clark and Kleshchev) is a fluvial sandstone. The trap is a combination of faults, pinchout and hydrodynamic effects. The Cretaceous Cacao field of Brazil

from the Espirito Santo basin of southeastern Brazil (by Lima and Aurich) is in a paleogeomorphic erosional high adjacent to a submarine canyon with the trap in a coastal alluvial fan which produces oil. The Paleocene Quiriquire field of Venezuela in the Maturin basin (by Ames, Salvador and Leon) is a diagenetic trap with an updip closure resulting from asphalt plugging of an alluvial fan with its reservoir of sandstone and conglomerate. The Burbank oil field of the Anadarko Basin of Oklahoma (by Johnson and Masera) is trapped in an updip pinchout of multistoried storied sands deposited in Pennsylvanian sandstone channels eroded into the underlying shales. The Lima-Indiana trend of the Cincinnati and Findlay arches of Ohio and Indiana (by Keith and Wickstron) contains fields with a complex combination of updip porosity pinchout and regional anticline faulting of fractured reservoirs in Ordovician dolomites which contain a mixture of oil and gas. The Mississippian Elkhorn Ranch field in dolomites of the Williston basin (by Dennis) has its reservoir in tidal flat to shallow marine carbonate sediments at the top of an anticlinal nose with a combination of hydrodynamics and the structural position trapping the oil. The Mississippian Stanley field of the Williston basin of North Dakota (by Beach and Giffin) is trapped by the northdip pinchout caused by a facies change from porous to dense tidal-subtidal grainstones in tidal-subtidal limestone. The original prospect map developed at Thomson Petroleum suggested that porous carbonate existed to the west whereas nonporous anhydrite and carbonate developed to the east in the Mission canyon. The Richardson/Taylor fields of the Williston basin of North Dakota (by Chimney, Tresca and Wolosin) are trapped in sandstones and draped across an anticline on an upthrown block. There is lateral closure by structure and porosity changes in sandstone. The trap is a combination of a faulted anticline which cuts across several reservoirs of sandstone.

As is usual with treatise produced by the AAPG, this is a really excellent book with numerous cross-sections, well logs, seismic profiles, gas chromatographs, isopach maps, photomicrographs, etc. This book should be in your libraries and perhaps on the shelves of those who are interested in the fields in question. Definitely this is a good reference text and should be in most libraries for this purpose. Once all these treatise are generally available, earth scientists will have the capability to easily study a large variety of traps. This is a nice series of AAPG books and they should be congratulated once again on doing a really fine job.