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ABSTRACTS

DIAGENESIS AND POROSITY IN CARBONATE ROCKS

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Effective porosity in carbonate rocks in Western Canada reservoirs is, to a large degree, dependent upon favourable post-depositional, particularly diagenetic, processes.

To assist in the search for carbonate rock reservoirs, and in the understanding of post-depositional processes, the geologist has available a wealth of information from recent carbonate sediment studies in such areas as Florida Bay, the Bahamas and the Persian Gulf. This information can be used to interpret the ancient rocks in terms of environments, deposition of the sediments, and the post-depositional changes that occurred during the lithification.

Although each depositional environment may host a relatively few sediment types, post-depositional processes can produce a wide variety of textures in the resultant rock. As carbonate sediments are commonly composed of more than one constituent, and the susceptibility of each constituent to the diagenetic process may vary, the diagenetic history of each sediment type may be exceedingly complex. Often, however, only one or two processes are involved, and the interpretation is relatively simple.

A variety of ancient depositional environments and sediment types can be interpreted from a study of cores of the Devonian Swan Hills, Rainbow, and Zama rock units. Diagenesis of some of these sediments has resulted in highly porous carbonate rocks that form the productive reservoirs in Northern Alberta. Although a number of different processes were involved, selective dolomitization and subsequent selective leaching were the dominant processes. To illustrate the development of the reservoir, and the processes involved, selected samples from cores of these three members are displayed and illustrated.

As the development of a porous reservoir from a sedimentary facies is so dependent upon diagenesis, and the geometry of the reservoir is often determined by the pattern of diagenesis, an understanding of these processes seems prerequisite to location and exploitation of this type of reservoir.

FEATURES OF THE CARBONATE FRONT, SULPHUR POINT FORMATION, DISTRICT OF COLUMBIA

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The Sulphur Point Formation is a blanket or platform of carbonate that overlies the Pine Point and Muskeg Formations in southern District of Mackenzie, northern Alberta and northeastern British Columbia. On the flanks of the Tathlina uplift in southern District of Mackenzie it passes laterally to shales of the Horn River Formation. It is overlain by and in places interbedded with green claystones of the Watt Mountain Formation in this area.

Cores have been selected to illustrate various sedimentary features at the carbonate front and the relationships with the underlying and overlying formations.

Displays include:

Black mudstone of Pine Point Formation with abundant coral and stromatoporoid pebbles.

Encrustation of coral by stromatoporoid in black mudstone facies.

Stromatoporoid growth on substrate of black mudstone containing pebbles of lime mudstone, stromatoporoids and crinoid fragments.

Lamellar and branching stromatoporoid growth trapping coarse lime grainstone.

Inter-organic vugular porosity.

Geopetal inclusions in stromatoporoid facies.

Breccias: fore-reef?

Recrystallization of stromatoporoid fragments to micro-grained limestone.

Breccias — Sulphur Point stromatoporoid facies and Watt Mountain green claystone facies.

THE HALFWAY RESERVOIR WESTERN PORTION, PEEJAY FIELD, BRITISH COLUMBIA

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The Peejay oil field is the largest of several, highly productive oil pools in northeastern British Columbia which produce from the Halfway Formation, a basal unit of the Triassic Schooler Creek Group. It is situated within the area of discontinuous Halfway deposition and distribution which trends northwest to southeast for 60 miles, near the eastern limits of the Schooler Creek.

This discussion is concerned with the Halfway Reservoir in only the western portion of the Peejay Field. This area covers an estimated 11,000 acres and has recoverable reserves, both primary and secondary, of about 50 million barrels, almost two-thirds of the Peejay Field total. The average net pay is 12.8 feet and the average porosity 15.6 per cent.

The trap is stratigraphic although structure is important. Oil production is limited laterally by discontinuity of deposition or deterioration of porosity and permeability. Water is present downdrip and a relatively small gas cap is present updip.

The Halfway lies unconformably on Doig silt, shale and sand topography and is overlain conformably by impermeable Charlie Lake siltstone, claystone and anhydrite. It consists of coquina and/or sandstone. The coquina is made up of leached or replaced pelecypod shells, usually dolomitized, with a matrix of up to 50 per cent poorly sorted sand grains. The sandstone is usually fine grained, quartzose, subangular to subrounded, poorly cemented and dlomitic. High angle bedding or crossbedding is apparent in only a few wells. Porosity in the coquina is usually over 20 per cent, in the sandstone 12 to 16 per cent, and in the cross-bedded sandstone over 20 per cent.

Proper pressure maintenance by water injection is difficult because of variable porosity and permeability, reservoir stratification and rapid lateral facies changes.