The minerals used in these studies were montomorillonite, illite, kaolinite and quartz. The specific organic compounds, all reported to exist in sea water or natural deposits, include carbohydrates, monoamino-di carboxylic acids and monoamino-monocarboxylic acids. The effects of organic and mineral concentration and species, chlornity, temperature, settling rate and pH were all considered.

The results of this preliminary experimental program demonstrate that minerals settling through a water column remove dissolved organic compounds from solution and incorporate them into the resulting sediment deposits. This association is not a random system, but follows a definite differential selection process primarily dependent upon mineral types, i. e. "active surface area," and molecular weight, structure and functional groups of the organic compound. Chlorinity, temperature, settling rates, and pH have secondary effects upon the system. The results cannot be explained on the basis of a classical adsorption phenomona, but rather indicate the development of a partially non reversable complex clay organic gel.

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"The Geology of the Amazon Basin of Brazil and Case History of Exploration, 1954-60"

Abstract

Systematic exploration for oil in the Amazon basin of Brazil was begun in a large way with the formation of Petrobras in 1953 and which got underway in 1954. This has been actively pursued ever since. Prior to this time little was known of the Amazon geology except for the paleontological studies of the Paleozoic areas in the north and south rims of the basin. These were started in the late half of the 1800's. A few shallow wells had been drilled on the Tapajos River on the south side of the basin and on the Monte Alegro Dome on the north side.

Under the direction of the Conselho Nacional de Petroleo, a government entity, some exploration was done in the late forties and early fifties prior to the formation of Petrobras. Three wells were drilled in the Amazon Delta and two were drilling in the Amazon proper when Petrobras took over in 1954.

The Amazon basin is an east-west trending Paleozoic basin with Cambrian, Silurian, Devonian and Pennsylvanian rocks. No Ordovician, Mississippian, Permian, Triassic or Jurassic has so far been recognized. Continental Cretaceous and Tertiary cover 95 per cent of the basin area and all except a narrow outcrop belt of Paleozoic on the north and south rims of the basin.

This huge basin appears to be structurally featureless. North south trending positive areas, which are known as the Gurupa, Parintis Puris and Iquitos Arches interrupt the east-west depression at four to five hundred mile intervals. Except for the Monte Alegre Dome, which was caused by igneous intrusion, no local structure has been found by any of the exploration methods used including drilling. The geological history is one of a gentle breathing during Paleozoic time involving sediments that were deposited between two great crystalline shields known as the Guiana and Brazillian shields.

Over $150,000,000.00 have been spent on Amazon exploration since 1954 on surface geology, gravimeter work, airborne magnetometer surveys, seismograph surveys and drilling. Over 100 holes ranging in depth from 1500 to 4000 meters were discovered. All geophysical surveys are made impotent by the injection of igneous rocks and lava flows into the Paleozoic section. These flows are thought to be early Mesozoic in age.

Although the Paleozoic section is more than 15,000 feet thick in the center of the basin, the geological setup of source rocks, structure and reservoir rocks does not exist in the right combination of geological conditions and it is doubtful that the Amazon will ever be a large producer of oil.

The Petrobras law was passed in Brazil in 1953 and gave the company an exploration monopoly. Prior to this law there was no oil law in Brazil.

Under the banner of "The Oil is Ours" Brazil passed this law and began to systematically explore the country. The writer was hired to set up an exploration department to do this job. Before this law was passed the Conselho Nacional de Petroleo was carrying on this work. The Consulting firm of De Golyer and Macnaughton, was used as exploration advisors, Drilling and Exploration to drill wells and develop the fields, United Geophysical, GSI and Askania were used for geophysical work.

The law was designed to create an oil company which would operate as a private enterprise and pay its own way. It was also supposed to be free of all political pressure. By the very nature of the setup whereby the president of the company was appointed by the president of the Republic, politics was bound to become important. During my six years and three months in Brazil the company had four presidents and a complete change of board members several times. When the writer left Brazil the board consisted of a president who was trained in the army intelligence and is a Brigadier General, an economist without oil or other business experience, a financial man who had never been in business and who was head of accounting prior to his appointment to the board after a resignation, and a navy commander who had been running a boat on the artificial lake in Brazillia. It was composed of men who had no oil or business experience and was entirely a political board.

This company which now has a production of around 100,000 barrels per day in a small area has a payroll of permanent employees of more than 20,000 people not counting the contracted personnel of the contractors. These people work in exploration, refining and the fleet. They are not in marketing at this time.

The first two presidents of the company kept it out of politics. The third injected the company into politics in a big way and played on the strong nationalistic feelings of the nation. It is possible that this might be corrected under Brazils economy minded new president, Janio Quadros, and the president of the company, Geniosa Barroso, who was manager in the Bahia fields. He is the only president who ever had oil experience. All the other presidents were military men.

January 8, 1962

Bill Walton, Pan American Petroleum Co., Houston, Texas

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