

## History of Hydrocarbon Exploration Activity in Perú

Estuardo Alvarez Calderon discussed the history and potential of hydrocarbon exploration in Perú at the Friday, November 8th meeting of DIPS (Denver International Petroleum Society) at the Wynkoop Brewing Company. Mr. Calderon is a Peruvian geologist who holds a degree from the University of Texas at Austin. He has 35 years experience and currently is the VP of Exploration and Production for BPZ Energy ([www.bpzenergy.com](http://www.bpzenergy.com)). BPZ Energy is an independent oil and gas exploration and production company based in Houston, with license contracts covering approximately 1.9 million net acres in four properties in northwest Perú. The presentation included a brief overview of the geology of the country, followed by an overview of the sedimentary basins.

Perú has an area of 1,285,216 km<sup>2</sup> with approximately 2,500 kilometers of coastline along the Pacific Ocean in northwestern South America. The country has four major regions: the coastal zone, the foothills, the Andean highlands, and the jungle (Amazon). Each of these areas vary widely in biodiversity, physiography, and climate conditions.

Twenty sedimentary basins have been identified in the country, of which 12 are coastal/offshore basins, five are intermontane basins, and three are foreland basins, the last belonging to the system of the sub Andean basins that extend the length of South America between the Andes Mountains and the Guyana and Brazilian preCambrian shields. Present day production averages 60,000 bopd, 102,000 bcpd and 1,240,000 Mcfd.

Peru's petroleum history began in the northwestern Pacific coastal area where several oil seeps were known from pre-Columbian times. Native people used the heavy oil/tar to waterproof their baked clay containers, for medicinal purposes, and in lighting during religious ceremonies. Later the Spaniards used it for caulking their ships during colonial times. The first well was drilled in this area in 1863, discovering the Zorritos field. Today after 150 years, the Talara and Tumbes Basins are producing 36,000 bopd and 25 Mmcf/d.

The petroleum development in northwestern Peru was followed by the discovery of the Pirin Field in the Titicaca Basin in 1875 (approximately 4,000 meters above sea level). This discovery was also related to oil seeps, but the find was small and the field only produced for a few years.

Due to its remoteness and difficult access exploration in the Amazon jungle began later than in other parts of the country. Some minor discoveries were made between the 1930s and 1950s, but it was only in the early 1970s when an aggressive campaign of exploration was carried out in the Amazon jungle that major initial commercial discoveries were made by PetroPeru (NOC) and by Occidental Petroleum. To date an estimated 2-2.5 MMBO have been discovered in the jungle with an API ranging from 10- 40 degrees. In addition the Camisea gas and condensate complex was discovered in the early 1980s by Shell in the Ucayali Basin. This complex is believed to contain between 12-15 TCF of gas and 600-800 MMBC. Cumulative production of the Marañon Basin is on the order of

1.0 MMBO with a present day production of 25,000 bopd. Commercial production in Camisea began only a few years ago and current production is 102,000 bcpd and 1,200,000 Mcfd.

*A license block map courtesy of PetroPeru is available at the end of this document.*

Peru is a country with a population of 30 million, of whom 10 million live in the capital city of Lima. People along the coastal plains speak Spanish, while the indigenous Indians of the interior speak Quechua, the language of the Incas. Peru gained its independence from Spain in 1821. The highest peak of the country is Nevado Huascarán at 22,205 ft.

Peru has proven reserves of 600 million barrels of oil and 12.5 TCF of gas. The country contains one billion sq. km. of sedimentary basins although it is relatively lightly explored, with an average of about five exploration wells per year. At its peak in the 1970s, it produced 195 million barrels per year. In 1863 the first oil well in Latin America was drilled in Peru and in 1870 the first refinery was built. It was the continent's leading producer in the early 1920's at 7,700 bpd, but was overtaken by Venezuela in 1928. Peru is currently a net importer of oil. The national oil company, PetroPeru, was founded in 1968. Amazon reserves were discovered in 1972 by Oxidental and PetroPeru. In 1985 the Camisea Gas Field was found by Shell, and LNG exports started in 2010. Exploration in the Amazon Basin is extremely environmentally sensitive and well pads are limited in areal extent to 2 hectares.

The source rock ages range from Cretaceous in the north to Paleozoic in the southern part of the country. In the prolific Talara Basin off the northwest coast of Peru, problems with seismic data acquisition led the early explorers to use the tactic of drilling on gravity highs.

In answer to a question about concession terms in Peru, Mr. Calderon said that companies were normally granted 7-year concessions. In the first period of 1-3 years, companies were allowed to perform just information gathering, but after this period, seismic surveys and drilling were expected. Interested parties could negotiate directly with the government on concession terms.

