

Tabasco mesozoic area, the Cerro Azul district and the Northeast border district.

Also, 81 development wells were drilled, of which six were gas producers and 51 oil producers, plus six injection wells for secondary recuperation and waste disposal. Therefore, 77% of these wells were successful and confirmed PEMEX's knowledge of the explored areas. The average depth of these wells was 3,498 meters. Drilling is generally between the 1,800 and 6,500 meter range but PEMEX has reported that wildcat drilling is having to go deeper. The Menonita No. 1 well in the State of Chihuahua went down to 7,050 meters, the deepest in Latin-America and only one of two wells deeper than the 7,000 meter range.

### **5.1.2 Primary Production**

Up to 1976, the primary source of hydrocarbon reserves was beneath the Poza Rica district in Central Mexico. However, in that year, significant amounts of hydrocarbons were discovered in the southeastern part of Mexico, both in the Chiapas-Tabasco regions and offshore, in the bay of Campeche. The Chiapas-Tabasco area covers close to 2,000 square miles and is the primary source of Mexico's light crude known as Olmeca and Isthmus. Productive reservoirs are deep, roughly 4,000 meters and have thick (100-500m) oil-bearing strata. These exceptionally deep columns account for the high per well production (6,700-16,000 bd). The Campeche marine zone, also called Zonda de Campeche, consists of 12 separate fields, and covers an area of 3,000 square miles. These fields have been discovered at more conventional depths (1,100-4,000m) and productive well columns are estimated at up to 8,400 feet. This coupled with high buoyancy levels make productivity of these wells among the highest in the world (28,000-40,000 bd). The remaining hydrocarbon producing area is called Chicontepec, located between the states of Puebla and Veracruz, covering a 4,300 square mile area. Only small amounts are produced in this area and wells have rapid rates of decline.

Total proven reserves at the end of 1989 were calculated at 66,450 million barrels, 1.7%, lower than those reported in 1988, despite the discovery of 12 new oil fields. Of these reserves, 46.2% are in the Campeche marine zone, followed by 26.4% in Chicontepec and 19.7% in the Southeast zone.

Between 1978 and 1989 crude production has increased at an average annual rate of 7%. During 1989, PEMEX extracted a total of 917.3 million barrels (mb) of crude oil, that is 2.51 million barrels a day (mbd), an increase of 0.3% over 2.50 mbd in 1988, distributed between light Olmeca oil (14.3%), light Isthmus (22.5%) and heavy Maya crude oil (63.2%). Geographically, the production of crude was distributed as follows: 1.74 mbd (69.3%) from the Marine Zone of Campeche, 0.61 mbd (24.2%) from the Southeastern Chiapas-Tabasco fields, the remaining 6.5% was produced in the fields located in the North, Center and South zones. Total crude production was distributed as follows: 468.2 mb (50.9%) were exported, 368.5 mb (40.0%) sent to refining, 80.6 mb (8.8%) to petrochemical production and the remainder either lost through accidents and evaporation or added to inventories.

PEMEX also operates eleven water injection systems to obtain an additional oil recovery. In 1989, an average of 555,640 bd of water were injected for an oil recovery of 211,170 bd, of which 52.5% in the Southeast zone.