

Petroleum Developments in South America, Central America, and Caribbean Area in 1973¹

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Abstract This review presents information on petroleum developments in 30 countries and areas. Eleven countries had crude production, totaling 1,704,188,000 bbl (4,669,000 b/d). This was an increase of 6.3% (291,000 b/d) over 1972, more than offsetting the sharp decline in 1972, and bringing production back to a level exceeded only in 1970 (4,760,000 b/d). Venezuela's historically dominant production (72% of the total in 1973) was up by 146,000 b/d, or 4.5%; output of the other producing countries, collectively, was also higher, by 145,000 b/d (about 12.5%). Ecuador was the main contributor to the net increase for the latter countries; it became the third-ranking producer in the review area (at 209,000 b/d), as development of the initial 3 Oriente fields advanced. Trinidad production was also up significantly, with steadily rising output from the new fields off the east coast that neared 70,000 b/d by year-end. Production increased substantially in Peru and Bolivia, and slightly in Brazil. It was down moderately in Argentina, Chile, and Colombia.

Barbados made a tenuous entry into the ranks of producing countries, the 11th in the review area, with small production from recompleted discovery wells of prior years.

Industry drilling again decreased in 1973, to 1,638 wells, from 1,703 in the previous year. Both development (1,254) and exploration (384) wells were down, each by about 4%. Development effort was down markedly in most of the more mature producing countries; only Venezuela showed a major increase. Argentina shifted notably to exploratory drilling, to a near-record of 139 for the country, but Chile, Ecuador, and Trinidad had decidedly fewer exploration wells. In all, 13 countries reported exploration drilling, including 3 which have no commercial production.

Overall geologic and geophysical field-party activity was about at the 1972 level. Argentina and Brazil maintained their historical high efforts. For the second successive year Peru had a major increase in seismograph work, to about 20 crew-years, attributable almost entirely to the expanding play in the eastern part of the country. Seismic surveys were down considerably in Colombia, and sharply in Ecuador. Party-months of work by principal methods was: surface geology, 192 months (190 in 1972); seismograph, 778 (764); and gravity, 38 (48).

Important oil discoveries are reported at several wildcats in the north part of eastern Peru, on private-company contract acreage adjoining Ecuador. Another promising new-frontier discovery appears to be gas finds on, and offshore of, the Guajira Peninsula, northeastern Colombia.

Brazil increased its already major wildcat effort ranging over much of the extensive continental shelf, and one potentially significant new-discovery area is reported, in the Patiguá basin off the northeast coast. Forty-three NFW wells were completed in 1973, and approximately 10 rigs were reportedly active at year-end. No major new-field discoveries are indicated for the eastern Ecuador and eastern offshore Trinidad plays; emphasis shifted from wildcat to evaluation and development drilling in discovery areas of prior years.

Results of further exploration drilling in Belize (3 wells) and in the Honduras offshore (3) continued disappointing, and most concessionaires withdrew from the latter area.

The more important acreage developments for the period were: (1) 8 additional contracts, approximately 8,000,000

ha., awarded to private companies, in eastern Peru; (2) first contracts (7 blocks, 7,000,000 ha.) to international majors, under Bolivia's 1972 Hydrocarbons Law; and (3) selected eastern Ecuador and Trinidad offshore acreage opened to competitive bidding, near year-end.

INTRODUCTION (Tables 1-4)

Oil output in 1973 from the 10 established producing countries in the review area was 1,704,126,000 bbl, an increase of 6.3% over the previous year (Table 1). The record sharp decline in 1972 and a smaller one in 1971 thus were reversed, and production returned to a level surpassed only in the record year 1970 (1,738,000,000 bbl). Venezuela, by far the dominant producer (72% of the total in 1973), contributed about half (146,000 b/d) of the increased production. Ecuador production was up sharply for the second year running, by 130,000 b/d, with the Trans-Ecuadorian pipeline in the first full year of operation, and development of the initial 3 Oriente fields (45 producers completed in 1973) well along by year-end. At an average production of 209,000 b/d, Ecuador became the third-ranking producer in Latin America (Table 2). Trinidad production also increased significantly, as a result almost entirely of further development (20 wells) of the eastern offshore Teak and Samaan fields, where output went from about 40,000 to 70,000 b/d during the year.

Bolivia's crude output was up for the third consecutive year, by 8.1% to 47,000 b/d, a full recovery from the disrupted operations of 3 years ago. Especially important for this gas-prone country, gas production again increased, about 25%. The added volumes reflect mostly increased deliveries via the export-gas pipeline to neighboring Argentina, in its first full year of operation; these exports averaged 152 MMCFD, or 36% of Bolivia production. In Peru, crude production was also up, by 9.3%, as a result of the continuing rise in production from the near offshore of the northwestern part of the country adjacent to the historic onshore fields. Brazil production was up slightly.

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Other countries had declines, Argentina (3.1%), Chile (8.7%), and Colombia (5.9%).

Brazil's first truly offshore production went on-stream in the second quarter of 1973, at an indicated daily rate on the order of 5,000 b/d. This is the Guaricema field, in the near offshore from the city of Aracaju, capital of Sergipe State. Extension and evaluation drilling is going forward for the immediate Guaricema area and for other potentially commercial discoveries of prior years in the same Sergipe offshore setting. Petrobras places crude reserves for these areas at about 30 MM bbl.

The Island of Barbados, in the easternmost Caribbean, becomes technically the 11th producing country in the review area. Several modest discovery wells of prior years were recompleted and placed on production, to the amount of 62,000 bbl (170 b/d) delivered to the local refinery. This is the first significant quantity of commercialized crude for the island. New development drilling was under way at year-end.

The total of wells drilled was 1,638, down about 4% from 1972, in both development and exploration categories (Table 3). Development drilling dropped off considerably in most of the more mature producing countries. Brazil effort was down by about a half, Colombia and Peru by approximately one third, and Argentina by 10% (55 wells). Only Venezuela showed a major increase (57 wells). Ecuador and Trinidad were understandably up, with vigorous development of their new fields.

Oil exploration or related activity is reported from 30 countries or areas in Latin America and the Caribbean. Nineteen countries had field-party effort (Table 4). The overall level was very nearly the same as in 1972. The state oil companies in Argentina and Brazil continued their historically large programs. Brazil's effort included 11,000 mi of marine-seismograph work, and 13,000 mi of experimental air-magnetometer profiles over the Parana basin. Peru stood out for its seismic activity, up markedly for the second year running, to about 20 crew-years. This work was mainly on the extensive contract acreage in the eastern part of the country, and probably reached its peak in 1973. Seismic effort in Colombia decreased considerably from the previous year, and declined sharply in Ecuador.

In exploration drilling, the phenomenon of the review area continues to be Brazil's very ambitious and still expanding program for the continental shelf. Forty-three offshore wildcats were completed during the year (15 more than in 1972), well over half of the total for the country. Brazil reports an offshore oil discovery in the Potiguar basin on

the northeastern coast of the country, about 125 mi west of the city of Natal. Despite widespread drilling along much of Brazil's extensive continental shelf, successes apparently have been limited largely to the Alagoas/Sergipe offshore. The Potiguar discovery, far in the north and in a probably different geologic setting, thus takes on added significance. Approximately 10 offshore rigs were active at year-end, and at least 2 additional units reportedly are scheduled for 1974. Beginning in 1968 and through 1973, offshore exploratory drilling stands at 127 wildcats and 37 extension wells.

Exploratory drilling results for the year point to several new-frontier areas of potentially major importance. In Peru, 4 consecutive wildcat successes, added to a first one in 1972, are reported for the north-central part, on private-company contract acreage adjoining Ecuador. Reserve estimates for these discoveries and for earlier ones in the south by the state oil company *Petroleos del Peru* are estimated by some sources to be several hundred million bbl. On this basis, *Petroperu* is proceeding with plans for a Trans-Andean pipeline. Another promising discovery appears to be the well-validated gas finds on, and offshore of, the Guajira Peninsula, northeastern Colombia.

Two potentially significant developments in Venezuela, suggested in last year's review, now can be better evaluated from the results of additional drilling reported for 1973. A first discovery in the South Lake contract acreage has been announced, after generally discouraging results from several deep tests by 3 private-company operators. In the Bay of La Vela area, off the east coast of Paraguana Peninsula, the national oil company CVP now reportedly has completed 9 wells, 3 of them apparently potential producers. CVP geologists foresee eventual reserves of 400-500 million bbl.

The results of further wildcat drilling in Belize (3 wells) and Honduras (also 3 wells) were not very encouraging. The current play in onland northern Belize spans 2 years and 8 tests, some with minor shows but all dry and abandoned. The 1971-1973 Honduras drilling was 7 wells, all offshore and reported dry. Much of the once extensive acreage holdings off Honduras were released during the year.

The major acreage activity of the year was in the Trans-Andean basins. In eastern Peru, 8 additional blocks were contracted which, with 8 previously awarded, total approximately 16,000,000 ha. now operated by international companies or combines. *Petroperu*, the state oil company, also formally acquired a large amount of additional acreage, and now holds roughly 10,000,000 ha. Bolivia

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the Coban Formation (Cretaceous).

Shenandoah carried out 3 party-months of surface geologic work and a 4-month gravity survey. Photogeologic studies also were made; data from a prior seismograph survey were reprocessed, without much success.

Westcoast Petroleum *et al.* did not have any field activity in 1973. Compania Centram's acreage holdings were modified during the year, with relinquishment of an inland block and an areal extension in the offshore, for a small net decrease from the previous year.

At year-end, Shenandoah was preparing location for a second deep test, Rubelsanto-1, about 30 km almost due east of Nueve Cerros-1. Westcoast Petroleum expected to drill 1 or 2 wells in the offshore part of the Centram-title acreage during 1974. This would be the first drilling ever on Guatemala's relatively small east-coast shelf area.

For more than 2 years Guatemala has been working toward a model service contract and establishment of a state oil company, to be elements in any major future acreage awards. These matters were still in process at this writing. In anticipation of the service-contract approach, some 27 companies and individuals reportedly had filed by year-end on 34 tracts, often overlapping, covering most of the Peten region and parts of the Pacific and Caribbean coastal areas. The applicants were mostly independents but included a few international majors.

According to local sources, the Government approved in late 1973 a long pending contract for development of lateritic nickel deposits in the Lake Izabal area, east-central Guatemala. The operator is Exmibal (Exploraciones y Explotaciones Mineras Izabal, S.A.), a joint International Nickel-Hanna Mining company. Production is to begin by mid-1978 and the projected investment is reportedly US\$120 million.

GUYANA (Fig. 13; Table 52)

By M. A. LEE, Commissioner of Geological Surveys & Mines
Georgetown

After a lull during the previous year, 1973 saw a renewal of activity both offshore and on the continental area of Guyana. In the offshore area, Deminex started with a 2-week seismic survey in March over its concession area, and followed this with a more detailed seismic survey lasting one week in October. From March 13-22 Oxoco Guyana Ltd. carried out its seismic work on its concession, after which the survey ship proceeded to the Comoro-Tricentrol concession where another survey was completed in 9 days.

In the south-central area, shallow-water seismic traverses were run on two of the rivers crossing the

Takutu graben. The third river traverse was abandoned because of low water. The Takutu investigation was initiated by the Guyana Geological Survey using a CIDA loan.

HAITI (Fig. 10)

By Petroconsultants S.A., Geneva, Switzerland

The joint venture of Wendell Phillips Oil Co. (90%) and Bonanza International Petroleum (10%) is the only holder of petroleum rights in the Republic of Haiti. The surface concession (86,350 sq km) covers practically the entire on land sedimentary area, as well as the entire continental shelf plus sizeable deeper water areas. No petroleum exploration activities were reported from Haiti during 1973. The last significant event was the drilling of the well Cul-de-Sac-1 in 1959 which was completed as a dry hole at TD 3,772 ft by Commonwealth Oil.

HONDURAS (Fig. 14; Table 53)

By JOE A. CHAMPION, International Ventures, Shell Oil Co.,
Houston, Texas

Exploration activity in offshore Honduras, which had picked up in 1972, came to a standstill by the end of the first quarter of 1973. Compania Petrolera Pecten de Honduras (Shell-USA) abandoned Caribe-2 at 11,315 ft and Caribe-3 at 9,225 ft, both in Lower Cretaceous rocks at total depth. There were no significant shows in either test. Union Oil Co. of Honduras abandoned Main Cape-1 at 11,400 ft, possibly in Paleocene sedimentary rocks, and reportedly tested a small amount of oil from Eocene carbonate rocks at about 9,000 ft.

No offshore geophysical activity was reported in 1973.

Several large concessions were surrendered during the year by Mobil, Signal/Occidental, and Chevron/Shell (USA). Figure 14, giving the concession status as of year-end 1973, shows LL&E, Union, Signal/Occidental, and Shell (SIPM) as remaining holders of concessions in offshore Honduras. The exact status of the onshore concession shown as belonging to Petroleos Hondurenos S.A. is not known. Another onshore concession in eastern Honduras once held by Chevron, apparently was surrendered before 1973.

JAMAICA (Fig. 15)

By ANTHONY R. D. PORTER, Mines and Geology Division,
Kingston, Jamaica

Land Holdings

Weaver International Jamaica Corp. and Associated Companies, holders of 34 Oil Prospecting Licenses over an area of approximately 6,363.046 sq mi of mainland and adjacent submarine areas, relinquished 2,121.186 sq mi during the year. The

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purchased from Compania Ganso Azul the rights of the Aguas Calientes concession (Oriente Zone). This leaves only one independent producer in the country, Compania El Oriente. Belco, previously an independent, changed its status by becoming a Petroperu contractor after combining its offshore concessions with additional offshore acreage in a block of 400,000 ha.

During 1973 Petroperu (the government oil agency) signed 8 contracts of one million ha. each in the Oriente zone. These were with Oceanic, Amerada Hess, Deminex, Signal, Hispanoil, Total, Cities Service, and Andes Petroleum (Fig. 21).

Surface Exploration

A total of 258.7 party-months of surface geology, seismograph, gravimetry, and magnetometer work was carried out in 1973. This represents an increase of 60.5% over the preceding year.

Drilling

In 1973, 38 exploratory wells were drilled (7 were classified as suspended) and 48% of those completed were successful. Sixteen of these tests were in the Oriente zone, 5 more than in the previous year. Eighty development wells (10% fewer than in 1972) were drilled (22 suspended at year-end) and 63.75% were successful. Success ratios for both exploratory and development wells were lower than in 1972.

Total development footage drilled in 1973 was 412,914, all of it in the Coastal zone, northwestern Peru. As last year, somewhat over half of this drilling (223,256 ft) was in the Lima concession, and most of the remainder in the near-offshore Pena Negra area (89,263 ft) and in La Brea-Parinas (86, 131 ft). Five rigs were active at year-end.

Production

Total crude-oil production in 1973 was 25,766, 540 bbl (70,593 b/d), an increase of 9.3% over 1972 production of 23,634,850 bbl (64,576 b/d). Gas production figures for 1973 were not available.

General

Bechtel Corp. completed the preliminary feasibility study for the pipeline from the Eastern Zone to the Pacific Coast. The government authorized the company to proceed with the final study of route and feasibility, and this was under way by the end of 1973.

PUERTO RICO

Information furnished by O. D. WEAVER, Weaver Oil and Gas Corp., Houston, Texas

The Department of Natural Resources, estab-

lished in 1972, has not completed its formulation of new terms and conditions for exploration licenses. Pending these, existing licensees did not carry out any exploration work during 1973. The acreage picture remains that given in the review of 1971 developments (Jacobsen and Neff, 1972, Fig. 26).

Reference Cited

Jacobsen, P., Jr., and C. H. Neff, 1972, Petroleum developments in South America, Central America, and Caribbean area in 1971: *Am. Assoc. Petroleum Geologists Bull.*, v. 56, no. 9, p. 1602-1660.

EL SALVADOR

By Petroconsultants S.A., Geneva, Switzerland

No rights currently are held in El Salvador. Globex, a group formed by Reading & Bates Offshore Drilling Co., Terra Resources, and Mapco Inc., has applied for rights in the offshore Pacific continental shelf.

Exploration and exploitation may be carried out by private companies under contracts to be negotiated with the government.

SURINAM

Information furnished by LOUIS PRADAL, ELF Aquitaine Group, Paris, France

The ELF/Shell/EURAFREP combine did a 3,667-km seismograph program on their major offshore concession in late March to early May. The field work was by CGG using the geophysical ship *Orion Arctic*.

The concession area is unchanged from that shown in the review of 1970 (Neff, 1971, Fig. 16).

Reference Cited

Neff, C. H., 1971, Review of 1970 petroleum developments in South America, Central America, and Caribbean area: *Am. Assoc. Petroleum Geologists Bull.*, v. 55, no. 9, p. 1418-1482.

TRINIDAD (Figs. 22, 23; Tables 63-72)

By Ministry of Petroleum and Mines, Port-of-Spain

Production

Trinidad and Tobago's oil fortunes continued their upward march in 1973. In spite of everyday setbacks, Amoco Trinidad Oil Co. progressed rapidly with its offshore development program off the east coast of the island. In January 1973 this company averaged 43,922 b/d, became the country's largest producer in May, and achieved a peak output of 67,908 b/d in December. As a result, its total output during 1973 was 20,584,000 bbl for an average rate of 56,400 b/d, which represents more than twice the volume produced in 1972. Closely paralleling the Amoco increase, Trinidad and Tobago's total crude output rose by 9,464,000 bbl,

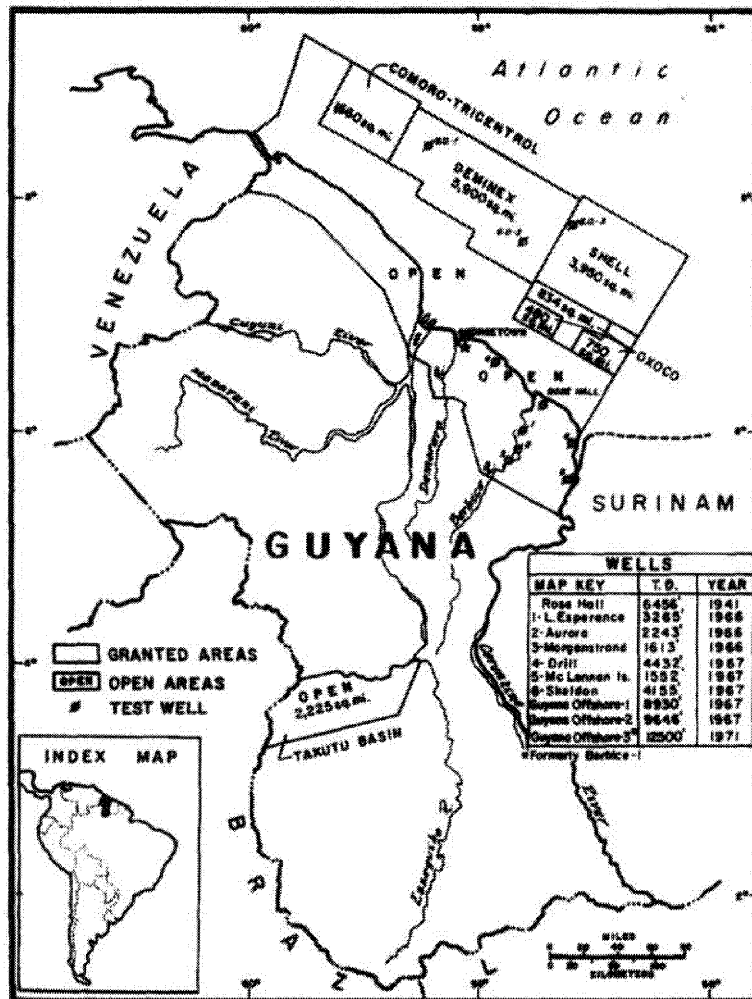


FIG. 13—Guyana, license areas year-end 1973, and drilling of prior years.

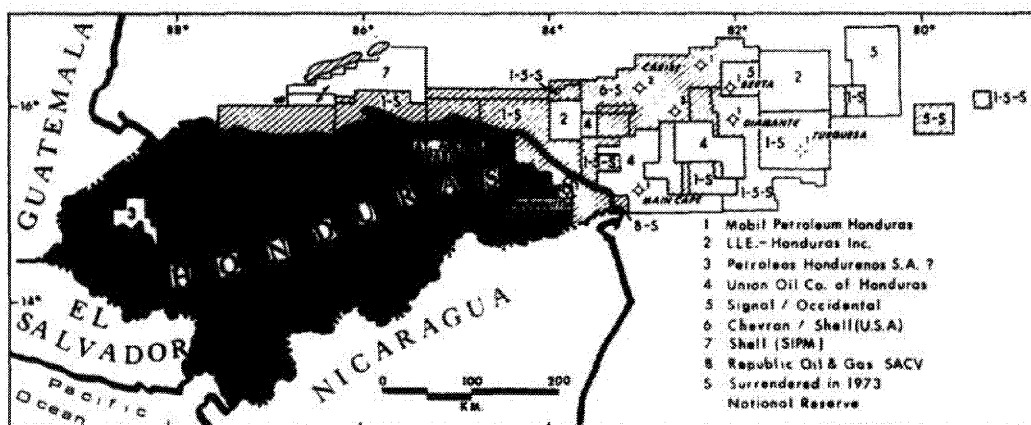


FIG. 14—Honduras, exploratory wells 1973 and prior years, and concessions at year-end 1973.

TABLE 49. GAS PRODUCTION IN ECUADOR (MMCF)

1972	1973
5,328	5,490

TABLE 50. LAND HOLDINGS (HA.) IN ORIENTE

Company	12/31/72	12/31/73	Increase (Decrease)
Anglo	227,000	230,700	3,700
Cayman Group	335,000	335,000	--
Minaa Group	622,867	--	(622,867)
OKC	282,694	291,150	8,456
Shenandoah	135,072	--	(135,072)
Sun	177,000	177,700	700
Texaco/Gulf	491,355	491,355	--
Total	2,270,988	1,525,905	(745,083)

TABLE 51. EXPLORATORY DRILLING IN GUATEMALA, 1973

Well Name	Location	Basis for Location	Lease Explor. Class	Comp. Date	Total Depth (Feet)	Deepest Formation	Result Remarks
SHENANDOAH et al.							
Huevo Cerros-1	15°59'30"N 90°35'02"W	Seis./Subsurf.	NPW	-	-	-	Drig. 8939' 12/31/73

TABLE 52. PARTY-MONTHS OF GEOPHYSICAL
EXPLORATION IN GUYANA, 1973

Company	Seis.	Total
Deminex	0.75	0.75
Oxoco	0.25	0.25
Comoro-Tricentral	0.25	0.25
Guyana Government	1.0	1.0
Total	2.25	2.25

TABLE 53. WILDCAT DRILLING IN HONDURAS, 1973

Well Name	Lat. Long.	Basis for Location	Lease Explor. Class	Comp. Date	Total Depth (Feet)	Deepest Formation	Result Remarks
COMPANIA PETROLERA PECTEN DE HONDURAS							
Chevron Caribe-2	16°15'42"N 83°01'21"W	Seismic	NPW	Jan. 9	11,315 ⁽¹⁾	L. Cretaceous	Dry Hole
Chevron Caribe-3	16°00'51"N 82°40'25"W	Seismic	NPW	Mar. 23	9,225	L. Cretaceous	Dry Hole
UNION OIL COMPANY OF HONDURAS INC.							
Main Cape-1	15°15'4"N 83°05'31"W	Seismic	NPW	Feb. 27	11,400	Paleocene	Dry Hole

(1) Footage drilled in 1972 (10,000 ft) not previously reported.

Total wildcat footage - 31,940.

TABLE 54. RIGHTS VALID IN THE LEYSER ANTILLES
AS OF DECEMBER 31, 1973

Company	License, Location	Area (Sq. Km.)	Remarks
Atlantic & Oceanic	Barbuda-Antigua-Redonda (two blocks) Leeward Islands	6,170	Onshore 500 sq km Offshore 1,600 sq km
Atlantic & Oceanic	St. Christopher-Nevis- Anguilla (four blocks) Leeward Islands	10,000	Onshore 300 sq km Offshore 9,700 sq km
Atlantic & Oceanic	Saba Bank Leeward Islands	8,100	Contested by Dutch government. All offshore
General Crude	St. Vincent Windward Islands	2,245	Onshore 335 sq km Offshore 1,890 sq km
Westtrans	Grenada Windward Islands	2,550	Onshore 310 sq km Offshore 2,200 sq km
Total		29,065	