

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS BULLETIN
V. 51, NO. 8 (AUGUST, 1967), P. 1445-1511, 27 FIGS., 77 TABLES

REVIEW OF 1966 PETROLEUM DEVELOPMENTS IN SOUTH AMERICA, CENTRAL AMERICA, AND CARIBBEAN AREA¹

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ABSTRACT

This review includes data from 23 countries. In addition there are notes concerning 6 other countries in which no positive developments during 1966 are known. Nine countries are established producers of petroleum. Collectively they contributed about 13% of the world's total oil production in 1966. Total production from these 9 countries averaged 4,247,047 b/d during 1966. This was a decrease of 41,770 b/d from the 1965 figure, the first year-to-year decline registered since 1958. Venezuela contributed 79% of the total production during 1966. There were appreciable increases, compared with 1965, from Argentina, Bolivia, Brazil, and Trinidad, totalling 64,540 b/d. This was more than offset by a decrease of 102,500 b/d in Venezuelan production. For the overall area reviewed exploration by geological and geophysical parties registered a moderate decline from the previous year. The number of exploratory wells drilled and the percentage which were successful registered small increases from last year. The activity by approximately 9 companies aimed at offshore exploration in the Central America region during 1966 continued as a significant trend in the search for oil within the area of this review. Bolivian crude oil became available to the overseas market in the last half of 1966 when a trans-Andean pipeline was placed into service.

INTRODUCTION

The total production of oil during 1966 from South America and the adjacent Caribbean area was 1,550,172,000 bbls or an average rate of 4,247,047 b/d. Compared with 1965 this was an overall decrease of 0.97%. Venezuela, which produced 79% of the total, had in 1966 a 37.4-million-bbl decrease (2.9%) in annual production from 1965. The 8 other oil-producing countries covered in this review had a combined annual production of 319.9 million bbls in 1966, an increase of 7.4% from the previous year. This was achieved mainly by increased production from Argentina, Bolivia, Brazil, and Trinidad. Production statistics by countries are in Tables I-II.

Combined drilling statistics for the countries show a 1.6% decrease in total wells drilled, a 9.6% increase in exploratory-well completions, and a 25% increase in successful exploratory wells in comparison with 1965. Statistics on individual countries are in Table IV.

The total of exploration by the leading surface methods was down compared with 1965. Investigations by surface-geology parties were down 14%, by seismograph down 12%, and by gravimeter down 26%. Statistics from individual countries are in Table III.

Among the four countries which registered

well-defined increases in oil production during 1966 from the previous year, statistics from Brazil are outstanding. Average daily production was up 22,205 bbls (24%), Carmópolis and Miranga fields being the main contributors to this increase. Development drilling showed an 82% increase. The number of exploratory tests completed was approximately the same as for 1965 but the percentage of successful wildcats was higher in 1966.

Argentina registered an increase in daily average production of 16,326 bbls (6%) from 1965. Development drilling showed an increase of 25%. The number of exploratory tests completed increased by 49% from the previous year, together with a higher percentage of successful wildcats.

Trinidad had an increase in oil production of 14% for 1966 and in addition there were substantial increases in well completions, petroleum reserves, gas utilization, and refinery output compared with 1965.

Bolivia experienced an 81% increase in oil production in 1966 from the previous year. This was mainly the result of the opening of the trans-Andean pipeline in September and the resulting export of petroleum by tankers. This pipeline carried approximately 2 million bbls of petroleum between its opening in September and year end. The bulk of this year's increase in production was from Bolivian Gulf Oil Company's Caranda and Colpa fields, which were discovered in 1960 and 1962, respectively. These fields had not been

¹ Manuscript received and accepted, May 13, 1967.

² Latin American Gulf Oil Company.

TABLE I. ANNUAL OIL PRODUCTION, 1961-1966
(Thousands of Bbls)

Country	1961	1962	1963	1964	1965	1966	Total Cumulative Production
Venezuela	1,065,734	1,167,900	1,185,520	1,241,657	1,267,709	1,230,298	21,033,298
Argentina	84,390	98,208	97,143	100,370	98,797	104,756	1,363,917*
Colombia	53,383	50,144	60,720	62,857	73,659	72,843	1,322,432
Trinidad	45,768	48,876	48,678	49,731	48,859	55,604	1,007,700
Brazil	34,807	33,401	35,714	33,313	34,345	42,450	306,721
Perú	19,371	21,154	21,468	23,119	23,068	23,027	709,877
Chile	9,278	11,708	13,223	13,687	12,704	12,429	108,013*
Bolivia	2,990	2,917	3,404	3,290	3,364*	6,105	50,617*
Ecuador	3,028	2,642	2,547	2,883	2,919	2,660	97,035
Total	1,318,749	1,436,930	1,468,417	1,530,907	1,565,424*	1,550,172	25,999,610
Per cent change	+9.0%	+2.2%	+6.3%	+2.2%	-0.97%		

* Includes adjustments made since last year's report.

TABLE II. 1966 OIL PRODUCTION

Country	Barrels per Day	% Change from 1965
Venezuela	3,370,679	+ 2.9
Argentina	287,003	+ 6.0
Colombia	199,570	- 1.1
Trinidad	152,340	+ 14.0
Brazil	116,301	+ 23.6
Perú	63,088	- 0.2
Chile	34,052	- 2.2
Bolivia	16,726	+ 81.9
Ecuador	7,288	- 8.9
Total	4,247,047	- 0.97

TABLE III. 1966 EXPLORATION ACTIVITY IN PARTY-MONTHS

Country	Surf. Geol.	Seis.	Grav.	Air-Tag.	Other	Total
Argentina	58	247	24	--	102	431
Bahamas	--	1/2	--	--	--	1/2
Bolivia	44	16	8	--	--	69
Canada	190	95	94	--	443	822
British Honduras	2-1/2	2	--	--	2	6-1/2
Chile	1	48	--	--	--	49
Colombia	54	55	5	3	1	118
Ecuador	30	20	4	1	--	55
Guyana	--	1/2	--	--	--	1/2
Netherlands Antilles	--	1/2	--	--	--	1/2
Nicaragua	16	4	--	--	--	20
Paraguay	--	6	--	--	--	6
Perú	46	4	2	--	3	55
Trinidad	10	3	--	1	--	14
Venezuela	10	7	--	--	--	17
Total	461-1/2	506-1/2	138	5	551	1662

on sustained production until the opening of the pipeline this year.

The revival of interest in offshore Central America by the major oil companies, which was commented on in the 1965 review, continued to expand during 1966. The main part of this play has been in the Caribbean between the eastern coastline of Nicaragua and Honduras and the island of Jamaica. On the Pacific side of Central America the center of activity is adjacent to the south coast of Guatemala and includes areas offshore and onshore. During 1965 and 1966 this activity consisted mainly of establishing acreage positions and conducting geophysical surveys. The combined area of the acreage blocks and the number of companies involved in this region continue to make it a well-defined and significant trend of exploration activity.

TABLE IV. 1966 DRILLING STATISTICS

Country	Total Wells Drid.*	Total Footage Drilled	Explor. Wells Compl.	Explor. Wells Success
Argentina	711	3,987,255	116	38
Barbados	11	49,696	9	5
Bolivia	47	169,906	15	2
Brazil	331	1,294,452	98	34
Chile	37	319,428	15	2
Colombia	69	446,364	24	7
Ecuador	49	170,800	31	23
Guyana	36**	7,100	3	--
Perú	158	865,693	24	10
Surinam	2	22,344***	2	--
Trinidad	278	1,187,202	36	26
Venezuela	356	2,073,000	26	14
Total	2,052	10,793,240	399	159

* Includes suspended wells.

** Stratigraphic tests.

*** Includes footage from a 3rd well which was drilling at year-end.

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ACKNOWLEDGMENTS

Compilation of this review was made possible by the help and cooperation of many individuals and the writers are pleased to express their appreciation to the following individuals for contributing sections and supplying information.

ARGENTINA	Eduardo Padula, Yacimientos Petroliferos Fiscales (YPF), Buenos Aires	PARAGUAY	C. D. Brown, Placid Oil Co., Dallas, Texas
BAHAMAS	R. B. Mitchell, Chevron Exploration Co., San Francisco, Calif.	PERÚ	Victor Benavides, International Petroleum Co., Ltd., Lima
BARBADOS	Edward Hickam, General Crude Oil Co., Houston, Texas	PUERTO RICO	Carlos Vincenty, Executive Secretary, Puerto Rico Mining Commission, San Juan
BOLIVIA	G. W. Hall, Bolivian Gulf Oil Co., Santa Cruz	SURINAM	R. Gageonnet and F. Civreis, PETROPAR, Paris, France
BRAZIL	Haroldo Ramos da Silva, Petróleo Brasileiro S.A. (Petrobrás), Rio de Janeiro	TRINIDAD AND TOBAGO	R. A. Thomas, O. O. Fernandes, and E. L. Bertrand, Ministry of Petroleum and Mines, Port-of-Spain
BRITISH HONDURAS	K. G. Redman, Phillips Petroleum Co., Bartlesville, Oklahoma	URUGUAY	Carlos Vanrell, Administración Nacional de Combustibles Alcohol y Portland, Montevideo
CHILE	Oswaldo Wenzel G., Mario Marino P., and Pluton Rossel, Empresa Nacional del Petróleo (ENAP), Santiago	VENEZUELA	Neal R. VanMiddlesworth, Venezuelan Oil Scouting Agency, Caracas
COLOMBIA	W. Ernest Aitken, Colombia-Cities Service Petroleum Corp., Bogotá		
COSTA RICA	César Dondoli B., Director de Geología, Minas y Petróleo, San José		
CUBA	Harry Wassall and Associates, Inc., Geneva, Switzerland		
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	Harry Wassall and Associates, Inc., Geneva, Switzerland		
	Harold M. Lian, Union Oil Co. of California, Los Angeles, Calif.		
JAMAICA	H. R. Versey, Director, Geological Survey, Kingston		
NETHERLANDS ANTILLES	Harry Wassall and Associates, Inc., Geneva, Switzerland		
NICARAGUA	Lee J. Eicher, Esso Exploration, Inc., Coral Gables, Florida		

Gratitude is also expressed for fill-in and background information, and shorter contributions supplied by various oil companies and by Harry Wassall and Associates, Inc., Geneva.

ARGENTINA (Fig. 1; Tables V-X)

By DR. EDUARDO L. PADULA, Yacimientos Petroliferos Fiscales, Buenos Aires

Exploration activities during 1966 were made by means of 39 parties (21 seismic reflection, 1 seismic refraction, 2 gravimeter, 6 geological, and 9 topographic) and 25 drilling rigs. The exploration parties confined their activities to the established sedimentary basins of the country, with the exception of the Rio Colorado basin area. The rigs drilled 116 exploratory wells, 10 of which were classed as stratigraphic tests. On December 31, 1966, 3 wells were awaiting production tests and 26 rigs were drilling or rigging up. In addition, with the cooperation of Naval Hydrographic Service, an extensive airmagnetometer survey was conducted over parts of northeastern La Pampa,

TABLE V. PARTY-MONTHS OF GEOLOGICAL AND GEOPHYSICAL EXPLORATION IN ARGENTINA, 1966

Basin	Seis- mic	Seis.	Grav.	Topog- raphy	Total
Morostu	-	40	-	27	67
Chaco-Patagonense	-	24	-	9	33
Guyana	28	43	12	24	112
Requeña	22	90	-	13	97
Cerro S. Jorge	2	-	-	3	5
Andal	6	73	-	24	105
Rio Salado	-	-	12	-	12
Total	58	247	26	102	431

TABLE XLIV. TOTAL GAS PRODUCTION
IN ECUADOR (Mcf)

1965	1966	Cumulative, 1960 through 1966
7,061	7,150	39,888

Ancón field and a 2-well pool in the La Fuente area on the southeast. Several successful extension wells were drilled in the Ancón and Carmela fields.

During early 1966, seismic-refraction surveys were made in the Santa Elena Peninsula and some experimental reflection work was done in the Progreso basin. During the year, field mapping was extended north from the Progreso basin through the southern half of the coastal region, and a large number of samples were collected for subsequent paleontological examination. A photo-geological map of the Progreso basin was prepared.

Anglo-Ecuadorian Oilfields Ltd.'s application for concessions totaling 4,880 sq km in the Progreso basin was pending throughout the year. Also, along the Pacific coast of Ecuador, applications have been filed covering the Gulf of Guayaquil, all of the continental shelf, and much of the adjacent onshore area. These filings were by numerous groups including Union Oil of California, Puna S.A., and by individuals.

The remainder of this review of Ecuador was contributed by other sources.

In eastern Ecuador generally referred to as "the Oriente," Texaco, as operator for Texaco-Gulf, continued an active exploratory program consisting of surface geology, gravimeter, reflection seismograph, and completion of an air-magnetometer survey that was started the previous year. All operations are supported by air. Base camp for the operations is at Santa Cecilia, 30 km south of the international border at approximate geographic coordinates Lat. 0°04' N and Long. 77°00' W. Personnel, equipment, and supplies are flown by fixed-wing aircraft to an all-weather airstrip which was constructed at Santa Cecilia and then taken to the site of field operations by helicopter. At year end, location was being prepared for the first wildcat, Lago Agrio-1, to be located on a seismic structure 15 km N 74° E from Santa Cecilia.

There was considerable "land" activity in the Oriente. In addition to older concessions held by Minas y Petróleos del Ecuador and Texaco-Gulf, new applications were filed by Cities Service, Superior, Cia. Minera del Napo S.A., Cia. Petrolera del Pacífico S.A., Yasumi C.A., and Anglo-Ecuadorian Oilfields Ltd., with the result that nearly all of the Oriente was covered by concessions or applications at year end.

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Gubler, Yvonne, and Igor Ortynski, 1966, Informe geológico preliminar sobre las posibilidades petrolíferas de las cuencas sedimentarias del Ecuador: Quito, Ministerio de Industrias y Comercio, Servicio Geológico Nacional.

FRENCH GUIANA (Fig. 14)

By R. GAGEONNET AND F. CIVREIS, PETROPAR, Paris

No field activity took place in 1966.

Seismic data resulting from the conventional marine seismic work conducted in 1965 were interpreted during the first months of 1966 by PETROSUR, operator for the joint venture French group headed by PETROPAR and Shell who took the place of Gulf States Land and Industries in the partnership on June 8. These same two groups also conducted a joint offshore operation in adjoining Surinam.

There was no change in the concession status.

GUATEMALA (Fig. 15)

By D. E. HIBBARD, Esso Exploration, Inc., Coral Gables, Florida

The only activities in Guatemala during 1966 related to concession matters. The most significant development is that a 4-company group, headed by Texaco and including Mobil, Superior, and Tenneco, is acquiring exploration rights on considerable Pacific coast acreage, both onshore and offshore. As shown on the map (Fig. 15), only 3 of the companies are represented at year end with a total of 907,628 ha. and it is probable that the fourth company will also apply for a block of acreage following domiciling of the company in Guatemala. Most acreage now applied for by the Texaco group formerly was under application by the Abularach and other interests, and reportedly the changeover was effected by the Texaco group through a farm-out

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agreement with these interests. In addition, 1 new application was filed in October, 1966, by an independent for 256,000 ha., which is just north of the Mobil and Superior blocks.

The Esso Exploration right, which consists of 396,968 ha. in the offshore Pacific coast, is contiguous with and just south of the Texaco group applications. Through 1966 it has remained the only formal petroleum exploration right in effect in the country. Following a 750-mi seismic survey shot in 1965, no further field activities have been

conducted in 1966. No plans for drilling have been announced.

Several unidentified pre-1966 applications totaling about 1 million ha. still remain in force on the Pacific coast, mainly in the offshore area surrounding the Esso block, and these are presumably held by Guatemalan independents. No new developments have taken place on these applications during 1966.

Elsewhere in the country, little or no exploration activity was reported. Most of the acreage in

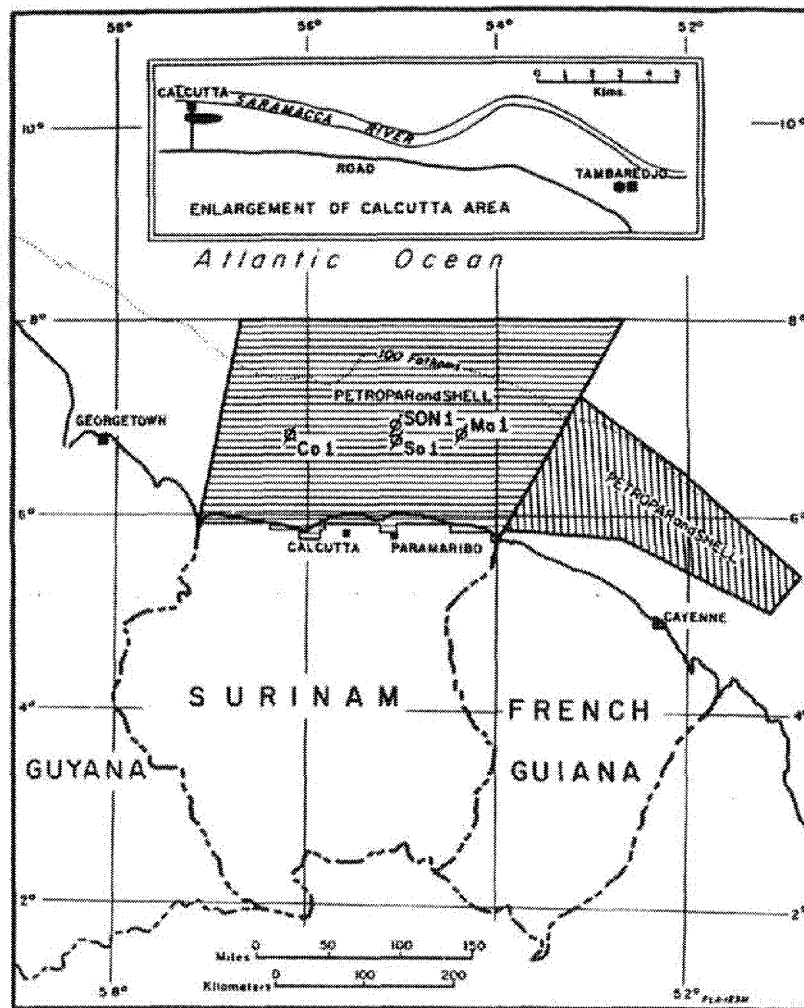


FIG. 14.—French Guiana and Suriname, concession and well-location map.



FIG. 15.—Guatemala, exploration right and application map, December, 1966.
All wells shown drilled before 1966.

the Petén and Alta Verapaz Departments north of Lat. $15^{\circ}45'N$ is now classified as National Reserve following relinquishment by petroleum companies after the Petén play of the late 1950s and early 1960s. In late 1966 it was reported that the Dirección General de Minería e Hidrocarburos would soon invite bids on several scattered National Reserve acreage parcels in the Petén, Izabal, and Alta Verapaz areas.

Four new applications have been filed in the

north-central part of the country. Three of these are by the Abularach interests for 191,099 ha. in the folded and uplifted area of Alta Verapaz Department. The fourth is by an independent who has applied for about 158,000 ha. covering the southern part of Lake Izabal and adjacent areas.

In November the Second Conference of Central American Geologists was held in Guatemala City. Some of the papers on regional and historical geology were of particular interest to petro-

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leum geologists and these have been published and made available for purchase through the Geologic Section, Central American Research Institute for Industry, Guatemala City. The Geologic Section is attempting to become the most complete reference library for geological material concerning Central America.

The Mapa Oficial de la República de Guatemala, scale 1:500,000, which was published in color in 1965 and made available for purchase in 1966, is a particularly useful topographic map. Copies may be ordered through the Instituto Geográfico Nacional, Ministerio de Comunicaciones y Obras Públicas, Guatemala City.

REFERENCE

ICAITI, 1966, Trabajos técnicos presentados en la Primera Reunión de Geólogos de América Central: Inst. Centroamericano de Inv. y Tec. Industrial, Publ. Geol. de ICAITI Nro. 1, 70 p.

GUYANA (Fig. 16; Table XLV)

By SOBHARAM SINGH, Director, Geological Survey, Georgetown

The country became independent in May and assumed the new name of Guyana.

The two major oil companies holding concessions in the coastal and offshore belt continued activities through the year. During the year Continental Oil Co. was granted an oil-exploration lease over an additional 2,225 sq mi offshore extending northwestward from its previous concession to the international boundary with Venezuela, bringing its total offshore concession to 16,025 sq mi. Toward year end, the company had applied for an additional exploration lease of 4,750 sq mi onshore.

Continental carried out an additional seismic program of 500 mi within its offshore concessions under contract to Western Geophysical.

Seismic data for Shell's offshore concession were still being processed at year end. The company, however, commenced drilling the first of 6 planned stratigraphic holes. By year end, 3 holes, totalling 7,100 ft, were completed. There were no significant shows of oil and gas.

The government had early in the year announced its intention to grant an oil exploration lease to Phoenix Canada Oil across 2,600 sq mi of the inland Takutu basin, but at year end that company had not yet taken up the license.

TABLE XLV. SUMMARY OF STRATIGRAPHIC DRILLING IN GUYANA, 1966

Operator, Well Name	Lat., Long.	Compl. Date	T.D. Ft(M)	Name and (or) Age, Deepest Fm.	Results
GUYANA SHELL LTD. L'Esperance-1	N 5°51' W 57°09'	12/15	3,265 (995.2)	NA	Abd.
Aurora-1	N 5°36' W 57°11'30"	12/26	2,231 (680.0)	NA	Abd.
Morgenstrand	N 6°01' W 57°38'	1/2/67	1,604 (488.9)	NA	Abd.

REFERENCES

Papers presented at the 7th Guiana Geological Conference, Paramaribo, Surinam, November, 1966:

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Hammen, T. van der, and D. Burger, Palynology and age of the Takutu Formation (Guyana).

McConnell, R. B., D. Masson Smith, and J. P. Berangé, Geological and geophysical evidence for a rift valley in the Guiana shield.

Wijmstra, T. A., Palynology and stratigraphy of the Guiana coastal basin.

— and T. van der Hammen, Late-glacial and Holocene climatic and vegetational history of the Rupununi Savannas (Guyana).

HAITI

There were no developments related to oil exploration reported during 1966.

M. Fayyad, a naturalized Haitian, was in principle awarded a blanket petroleum concession covering exploration and refining in 1964. It is probable that the concession is no longer in effect, but it has not been possible to verify this.

HONDURAS (Fig. 17; Table XLVI)

By GABRIEL DENGU, Instituto Centroamericano de Investigación y Tecnología Industrial (ICAITI), Guatemala, and HARRY WASSALL AND ASSOCIATES, INC., Geneva, Switzerland

There was a large reduction in licensed acreage during the year, from about 104,900 sq km to 65,700 sq km, but most of this concerned required reductions onshore. The interest in the continental shelf remains high, and nearly all offshore areas which were relinquished during the year were acquired by other companies.

During 1966, Signal Oil and Gas was awarded approximately 10,000 sq km in several offshore

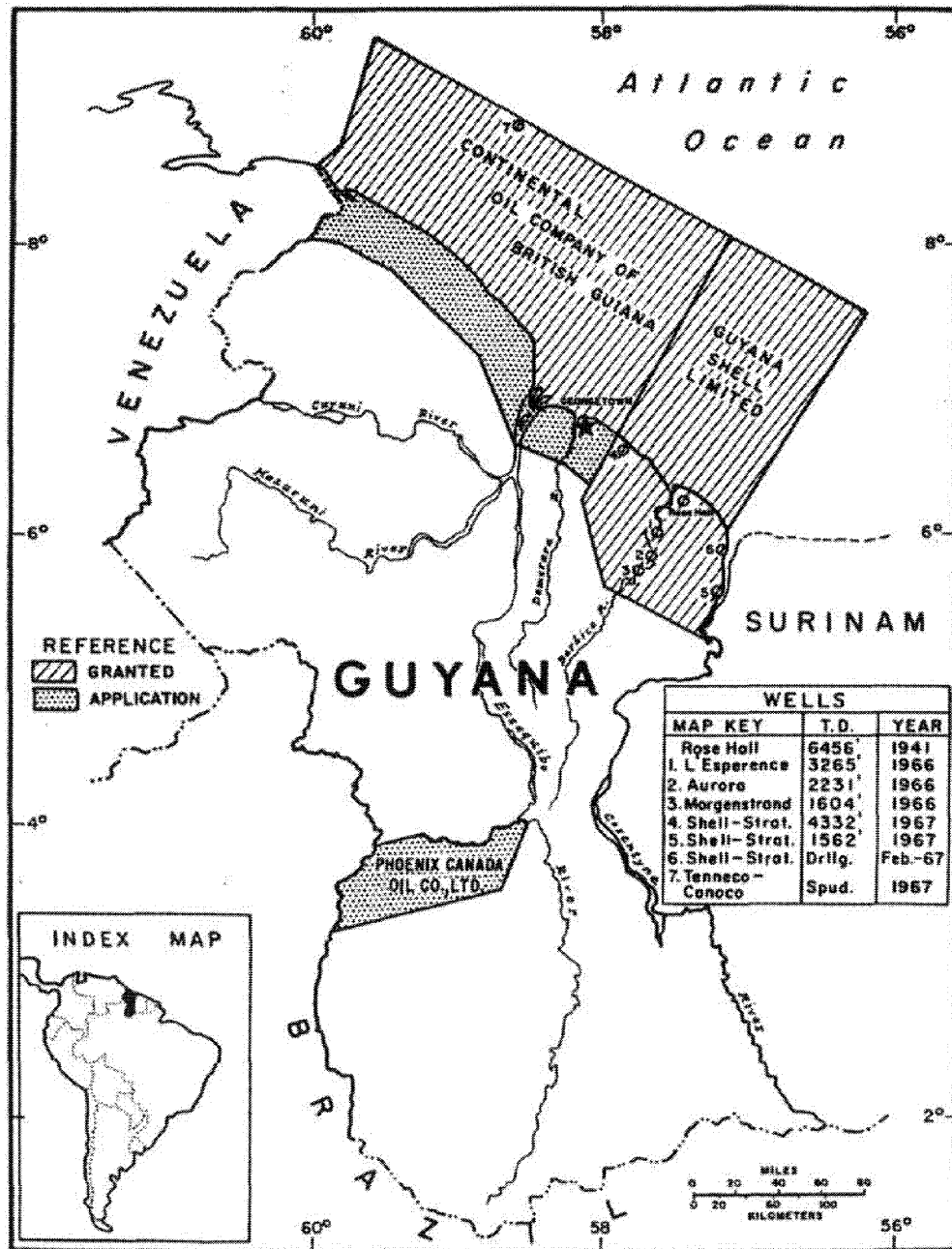


FIG. 16.—Guyana, concession and application map, December, 1966; also well locations.

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TABLE LIV. OIL PRODUCTION (IN BBLs) IN PERÚ

Area, Field, Concess.	Company	Discovery Year	Total Wells Drilled	Producing Formation	Annual Production		Cumulative Production through December, 1966
					1965	1966	
CONTINENTAL SHELF							
Litoral	Belco	1960	56	Tertiary	1,063,863	1,383,651	4,139,056
Humboldt(*)	Cabeen	1955	32(b)	Tertiary	67,100	366,294	936,411(c)
Rincón-37	Per. Pacific	1955	1	Tertiary	5,033	3,761	25,349
EPP-10	E.P.F.	1965	1	Tertiary	--	3,979	3,979
COASTAL							
Mirador	Belco	1955	39	Tertiary	122,372	101,724	2,044,135
Los Órganos(d)	E.P.F.	1943	980	Tertiary	2,629,616	2,435,409	23,416,121(e)
La Brea-Paríñas	I.P.C.	1869	5,127	Tertiary	7,357,637	6,715,108	470,306,961
Interlob(f)	I.P.C.	1905	2,466	Tertiary	10,557,893	10,883,120	195,261,647
Tablazo	Per. Pacific	1955	--	Tertiary	--	--	193,426(g)
Amotape	Per. Amotape	1956	32	Tertiary	12,578	11,030	305,031
SIERRA							
Pirín (Puno)	Titicaca	1906	--	Cretaceous	--	--	286,644
EASTERN							
Maquila	Oriente	1957	14	Cretaceous	583,211	550,761	5,276,022
Agua Calientes	Ganso Azul	1939	28	Cretaceous	668,686	572,209	9,682,165
Total					23,067,989	23,027,026	709,876,945

- (a) Includes the Humboldt concessions and the Douglas Oil Co. wells operated by Cabeen Exploration Corp.
- (b) Includes wells drilled by Douglas, Peruvian Pacific, and Cabeen.
- (c) Reduced by 195,426 bbls. now recorded from Tablazo. See footnote (g).
- (d) Includes all E.P.F.'s coastal producing areas in northwest Peru.
- (e) Includes production of predecessor companies on E.P.F.'s coastal area in northwest Peru.
- (f) Lima concessions jointly held by International Petroleum Co. (operator) and Compañía Petrolera Lobitos.
- (g) Accumulated production from the farmed-out Tablazo concessions prior to return to E.P.F. in February, 1960.

refinery, located just north of Lima and having a capacity of 20,000 b/d.

PUERTO RICO

The Executive Secretary of the Puerto Rico Mining Commission advised that there were no activities related to the search for petroleum during the year 1966 on the island of Puerto Rico or within the adjacent marine zone.

EL SALVADOR

From all available information, there were no developments related to oil exploration in the country during 1966.

SURINAM (Fig. 14; Table LVII)

Principally by R. GAGEONNET and F. CIVREIS, PETROPAR, Paris, France

Following the conventional marine seismic sur-

TABLE LV. TOTAL GAS PRODUCTION IN PERÚ (Mcf)

1965	1966
58,143	58,900

TABLE LVI. PETROLEUM CONCESSIONS IN FORCE IN PERÚ, DECEMBER 31, 1966

Company	Area in Hectares
D'Onofrio di Paolo	5,002
Compañía Petrolera Lobitos	55,278*
I.P.C. (north coast)	166,456
I.P.C. (eastern areas)	32,295
Cerro de Pasco	108,648
El Oriente (Nat.)	293,825 ^b
Ganso Azul	44,726
Elverath/Wintershall/DEA	29,400 ^b
Peruvian Gulf	323,101
Peruvian Oil & Minerals	267,425 ^c
Peruvian Pacific (Cabeen Explor. Corp.)	2,022 ^d
Petróleo Sullana (Nat.)	7,468 ^e
Petrolera Amotape	12,985 ^d
Petrolera del Pacifico (Nat.)	18,167 ^e
Belco Petroleum	64,590
Mobil Oil	245,387
Texas Petroleum	246,623
Three miscellaneous held blocks	6,752
Total	1,928,288
Empresa Petrolera Fiscal (EPF)	3,166,120
Grand Total	5,076,388

- * I.P.C. holds 1/2 interest. E.P.F. holds 1/6 interest in 84 has.
- ^b El Oriente and E/W/DEA each hold 1/2 interest.
- ^c Ganso Azul holds 2/3 interest in 14,007 has., and Mobil has carried interest in 38,222 has.
- ^d E.P.F. farm-out.
- ^e Farmed-in by Cabeen Explor. Corp.

Note: For southern Perú, see Fig. 18 of the 1965 review, page 1605.

TABLE LVII. SUMMARY OF WILDCAT DRILLING BY PETROSUR IN SURINAM, 1966

Well Name	UTM Coord.	Loges Explor. Class.	T.D.(M.)	Deepest Fm.	Results/Remarks
Maroni Offshore No. 1 (MO-1)	X 440 611 Y 757 679	NFW	1,865	Eocene	Abd.
Surinam Offshore North No. 1 (SON-1)	X 371 469 Y 755 012	NFW	1,925	Eocene	Abd.
Coronie Offshore No. 1 (CO-1)	X 251 975 Y 755 128	NFW	3,294	Cret.	Abd. 1/29/67 Depth 12/31/66, 3,020 m.

vey in 1965, drilling activity was resumed on August 15, 1966, with the drilling catamaran *E. W. Thornton* of Reading and Bates.

Three locations had been selected, all of them about 100 km from the coastline and corresponding to a water depth of 40–55 m.

The first well, Maroni Offshore No. 1 (MO-1), was plugged and abandoned on September 30 at T.D. 1,865 m in beds of Eocene age. The second well, Surinam Offshore North No. 1 (SON-1), was plugged and abandoned on October 31 at T.D. 1,925 m in the same Eocene beds as MO-1.

The third well, Coronie Offshore No. 1 (CO-1) in the western part of the concession, reached a depth of 3,020 m on December 31 and was plugged and abandoned on January 29, 1967, at T.D. 3,294 m in beds of Cretaceous age.

This work was done under the supervision of PETROSUR, operator for the joint venture French group headed by PETROPAR and Shell, who took the place of Gulf States Land and Industries in the partnership on June 8. These same two groups also conducted offshore operations in French Guiana.

There was no change in the concession status.

The 7th Guiana Geological Conference was held in Paramaribo on November 21–25, 1966. PETROSUR presented the paper, "Micropaleontological survey of SO-1 drilling," written by B. Prestate, D. Rerat (Foraminifera), E. Grosdidier (ostracods), Mrs. E. Sales (nanofossils), and S. Jardine and C. Youdine-Belsky (palynology).

The remainder of this review on Surinam was contributed by other sources and is based on papers distributed at the 7th Guiana Geological Conference in Paramaribo, November, 1966.

The Surinam Geological and Mining Service found oil within a zone at approximately 500–600 ft while drilling a water well at the town of Calcutta during October, 1965 (Fig. 14).

Additional drilling in this area resulted in 5 holes, extending for 4 km in an east-west direction, in which shallow oil-bearing sandstone was found.

Later a well was drilled 16 km east of Calcutta at the settlement of Tambahredjo. This test found oil-bearing sandstone at 925–950 ft.

This drilling was done with a water-well rig having a capacity of about 1,000 ft.

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- Geomorphological map of Surinam, 1966 ed.: Scale 1:500,000 (in two parts).

TRINIDAD AND TOBAGO (Figs. 22–25; Tables LVIII–LXX)

By O. O. FERNANDES and E. L. BERTRAND, Ministry of Petroleum and Mines, Port-of-Spain

INTRODUCTION

More progress has been achieved in the petroleum industry of Trinidad and Tobago during the year 1966 than in any other year since its inception, despite two of the major companies showing a general decline in operational effort. There were 51 more wells completed in 1966 than in 1965; production increased by 14% after being fairly constant during the last 3 years. The reserve situation was, at year end, better than ever, showing an increase of 11.3% from the previous year; the gas utilization position was enhanced greatly and, not only did the volume of crude oil refined exceed that of the previous year by 5.1%,

REVIEW OF 1967 PETROLEUM DEVELOPMENTS IN SOUTH AMERICA,
CENTRAL AMERICA, AND CARIBBEAN AREA¹

W. H. HADLEY² AND C. H. NEFF²

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ABSTRACT

This review includes data from 29 countries, of which 11 are producers of petroleum. Their combined production during 1967 was approximately 1,653,216,000 bbl. or an average rate of 4,529,353 b/d. This is about 13% of the world's total oil production during 1967. Within the area reviewed Venezuela experienced a 5.1% increase in production from 1966 and had 78% of the 1967 total. The other oil-producing countries of the area combined had a 12.6% increase in production from 1966 and contributed 22% of the 1967 total. For the overall area, the total 1967 exploration activity in 16 countries, in party-months, was changed little from the previous year. Activity by surface-geology parties decreased 15% whereas activity by seismograph parties increased 14%. The totals based on drilling statistics from 14 countries decreased in 1967; wells drilled decreased 16%, footage drilled decreased 4.7%, exploratory wells completed decreased 5%, and successful exploratory wells decreased 20%. There are indications that the area reviewed may be entering a period of increasing petroleum exploration and development. The known hunting grounds for possible further investigation are extensive.

INTRODUCTION

Tables I to IV present statistical data by country. Detailed statistics for individual countries are given by other tables.

While checking and compiling the large amount of statistical data presented in this review, some problems in reconciling totals with internal figures were encountered. Time and distance did not always permit the desired clarification by the contributors. Minor adjustments were made in instances where the apparent explanation for irregularities could be located.

ACKNOWLEDGMENTS

This review was made possible by the efforts, cooperation, and assistance of many individuals and organizations. The writers are most grateful for the support received and express their appreciation to the contributors.

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¹ Manuscript received and accepted, April 22, 1968.

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DEVELOPMENTS IN SOUTH AMERICA AND CARIBBEAN AREA

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TABLE I. ANNUAL OIL PRODUCTION, 1962-1967
(1,000 of Bbl)

Country	1962	1963	1964	1965	1966	1967	Total Cumulative Production
Venezuela	1,167,900	1,185,520	1,241,657	1,267,709	1,230,298	1,292,787	22,326,085
Argentina	98,208	97,143	100,370	98,797	106,756	115,237	1,479,123*
Colombia	50,144	60,720	62,857	73,659	72,843	70,582	1,393,016*
Trinidad	48,876	48,678	49,731	48,859	55,603	65,184	1,070,241*
Brazil	33,401	35,714	33,313	34,345	42,450	53,519	360,233*
Perú	21,134	21,468	23,119	23,068	23,027	25,857	735,734
Bolivia	2,917	3,404	3,290	3,364	6,105	14,594	65,211
Chile	11,708	13,223	13,687	12,704	12,429	12,369	120,378*
Ecuador	2,642	2,547	2,883	2,919	2,660	2,272	99,307
Cuba	307	219	265	407	491	807	--
Barbados	--	--	--	--	9	8	17
Total	1,437,237	1,468,636	1,531,172	1,565,831	1,550,671	1,653,216	27,649,345
Percent change	+2.2%	+4.3%	+2.2%	-0.97%	+6.6%		

* The 1967 production added to total cumulative published last year will not give the exact figures recorded above. Factors responsible for this include - 1) adjustments made since last year's report, 2) conversion from cubic meters to barrels, and the rounding off to the nearest one thousand barrels.

TABLE II. 1967 OIL PRODUCTION

Country	barrels per Day	% Change from 1966
Venezuela	3,541,883	+ 5.1
Argentina	313,718	+ 10.0
Colombia	193,974	- 3.1
Trinidad	178,585	+ 17.2
Brazil	146,827	+ 26.0
Perú	70,840	+ 12.3
Bolivia	39,884	+139.0
Chile	33,886	- 0.4
Ecuador	6,224	- 14.3
Cuba	2,210	+ 54.3
Barbados	22	- 8.0
Total	4,529,353	+ 5.6

TABLE IV. 1967 DRILLING STATISTICS

Country	Total Wells Drilled.*	Total Footage Drilled	Explor. Wells Completed	Explor. Wells Successful
Argentina	597	3,721,553	92	23
Barbados	3	14,607	1	--
Bolivia	49	313,410	28	9
Brazil	234	1,145,546	110	29
Brit. Honduras	1	3,147	2 ^b	--
Chile	73	467,838	10	--
Colombia	34	298,128	18	2
Ecuador	34	147,717	14	12
Guyana	5 ^b	28,715	6 ^c	--
Nicaragua	1	5,101	1	--
Paraguay	3	9,004	3	--
Perú	164	792,521	50	27
Surinam	1	900	1	--
Trinidad	218	928,210	14	10
Venezuela	302	2,409,000 ^d	31	15
Total	1,719	10,285,399	380	127

* Includes suspended wells.

^a Includes 1 well drilled (7,004') in 1966 and completed in 1967.

^b Includes 3 stratigraphic tests.

^c Includes 1 well drilled (1613') in 1966 and completed in 1967.

^d Completed and abandoned wells.

TABLE III. 1967 EXPLORATION ACTIVITY IN PARTY-MONTHS

Country	Surf Geol.	Seis.	Grav.	Air-Mag.	Other	Total
Argentina	66.00	264.00	12.00	--	108.00	450.00
Bolivia	32.00	26.00	9.00	--	20.00	107.00
Brazil	144.00*	99.00	56.00	--	444.00	743.00
British Honduras	--	2.00	--	--	--	2.00
Chile	2.00	40.00	--	--	--	42.00
Colombia	45.75	94.00	8.00	--	0.50	148.25
Costa Rica	--	0.10	--	--	--	0.10
Ecuador	16.00	26.50	--	0.25	--	42.75
Guatemala	--	--	--	0.25	--	0.25
Honduras	1.00	--	--	--	--	1.00
Jamaica	6.00	1.00	--	1.00	--	8.00
Nicaragua	4.80	5.70	--	0.95	--	11.45
Paraguay	1.00	4.00	--	--	--	5.00
Perú	30.00	5.00	9.00	--	9.50	73.50
Surinam	--	0.10	--	--	--	0.10
Trinidad	--	7.00	--	--	--	7.00
Venezuela	4.00	5.00	--	--	--	9.00
Total	392.55	579.40	94.00	2.45	582.00	1,650.40

* Includes 12 party-months of structure drill work.

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EL SALVADOR	Gerald Dixon, Harry Wassall and Associates, Inc., Geneva, Switzerland

DEVELOPMENTS IN SOUTH AMERICA AND CARIBBEAN AREA

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nuses. Some remaining, interspersed blocks will be retained by the government as National Reserves.

GUYANA (Fig. 20; Table LI)

By **SOBHARAM SINGH**, Director, Geological Survey, Georgetown

The 2 oil companies holding Oil Exploration Licenses in the coastal and offshore continental shelf belt increased their activities during the year.

By the end of the first quarter Guyana Shell Ltd. had completed a program of 6 stratigraphic tests to basement on its onshore concession. In 1 of these holes (DRI 1) an insignificant show of hydrocarbons was reported. Palynological and paleontological investigations of the borehole material continued during the rest of the year. The company reported continuing studies of seismic data for its offshore concession.

The Continental Oil Company of Guyana, which holds an exploration lease on a 16,025-sq-mi block offshore, entered a working agreement with Tenneco Guyana Ltd. and assigned to Tenneco half of its title right and interest in the exploration lease. By midyear Tenneco had completed 2 wildcat holes totaling 18,576 ft offshore on the continental shelf.

At year end the government was considering applications from 2 large American oil companies for exploration concessions across an onshore

coastal block and the Takutu basin in the southern part of the country.

In September amendments were made by the government to the country's petroleum ordinance to bring these up to date and to facilitate the process of granting leases for oil exploration, prospecting, and mining.

HAITI

By **GERALD DIXON**, Harry Wassall and Associates, Inc., Geneva, Switzerland

No developments related to petroleum exploration were reported during 1967. There has been no active exploration since 1959. The blanket petroleum exploration and refining concession reportedly granted to M. Fayyad in 1964 is believed to be invalid, but it has been impossible to obtain official confirmation from the Department of Commerce.

HONDURAS

By **LORING B. SNEDDEN**, Signal Oil and Gas Co., Los Angeles, California

There was very little exploration activity in Honduras during 1967. The only seismic activity was 1 party-month of marine Vibroseis work by Signal Oil and Gas Co. No wildcat wells were drilled. There were no changes in offshore concessions. Petroleros Hondureños requested modification of its concessions in western Honduras. This company's total holding is now 380,400

TABLE LI. SUMMARY OF EXPLORATORY DRILLING IN GUYANA, 1967

Well Name	Location	Explo. Class.	Compl. Date	Total Depth (Feet)	Deepest Formation	Special Remarks
TENNECO GUYANA INC.						
Guyana Offshore-1	08°27' N 58°30' W	Wildcat	Apr. 30	8,910	PreCambrian Basement	Abd.
Guyana Offshore-2	07°41'42"N 57°40'56"W	Wildcat	July 20	9,646	---	Abd.
GUYANA SHELL LTD.						
NoR-1	X 2,092,450' (05°45'04") Y 1,353,813' (57°45'11")	Strat. test to Basement	Jan. 4	1,611	---	Abd.
DRI-1	X 2,394,800' (06°36'06") Y 1,327,150' (57°51')	Strat. test to Basement	Feb. 1	4,432	---	Abd. Trace show of hydrocarbons reported.
NLI-1	X 2,027,580' (5°35'18") Y 1,561,000' (57°10'54")	Strat. test to Basement	Feb. 16	1,592	---	Abd.
SKE-1	X 2,133,800' (05°52'48") Y 1,575,880' (57°07'30")	Strat. test to Basement	Mar. 1	6,155	---	Water producing at 1,820-1,899 ft.

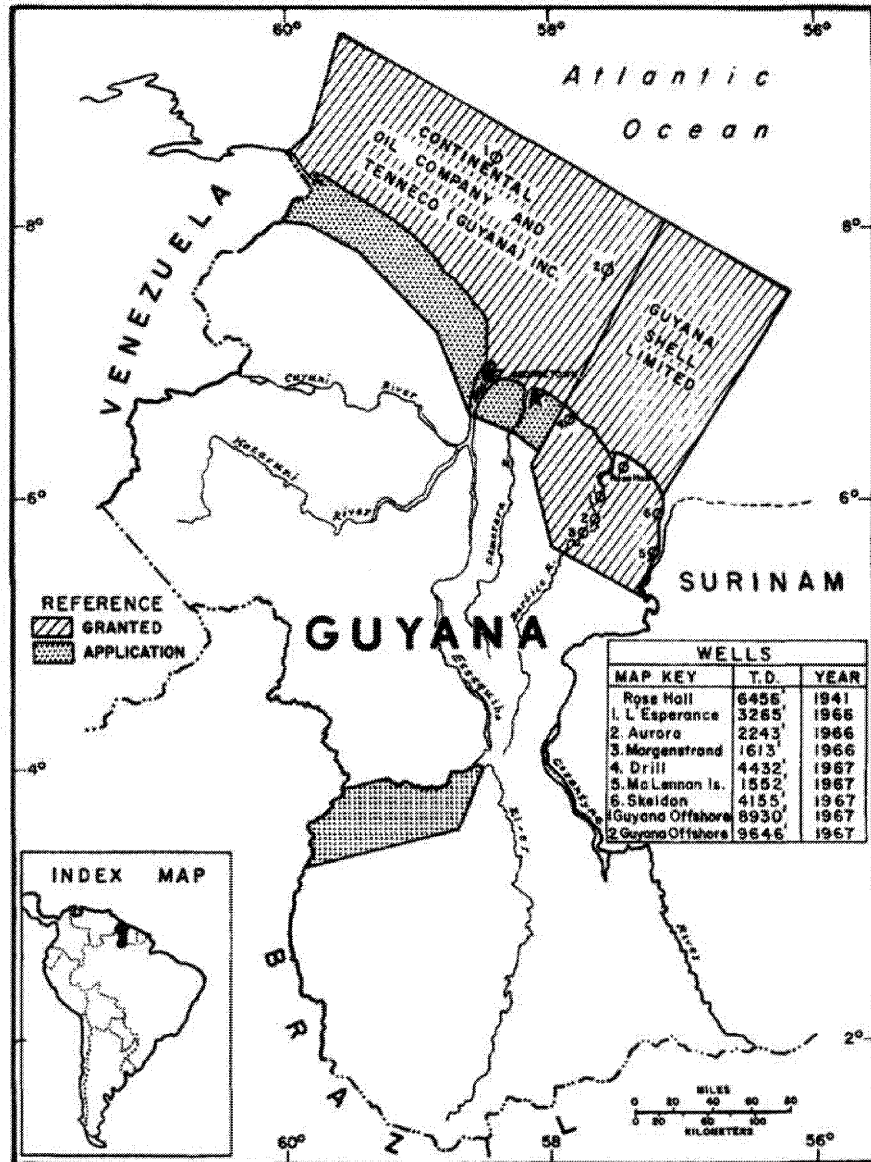


FIG. 20.—Guyana, concession and application map, December 1967; also well locations.

ha. in the districts of Santa Bárbara and Copán.

A map of concession holdings in Honduras as of December 1966 appears in the review of 1966 (Hadley and Neff, 1967).

REFERENCE CITED

Hadley, W. H., and C. H. Neff, 1967, Review of 1966 petroleum developments in South America, Central America, and Caribbean area: Am. Assoc. Petroleum Geologists Bull., v. 51, no. 8, p. 1484-1485. Fig. 17.

JAMAICA

By H. R. VERSEY, Director of Geological Surveys, Jamaica

Following an agreement between the government and Signal Oil Co. Ltd. signed in December 1966, an Oil Exploration License was issued on April 3, 1967 to Signal (Exploration) Jamaica Co. Ltd. covering 6,314 sq mi as shown in the map accompanying the review for 1966 (Fig. 18 of

TABLE LXIV. OIL PRODUCTION (IN BBL) IN PERÚ

Zone, Field, Concession	Company	Discovery Year	Total Wells Drilled	Age of Producing Formation	Annual Production		Cumulative Production through December, 1967
					1966	1967	
CONTINENTAL SHELF							
Litoral	Belco	1960	89	Tertiary	1,383,651	3,517,083	7,656,000
Humboldt(a)	Cabeen	1955	34(b)	Tertiary	366,294	667,500	1,605,000
Providencia	Cabeen	1967	15(c)	Tertiary	--	278,524	279,000
Rincón-37	Per. Pacific	1959	2	Tertiary	3,741	10,309	55,000
EPF-10	EPF	1965	5	Tertiary	3,979	358,123	362,000
EPF-Belco Acreage	EPF	1967	1	--	--	--	--
COASTAL							
Mirador	Belco	1955	39	Tertiary	101,724	81,235	2,125,000
Los Organos(d)	EPF	1943	987	Tertiary	2,435,409	1,983,794	25,400,000(e)
La Brea-Paríñas	IPC	1869	5,154(f)	Tertiary	6,715,108	6,973,623	477,279,000
Interlob(g)	IPC	1905	2,517(h)	Tertiary	10,883,120	10,798,390	206,060,000
Tablazo	Per. Pacific	1955	--	Tertiary	--	--	195,000(i)
Amotape	Pet. Amotape	1954	32	Tertiary	11,030	9,673	315,000
SIERRA							
Pirín	Titicaca	1906	--	Cretaceous	--	--	287,000
EASTERN							
Maqta	Oriente	1957	14	Cretaceous	550,761	591,159	3,867,000
Agua Calientes	Genso Azul	1939	29	Cretaceous	572,209	587,219	10,269,000
Total					23,027,026	25,856,632	735,734,000

- (a) Includes the Humboldt concessions and the Douglas Oil Co. wells operated by Cabeen Exploration Corp.
 (b) Includes wells drilled by Douglas, Peruvian Pacific, and Cabeen.
 (c) Includes 6 dry holes drilled previously by Peruvian Pacific.
 (d) Includes all EPF's coastal producing areas in northwest Perú.
 (e) Includes production of predecessor companies on EPF's coastal areas in northwest Perú.
 (f) Excludes despending of an abandoned well in 1967.
 (g) Lima concessions jointly held by International Petroleum Co. (operator) and Compañía Petrolera Lobitos.
 (h) Excludes despending of an abandoned well in 1967.
 (i) Accumulated production from the farmed-out Tablazo concessions before their return to EPF in February 1960.

platforms offshore in the Talara region. Directional drilling is done from these platforms with the rig mast inclined up to 45° from vertical. So far as is known, this is an innovation in offshore drilling.

MISCELLANEOUS

On November 15, 1967 the 20,000-b/d Pampilla refinery of Empresa Petrolera Fiscal, just north of Lima, went on stream.

PUERTO RICO

The Economic Development Administration advised that in Puerto Rico there were no activities related to the search for petroleum during the year 1967.

TABLE LXV. TOTAL GAS PRODUCTION IN PERÚ
(Million Cu Ft)

1966	1967
58,900	60,093

EL SALVADOR

By GERALD DIXON, Harry Wassall and Associates, Inc., Geneva, Switzerland

Several companies reportedly applied for permission to conduct offshore seismic surveys during 1967, but from all available information, no surveys were run during the year. There is no petroleum law in El Salvador, and no concessions are held, although most of the continental shelves of Nicaragua on the south and Guatemala on the north are under license or application.

SURINAM (Fig. 25; Table LXVI)

By R. GAGEONNET and F. CIVREIS, PETROPAR, Paris, France

DRILLING

The wildcat Coronie Offshore No. 1 was abandoned as a dry hole January 29, 1967 at TD 3,294 m, thus, completing the offshore drilling program started in 1966.

This was the only drilling operation by PETROSUR in 1967. However, in the onshore area of the PETROSUR concession, the water well C

DEVELOPMENTS IN SOUTH AMERICA AND CARIBBEAN AREA

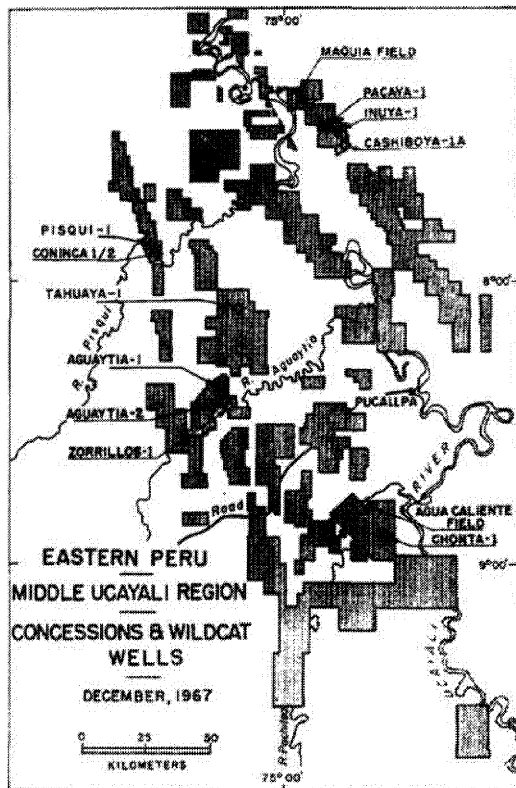


Fig. 24.—Perú, concessions and wildcats in eastern part of country. Includes exploratory wells for 1967 and previous years.

XI drilled northwest of Paramaribo by the Department of Mines of Surinam found some oil shows.

SEISMIC

An offshore seismic experimental survey was carried out by the CGG Vessel *Lady Nathalia*; 72 km of line was shot with the Flexotir system.

CONCESSIONS

On January 30, 206 blocks were released. The

initial concession consisted of 1,176 blocks. The remaining area is 83,265 sq km (Fig. 25).

TRINIDAD AND TOBAGO (Figs. 26-29; Tables LXVII-LXXXVI)

By O. O. FERNANDES and E. BERTRAND, Ministry of Petroleum and Mines, Port-of-Spain.

INTRODUCTION

Phenomenal growth in the producing sector of the Trinidad and Tobago petroleum industry reflected highly successful drilling programs in the Texaco Guayaguayare-Navette field on land and in the Marine North and East Soldado fields of Trinidad Northern Areas Ltd. Compared with the previous year, crude-oil production from all areas increased by 17.2% to a record high of 65,183,582 bbl. The marine areas output rose by 19.3%, whereas land production registered an increase of 16%.

Natural gas production also increased to a new record of 140 Bscf for the year. Gas utilized for the year in all industries, including refining, increased from 48.7 to 53.5 Bscf; gas utilized for other purposes also increased from 26.8 to 32.1 Bscf. The quantity used for gas lifting, etc., before venting rose from 23.2 to 30.9 Bscf.

Other highlights of the petroleum industry during 1967 are:

1. Proved crude-oil reserves increased 5¼% to a total of 612 million bbl as of December 31, 1967. This figure does not reflect any increase in ultimate oil recovery which might accrue from steam-injection operations. Recently a greater degree of success has been obtained in several areas but has not been conclusive enough to permit an estimation of additional oil recovery from this relatively new fluid-injection method.

2. Although there was further reduction in the number of rigs in operation, rig efficiency improved and the number of completions was substantially unaltered.

TABLE LXVI. SUMMARY OF WILDCAT DRILLING BY PETROSUR IN SURINAM, 1967

Well Name	Lat., Long.	Basis Lahee for Explor. Loc. Class.	Compl. Date	Total Depth (Meters)	Deepest Form.	Result, Remarks
Coronie Offshore No. 1 (CO 1)	N 6°49'34" W 56°74'38"	Seis. NFW	Jan. 29	3,294	Cret.	Abd. Lowermost 274 m drilled in 1967

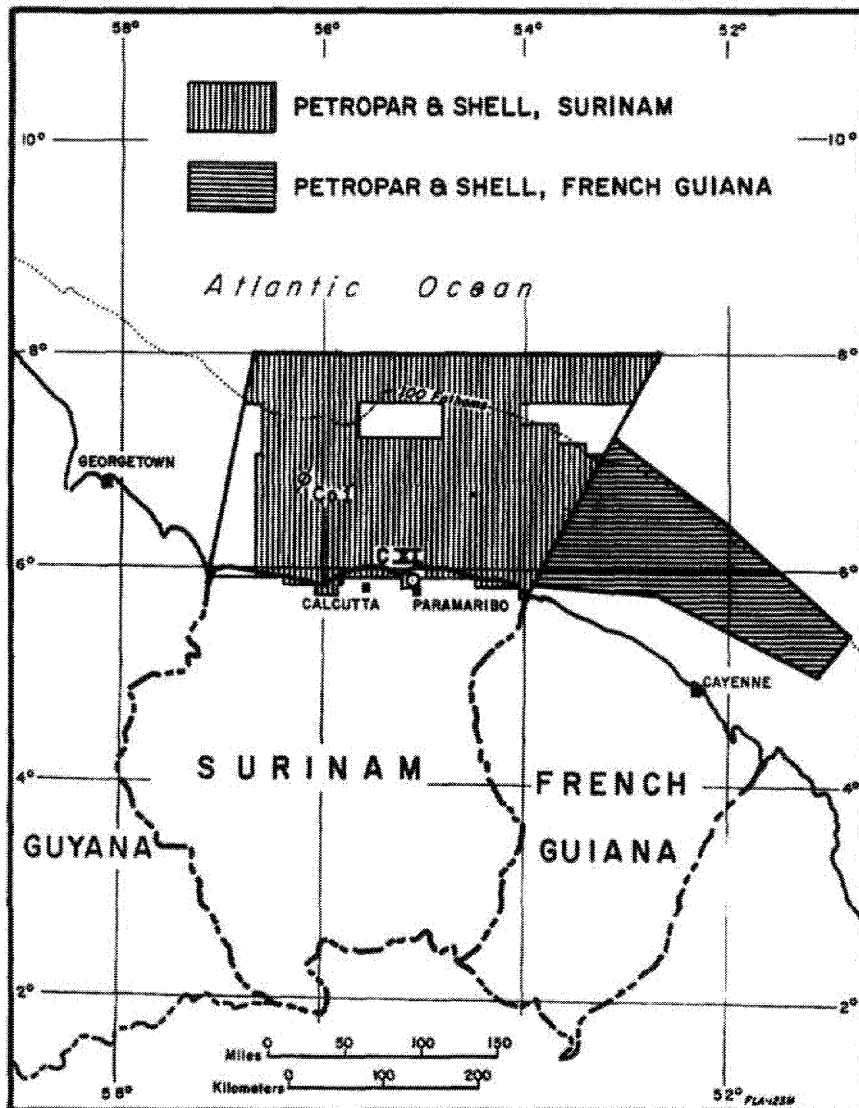


FIG. 25.—Surinam and French Guiana, 1967 exploratory wells and concession areas.

3. Pan American Trinidad Oil Co., after a 3½-year lapse, started drilling a 15,000-ft exploratory well in about 250 ft of water 40 mi off the southeastern coast of the island. An additional 512,000 acres was acquired by this company during the year on terms and conditions which were similar to those in the original license but included other provisos which insured a digital-seismic survey of the entire new area and a 15,000-ft exploratory well, if justified, within an 18-month period.

4. As a consequence of the very encouraging results obtained last year from the aeromagnetic survey of the marine areas north of Trinidad and west of Tobago, the United Nations approved a comprehensive program of technical and financial aid for a follow-up seismic survey in this area. The seismic survey is programmed for April 1968 and all interested parties will be permitted to examine the results of these surveys at an appropriate time.

5. In October 1967, the Minister of Petroleum

Review of 1968 Petroleum Developments in South America, Central America, and Caribbean Area¹

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Abstract This review includes information on 29 countries. Petroleum production in 1968 is reported from 9 countries and their combined total production was 1,692,889,000 bbl, an increase of 2.4% from the previous year. Venezuela's production at 78% of the total continues to dominate in this region. However, notable increases were made in daily production rates of Chile (10.4%), Brazil (9.5%), and Argentina (8.6%). Production declined in Colombia (8.4%) and Ecuador (20.3%) but the trend of these 2 countries should be reversed in the near future, as new fields in the Putumayo basin of Colombia are scheduled to go on production in 1969 and important discoveries were made this year in eastern Ecuador.

In 1968, a total of 10,632,407 ft was drilled in 1,748 wells, an increase from 1967 of 3.4% in footage and 29 wells. Exploration drilling was carried out in 12 countries and of the 370 exploratory wells completed, 32% were successful. Party-months of geologic and geophysical work for the whole area were: surface geology, 338; seismograph, 593; gravity, 76; and airmagnetometer, 16,—61% of this work was in Argentina and Brazil.

A significant omen, indicative of increased exploration in the future, is the new concession activity which took place in Argentina, Perú, Ecuador, Colombia, Panama, Nicaragua, Honduras, Guatemala, Jamaica, and Puerto Rico; further, there is a suggestion that bids for new acreage soon will be requested for the offshore area between Trinidad and Tobago and possibly in Venezuela.

INTRODUCTION (Tables 1-4)

Petroleum production in 1968 from the review area was 1,692,889,000 bbl, an increase of 2.4% from the previous year (Table 1). Venezuela continued to furnish most of the production (78%), as it produced oil at a rate of 3,604,800 b/d—up 1.8% from last year. Table 2 shows that notable increases in daily production rates were made by Chile (10.4%), Brazil (9.5%), and Argentina (8.6%). Production declined in Colombia (8.4%), but the decline should be reversed in the near future as the fields in the Putumayo basin go on production through a pipeline to the west coast that is scheduled for completion early in 1969. There was also a decline in Ecuador's production (20.3%), but the successful wildcats completed the last 2 years in the eastern part of the country augur well for a substantial increase in production when a pipeline outlet is available.

¹ Manuscript received and accepted, April 23, 1969.

² Gulf Oil Company—Latin America.

Party-months of exploration activity by country are shown in Table 3. Argentina and Brazil were leaders in this effort.

A total of 1,748 wells was drilled—29 more than in the previous year; 370 were classified as exploratory and 32% of these were successful (Table 4).

Possibly the most important exploration drilling events of 1968 were Pan American's condensate discovery off the southeast coast of Trinidad, the successful completions in offshore Brazil by Petrobrás, and the continued success of wildcats by Texaco and Gulf in their joint area in eastern Ecuador. Equally significant may have been the activity in many countries in acquisition of exploration rights. In each Central American country except El Salvador, there are now large concession holdings. New rights were acquired in Jamaica and Puerto Rico. Particularly notable in South America were the applications in Colombia's Llanos, eastern and coastal Ecuador, Perú's offshore, and in onshore and offshore Argentina. In addition, the government of Trinidad and Tobago has announced that competitive bids will be called for on the area between the 2 islands which this year was covered by a seismic survey. There also are indications that areas in Venezuela, already covered by seismograph, may be opened for contract bids and that new areas in Argentina will be opened for bids in 1969. All of this activity suggests increased future exploration in this part of the world.

Tables 1 to 4 are incomplete for 1968 in that Cuba is not included. There was petroleum activity as reported in the section on that country, but data were so indefinite that they were omitted.

ACKNOWLEDGMENTS

A review of this nature is made possible only through the efforts of many individuals and organizations. The writer expresses his personal appreciation and that of The American Association of Petroleum Geologists to the following contributors of information for this review

Developments in South America and Caribbean Area

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Table 1. Annual Oil Production, 1964-1968 (1,000 of Bbl)

Country	1964	1965	1966	1967	1968	Total Cumulative Production
Venezuela	1,261,657	1,267,709	1,230,298	1,292,787	1,319,356	23,645,441
Argentina	100,370	98,797	104,756	115,237	125,474	1,604,397
Trinidad	69,731	48,859	35,603	65,202*	66,904	1,137,163
Colombia	62,857	73,659	72,843	70,982	64,828	1,457,844
Brazil	33,313	34,365	42,450	53,521*	56,787	419,031
Perú	23,119	23,068	23,027	25,857	27,056	762,790
Bolivia	3,290	3,366	6,105	14,592*	14,976	80,191
Chile	13,687	12,704	12,429	12,369	13,695	134,073
Ecuador	2,883	2,919	2,660	2,272	1,815	101,122
Cuba	265	407	491	807	--	--
Barbados	--	--	9	8	--	17
Total	1,531,172	1,565,831	1,550,671	1,653,234*	1,692,889	29,342,269
Percent change	+2.2%	-0.9%	+6.6%	+2.4%		

*Minor adjustment.

of petroleum developments during 1968 in South America, Central America, and the Caribbean area:

ARGENTINA	Eduardo L. Padula, Yacimientos Petroliferos Fiscales (YPF), Buenos Aires
BAHAMAS	C. R. Goss, Chevron Overseas Petroleum Inc., San Francisco, Calif.
BARBADOS	Edward E. Hickam, General Crude Oil Co., Houston, Tex.
BOLIVIA	J. N. Bond, Bolivian Gulf Oil Co., Santa Cruz
BRAZIL	Haroldo Ramos da Silva, Petróleo Brasileiro S.A. (Petrobrás), Rio de Janeiro
BRITISH HONDURAS	C. R. Goss, Chevron Overseas Petroleum Inc., San Francisco, Calif.
CHILE	Mario Marino P., Empresa Nacional del Petróleo (ENAP), Santiago
COLOMBIA	W. Ernest Aitken, Colombia-Cities Service Petroleum Corp., Bogotá

Table 2. 1968 Oil Production

Country	B/D	% Change from 1967
Venezuela	3,604,800	+ 1.8
Argentina	342,825	+ 8.6
Trinidad	182,798	+ 2.3
Colombia	177,126	- 8.4
Brazil	160,620	+ 9.5
Perú	73,924	+ 4.4
Bolivia	40,913	+ 2.3
Chile	37,418	+10.4
Ecuador	4,959	-20.3
Total	4,625,383	

Table 3. 1968 Exploration Activity in Party-Months

Country	Surf. Geol.	Seis.	Grav.	Air-Mag.	Other	Total
Argentina	86.00	294.00	12.00	2.00	108.00	500.00
Bahamas	--	2.00	--	--	--	2.00
Barbados	--	0.30	--	--	--	0.30
Bolivia	48.00	23.00	9.00	--	16.00	96.00
Brazil	115.00	85.00	22.00	5.00	32.00	259.00
British Honduras	--	6.00	--	--	--	6.00
Chile	6.00	32.00	--	--	--	38.00
Colombia	18.00	71.42	28.00	6.98	12.00	136.40
Costa Rica	--	2.30	--	--	--	2.30
Ecuador	14.25	30.50	--	2.75	1.50	49.00
French Guiana	--	1.00	--	--	--	1.00
Guyana	--	0.50	--	--	--	0.50
Honduras	--	2.00	--	--	--	2.00
Jamaica	--	1.00	--	--	--	1.00
Nicaragua	2.00	5.00	--	0.30	--	7.30
Panama	2.00	--	--	--	--	2.00
Perú	27.50	13.25	5.00	1.00	13.00	59.75
Surinam	--	3.00	--	--	--	3.00
Trinidad	18.00	6.28	--	--	--	24.28
Venezuela	3.50	11.50	--	--	--	15.00
Total	718.25	593.25	78.00	16.03	182.50	1,206.03

Table 4. 1968 Drilling Statistics

Country	Total Wells Drilled	Total Footage Drilled	Explor. Wells Compl.	Explor. Wells Success
Argentina	515	2,993,240	85	22
Bolivia	61	436,425	28	15
Brazil	231	1,152,123	115	31
Chile	100	614,882	17	2
Colombia	55	373,448	21	5
Ecuador	20	93,319	8	5
Guatemala	2	13,526	2	--
Nicaragua	2	24,064	2	--
Perú	164	838,000*	36	10
Surinam	4	7,464	4	--
Trinidad	175	942,686	23	10
Venezuela	419	3,143,230	29	18
Total	1,748	10,632,407	370	118

* Estimated.

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C. H. Neff

COSTA RICA	M. Sadoun and M. Sourisse, ELF, Paris, France
CUBA	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
DOMINICAN REPUBLIC	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
ECUADOR	K. W. Bond, Anglo-Ecuadorian Oilfields Ltd., Quito
FRENCH GUIANA	M. Sadoun and M. Sourisse, ELF, Paris, France
GUATEMALA	P. Jacobsen, Jr., Esso Exploration Inc., Coral Gables, Fla.
GUYANA	Sobharam Singh, Director, Geological Survey, Georgetown
HONDURAS	L. B. Snedden, Signal Oil and Gas Co., Los Angeles, Calif.
JAMAICA	J. B. Williams, Director, Geological Survey Department, Kingston
NETHERLANDS ANTILLES	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
NICARAGUA	Paul M. Miller, Esso Exploration Inc., Coral Gables, Fla.
PANAMÁ	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
PARAGUAY	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
PERÚ	Percy Rozas V., Peruvian Gulf Oil Co., Lima
PUERTO RICO	O. D. Weaver, Weaver Oil & Gas Corp., Houston, Tex.
EL SALVADOR	Gerald E. Dixon, Petroconsultants S.A., Geneva, Switzerland
SURINAM	M. Sadoun and M. Sourisse, ELF, Paris, France
TRINIDAD AND TOBAGO	O. O. Fernandes and E. Bertrand, Ministry of Petroleum and Mines, Port-of-Spain
URUGUAY	Jorge L. Mackinnon, Administración Nacional de Combustibles, Alcohol y Portland (ANCAP), Montevideo
VENEZUELA	Neal R. VanMiddlesworth, Venezuelan Oil Scouting Agency (VOSA), Caracas

Sincere thanks are due fellow workers at Gulf Oil Company—Latin America for their help. Maps, including drafting where necessary, were done by J. R. Gomez, C. D. Chaisson, and A. J. Schieritz, and special recognition is accorded to Marianne Bryant for checking and

preparing in final form all of the statistical data, for typing the text and tables, and assembling the manuscript.

ARGENTINA (Fig. 1; Tables 5-10)

By EXPLORATION DEPARTMENT, Yacimientos Petroliferos Fiscales (YPF), Buenos Aires

Exploration

Exploration work in Argentina was at a high level as Yacimientos Petroliferos Fiscales (YPF) continued an aggressive program and private companies initiated work in newly-acquired concession areas (Table 5). YPF had 22 reflection seismic parties that surveyed 7,807 km of profile; additional exploration work consisted of gravity surveys over 10,650 km², surface geology over 8,400 km², photogeology of 91,600 km², and, in conjunction with the Naval Hydrographic Service, airmagnetometer survey of 110,000 km². Length of seismic profile decreased 2% from the previous year; however, there was a shift in emphasis to the common-depth-point stacked technique, as is shown by the increase from 41,778 in 1967 to 63,771 in 1968 in the number of shot points drilled. Most of the YPF exploration work was centered in areas that were reserved under Petroleum Law 17,319 of 1967.

All exploratory drilling was in YPF areas as the new private concessions had not reached the drilling stage. The YPF drilling program established production as proved on 2,034 ha. for oil and 5,563 ha. for gas, and classed as probably productive an additional 5,589 ha. for oil and 9,404 ha. for gas. Successful YPF wildcats are listed with pertinent data in Table 7 and are shown on Figure 1. Worthy of special mention is the new field, Estructura Cruz de Piedra, in Mendoza where wells had an IP of more than 100 m³/day and an area of more than 770 ha. was proved at year end. The more important successful wells in Neuquén appear to be Senillosa Norte and Puesto Hernández, although further evaluation is needed at Los Bastos and Rincón de los Sauces. Successful exploration wells in the province of Río Negro (Neuquén basin) were drilled at Quemado, El Santiagueño, and Puesto Morales. In the southernmost part of the country, gas discoveries were made at Chimen Aike, Sur Río Chico, and at Moy Aike in Santa Cruz. In Tierra del Fuego, Cabeza de León 1 was an oil producer.

Although abandoned, an exploratory well deserving mention is Punta Delgada 1 which is near the coast in the approximate center of San

awarded exploration rights totaling 81,396 ha. in the east-central part of the country. Some of this acreage is offshore in Amatique Bay. These interests also have applied for selected National Reserves acreage (252,826 ha.) in the same region.

The composite Guatemala acreage picture at the end of 1968 was as follows.

Exploration rights	1,332,823 ha.
Applications (approx.)	3,962,000 ha.
National Reserves (approx.)	2,025,000 ha.

No geologic or geophysical field effort was reported by the oil industry for 1968. It is known that some airborne geophysical work was done, but probably was oriented to nonhydrocarbon minerals exploration and to general resources evaluation. Apparently, none of the applicants for National Reserves acreage in the Petén region had mounted sizeable exploration efforts by year end.

The Texaco Group's onland test, Madre Vieja-1 along the Pacific coast, marked Guatemala's first important exploration drilling in several years. The information released on the well is given in Table 45. The Abularach interests drilled a shallow cable-tool test, Agua Negra-1, on a small exploration right since relinquished in central Guatemala. This well, in the folded and faulted belt of outcropping Mesozoic and older rocks, probably spudded in the Cretaceous. No other information is available.

Several studies on Guatemalan geology were published or presented during the year. The new work concerns principally the older sedimentary section of the central part of the country and is not of immediate interest to current petroleum exploration.

GUYANA (Fig. 13)

By SOBHAM SINGH, Director, Geological Survey, Georgetown

Oil activity in Guyana was relatively slight during 1968. The only exploration was the shooting of approximately 1,000 km of marine seismic profile—900 km by Guyana Shell Ltd. and 100 km by Continental Oil Co. and Tenneco Guyana Inc.

During the year, Guyana Shell made modifications to the titles of their exploration licenses. They relinquished 2,350 mi² of their onshore concession and converted the remaining 1,700 mi² to 9 oil prospecting licenses; 7,900 mi² of offshore exploration license was converted to a single oil prospecting license (OPL 211).

Continental Oil and Tenneco Guyana re-

linquished 2,225 mi² of their westernmost oil exploration license bordering Venezuela. They now hold a single oil exploration license over 13,800 mi² offshore.

There was no activity during the year in the Takutu basin of southern Guyana. Octagon Petroleum and Macmillan Ring-Free applied for an exploration concession over 2,600 mi² of the basin and, although the government approved the application early in the year, the companies had not taken up their license at year end. Under the circumstances, the application was treated as lapsed.

General elections were held in Guyana in December and the government of Prime Minister Forbes Burnham was returned with an overall majority.

HAITI

No petroleum concessions were valid in Haiti during 1968, and there were no developments related to petroleum exploration.

HONDURAS (Fig. 14)

By L. B. SNEDDEN, Signal Oil and Gas Company, Los Angeles, California

Exploration activity in Honduras during 1968 consisted chiefly of the acquisition of exploration rights and geophysical surveying. In June, Republic Oil and Gas Co. was granted 4 onshore blocks totaling 184,670 ha., and 4 offshore blocks totaling 19,823 ha. on the west coast in the vicinity of the Golfo de Fonseca. In July, Lloyd Honduras Inc. was granted 6 offshore blocks on the east coast totaling 760,510 ha. Overlooked in the report on activities for 1967 was the grant to Chevron in November of 984,751 ha. offshore on the east coast.

Geophysical work in 1968 consisted of approximately 2 weeks of marine vibroseis and magnetometer surveying of about 300 mi by Signal Exploration (Honduras) Co., and 2 weeks of the same type work by Chevron. It is reported that Pacific Inland and International Geophysical Co. jointly conducted a sparker seismic survey and aeromagnetic survey. All geophysical work was on the north coast. Surface geologic mapping was reported by CAMO.

JAMAICA (Fig. 15)

By J. B. WILLIAMS, Director, Geological Survey Department, Kingston

Land Holdings

Signal Exploration (Jamaica) Co., a wholly owned subsidiary of Signal Oil and Gas Co. of

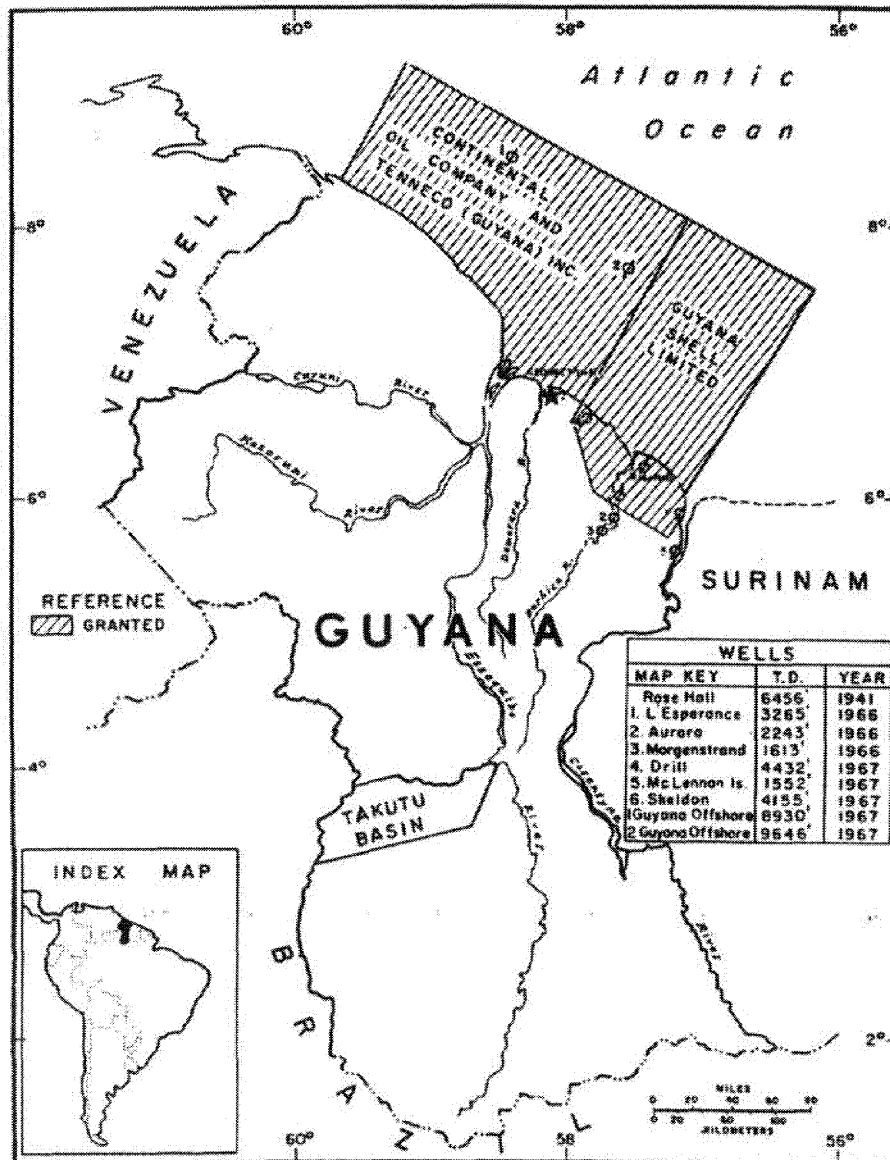


FIG. 13.—Guyana, 1968 concession areas.

Los Angeles, has an agreement with the government under which it was issued an oil exploration license on April 3, 1967, for an initial term of 2 years to explore for oil in an area of about 6,313 mi² comprising: (a) approximately 1,772 mi² consisting of a small part of the southwest coast of Jamaica and the shallow

waters off the southwest coast; (b) the Pedro Banks, 4,347 mi², approximately 60 mi southwest of the island, and (c) the Walton Banks, 194 mi² situated between the other two areas.

O. D. Weaver of Pittsburgh, Pennsylvania, executed an agreement with the government of Jamaica on September 10, 1968, to obtain pe-

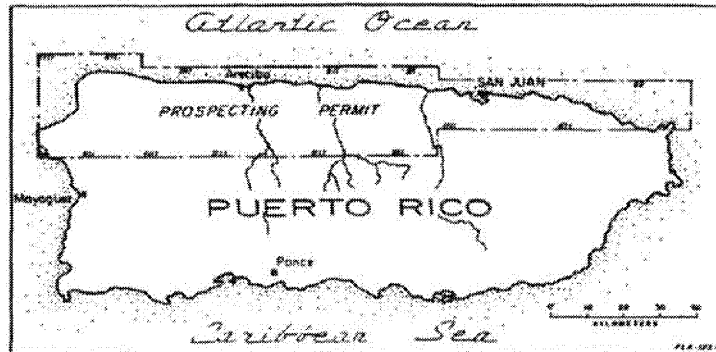


Fig. 20.—Puerto Rico, 1968 oil and gas prospecting permit.

fic in San Juan and is proceeding with a detailed surface and photogeologic study as called for in the agreement with the Mining Commission.

EL SALVADOR

By GERALD E. DIXON, Petroconsultants S.A., Geneva, Switzerland

There is no petroleum legislation in El Salvador and no concessions have ever been held, although some companies have expressed interest in the continental shelf. No new developments were reported during 1968.

SURINAM (Table 57)

By M. SADOUN and M. SOURISSE, ELF, Paris, France

Four exploratory tests were drilled by PETROSUR in the Paramaribo area between February 27 and April 28 using a Failing 2500 rig of the Department of Mines. Some oil shows were observed but production tests gave fresh water and a small quantity of oil (Table 57).

An offshore seismic reflection survey was carried out by ELF Petroleum Suriname as operator for a group which also includes EU-

RAFREP and Shell Suriname. Three party-months of work yielded 2,257 km of profile. The offshore concession area held by the group is shown in the review of 1967 (Hadley and Neff, 1968, Fig. 25).

Reference Cited

Hadley, W. H., and C. H. Neff, 1968, Review of 1967 petroleum developments in South America, Central America, and Caribbean area: Am. Assoc. Petroleum Geologists Bull., v. 52, no. 8, p. 1420.

TRINIDAD AND TOBAGO (Figs. 21-26; Tables 58-68)

By O. O. FERNANDES and E. BERTRAND, Ministry of Petroleum and Mines, Port-of-Spain

Operations in the oil industry in Trinidad and Tobago during 1968 were maintained, in general, at the high level attained during preceding years. Results were satisfactory (Table 58). The most significant event was the discovery of a large deep gas-condensate field off the east coast of Trinidad by the Pan American Trinidad Oil Co.

The discovery of new oil and gas fields has been an urgent need of the country; thus the

Table 57. Summary of Wildcat Drilling by Petrosur in Surinam, 1968

Well Name	Location (UTM)	Comp. Date	Total Depth (Meters)	Deepest Formation	Result Remarks
Paramaribo-1	X 350,390 Y 970,800	Mar. 14	330	Paleocene/ Maestrichtian	Abd.
Paramaribo-2	X 354,180 Y 970,750	Apr. 1	620	Basement	Abd.
Paramaribo-3	X 350,370 Y 971,840	Apr. 28	663	Basement	Abd.
Paramaribo-4	X 346,200 Y 972,870	Apr. 16	662	Basement	Abd.

Review of 1969 Petroleum Developments in South America, Central America, and Caribbean Area¹

C. H. NEFF²

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Abstract. This review includes information on petroleum developments during 1969 in 29 countries. Petroleum was produced in 10 countries and their combined total production for the year was 1,696,391,000 bbl, an increase of 0.15% from the previous year. Venezuela produced 77% of the total although its production decreased slightly (0.3%). Production increased in Colombia (19.3%), Brazil (7.5%), and Argentina (3.9%), and decreased in all other producing countries.

A total of 10,684,429 ft was drilled in 1,627 wells; in comparison with 1968, this was an increase of 0.5% in footage but a decrease of 121 wells. Exploration drilling was carried out in 14 countries and 28% of the 365 wells were successful. Party-months of geologic and geophysical work for the area of this review were: surface geology, 322; seismograph, 544; gravity, 30; airmagnetometer, 19; 63% of this work was in Argentina and Brazil. Notable exploration events were the Caimonito field discovery in Argentina, discovery of crude oil off the east coast of Trinidad in the area where gas and condensate were found earlier, and the continued successful wildcatting in eastern Ecuador.

A new petroleum law was enacted in Trinidad and Tobago; the petroleum law in Peru was revoked—however, existing rights will remain in effect.

¹ Manuscript received and accepted, May 1, 1970.

² Gulf Oil Company—Latin America.

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INTRODUCTION (Tables 1-4)

From the 29 countries covered by this review, petroleum production in 1969 was 1,696,391,000 bbl, a slight increase of 0.15% from the previous year (Table 1). Venezuela continued to be the major producer furnishing 77% of the total as oil was produced at a rate of 3,594,100 b/d, down 0.3% from last year; within that country, Lake Maracaibo continued as the major area producing 2.4 million b/d, and Creole was the leading company with 1.5 million b/d.

Percentagewise, the most notable increase in production was in Colombia (19.3%), largely a result of the Orito field being put on production through a pipeline across the Andes to a terminal in Tumaco on the Pacific coast of Colombia. Production also increased in Brazil (7.5%) and in Argentina (3.9%). Production decreased in all other countries.

Party-months of exploration activity by country are shown in Table 3. Leader in this effort was Argentina as YPF had 22 seismic parties in the field. Next was Brazil where work

Table 1. Annual Oil Production,
1965-1969 (1,000 of Bbl)

Country	1965	1966	1967	1968	1969	Total Cumulative Production
Venezuela	1,267,709	1,230,298	1,292,787	1,319,356	1,311,831	26,962,760*
Argentina	98,797	104,756	115,237	125,474	130,031	1,734,628
Colombia	73,659	72,843	70,582	64,828	77,122	1,534,966
Brazil	34,345	42,450	53,521	58,787	63,043	482,074
Trinidad	48,859	55,603	65,202	66,904	57,418	1,194,571*
Peru	23,068	23,027	25,857	27,056	26,330	789,120
Bolivia	3,364	6,105	14,592	14,974	14,758	94,969
Chile	12,704	12,429	12,369	13,695	13,350	167,423
Ecuador	2,919	2,660	2,272	1,815	1,608	102,730
Cuba	407	491	807	1,000*	900	9,605**
Barbados	--	9	8	--	--	17
Total	1,565,831	1,550,671	1,653,234	1,693,889*	1,696,391	31,052,843*
Percent change	-0.97%	+6.6%	+2.4%	+0.15%		

*Adjustment.

**Estimated.

Developments in South America and Caribbean Area

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on the continental shelf was featured—airmagnetometer surveyed 47,800 km of profile and marine seismic recorded 22,000 km of profile.

A total of 1,627 wells was drilled—121 less than last year; 365 were classified as exploratory and 28% were successful (Table 4).

Probably the most important new discovery during 1969 was YPF's Caimancito field in north Argentina which established commercial production in a new part of the stratigraphic column; of equal significance may have been the discovery of oil production off the east coast of Trinidad by Pan American where condensate production had been established the previous year. Ecuador featured the continued successful wildcatting by Texaco/Gulf and a buildup of concession acquisitions and related exploration activities by other companies.

Trinidad and Tobago passed a new petroleum law (Act No. 46 of 1969) and early in 1970, called for competitive bids on the north coast marine area. In Perú, the government issued Decree Law No. 17,440 cancelling the concession system—a new petroleum law is being prepared. In Bolivia, the properties of Bolivian Gulf Oil Company were nationalized.

Data for Cuba in Tables 1 and 2 are approximate.

ACKNOWLEDGMENTS

I am indebted to the following individuals and companies for their part in contributing sections and/or supplying information for this review of petroleum developments during 1969 in South America, Central America, and the Caribbean area:

ARGENTINA

Eduardo L. Padula, Yacimientos Petrolíferos Fiscales (YPF), Buenos Aires, and Private Companies

Table 2. 1969 Daily Oil Production

Country	B/D	% Change from 1968
Venezuela	3,594,100	- 0.3
Argentina	356,249	+ 3.9
Colombia	211,293	+19.3
Brazil	172,720	+ 7.5
Trinidad	157,310	-13.9
Perú	72,136	- 2.4
Bolivia	40,433	- 1.2
Chile	36,575	- 2.3
Ecuador	4,405	-11.1
Cuba	2,500*	—
Total	4,647,721	

* Estimated.

Table 3. 1969 Exploration Activity in Party-Months

Country	Surf. Geol.	Seis.	Grav.	Air-Mag.	Other	Total
Argentina	100.00	287.10	12.00	1.30	--	400.40
Bahamas	--	1.75	--	--	--	1.75
Barbados	1.00	1.00	--	--	--	2.00
Bolivia	43.50	27.00	--	--	--	70.50
Brazil	74.00	82.00	--	5.00	48.00	209.00
British Honduras	--	5.00	--	0.50	--	5.50
Chile	5.00	24.00	1.00	--	6.00	36.00
Colombia	18.16	51.22	8.64	2.33	--	80.35
Costa Rica	4.00	--	--	--	--	4.00
Dominican Republic	3.00	1.00	1.00	--	--	5.00
Ecuador	14.00	34.00	1.00	4.00	--	53.00
Guatemala	3.50	0.70	--	0.75	--	4.95
Honduras	2.00	3.20	--	2.25	--	7.45
Jamaica	8.00	0.50	--	--	--	8.50
Nicaragua	--	3.80	--	--	--	3.80
Panama	24.00	--	--	--	--	24.00
Paraguay	--	--	--	1.00	--	1.00
Perú	5.00	--	6.00	2.00	5.00	18.00
Puerto Rico	5.00	--	--	0.25	--	5.25
Surinam	--	1.00	--	--	--	1.00
Trinidad	8.60	3.57	--	--	--	12.17
Venezuela	3.50	17.50	--	--	--	21.00
Total	322.26	544.34	29.66	19.38	59.00	974.64

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BARBADOS

Edward E. Hickam, General Crude Oil Co., Houston, Tex.

BOLIVIA

Yacimientos Petrolíferos Fiscales Bolivianos (YPFB), La Paz

BRAZIL

Haroldo Ramos da Silva, Petróleo Brasileiro S.A. (PETROBRAS), Rio de Janeiro

BRITISH HONDURAS

C. R. Goss, Chevron Overseas Petroleum Inc., San Francisco, Calif.

Table 4. 1969 Drilling Statistics

Country	Total Wells Drilled	Total Footage Drilled	Explor. Wells Comp.	Explor. Wells Success.
Argentina	432	2,915,483	86	20
Barbados	—	11,643	—	—
Bolivia	57	416,494	15	8
Brazil	181	944,915	86	20
Chile	78	519,690	19	4
Colombia	67	457,300	30	11
Dominican Republic	7	29,300	7	—
Ecuador	14	115,626	8	7
Honduras	1	9,997	1	—
Nicaragua	5	41,430	5	—
Perú	189	937,111	38	10
Surinam	17	34,212	17	—
Trinidad	130	690,671	20	10
Venezuela	449	3,560,557	33	14
Total	1,627	10,684,429	365	104

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PERÚ

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EL SALVADOR

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SURINAM

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TRINIDAD AND TOBAGO

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It is my pleasure to acknowledge the assistance received in compiling this review from fellow workers at Gulf Oil Company—Latin America. Marianne Bryant made valuable suggestions as to the form of presentation, in addition to checking all statistical data, typing text and tables, and assembling the manuscript; preparation of maps was handled by J. R. Gomez, C. D. Chaisson, and B. R. Barba—to each my sincere thanks.

ARGENTINA (Fig. 1; Tables 5–11)

By EXPLORATION DEPARTMENT, Yacimientos Petrolíferos Fiscales (YPF), Buenos Aires, and Private Companies

Exploration activity by Yacimientos Petrolíferos Fiscales (YPF) and private companies continued at about the same pace as the previous year; however, there was some shift in emphasis, particularly by the private companies, as the drilling stage was reached on recently acquired concessions.

Geological and geophysical.—YPF operated 22 reflection seismograph parties continuously and surveyed 8,746 km of profile, 87% of which was shot multiply for stacking. This seismic effort was distributed in all of the basins; however, most of the work was done in Neuquén, Cuyo, and Austral—about 60 party-months in each. YPF now has 1 seismic crew equipped for digital recording and in the near future will place 2 additional digital crews in the field. To aid in seismic data processing, YPF is also installing equipment for analog-digital-analog conversion. A YPF gravity party covered an area of 8,028 sq km and 7 surface geology parties carried out reconnaissance and detailed mapping as well as special stratigraphic and structural studies.

Reflection seismic surveys also made up the greater part of the party-months of geologic and geophysical work by private companies. Several short marine projects were carried out in areas covered in 1968 by reconnaissance, detailing structures for wildcat drilling. On land,

Guatemala were opened to bidding in 1968, and offers were received on 57 (approximately 3,029,000 ha.) of the 80 blocks. Little specific information is available on the status of these bids. According to recent press notices, a local bidder, Weissenberg Martinez, has been awarded 6 reserves blocks totaling 374,548 ha. Other bidders presumably continue their efforts to arrange farm-in or other participation.

The composite Guatemala acreage picture at the end of 1969 was as follows:

Exploration rights	1,634,717 ha.
Applications (approx.)	3,425,000 ha.
National reserves (approx.)	2,255,000 ha.

Both the Texaco Group and Esso carried out reflection seismograph surveys on the Pacific continental shelf during 1969 totaling about 1,000 mi. Centram did surface geologic and airborne magnetometer work (2,260 line-mi) in the east-central part of the country. Field party effort is detailed in Table 47. No exploration drilling for oil was reported for Guatemala.

A purported oil indication at shallow depth from a sulphur exploration core hole in the southwesternmost part of the National Reserves acreage drew some newspaper publicity in 1969. These continuing operations by the Monsanto affiliate, Recursos del Norte Ltda., are in remote Alta Verapaz and El Quiche Departments. They are in an area of known and suspected salt domes along the southern margin of a Mesozoic evaporite basin. The oil show is not considered of economic importance.

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GUYANA (Fig. 13)

By SOBHARAM SINGH, Director, Geological Survey Department, Georgetown

No work was done during 1969 by Continental Oil Co., Tenneco (Guyana) Inc., or Guyana Shell Ltd. The companies reported that they were engaged in negotiations for joint prospecting of a structure which extends across the boundary of their prospecting licenses.

Early in 1970, Continental and Tenneco relinquished 12,800 sq mi of their prospecting license and retained a 1,000 sq mi block offshore, together with a 1-mi strip attaching this block to the coast. Guyana Shell renounced its onshore prospecting license.

There was also no activity for the year in the Takutu basin of southern Guyana. At year-end, there was an indication that the Canadian International Development Agency and the Guyana government would carry out an aeromagnetic/seismic investigation of this basin.

HAITI

By PETROCONSULTANTS S.A., Geneva, Switzerland

According to available information, no oil rights were in force in 1969 in Haiti and no exploration or drilling was reported during the year. The last well drilled, Cul de Sac-1, was abandoned 10 years ago (February 1959) at a total depth of 3,772 ft.

HONDURAS (Fig. 14; Table 48)

By L. B. SNEDDEN, Signal Oil and Gas Company, Los Angeles, California

Exploration in Honduras during 1969 was almost entirely on the Atlantic coast and consisted of geophysical and geologic surveying (Table 48), the drilling of 1 wildcat test, and modification of concession holdings (Fig. 14).

Several new companies became concession holders during 1969. Kewanee Overseas Oil Co., Tulsa, Oklahoma, acquired offshore holdings totaling 438,519 ha. from International Geophysical Exploration, Inc., and 149,300 ha. from Pacific Inland Oil Corp. Louisiana Land and Exploration acquired concession rights to 546,935 ha. and had under application 82,394 ha. at the end of the year. Mobil Oil Exploration Honduras, Inc., and Mobil Oil Company de Honduras S.A. acquired acreage from Lloyd Honduras, Inc., and Central American Mining and Oil Co. totaling 1,224,117 ha. Shell Oil Co. applied for 440,550 ha. and Republic Oil Co. from Los Angeles applied for concession rights to 682,627 ha. offshore along the north coast of Honduras. Chevron Oil Co. was being issued concessions at year-end totaling 395,480 ha. onshore along the northeast coast. One wildcat

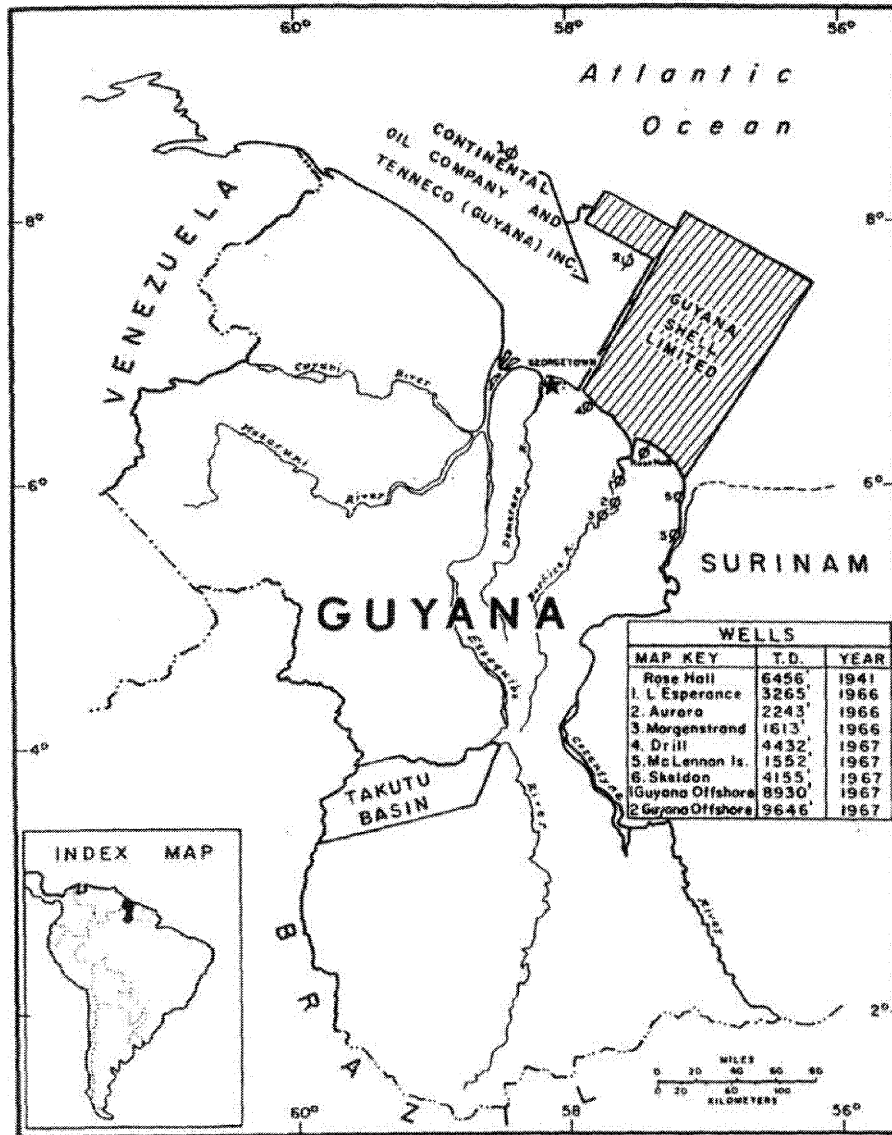


FIG. 13.—Guyana, 1969 oil prospecting licenses.

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operations under a new official entity—Petróleos del Perú.

The Peruvian government has appointed a technical commission to draft a new petroleum code which will rule future oil activities.

PUERTO RICO (Fig. 20)

By O. D. WEAVER, Weaver Oil & Gas Corporation, Houston, Texas

Figure 20 shows the present status of the various "exclusive prospecting permits" in and around Puerto Rico. These permits were granted by the Mining Commission of Puerto Rico in 1968 to the Weaver Group, and in 1969 to Sun Oil Co. and to Puerto Rican Exploration Corp.

The Weaver Group is composed of O. D. Weaver, Theo Law, and Lloyd Smith of Houston, Texas, and American Ultramar of New York. This group is presently evaluating the results of its recent surface mapping program.

Near the end of the year, Sun Oil Co. started an airmagnetometer survey of its permit area; the project was completed early in 1970. No geologic work has been instigated on the south coast permit area held by Puerto Rican Exploration Corp.

EL SALVADOR

No oil rights were in force in 1969 and no exploration was reported during the year.

SURINAM

By R. GAGEONNET, ELF, Paris, France, and Batsafse Internationale Petroleum Maatschappij N.V., The Hague, Netherlands

An offshore seismic reflection survey was carried out by ELF Petroleum Suriname as operator for a group which also includes EURA-FREP and Shell Suriname. One party-month of work yielded 2,054 km of profile.

Table 61. Trinidad and Tobago Summary Data

	1967	1968	1969
Crude oil prod. (bbl)	65,201,582	66,903,906	57,418,493
Nat. gas prod. (Mscf)	140,338,345	157,444,945	137,502,590
Aver. GOR (scf/bbl)	2,160	2,264	2,394
CHPS (nat. gas prod., bbl)	191,995	163,670	150,466
Refinery capacity (b/d)	405,000	430,000	433,000
Refinery throughput (bbl)	138,924,636	151,282,098	154,076,702
Total wells compl.	217	175	130
Aver. depth compl. wells (ft)	4,328	5,356	5,468
Total footage	928,210	942,686	690,671
Oil and gas wells compl.	198	152	99
Percent success	91	86	76
Proved crude oil reserves (million bbl)	612	NA	NA
Acreage developed	42,175	43,630	44,915
Aver. rigs running	9.5	8.2	7.0

Drilling operations by Shell Suriname Exploratie en Productie Maatschappij started on March 23, 1969, with the Skinner Drilling Co. as contractor. Of the 20 wells programmed, as stipulated by the concession agreement, 17 were completed by the end of 1969. Only 2 of these wells, situated in the Calcutta-Tambar-edjo area, found oil indications.

Total footage drilled was 34,212, with the depths of wells ranging between 225 ft and 3,245 ft.

TRINIDAD AND TOBAGO (Figs. 21-23; Tables 61-67)

By O. O. FERNANDES, Ministry of Petroleum and Mines, Port-of-Spain

Although drilling and production decreased during 1969, all other aspects of the petroleum industry in Trinidad and Tobago showed healthy increases. Table 61 summarizes the results obtained during the year and presents comparable statistics for the 2 previous years. The overall performance was good.

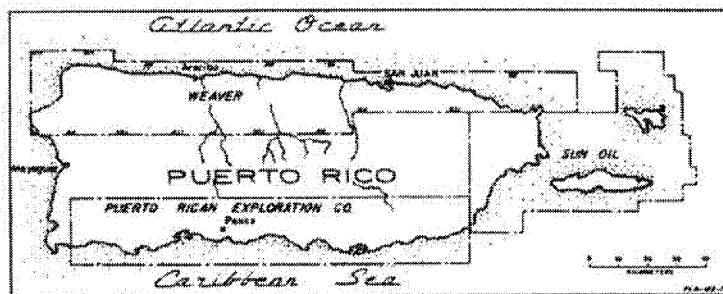


FIG. 20.—Puerto Rico, 1969 exclusive oil and gas prospecting permits.