

Petroleum Developments in South America, Central America, Mexico, and Caribbean Area in 1977¹

F. L. AMATO²

Abstract The review for 1977 presents information on petroleum developments in 31 countries from South America, Central America, the Caribbean area, and Mexico. Hydrocarbons were produced in 13 of these countries, for a total reported production of 1,685,223,000 bbl of oil. Statistics on gas production were not available on all countries so total gas production could not be determined. Argentina, Mexico, Peru, and Trinidad had increases in production.

Major increases in development drilling were experienced in Argentina (private companies), Bolivia, Chile, and Colombia. Ecuador and Peru had slight decreases.

Continued exploratory efforts resulted in significant new discoveries in Bolivia, Brazil, Chile, Colombia, Peru, Trinidad, and Venezuela. Recent exploratory successes in Mexico continued, as evidenced by the increase of reserves to 16 billion bbl from 11 billion bbl established at the end of 1976.

INTRODUCTION (Tables 1-4)

Information on petroleum developments from 31 countries in South America, Central America, the Caribbean, and Mexico is available for the 1977 review. Hydrocarbons were produced in 13 of these countries with total reported production of 1,685,223,000 bbl of oil. Complete statistics on gas production are not available, although gas is produced in some of these countries. Oil production for the year 1977 showed a gain. Table 1 shows annual oil production from 1973 to 1977. Daily production for 1977 is shown in Table 2. Table 3 summarizes exploration activity in party-months for each country reporting. A summary of wildcat and development drilling for applicable Latin American countries is given in Table 4.

Significant exploration highlights are the following.

1. Argentina: New offshore exploration areas in the South Atlantic were granted to private companies in early 1978, and new calls for bids for primary and secondary exploration contracts should be granted in late 1978.

2. Bolivia: Tesoro discovered the new gas and oil field of La Vertiente. Occidental discovered the small Techí field and 3 small fields were discovered by YPF.

3. Brazil: Important discoveries were made along the coast of Ceara, Espirito Santo, and Rio de Janeiro in the Campos basin.

4. Chile: A new gas field was discovered in the Springhill district, and in the Straits of Magellan

new fields and onshore field extensions were proven through drilling of 21 exploratory wells.

5. Colombia: Nine new association contracts were signed between Ecopetrol and private companies for a total area of 2,841,596 ha. Texaco made a significant discovery in Cartagena 2 (offshore Caribbean), with a cumulative flow of 42,440 MCFGD from 4 zones. Discoveries were made by Intercol in the Sucre area, and Ecopetrol in the Middle Magdalena Valley.

6. Guatemala: Shenandoah West Chinaja 1A, an exploratory well 12 km northeast of Rubelsanto was drilled to TD of 10,877 ft and produced at a rate of 6,833 BOPD of 32 to 35° API oil from 2 zones between 3,651 and 3,813 ft in the Cretaceous Coban Formation. Oil production from the Rubelsanto field for local consumption and road building was 48,000 bbl. The government approved a 12-in., 200-km pipeline from Rubelsanto to the Caribbean coast.

7. Mexico: A total of 79 exploratory wells was completed, resulting in 17 new oil fields and 9 gas fields. Total proved reserves in Mexico were placed at 16 billion bbl at year end, which represents a 43% increase from the 11.1 billion bbl at the end of 1976.

8. Peru: In April 1977, the Transandean pipeline linking the northeastern Oriente field to the Pacific coast at Bayovar became operative resulting in total production exceeding 100,000 BOPD at year end.

9. Trinidad: Trinidad and Tobago experienced a record high level of production with 229,081 BOPD. The increase was the result of Amoco's offshore production rise from 117,800 BOPD in 1976 to 135,483 BOPD in 1977.

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South America, Central America, Mexico, and Caribbean

2045

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Special thanks are due Petroconsultants S.A., Geneva, Switzerland, for permission to draw from the data of their "1977 Annual Reviews" in areas where specific information was unattainable. I specifically acknowledge the efforts of the following writers in preparing texts and/or furnishing statistical information. This list will also serve as an alphabetic index of countries and authors included in this review.

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ARGENTINA (Fig. 1; Tables 5, 6, 8-12)

Private Company Activities by Marcelo R. Yrigoyen, Esso S.A.P.A.

YPF Activities by José Alberto Suarez Lynch, YPF

As in the previous report, private activities in Argentina during the last year were almost negligible with only 3 development wells drilled by Astra C.A.P.S.A. With the exception of individual production by companies shown on Table 9, all other activities by private companies were performed in the capacity of contractors of the state oil agency and are therefore included in YPF tables.

Recently (April 1978), offshore exploration areas in the South Atlantic were granted to private companies, and new calls for bids for exploration and for primary and secondary exploitation contracts to be granted during the current year have

2052

F. L. Amato

the 5 previously designated areas AA, BB, CC, D, and E.

Governmental Activities

In September, the draft of a model production-sharing contract was offered by the government to interested foreign companies and their comments were invited. In December, the Guatemalan Congress passed Decree 96-75, detailing the terms of the new model contract and the new petroleum law. At year end this long-awaited legislation was pending presidential signature. Further, during December, Decree 66-77 was passed, whereby a hydrocarbon export tax was defined as being 2% of the sales price realized.

The Shenandoah and Centram groups continue to operate under the old Petroleum Code of 1955 (Decree 345).

Geothermal

Guatemala has 22 geothermal prospects. To date, 3 of these, all in volcanic terrane, have been investigated by the Instituto Nacional de Electrificación (INDE). Moyuta prospect, located 80 km southeast of Guatemala City, was evaluated in 1976. The second of 2 wells drilled, INDE-2, was completed in early 1977 (see 1976 Developments, AAPG *Bulletin*, v. 61, p. 1586), and indicated that the Moyuta prospect is in a senile stage in the geothermal cycle of reservoir development.

The Zunil prospect is 106 km west of Guatemala City and occupies an area of 35 sq km. Prior to drilling, 5.2 km and 1.1 km of reflection and refraction seismic work, respectively, and 100 sq km of gravity and magnetic work were acquired in the area. Five core holes were drilled in 1977, with a total footage of 4,926 (1,501.4 m); core recovery amounted to 60%. Well Z-4, drilled to 902 ft (275 m), flowed a mixture of hot water and vapor with a bottom-hole temperature of 205°C (401°F). Optimism is high and this area occupies top priority in INDE's geothermal program.

A third area, Amititlan prospect, is located 20 km south of Guatemala City between the Pacaya Volcano and Lake Amatitlan. The numerous hot springs, known for over 1,000 years, give vivid testimony to the region's geothermal potential. Reconnaissance mapping was begun in May 1977, but was later discontinued owing to the higher priority of the Zunil prospect area.

FRENCH GUIANA (Fig. 6)

By P. Jacobsen, Jr., Esso Inter-America Inc.

For the decade 1966-75, Elf and Shell (SIPM) jointly were active in exploring major marine-

acreage holdings embracing both French Guiana waters and the neighboring Surinam offshore on the west. The original concession areas covered much or all of the continental shelf, but they also extended in effect indefinitely northward into much deeper waters. The greater part of the Elf-Shell effort was on the shelf. This emphasis changed in 1976, when Esso became a partner and the operator in the deeper water portions of the concessions.

In French Guiana, the Esso-Elf-Shell area is defined on the south by straight-line segments which correspond approximately to the 200-m isobath. Elf-Shell retain an adjoining area on the outer shelf. These 2 blocks comprise the remainder of the so-named Guyane marine permit. This license was originally open-ended on the north, but with the latest renewal, to September 1980, the seaward limit was fixed at the 2,000-m isobath, which for lack of close control is only approximately known. Also, the French Guiana-Surinam boundary has not been formally established. For these various reasons, the acreage of the Esso-Elf-Shell and Elf-Shell holdings cannot be closely stated.

A coordinated French Guiana-Surinam seismograph survey in 1976 included about 600 km in French Guiana waters. A second Esso-operated survey of similar scope was carried out in August-September 1977 (by CGG). The French Guiana part totaled 1,320 km and took about 2 weeks.

In a reorganization of French state oil companies during 1976, a resulting new company, Société Nationale Elf-Aquitaine (SNEA) replaced Erap as the nominal titleholder of the Guyane permit.

GUYANA

By Petroconsultants S.A.

Petroleum Rights

No rights are currently held in the country since Deminex relinquished its offshore license in April 1977.

Exploration and Drilling

Last activity reported from the country was the abandonment by Deminex of the offshore wildcat, Essequibo 2, at 14,280 ft TD, in the fall of 1976.

HAITI (Tables 7, 35)

By Petroconsultants S.A.

Summary

About 31,900 sq km were held on December 31, 1977, by the Crux group and Hideca. The Cul-

South America, Central America, Mexico, and Caribbean

2059

During 1977, *Corporacion de Desarrollos de Recursos Minerales (CODREMI)*, a government-owned company, was sole right holder onshore and offshore Puerto Rico. Applications filed by Mobil, Sun, Exxon, Superior Oil, and Kestern International Petroleum Operations (KIPO) for 5 blocks offshore both north and west of San Juan were pending at the end of 1977.

Negotiations with these companies await the completion of the Ambient Impact Statement, the settlement of the Puerto Rico offshore jurisdiction zone, and the enactment of the new Mineral Law Regulations.

In 1977, the National Science Foundation carried out a 7-month marine seismic survey, and the U.S. Geological Survey conducted a general hydrographic study.

CODREMI reportedly planned for exploratory drilling onshore early in 1978.

EL SALVADOR

By Petroconsultants S.A.

Petroleum Rights

No rights are currently held in El Salvador. The government is reported to have contracted American and Canadian firms to prepare a new legislation.

To attract foreign companies to bid for offshore acreage, the government enacted in 1974 an offshore legislation, but results of the bidding were unsuccessful.

Exploration and Drilling

No activities related to exploration for hydrocarbons were reported for 1977.

SURINAM (Fig. 6)

By P. Jacobsen, Jr., Esso Inter-America Inc.

As described under the paragraphs on French Guiana, Esso joined the previous partners Elf and Shell (SIPM) in 1976, and became the operator in the outer offshore part of the so-called Colmar Suriname Concession. The southern limit of the Esso-Elf-Shell area is 7°30'N lat., which coincides roughly with the edge of the continental shelf. In that same year Elf-Shell relinquished its remaining on-shelf acreage to the south.

The northern limit of the Colmar Suriname license is not specified, but under the 1965 concession agreement with the government, the rights extend northward "as far as the country has or will have claims with respect to minerals exploration and exploitation." Related to the matter of seaward jurisdiction, the Suriname Parliament in

early 1978 legislated a 200-n. mi limit, a step adjoining countries had taken several years ago.

Neither Surinam's western offshore boundary with Guyana, nor the eastern boundary with French Guiana, has been formally established. A joint Surinam and France Boundary Commission reportedly held several negotiating sessions during the year.

A coordinated French Guiana and Surinam seismograph program of 1976 included about 2,050 km in Surinam waters. A second Esso-operated project of similar scope was made by CGG in 1977. The Surinam coverage was 540 km and required about 10 days.

An ocean-current survey, begun in October 1976, was completed in early 1977; it was conducted by E G & G International using the vessel *State Horn*, separately chartered from Tracor Marine. The current measurements were made on the Demerara Rise in water depths to 1,200 m.

Esso, as operator, spudded a first deep-water well in November (A2-1) at N8°16'20", W54°07'40", in 3,940 ft (1,201 m) of water. SEDCO is the drilling contractor, using the new floating rig SEDCO 472.

The Paramaribo press reported around mid-year that the private Venezuela company *Sociedad Anonima Petrolera Las Mercedes* had been granted a 120,000-ha. onshore concession toward the northwestern part of the country. A program of shallow drilling was to have begun within a few months, presumably to evaluate heavy-oil occurrences on the coastal plain first known in the middle 1960s. Commencement of these activities had not yet been announced at year end.

Bauxite mining and processing continue to be Surinam's major industry, and efforts toward development of further bauxite deposits and other mineral resources are also progressing. Of particular interest is a major government undertaking (known collectively as the West Suriname Project) in the northwestern part of the country. The project is aimed principally at eventual exploitation of a relatively low grade but extensive bauxite find of some years ago in the rather remote Bakhuis Mountains. Access roads, a railroad, and a large hydroelectric installation are in varying stages of construction or planning.

Note—We take this opportunity to express regret at having omitted, through oversight, the 1976 Surinam and French Guiana reports prepared by P. Jacobsen of Esso Inter-America.

TRINIDAD (Fig. 10: Tables 5-7, 45-57)

By Trinidad Ministry of Petroleum and Mines

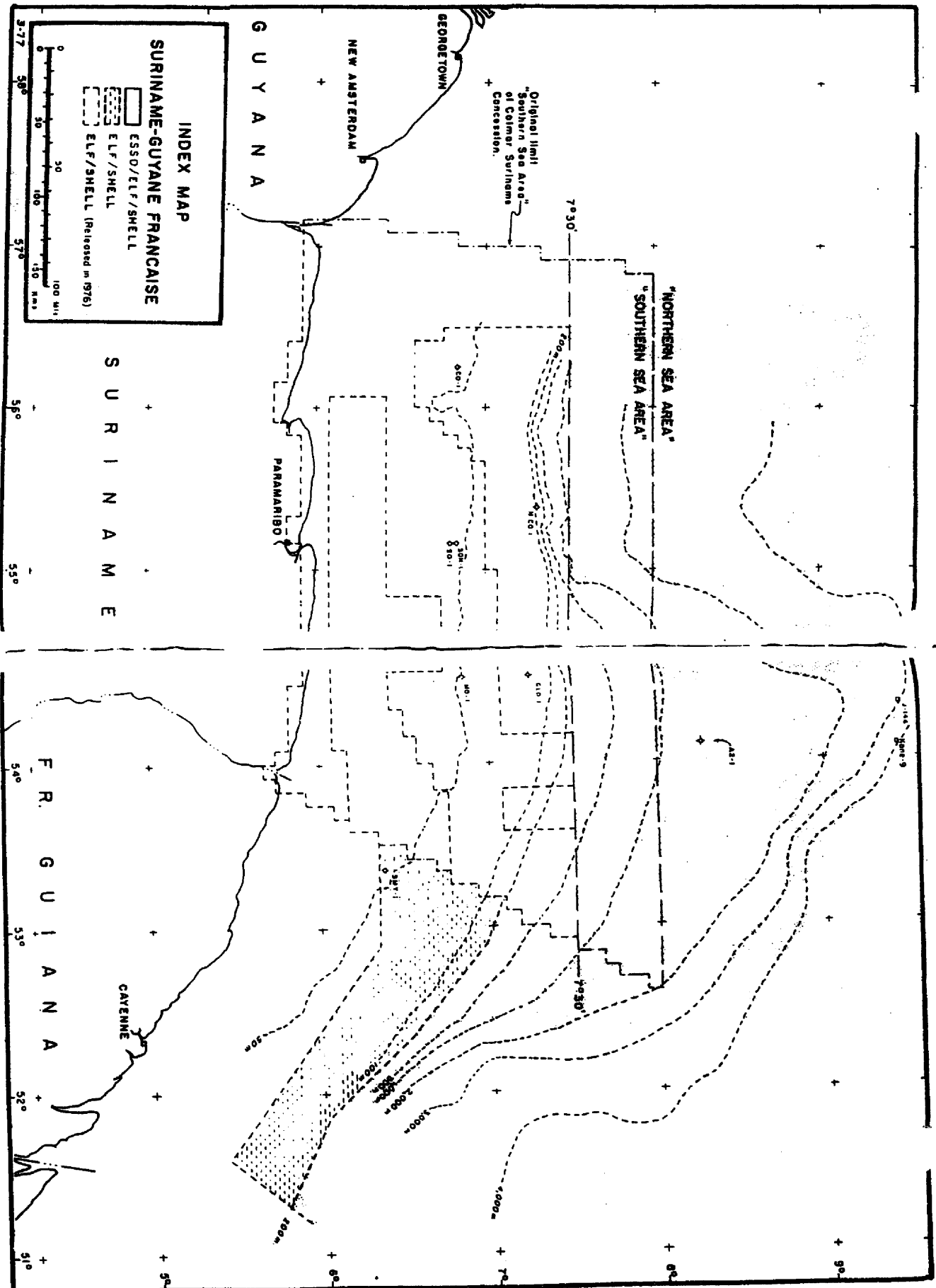


FIG. 6—Suriname and French Guiana, concession area at 1977 year end, 1977 exploration well, and offshore exploration wells of prior years.

Petroleum Developments in South America, Central America, Mexico, and Caribbean Area in 1978¹

F. L. AMATO²

Abstract The review for 1978 presents information on petroleum developments in 30 countries from South America, Central America, and the Caribbean area. Hydrocarbons were produced in 12 of these countries, for a total reported production of 1,292,427,218 bbl of oil. Statistics on gas production were not available for all countries so total gas production could not be determined. Argentina, Trinidad, Peru, Ecuador, and Barbados had increases in production. A summary on Mexico is included but, in the future, Mexico will be reported under "North American Drilling Activities."

Major increases in development drilling were experienced in Barbados, Brazil, Colombia, Trinidad, Ecuador, and Peru. Chile and Venezuela had slight decreases.

INTRODUCTION (Tables 1-7)

Information on petroleum developments from 30 countries in South America, Central America, and the Caribbean is available for the 1978 review. Hydrocarbons were produced in 12 of these countries with total reported production of 1,292,427,218 bbl of oil. Complete statistics on gas production are not available, although gas is produced in some of these countries. Table 1 shows annual oil production from 1974 to 1978. Daily production for 1978 is shown in Table 2. Table 3 summarizes exploration activity in party-months for each country reporting. A summary of wildcat and development drilling for applicable Latin American countries is given in Table 4. Available gas production statistics are given in Table 5. A detailed summary of completion and exploration is shown in Tables 6 and 7.

Significant exploration highlights are the following.

1. Argentina: Continued exploratory efforts in the South Mendoza-Neuquen basin resulted in discovery of 11 new oil and gas fields.
2. Brazil: The first commercial discovery in the Alto Amazonas basin, 700 km southeast of Manaus, was made with the well 1-JR-1-AM producing 260,000 cu m gas/day on a 3/4-in. choke.
3. Guatemala: Three new contract areas for exploration rights were granted to oil companies during 1978.
4. Peru: An all-time production record of 186,877 BOPD was reached in November owing mostly to the throughput of Occidental's new northern branch feeder line becoming operational in early 1978.
5. Trinidad: Oil production in Trinidad and Tobago reached a new high in February of 240,

333 b/d largely because of Amoco's maximum production level of 148,590 b/d.

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ARGENTINA (Tables 8-12; Fig. 1)

Private Company Activities by Marcelo R. Yri-
goyen; YPF Activities by Juan A. Robbiano

Petroleum exploration activity in Argentina by YPF (state owned) during 1978 was located in onshore and offshore sedimentary basins. The main exploration program was in South Mendoza-Neuquén basin, and resulted in discovery of 11 new oil and gas fields. Exploration efforts have confirmed the oil possibilities of the western region of the Golfo San Jorge basin. Puesto Quiroga x-1 and Paso Rio Mayo were 2 significant new-field wildcats. Exploratory drilling in the Golfo San Jorge offshore discovered noncommercial oil and gas.

An extensive program of seismic onshore and offshore marine work was carried out during 1978. A total of 20,901 km of seismic survey was run.

Wildcat drilling by YPF during 1978 totaled 254,477 m, development drilling totaled 1,440,335 m, for an overall total of 1,694,812 m drilled.

During 1978, 766 development wells were completed, including 646 oil wells, 20 gas wells, 89 dry holes, and 11 injection wells.

Total oil production was 26,009,577 cu m, 4.7% above production of the previous year. Oil production averaged 71,259 cu m/day. Total gas production during the year amounted to 11,468,817,682 cu m. Proved oil reserves are now estimated at 385,507,000 cu m and gas reserves reached a volume of 432,320 million cu m.

A risk contract was negotiated between YPF and Total-Deminex-Bridas-Arfranco for exploration and exploitation of an offshore area in the Austral basin. The area under contract is 10,655 sq km, and it extends seaward from the Tierra del Fuego shoreline to 67°W on the Atlantic platform.

Private company activities (independent of YPF, the state oil company) during 1978 were of small significance, with only 7 development wells drilled and no wildcats. The amount of crude oil produced by private companies was also small. However, during 1978, private companies were a relatively significant factor in overall activities as contractors to YPF in many primary and secondary exploitation operations or under risk contracts (Risk Contract Law No. 21778 was enacted in April 1978). As these contract operations will be reported by YPF in its annual statistics, no further reference is made here.

under certain conditions. SGI's properties include a 25% undivided interest in the Guatemalan exploration Rights 87 through 92, a 37.5% beneficial interest in production from the Rubelsanto oil field, and a 30% beneficial interest in any production from the remaining rights. Closing date for the contract of sale is July 31, 1979.

Hispanoil Activities

Hispanoil area AA is located in the Alta Verapaz/Petén Departments east of and contiguous to Basic's rights. Two crews conducted field geology in the southern and western mountains of Guatemala in October and November, and in area AA in December. Western Geophysical and CGG were awarded the contracts for the ± 500 km Vibroseis and ± 200 km portable seismic programs, respectively. Traverse cutting was begun in December for the Vibroseis program, while portable work was scheduled for early 1979. Hispanoil intended to spud its first well in the last third of 1979.

Getty Activities

Getty area BB is also located in the Alta Verapaz/Petén Departments east of and bordering the Hispanoil area. Activities began in mid-year and 6 party-months of field geology and seismic were reported. Getty's 500 to 750 km Vibroseis program is being conducted by Western Geophysical party V-10. Progress during 1978 included 300 km of 24-fold seismic, and surface geologic work along the seismic lines and some rivers. Getty plans to spud its first well by midyear 1979.

Centram Activities

Summary from Petroconsultants S.A.

The government granted a 2-year extension until April 4, 1980, of the exploration period for Rights 93 through 97. Rights 82 through 85 were not renewed.

About 75 km of land seismic was shot by Western Geophysical in Rights 82, 84, and 97. Additionally, Petty Ray shot about 300 km of marine seismic in Lake Izabal in Rights 93, 94, and 97 under Arco's supervision. Arco signed an agreement to conduct seismic work at its own risk in order to make a decision whether to drill a well to earn an interest in the Centram area. However, Arco did not exercise its option after the seismic work.

Geothermal

Information provided by Hugo R. Bethancourt, INDE

The Instituto Nacional de Electrificación (INDE) continued work on the Zunil and Amatitlán prospects located 105 km west and 20 km south of Guatemala City. Preliminary exploration work was also carried out in San Marcos, Momostenango, and Sololá areas located 143, 105, and 75 km west of Guatemala City.

Work continued in the Zunil prospect totaling 83 sq km of gravity and 100 sq km of magnetic work. About 8,961 chemical analyses were conducted on 602 samples taken from vapor-flowing wells and surface springs. Samples from wells Z-2, Z-4, and Z-6 indicate 0.15, 0.033, and 0.13% by volume of noncondensable gases, which are considered highly satisfactory regarding plant construction design. Phase II, or drilling of deep wells, was started including the drilling of reduced-diameter holes in wells drilled in 1977. Wells Z-2 (TD 647 m), Z-5, Z-6, and Z-8 were completed, and wells Z-7 and Z-9 are nearly at completion. Total footage drilled and/or cored was 1,310 m. Core recovery ranged from 60 to 100%. Maximum recorded temperatures were respectively 257, 175, 157, and 187°C in wells Z-2, Z-3, Z-5, and Z-7. Wells Z-2, Z-4, and Z-6 are flowing a mixture of hot water and vapor.

Work on the Amatitlán prospect included surface geologic mapping and location of hot springs, 10 sq km of gravity, and 140 sq km of magnetometry. About 3,481 chemical analyses were carried out in 277 samples from hot springs and existing wells.

In addition, geologic-geochemical reconnaissance work was done on the geothermal zones of San Marcos, and geochemical sampling in the Momostenango, Atilán, Nueva Santa Rosa, and Nahualate river; samples were analyzed with 388 chemical analyses.

FRENCH GUIANA (Table 48; Fig. 11)

By P. Jacobsen, Jr.

The major activity was drilling of the deep-water exploratory well FG2-1 by Esso, as operator, with partners Elf, Shell (SIPM), and EURA-FREP. The test was dry and abandoned (Table 48). The drilling was done by the floating rig *Sedco-472*, specially outfitted for work in deeper waters. The ship came to French Guiana at midyear from a similar operation in the adjoining Surinam offshore.

There was no geophysical work in 1978.

Esso increased its equity in both the French Guiana off-shelf area and the associated Surinam holdings, from 33 1/4% to 45%, this being an option under the global 1975 farm-in agreement.

Elf and Shell continue to hold their separate

1754

F. L. Amato

interest in on-shelf acreage. There was no activity for that area during the year.

GUYANA

By Petroconsultants S.A.

No rights are currently held in the country and no recent application was reported. A 16,213-sq km offshore oil prospecting license held by the German Deminex was relinquished about April 1977. A bill was issued in late 1978 by the government to prepare for establishment of a state-owned company, the Guyana Petroleum Corp., to be responsible for promoting oil exploration in the country and controlling downstream operations.

No exploration or drilling activity took place in 1978.

HAITI

By Petroconsultants S.A.

Rightholding Situation

More than 4,800 sq km was held in the fall of 1978 by 2 companies, the United States Crux and the Venezuelan Hideca. As during previous years, only very scanty information was received on the rightholding situation.

Agreement with Hideca extended—The exploration permit held by Hideca since October 8, 1976, expired in August 1978 but was extended without new terms being known. It appears that most acreage originally granted (27,900 sq km) was relinquished and that one block (Block A) was retained in an onshore area extending north of the Etang Saumatre and probably corresponding to the Artibonite basin. Information received in March 1979 from Hideca mentions that the company is committed to undertake additional work and is looking for a farmout to drill 1 or several tests.

Crux relinquishment—Contrary to our 1977 annual review, the Cul de Sac block was not relinquished in 1977, but the block Plaine du Nord was relinquished in 1978. The acreage held by the company at the end of 1978 was 4,826 sq km.

Exploration

Hideca—During 1977, Hideca conducted surface geologic studies including mapping with Landsat data. In addition, land gravimetry measurements were made on a surface covering approximately 30 sq km. Areas surveyed are mainly located near Thomassique (Plaine Centrale basin) and Mirebalais (Artibonite basin).

Surface geology and review work were conducted during 1978.

Wildcat Drilling

No drilling activity took place during 1978 and none is planned for the near future.

HONDURAS (Table 49; Fig. 12)

By P. Jacobsen, Jr.

Exploration activity was mainly directed to marine acreage granted in 1977 and early 1978 off the north coast of the country. Detailed seismograph surveys were carried out by Esso and Texaco/Amerada. Esso drilled 2 exploratory wells, both abandoned dry.

Acreage holdings at year end are shown in Figure 12. Anschutz holds 590,000 ha., Esso 611,000, and Texaco/Amerada 179,000. The Esso acreage is of 2 types: 2 southerly blocks, largely on the continental shelf, which are former National Reserves areas awarded in competitive bidding, and with specific work commitments; and adjoining on the north, a belt of off-shelf parcels held under the more general terms of the petroleum law. The Texaco/Amerada block was also awarded through competitive bidding. The 2 Anschutz concessions are held under the regular terms of the petroleum law.

The Honduras Mines & Hydrocarbons office reports that the various other applications or concessions shown in last year's review are now without effect. All of these areas had been inactive for several years.

Esso carried out a 3,230-km seismograph survey early in the year, including some coverage on the eastern Anschutz concession. Texaco/Amerada ran a 780-km program near year end. These surveys were made by the respective company geophysical ships *Kirsten Bravo* (Esso) and *Percheron* (Texaco).

To complement its offshore studies, Esso headed a 1-month reconnaissance geologic effort on the mainland. This was a cooperative project with the Mines & Hydrocarbons Office; both Esso and government geologists participated.

The exploration drilling by Esso is summarized in Table 49. This 2-well program completed the company's work commitments under the concession contract for the 2 "National Reserves" blocks.

JAMAICA

By Petroconsultants S.A.

Rightholding Situation

No petroleum rights have been valid in Jamaica since April 1975, when the Weaver group licenses were terminated. However, the government plans to offer offshore blocks in the Pedro Bank area in early 1979.

Production

For the first time since 1962, the country again produced from March 1978 more crude oil than the domestic consumption, which currently averages about 130,000 BOPD.

An all-time record was reached in November with a daily average of 186,877 bbl, whereas the year's average was 153,089 BOPD, 66.7% more than during 1977 with 91,859 BOPD. This increase of production was mainly due to the throughput of Occidental's new northern branch feeder line which became fully operational in early 1978. At year end, Occidental production averaged about 100,000 BOPD of which 50% is exported.

Petroperu may also step up oil production in the northern jungle fields after the completion of the 81-km spur line from the Pavayacu field to Corrientes (Trompeteros field).

The new transport facilities allowed production to start from several Occidental and Petroperu fields (Capahuari North and South, Carmen, Shiyayacu Northeast, Huayuri South, and Tambo for Occidental; Pavayacu, Yanayacu, and Capirona for Petroperu).

It is reported that 1979 crude oil production will pass the 200,000-BOPD mark after Occidental starts additional production from 1-A and 1-B block fields. It is expected that the first results from the Occidental-Bridas group's secondary recovery project in the northwestern area will be obtained in 2 years or more.

Peru will be exporting about 48,000 b/d of crude oil in the first quarter of 1979 of which about 30,000 bbl belongs to Petroperu. Exports are expected to increase by another 20,000 b/d in the second quarter when the capacity of Occidental's feeder line will be increased with the completion of booster station.

PUERTO RICO

By Roland Umiker

During 1978, CODREMI (Corporacion de Desarrollos de Recursos Minerales) a government-owned company, was sole rightholder onshore and offshore Puerto Rico. The only exploration activity reported was carried out by the U.S. Geological Survey, which conducted marine geologic and hydrologic studies, together with shallow seismic work. CODREMI has plans to shoot seismic surveys over 2 previously outlined structures near Dorado, between San Juan and Vega Baja; drilling will follow subsequently.

EL SALVADOR

By Petroconsultants S.A.

No rights are currently held in El Salvador. Last activities reported in the country consisted of geophysical surveys (seismic and air magnetometer) carried out in 1974 over the Pacific shelf and sponsored by the United Nations and the government of El Salvador.

In 1976, the government initiated a reevaluation of the Pacific offshore with the technical assistance of ARPEL (Latin America state oil companies) and Colombian Ecopetrol. No wells have ever been drilled for hydrocarbons in El Salvador.

SURINAM (Table 77; Fig. 11)

By P. Jacobsen, Jr.

The major activity in Surinam was completion of the deep-water exploratory well A2-1 by Esso (as operator), with partners Elf, Shell (SIPM), and EURAFREP. This test was dry and abandoned. At the end of January 1979 the companies made an obligatory relinquishment of acreage, in the southwestern part of the jointly held area (Fig. 11). A concession to private Venezuelan interests for evaluation and exploitation of known shallow heavy-oil deposits on the northwestern coastal plain has been under consideration by the government since 1977, but no final action has yet been taken. There was no geophysical activity in Surinam during 1978.

The A2-1 wildcat (coordinates 8°16'22"N, 54°07'42"W) was the first well drilled by the floating rig *Sedco-472*, especially engineered for work in deeper waters. When spudded in late 1977, the wildcat set a water-depth record (3,940 ft, 1,201 m) for the industry. Drilled on a seismic location, the A2-1 bottomed in Neocomian at a total depth of 16,173 ft (4,929 m).

The acreage relinquishment (386,000 ha.) was in compliance with reductions at 4-year intervals stipulated by the concession contract (Colmar Agreement).

In exercise of an option under the 1975 farm-in agreement, Esso increased its equity in both the Surinam and the associated French Guiana holdings from the original 33 1/3% to 45%.

TRINIDAD (Tables 60-64)

By Trinidad Ministry of Petroleum and Mines

Crude Oil Production

Oil production in Trinidad and Tobago reached the highest level ever attained in February of 1978, 240,333 b/d. This peak in production coincided with the Amoco Trinidad Oil Co. maximum production level of 148,590 BOPD and production for this year was 83.7 million bbl, for an

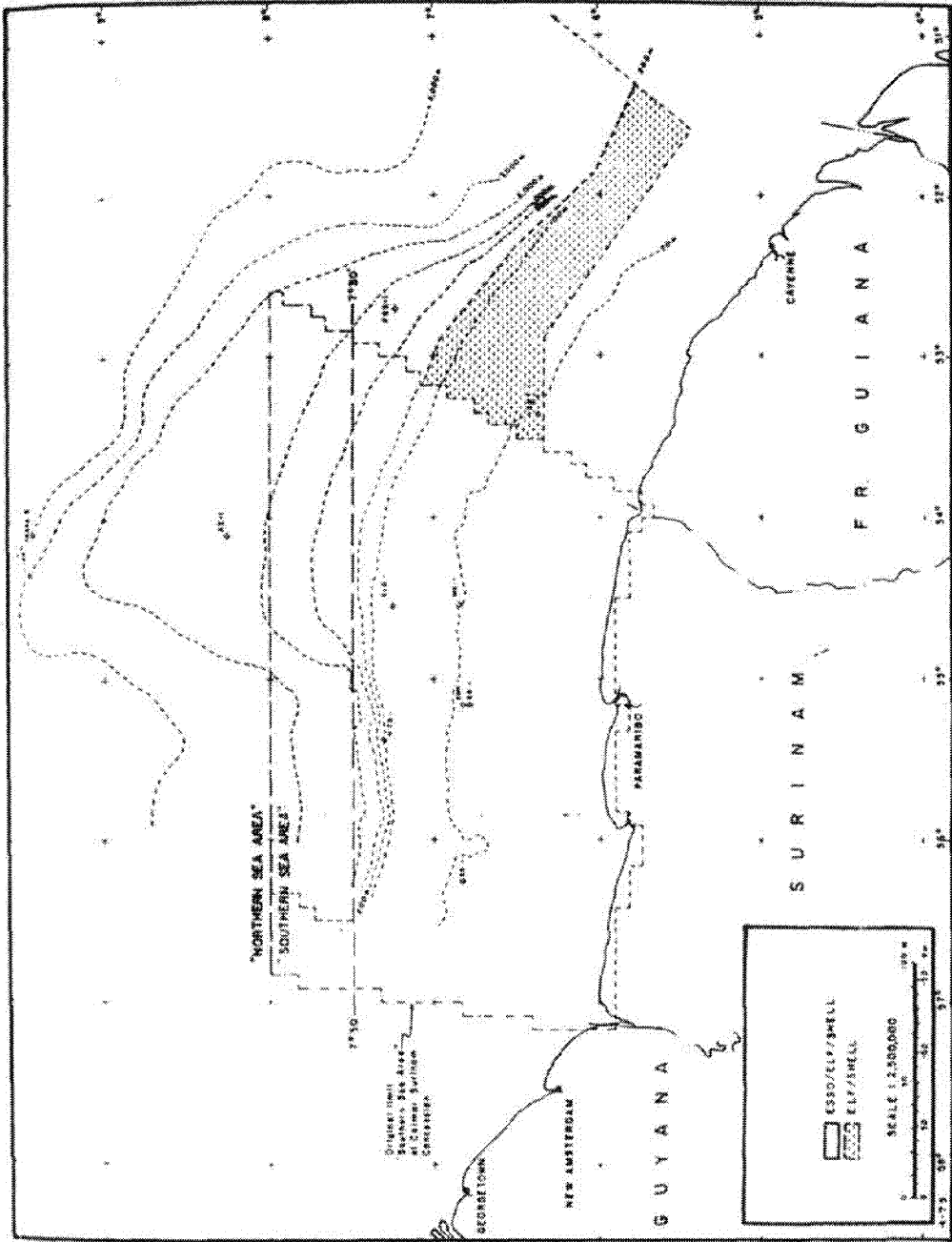


FIG. 11—Exploratory wells in 1978 and offshore tests of prior years, and concessions held in early 1979, Surinam and French Guiana.

1782

F. L. Amato

Table 45. Ecuador Contract Areas (in Hectares)

Company	12/31/77	12/31/78	Increase (Decrease)
CEPE			
Oriente	---	1,500,000	1,500,000
Occidente	---	500,000	500,000
CEPCO	48,056.15	48,056.15	---
Texaco-CEPE	491,355	491,355	---
Northwest	200,000	200,000	---
YPF	200,000	160,000	(40,000)
Total	939,411.15	2,899,411.15	1,960,000

Table 46. Guatemala Geologic and Geophysical Exploration in 1978

	Surf. Geol.	Land Seis.		Marine Seis.		Total
	Party- Months	Party- Months	Line- Km	Party- Months	Line- Km	Party- Months
Basic	5	---	---	---	---	5
Centram	---	2.5	75	1.5	300	4
Hispanol	6	---	---	---	---	6
Getty	6	6.0	300	---	---	12
Total	17	8.5	375	1.5	300	27

Table 47. Guatemala Exploration Drilling in 1978

Well Name	Location	Basis for Loc.	Well Classification		Comp. Date (m/d)	TD (ft)	Fm. at TD	Remarks
			Original	Final				
BASIC								
West Chinaja 2 & ST	16°00'21.6"N 90°19'36"W	Seis./Surf.	Ext.	Dry	04/78	4,401	Cret.	Pressure observa- tion well
Chisec	15°52'49.6"N 90°29'47.7"W	Surf./Subsurf.	NFW		Drig.	4,510 ST	Coban Fm.	Drig.

Table 48. French Guiana Wildcat Drilling, 1978

Operator Well Name	Location	Basis for Loc.	Explor. Class	TD (BSL)		Deepest Fm.	Remarks
				ft	m		
Esso FG2-1	7°15'40"N 52°43'31"W	Seis.	NFW	12,896	3,930	Basalt Neocomian (?)	D&A, water depth 2,688 ft

Table 49. Honduras Wildcat Drilling, 1978

Operator Well Name	Location	Basis for Loc.	Explor. Class	TD (BSL)		Deepest Fm.	Remarks
				ft	m		
Esso Gracias a Dios-1	16°97'40"N 84°42'55"W	Seis.	NFW	7,864	2,397	E. Cret.	D&A, water depth 1,107 ft
Punta Patuca-1	16°07'24"N 84°19'48"W	Seis.	NFW	10,240	3,121	U. Cret. (?)	D&A, water depth 559 ft

Table 50. Nicaragua Wildcat Wells Drilled in 1978

Operator Well	Class	Location	Water Depth ft (m)	TD ft (m)	Prob. Objective	Rig	Spud / Comp.	Final Status
Tuapi	Wildcat	14°39'17"N 82°20'34"W	77	12,868 (3,922)	Eocene	Glomar Grand Isle	02/26/78 02/26/78	P&A