

PETROLEUM DEPARTMENT



ANNUAL

ADMINISTRATION

REPORT FOR

THE YEAR

1957

TRINIDAD AND TOBAGO

PETROLEUM DEPARTMENT



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ADMINISTRATION REPORT OF THE PETROLEUM DEPARTMENT, 1957

HONOURABLE MINISTER OF INDUSTRY, COMMERCE, TOURISM AND EXTERNAL COMMUNICATIONS,

I have the honour to submit the following report on the Oil and Asphalt Industries of the Colony for the year 1957.

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THE OIL INDUSTRY

1. The year 1957 was a record one for the Oil Industry, drilling activity increasing by 19 per cent. and crude oil production rising by nearly 18 per cent. An overall view of the activities of the industry in comparison with previous years is given in Table I. Significant increases will be noticed in all phases of the industry except imports of foreign crude which remained nearly constant.

2. Exploration was rather disappointing, wild-cat wells being drilled in widely scattered areas without any new fields being discovered. Outsteps from producing fields were in general successful except in the Catshill Field where Shell Trinidad Limited abandoned several holes owing to wet sands being encountered.

Dominion Oil Limited, completed 10 exploratory wells without encountering commercial production. They found an encouraging oil show in their Colenso I.

Outsteps drilled by Texaco Trinidad Limited in their Forest Reserve, Guayaguayare and Barrackpore Fields were generally successful, and their joint interest with Premier Consolidated Oilfields Limited, Siparia No. 4, opens up a small area for Herrera Sand development, on the Coora-Solomon anticline, south of the Penal Field.

Apex (Trinidad) Oilfields Limited, carried their Cedros well to 13,000 but did not encounter commercial production.

Outstepping in the Soldado Marine Field was most successful. All wells drilled being completed as commercial producers.

3. Drilling rigs in continuous operations during the year averaged 29 as compared to 27 in 1956. Rig performance again increased by nearly 10 per cent. to an average of 123 feet drilled per rig per day resulting in a total footage of 1,322,483 feet for the year. Table II gives a monthly analysis of drilling wells. It will be noted that 12.7 per cent. of footage drilled was non-productive as compared to 18.9 per cent. in 1956.

4. The production of crude oil in 1957 was 34.3 million barrels, an increase of over 5 million as compared to 1956. Noteworthy increases in production were Texaco Trinidad Incorporated, (Formerly The Trinidad Oil Company, Limited) with 25 per cent., Shell Trinidad Limited, with 24 per cent. and Trinidad Central Oilfields Limited, with 18 per cent. Trinidad Northern Areas Limited, increased the production from the Soldado Field (Marine) by over 60 per cent.

5. Statistics relative to production of crude oil will be found in Table I, Items 1-5 and 22-27, while a detailed monthly analysis by production methods is given in Table III. A similar breakdown by companies appears in Table IIIA. Appendix "B" gives an interesting picture of production methods and clearly brings out that the percentage of total production contributed by flowing wells has been steadily increasing for the past five years.

6. The daily average production per flowing well was 69 barrels in 1957 as compared to 61 barrels in 1956. For all producing wells the daily average was 30.6 barrels in 1957, and 27.7 barrels in 1956. The increase in these averages reflects the intensified drilling of the past few years (Table I, Item 18) and is not due to any change in production policy.

7. Considerable interest was shown in secondary recovery and over 20 projects were in operation or under consideration during the year. The results on the whole have been most encouraging and details are given in an appendix to this report.

MOVEMENT OF CRUDE OIL AND PRODUCTS

8. The overall picture of crude oil movement and product disposal is given in detail in Table V which can be summarized as follows :—

<i>Availability</i>	<i>Crude Oil Balance</i>		<i>Disposal</i>	<i>Million Barrels</i>
	<i>Million Barrels</i>	<i>Million Barrels</i>		
Stock on 1st January	...	...	Exports	3.27
Production	34.33		Local Consumption	.05
Less loss*	.13	34.20	Delivered to Refinery	50.47
Imports	...	...	Stock on 31st December	1.62
		55.41		55.41

* Water reported as oil.

Refined Products Balance

<i>Availability</i>	<i>Million Barrels</i>	<i>Disposal</i>	<i>Million Barrels</i>
Stock on 1st January ...	3.09	Shipments ...	38.00
Crude from fields 50.47		Bunkers ...	8.98
Less loss on refining 1.43		Local consumption including fuel used in refinery ...	1.89
	49.04		
Products obtained ...	49.04	Adjustment to lub. Oil Stock*	.02
Imports ...	.62	Stocks on 31st December ...	3.86
	52.75		52.75

* Necessitated by change in method of reporting lub. oil stock.

INDUSTRIAL RELATIONS

9. Towards the end of 1956 the Oilfield Workers Trade Union started negotiations with the Oil Companies with a view to arriving at new agreements on wages and conditions of employment to replace the then existing agreements which had commenced on the 5th August, 1955 for a term of two years and three months.

10. The Oilfields Employers' Association of Trinidad was dissolved in July, 1956. Negotiations were therefore concluded for the first time directly between the Oilfield Workers Trade Union and each individual Oil Company and they were still in progress at the end of the year.

11. A cost of living bonus addition to the wages of all hourly and weekly paid workers of $\frac{1}{2}$ cent per hour was effective on and from 30th April, 1956 consequent upon the Official Index of Retail Prices for April having risen to 116.1 (January 1952=100)

No stoppages of work occurred during the year.

THE ASPHALT INDUSTRY

12. The following table shows the quantity of Natural Asphalt extracted from the Pitch Lake and the quantity of derived products exported or sold locally :—

	Natural Asphalt	
	<i>Tons 1957</i>	<i>Tons 1956</i>
Extracted by Works and Hydraulics Department for local use ...	61,045	55,393
Extracted by the Trinidad Lake Asphalt Company ...	74,885	85,734
	135,930	141,127

Derived Products Manufactured by the Company

<i>Exported :</i>							
Crude Asphalt	...	...	...	...	...	—	—
Dried Asphalt	...	...	...	...	...	43,386	45,783
Cement Asphalt	...	...	...	...	...	15,909	13,548
						59,295	59,331
<i>Local Sales :</i>							
Crude Asphalt	...	...	...	...	...	12	30
Dried Asphalt	...	...	...	...	...	50	109
Asphalt Cement	...	...	...	...	...	1,851	2,954
						1,943	3,053

CONTRIBUTION TO REVENUE AND LOCAL DISBURSEMENTS

13. The sum disbursed by the Oil Industry in the Colony during 1957 amounted to \$130.6 million, an increase of 23.4 per cent. on the previous year. Tables VI and VII give details of the disbursements. Noteworthy increases occurred in the amount collected in Income Tax, which rose by nearly 41 per cent. and in Royalty which was higher by over 36 per cent. Both these increases were the result of increased local production and higher product prices.

14. The following Tables show the contributions of the Oil Industry under each Head of Revenue listed in the Colony's Estimates. Contributions to the Revenue of the Port Services and also of the Railway and Telegraph are shown separately in order to conform to the present form of presenting the Colony's Estimates. Revenues from these two services were included in the Colony's total revenue in past years and for ease in comparison with past years are so included in Table VI which is set up to show pure taxation as distinct from payments to Government Departments in return for various services.

CONTRIBUTION BY THE OIL INDUSTRY TO THE REVENUE OF THE COLONY IN 1957

Revenue Head in Colony's Estimates	Revenue Received	Oil Industry's Contribution	Percentage Contribution by Oil Industry
	\$	\$	%
<i>Ordinary Revenue</i>			
1. Customs and Excise	29,513,987	2,396,297	8.12
2. Licences and Internal Revenue not otherwise classified ...	4,908,822	130,267	2.65
3. Taxes on Income	42,187,820	27,666,940	65.58
4. Fees and Payments for Specific Services	1,253,167	44,988	3.59
5. County Council	996,436	209,973	21.07
6. Reimbursements	2,848,171	11,525	0.40
7. Earnings of Government Departments	658,590	157,505	23.91
8. Post Office	1,739,395	58,510	3.36
9. Rent of Government Property	365,155	17,774	4.87
10. Interest	1,412,282	—	—
11. Miscellaneous	255,909	12,073	4.72
12. Forests, Lands and Petroleum	14,592,238	14,158,464	97.03
TOTAL ORDINARY REVENUE	100,731,972	44,864,316	44.54
<i>Extraordinary Revenue</i>			
13. Premia on Leases (formerly Land Sales)	10,511	—	—
14. Loans to Public Bodies	322,839	—	—
15. Grants under Colonial Development and Welfare Organization	516,213	—	—
16. Extraordinary	28,491	—	—
Total as per Colony's Financial Statement, 1957 ...	101,610,026	44,864,316	44.15
A. Port Services	8,378,960	1,109,204	13.24
B. Railway and Telegraph	965,743	140,469	14.54
	110,954,729	46,113,989	41.56

EXPORTS OF PETROLEUM AND ITS PRODUCTS

15. Exports of petroleum including the re-export of products from imported crude increased from 43.7 million barrels in 1956 to 50.4 million barrels in 1957 (Table I, items 10-12). This increase was entirely due to increased production since imports of crude for refining and re-export dropped slightly. Higher prices for products coupled with the increased production resulted in the value of petroleum exports increasing by 19.7 per cent. to a figure of \$306.6 million. There were substantial increases in the export values of agricultural products so that the percentage contribution to the total value of the Colony's exports contributed by Petroleum and Asphalt products as compared to the contribution of Agricultural and other products remained almost constant at about 82.5 per cent. and 17.5 per cent respectively. (Appendix E).

Exports	% increase or decrease as compared to 1956	1957		1956	
		\$	%	\$	%
Petroleum (including products from imported crude)	+ 19.7	306,617,525	80.7	256,039,991	79.5
Petroleum Bitumen	— 10.9	5,123,868	1.4	5,751,801	1.8
Asphalt and its products	+ 7.8	2,698,442	0.7	2,504,100	0.8
Cocoa	+ 19.2	8,474,572	2.2	10,485,241	3.2
Sugar, molasses and rum	+ 19.6	32,308,242	8.5	27,012,290	8.4
Coconuts, coconut oil, &c.	+ 34.6	1,287,097	0.3	955,919	0.3
Coffee	+ 36.9	2,151,036	0.6	1,571,566	0.5
Bitters	— 5.4	892,651	0.2	943,416	0.3
Fresh fruits and juices	+ 26.1	4,021,367	1.1	3,189,036	1.0
All others	+ 21.0	16,447,717	4.3	13,595,773	4.2
TOTALS	+ 18.0	380,022,517	100.0	322,049,133	100.0

ROYALTY ASSESSMENT

16. The royalty assessed on the crude oil, natural gasoline and natural gas produced on Crown Oil Mining leases for each half yearly royalty period during 1955, 1956 and 1957 is shown in the following table :—

SOURCE OF REVENUE	ASSESSMENT FOR HALF-YEARLY PERIOD ENDING											
	31.12.57		30.6.57		31.12.56		30.6.56		31.12.55		30.6.55	
	\$	c.	\$	c.	\$	c.	\$	c.	\$	c.	\$	c.
Royalty on Natural Gas ...	60,383	21	59,029	14	71,129	55	49,160	07	44,166	93	47,635	05
Royalty on Natural Gasoline	64,694	90	71,433	53	60,336	99	58,548	06	60,299	67	54,861	71
Minimum rents not offset by royalty on Crude Oil ...	586,919	89	582,229	63	302,289	09	528,502	94	422,818	99	418,918	54
Royalty on Crude Oil ...	7,479,805	49	7,251,605	19	5,462,344	84	4,877,501	51	4,447,698	52	3,928,449	33
Half-yearly Totals ...	8,191,803	49	7,964,297	49	5,896,095	47	5,513,712	58	4,974,984	11	4,449,864	63
Yearly Totals ...	16,868,098 98				11,409,808 05				9,424,848 74			
Assessment Totals ...	13,860,392 96				10,488,696 69							
Drawback claimed ...	—				—				13,896 47			

Note :

Drawback represents the amount by which the sum of the royalties assessed on a lease fell short of the minimum rent in the previous half-yearly period. Drawback is deductible from any excess of royalty over dead rent on the same lease in the next half-yearly period only to that in which the shortfall occurred.

17. The volumes upon which the above assessments were made were as follows :—

SUBSTANCE ASSESSED FOR ROYALTY	Unit	HALF-YEARLY PERIOD ENDING					
		31.12.57	30.6.57	31.12.56	30.6.56	31.12.55	30.6.55
Natural Gas ...	M.C.Ft.	4,025,546	3,857,937	3,796,160	2,978,008	2,412,579	2,738,992
Natural Gasoline ...	Gals.	3,349,343	3,602,604	3,307,596	3,196,860	3,264,441	2,959,153
Crude Oil—Gross ...	Bbls.	14,919,396	13,591,721	12,142,112	11,129,530	10,406,367	9,527,718
Crude Oil used free of Royalty ...	Bbls.	49,505	51,357	40,652	92,842	102,824	91,722
Crude Oil—Nett ...	Bbls.	14,869,891	13,540,364	12,101,460	11,036,688	10,303,543	9,437,869
Crude Oil—Average Value ...	\$/Bbl.	5.51	5.36	4.51	4.42	4.32	4.16

NOTE:—Statistical volumes of gross production, free of royalty, &c., are mainly reported at 34.9726 Imperial Gallons per barrel, but include some volumes reported at 35 Imperial Gallons per barrel. Royalty quantities are all at 34.9726 Imperial Gallons per barrel.

18. The data used to evaluate crude oil for crown royalty assessment for each of the last five half-yearly periods together with the royalty rate on casing head petroleum spirit for each of these periods are shown in the following table :—

PRODUCT	AVERAGE PRICE IN B.W.I. CURRENCY PER BARREL OF 34.9726 IMPERIAL GALLONS FOR THE HALF-YEAR PERIOD ENDED				
	31.12.57	30.6.57	31.12.56	30.6.56	31.12.55
Bunker "C" Grade Fuel ...	\$ 4,406,645	\$ 4,693,006	\$ 3,746,951	\$ 3,593,244	\$ 3,584,373
No. 2 Fuel ...	6,532,492	7,243,772	6,367,476	6,367,150	6,115,162
43-47 D.I. Gas Oil ...	6,622,717	7,325,556	6,400,921	6,455,993	6,115,162
48-52 D.I. Gas Oil ...	6,712,942	7,414,320	6,489,946	6,543,850	6,204,947
53-57 D.I. Gas Oil ...	6,803,167	7,503,084	6,579,953	6,631,707	6,294,731
70-72 Oct. M. Leaded Motor Gasoline ...	7,086,592	7,284,664	6,751,608	6,827,164	6,860,913
Average Middle Rate for sight drafts on New York. Premium in B.W.I. Cents per \$1.00 U.S. ...	71.857,337	71.924,585	72.381,250	71.106,868	71.952,717
Value of Tetra Ethyl Lead in B.W.I. Cents per Millilitre ...	0.432,255	0.429,451	0.428,892	0.429,015	0.432,724
Royalty in B.W.I. Cents per Gallon on Casing Head Petroleum Spirit ...	2,058,014	2,087,597	1,915,212	1,905,925	1,910,170

The half yearly volumes of products to which the above average prices for 1957 were applied respectively in calculating royalty on crude oil will be found in Table X.

LOCAL SALES OF PETROLEUM PRODUCTS

19. Excisable sales of gasoline amounted to 26,100,707 gallons in 1957, an increase of 7.4 per cent. compared to 1956. The Excise duty on these sales was \$2,361,373.51. The Excise tax on gasoline was increased from 9 cents per imperial gallon to 18 cents per imperial gallon effective on 31st December, 1957.

20. Sales of bottled propane showed an increase of 25 per cent. over the previous year amounting to 2,616,878 lb. on which excise duty at $\frac{3}{4}$ cent. per lb. yielded \$19,644.60.

21. The local wholesale and retail prices effective during 1957 for 83 Octane motor gasoline were as follows :—

DATE		B.W.I. CENTS PER IMPERIAL GALLON		
From	To	Wholesale Price	Dealers Margin	Retail Price
	7th January	38.5	6.5	45
8th January	– 22nd October	39.5	6.5	46
23rd October	– 2nd November	39.5	8.5	48
3rd November		38.5	8.5	47

22. The increase of 1.0 cent B.W.I. per imperial gallon in the wholesale price on 8th January was in response to rising prices for Gulf Coast cargoes of gasoline. Platt's low quotation for 83 Octane gasoline increased from 9 $\frac{7}{8}$ U.S. cents per U.S. gallon at the beginning of the year to 10 $\frac{5}{8}$ U.S. cents per U.S. gallon on 29th January. This increase of $\frac{3}{4}$ U.S. cent was equivalent to 1 $\frac{1}{2}$ B.W.I. cents per imperial gallon.

23. Platt's low quotation fell from 10 $\frac{5}{8}$ to 10 $\frac{3}{8}$ U.S. cents per U.S. gallon on 7th May, 1957 and to 10 $\frac{1}{8}$ U.S. cents per U.S. gallon on 22nd October, a total drop of $\frac{1}{2}$ U.S. cent per U.S. gallon equivalent to 1.03 B.W.I. cents per imperial gallon. The wholesale price was accordingly dropped by 1.0 cent per imperial gallon on the 3rd November, 1957. As a result of negotiations between the Petroleum dealers and the distributing Companies the dealers margin was increased from 6 $\frac{1}{2}$ to 8 $\frac{1}{2}$ cents per Imperial Gallon on the 23rd October. The retail price changed three times during the year rising on 8th January from 45 to 46 cents per gallon to match the increase in the low quotation for Gulf Coast cargoes and again on 23rd October from 46 to 48 cents to cover the increase of 2 cents in the dealers margin. It fell to 47 cents per Imperial Gallon on 3rd November in response to the fall in Gulf prices.

24. In view of the increase of two cents per gallon in the retail price of gasoline in October a Commission was appointed by the Government under Section 2 of the Commissions of Enquiry Ordinance, Chap. 7 No. 2 to enquire into all factors affecting the distribution and price of petroleum products sold at public filling stations in the colony, including :—

- i. the margin of profit carried by distributors and retailers, and
- ii. the rates of pay and working conditions of employees.

25. Mr. Kenneth Vincent Brown C.M.C. was appointed Chairman, the two other commissioners being Mr. Martin Pounder and Mr. Harold Fraser.

The Commissioners had not completed their enquiry at the end of the year.

26. The motor gasoline sold locally is manufactured in the Pointe-a-Pierre refinery of Texaco Trinidad Incorporated and is a blend of straight run and cracked gasolines. The octane rating of the motor gasoline stock before leading varies according to the crude oil from which it was produced, but is usually in the range of 68–70 Octane. During 1957 the volume of Tetra-ethyl-lead required to raise the octane rating from 68/70 to 83 was about 1 $\frac{1}{2}$ c.c. per gallon of gasoline.

27. Commercial and private aircraft refueling at Piarco Airport during 1957 took 4,168,301 gallons of Aviation spirit.

28.

ACCIDENT STATISTICS FOR 1957

COMPANY	DRILLING AND PRODUCTION			*OTHER DEPARTMENTS			TOTAL NO. OF ACCIDENTS
	Non-Serious	Serious	Fatal	Non-Serious	Serious	Fatal	
Antilles ...	10	—	—	13	—	—	23
Apex ...	35	5	1	27	1	—	69
Dominion ...	—	—	—	—	—	—	—
K.T.O. ...	8	4	—	—	—	—	12
S.T.L. ...	18	3	1	71	11	—	104
T.P.D. ...	43	3	1	49	3	—	99
†T.O.C. ...	47	11	3	34	5	1	101
	161	26	6	194	20	1	408

*Excluding Refineries, Electrical, Machine and General Field Workshop and Power Stations.

†Includes P.C.O.L. and T.N.A.

The total number of accidents reported to this Department in 1957 was 408 which compares with 508 in 1956. This is the second successive year in which there has been a significant decrease in field accidents. There were seven fatal accidents during the year, five of which were associated with Drilling Rigs. The Department conducted extensive investigations into each of the fatal accidents and certain safety recommendations were made.

29. An intensive Safety Campaign conducted by the larger companies continued in 1957. Five departments of the Trinidad Oil Company Limited received awards from the American Petroleum Institute of Accident Prevention for having worked one million man-hours without a disabling injury. The Pointe-a-Pierre field of this company received the National Safety Council Award of Merit for working 1,105,000 man-hours without a lost-time accident. In addition, three departments of the company earned A.P.I. Accident Prevention awards for having worked 500,000 man-hours without a disabling injury.

30. At Shell Trinidad Limited, the Drilling and Production departments received International Safety Contest certificates of achievement for significant reductions in their accident frequency rates.

31. The accident frequency and severity rates for the Trinidad Oil Industry compare most favourably with those for other oil producing countries.

LOCAL OIL COMPANIES

32. On the 8th November, 1957, the Christiana Trinidad Oil Corporation, a wholly owned subsidiary of Christiana Oil Corporation, was registered in Trinidad under Part X of the Company's Ordinance.

33. The Christiana Trinidad Oil Corporation was incorporated in Delaware, U.S.A. with a capital of U.S. \$50,000 in common stock all of which was subscribed in cash by the parent Corporation. It was formed with the specific object of entering into an agreement with Kern Trinidad Oilfields Limited to participate in the development of the latter company's marine concessions. At the end of 1957 Government had not been advised of the final details of the agreement between the two companies.

TEXACO TRINIDAD INCORPORATED

34. During the year Texaco Trinidad Incorporated, a wholly owned Delaware subsidiary of the Texas Company was formed and took over all the assets in Trinidad of the Trinidad Oil Company Limited which is now in process of liquidation.

TRINIDAD PETROLEUM DEVELOPMENT COMPANY

35. At an extraordinary general meeting of the company held on 17th July, appropriate special resolutions were passed to authorise the transfer of control and management of the company to Trinidad and to amend the Articles accordingly. Treasury permission to the transfer had previously been received.

LEGISLATION

36. The Pipe Lines (Amendment) Ordinance, 1956 came into operation on the 1st April, 1957 by virtue of Proclamation No. 11 of 1957 dated 18th March, 1957. See Government Notice No. 62 published in the supplement to the *Royal Gazette*. Vol. 126 No. 29 dated 28th March, 1957. A note on this Ordinance will be found in paragraph 67 of this department's annual report for 1956.

37. The Pipe Lines (Specification of Fees) Order, 1957 made under section 4 (7) of the Pipe Lines Ordinance came into operation on the 1st April, 1957 See Government Notice No. 63 published in the Supplement to the *Royal Gazette* Vol. 126 No. 29 dated 28th March, 1957. The fees chargeable under the order are :—

1. For each pipe line connected along, over or under a trace, road, or railway track, 2 cents per foot of pipe line per year.
2. For each pipe line laid or connected across a trace, a road, a railway track or across crown lands \$4.80 per crossing per year provided that a sleeve or culvert shall be regarded as a single pipe-line irrespective of the number of pipe lines contained in the sleeve or culvert.

38. The Excise duty Order 1957 made under section 13 (2) of the Excise (General Provisions) Ordinance came into operation on the 31st December, 1957. See Government Notice No. 196 published in the supplement to the *Royal Gazette* Vol. 126, No. 128 dated 31st December, 1957. This order provided, *inter alia*, that the excise duty on every imperial gallon of petroleum spirit manufactured in the Colony shall be eighteen cents.

39. The Petroleum Department and Conservation Board (Oil Impost for 1956) Ordinance, 1957 was enacted in order to legalize the publication of a rating order made under sections 7 and 9 of the Petroleum Department and Conservation Board Ordinance. It was published in a supplement to the *Royal Gazette* dated 1st January, 1958. The rating order in respect of footage drilled and oil won in 1956 should have been published in the *Royal Gazette* during November, 1957. Owing to an oversight it was not published in 1957 and special legislation was needed to legalise its publication in 1958.

CROWN OIL MINING LEASES AND LICENCES

40. At the end of 1957 a total of 538,515 acres of crown oilrights on land were under lease while submarine oil mining licences covered 1,021,000 acres giving a total of 1,559,515 acres—an increase of 114,409 acres or 7.9 per cent. as compared to 1956.

41. During 1957 seventeen (17) principal leases (87,683 acres) and seventeen (17) supplemental leases (27,297 acres) were issued over crown oilrights. Only a very small part of the area leased during 1957 represented previously unleased acreage since leasing rights deriving from Exploration Licences accounted for over 75,000 acres. The assignment of existing leases represented a further 19,000 acres while another 12,500 acres was accounted for by a redistribution of acreage held by Shell Trinidad Limited between that company's existing leases.

42. Apex Trinidad Oilfields Limited acquired 5,824 acres in the Central Range Area by assignment from Trinidad Petroleum Development Company and leased a further 3,900 acres of crown oilrights.

43. Dominion Oil Limited converted its exploration licences to mining leases and in addition acquired about 1,000 acres of previously unleased crown oilrights, mostly in the Chaguanas area.

44. The Crown oil mining leases held by the Siparia Trinidad Oilfields Limited were transferred to the Trinidad Oil Company Limited by surrender and the issue to the latter Company of leases supplemental to three of its principal leases.

45. The entire free holding and lease-holding including both crown and private oil rights of the Trinidad Oil Company were assigned to Texaco Trinidad Incorporated by deed dated 31st December, 1957 and later registered as No. 728/1958.

46. The Acquisition by Shell Trinidad Limited of crown oilrights in the Ortoire area over a period of more than 20 years had resulted in a patch-work of leases which was inconvenient and to clean up this situation the company agreed to a reduction in the number of its leases. This was effected by the surrender of eight leases totalling 13,600 acres which area was redistributed and attached by supplemental deeds to three other leases held by this Company.

47. A summary of leasing activity during the year is shown in the following paragraph and is followed by details of individual leases and licences issued, surrendered and outstanding. Changes in companies holdings are shown in Table VIII.

SUMMARY OF LEASING ACTIVITY DURING 1957

	No. of Lease or Licence	CROWN OIL RIGHTS—ACREAGE					
		Private Surface			Crown Surface		
		A.	R.	P.	A.	R.	P.
Principal Leases at 31st December, 1956	119	113,132	1	11½	342,805	2	17½
Principal leases registered in 1957	*17	3,512	0	03	84,171	1	04
Supplemental leases registered in 1957	—	23,775	1	00	3,521	2	17
Surrendered during 1957	136	140,419	2	14½	430,498	1	38½
	14	23,506	1	04	8,896	3	07
Leases at 31st December, 1957	122	116,913	1	10½	421,601	2	31½
Exploration Licences at 31st December, 1956	5	—	—	—	81,058	0	36
Exploration Licences issued in 1957	—	—	—	—	—	—	—
Exploration Licences converted to Mining Leases	3	—	—	—	81,058	0	36
					75,736	0	28
Balance					5,322	0	08
Leases applied for	2				4,055	0	16
Area surrendered					1,266	3	32
					1,266	3	32
Exploration Licences at 31st December, 1956	—						
Submarine Licences at 31st December, 1956	7				1,021,243	0	00
Submarine Licences issued in 1957	—				—	—	—
Submarine Licences surrendered in 1957	—				—	—	—
Submarine Licences at 31st December, 1957	7				1,021,243	0	00
TOTAL ACREAGE LEASED		116,913	1	10½	1,442,844	2	31½

* Includes 1 lease registered in January, 1958 but with commencing date 1st July, 1957.

Details of the leasing summary in the preceding paragraph are given in the following tables:—

Crown Oil Mining Leases Registered during 1957

Mining Leases	No.	Locality	CROWN OIL RIGHTS—ACREAGE					
			Private Surface			Crown Surface		
			A.	R.	P.	A.	R.	P.
(A) PRINCIPAL LEASES:								
Antilles Reg. No. 283/57	1	Naparima ...	67	1	37	—	—	—
Apex Reg. No. 350/57	—	Moruga and Ortoire	—	—	—	609	1	25
	—	6918/57 Charuma and Cocal	160	0	12	5,664	0	00
	—	10199/57 Cedros ...	536	1	10	701	1	03
	5	10477/57 Charuma ...	1,752	0	01	297	1	07
D.O.L. Reg. No. 963/57	—	Turure, Manzanilla & Tamana	192	2	05	88	0	10
	—	3781/57 Cedros ...	152	1	00	—	—	—
	—	6961/57 Naparima ...	16	3	00	—	—	—
	—	6962/57 Cedros ...	—	—	—	816	1	22
	—	6959/57 St. Ann's & Tacarigua	—	—	—	158	0	24
	—	8357/57 Chaguana, Cunupia, &c.	—	—	—	283	0	35
	—	9015/57 St. Ann's, Cunupia, &c.	—	—	—	61,803	2	14
	—	12239/57 Montserrat ...	8	3	38	192	2	35
	9	12737/57 Turure ...	—	—	—	12,924	0	00
T.T.O.C. Reg. No. 10967/57	1	Naparima ...	57	2	06	—	—	—
Shell Reg. No. 8091/57	1	Siparia ...	421	0	26	633	0	29
TOTAL ...	17		3,365	0	15	84,171	1	04
(B) SUPPLEMENTAL LEASES:								
Apex Reg. No. 8433/57 Suppl. to 745/55	1	La Brea & Cedros	—	—	—	504	0	00
D.O.L. 5103/57 10725/54	—	San Rafael ...	59	3	04	—	—	—
	—	5104/57 10638/54 do. ...	—	—	—	32	0	23
	—	6960/56 6765/56 Chaguana & Montserrat	166	0	35	59	1	05
	—	8358/57 2627/55 Chaguana & Cunupia	340	3	35	—	—	—
	5	11070/57 2627/55 Chaguana	71	2	33	—	—	—
T.T.O.C. 4141/57 10285/56	—	— ...	5,116	0	25	2,030	0	01
	—	4142/57 10241/56	5,860	2	23	—	—	—
	3	10509/57 10243/56	—	—	—	228	0	00
T.P.D. 15249/57 3450/35	—	Erin ...	179	2	19	37	0	02
	2	15250/57 7599/51 Cedros ...	26	3	14	57	1	38
Shell 6682/57 2580/38	—	Charuma, Ortoire & Cocal	4	3	36	—	—	—
	—	8092/57 11662/54 La Brea ...	—	—	—	207	2	34
	—	8093/57 4037/52 do. ...	272	0	18	342	0	30
	—	8094/57 286/54 Charuma, Cocal & Ortoire	1,418	1	17	19	3	33
	—	8095/57 286/54 Charuma, Cocal & Ortoire	10,257	2	23	—	—	—
	6	13083/57 11661/54 Siparia & St. Patrick	3	3	11	—	—	38
TOTAL ...	16		23,778	3	13	3,518	0	04
(C) SURRENDERED LEASES:								
S.T.O.L. Reg. No. 2711/36	—	Siparia ...	5,860	2	23	—	—	—
	—	2724/37 La Brea & Erin	—	—	—	1,373	0	00
	—	2725/37 Erin ...	1,737	0	37	15	2	18
	4	4340/37 Siparia ...	3,379	0	08	641	0	23
Shell Reg. No. 4608/35	—	La Brea ...	272	0	18	342	0	30
	—	3487/36 do. ...	—	—	—	207	2	34
	—	2412/37 Siparia ...	360	2	28	633	0	29
	—	1509/38 Ortoire ...	467	1	12	—	—	—
	—	2580/38 Charuma, Ortoire & Cocal	10,257	2	23	—	—	—
	—	5547/38 Sangre Grande & Ortoire	904	2	29	—	—	—
	—	3064/44 Ortoire ...	46	1	16	19	3	33
	8	3531/44 Siparia ...	60	1	38	—	—	—
T.P.D. Reg. No. 4863/51	—	Charuma & Cocal	160	0	12	—	—	—
	2	9310/53 Charuma ...	—	—	—	5,664	0	00
TOTAL ...	14		23,506	1	04	8,896	3	07

	No.	CROWN OIL RIGHTS		
		Crown Surface		
		A.	R.	P.
Exploration Licences issued during 1957	—	—	—	—
Exploration Licences converted to Oil Mining Leases in 1957:				
D.O.L. Reg. Nos. 11309/53 to M.L. 12737/57	—	12,924	0	00
5538/54 to M.L. 9015/57	—	61,803	0	11
5539/54 to M.L. 6962/57	—	816	1	22
2116/56 to M.L. 12239/57	4	192	2	35
		75,736	0	28
Submarine Licences issued during 1957		—	—	—
Submarine Licences surrendered during 1957		—	—	—

Application for Oil Mining Leases Outstanding at 31st December, 1957 :—

Lands and Surveys Dept. File No.	Locality	Private Surface			Crown Surface		
		A.	R.	P.	A.	R.	P.
APEX							
L. & S. 921/56 ...	Siparia ...	151	2	24	4	2	05
L. & S. 666/57 ...	Siparia ...	25	2	34	26	3	37
DOMINION							
L. & S. 522/53 ...	E.L. 4432/54 ...	—	—	—	1,307	0	22
L. & S. 391/55 ...	Cedros ...	40	0	20	158	1	12
L. & S. 834/55 ...	Chaguanas ...	93	2	04½	—	—	—
L. & S. 1483/55 ...	Chaguanas ...	47	2	08	0	3	36
L. & S. 156/56 ...	Pointe-a-Pierre & Montserrat ...	1,162	3	21	17,765	3	16
L. & S. 157/56 ...	Chaguanas ...	867	0	38	20	0	17
L. & S. 540/56 ...	P.-a-Pierre & Savana Grande ...	11,353	2	06½	—	—	—
L. & S. 578/56 ...	St. Georges & Caroni ...	308	1	31½	56	2	04
L. & S. 814/56 ...	Chaguanas & Montserrat ...	329	2	32	—	—	—
L. & S. 1885/56 ...	Pointe-a-Pierre ...	—	—	—	78	2	16
L. & S. 1946/56 ...	Montserrat & Pointe-a-Pierre ...	27	2	01	—	—	—
L. & S. 943/57 ...	Chaguanas & Montserrat ...	253	1	11	549	3	05
L. & S. 1270/57 ...	Charuma ...	43	3	04	57	3	03
L. & S. 1431/57 ...	Chaguanas & Ortoire ...	80	3	00 1/3	—	—	—
L. & S. 1619/55 ...	Couva & Pointe- a-Pierre ...	192	3	21	—	—	—
L. & S. 707/56 ...	Tamana ...	19	1	17	—	—	—
L. & S. 1312/56 ...	Chaguanas & Tamana ...	427	3	13	—	—	—
L. & S. 1457/56 ...	Cocal ...	1,268	2	28	6	3	06
SHELL							
L. & S. 1751/56 ...	Cocal ...	—	—	—	1,250	1	35
L. & S. 1068/57 ...	... ..	25	2	38	42	0	09
L. & S. 1311/57 ...	Cocal ...	—	—	—	18	1	14
TEXACO							
L. & S. 663/53 ...	Savana Grande ...	16	1	10	—	—	—
L. & S. 1450/56 ...	Montserrat & Charuma ...	—	—	—	10,883	0	00
L. & S. 1708/56 ...	Savana Grande ...	—	—	—	115	3	08
L. & S. 1721/56 ...	Charuma ...	264	0	16	—	—	—
L. & S. 114/57 ...	Moruga ...	—	—	—	131	2	05
L. & S. 221/57 ...	Moruga & Siparia ...	215	3	12	1	1	34
L. & S. 1490/56 ...	Moruga ...	—	—	—	685	2	24
L. & S. 26/58 ...	P.-a-Pierre & Montserrat ...	—	—	—	191	2	32
L. & S. 1540/56 ...	Cocal ...	—	—	—	1,282	0	00
L. & S. 1428/57 ...	Moruga ...	13	1	37	—	—	—
T.P.D.							
L. & S. 1214/56 ...	Cedros ...	10	0	00	—	—	—
L. & S. 1559/56 ...	Cedros ...	—	—	—	6	2	04
L. & S. 1911/56 ...	Cedros ...	73	0	29	37	3	14
L. & S. 770/57 ...	Moruga ...	8	3	24	2	3	12
L. & S. 1514/57 ...	Cedros ...	36	2	02	—	—	—

SUMMARY OF ALL LEASED OIL AREAS

<i>Crown Oil Rights:</i>	A	B	P
1. Principal Leases issued as at 1st January, 1958 (Private Surface)	116,913	1	10½
2. Principal Leases issued as at 1st January, 1958 (Crown Surface)	421,601	2	31½
3. Exploration Licences issued as at 31st December, 1957 ...	—	—	—
4. Marine Licences issued as at 31st December, 1957 ...	1,021,243	0	00
5. Acreage under Lease and Licence ...	1,559,758	0	02
6. Principal Leases applied for but not issued prior to 31st December, 1957 (Private Surface) ...	—	—	—
7. Principal Leases applied for but not issued prior to 31st December 1957 (Crown Surface) ...	4,055	0	16
	1,563,813	0	18
<i>Private Oil Rights:</i>			
8. Private Oil Rights under Lease on 31st December, 1957 ...	223,679	1	36
9. Total Acreage of Oil Lands ...	1,787,492	2	14

STAFF

48. During 1957 Mr. J. Back, Inspecting Officer, retired after 34 years service in the Petroleum Department.

Mr. T. Rahaman was appointed Assistant Draughtsman.

Mr. J. Burslem, Assistant Petroleum Technologist, paid a short visit to British Guiana to advise the Local Government on the issue of oil mining leases, while Mr. W. N. Foster, Petroleum Technologist, visited British Honduras, Barbados, Brunei and North Borneo, in connection with oil exploration and exploitation in these territories.

I have much pleasure in recording the very able and willing assistance that I have received from all members of the staff.

W. N. FOSTER
Petroleum Technologist

Petroleum Department,
Trinidad

SECONDARY RECOVERY

By G. J. MAINGOT AND O. O. FERNANDES

49. It is generally accepted that under standard primary depletion practices Trinidad Miocene reservoirs yield on an average between 15 and 25 per cent. of original stock-tank oil in place. The prime purpose of secondary recovery is to increase this yield significantly within the limits of production economics.

50. Secondary recovery was pioneered in the United States more than two decades ago but was not introduced into Trinidad until recently. The extreme structural complexity of the area and the generally high hydratable-shale content of the miocene formations necessitated a most cautious approach to the subject. However, after some preliminary experimental investigations on a small scale in the pre-war years, the Trinidad Oil Company Limited, (now Texaco Trinidad Incorporated) in 1945, commenced injecting gas into an Upper Cruse reservoir in the Forest Reserve Field as part of a planned secondary recovery operation. The satisfactory results obtained from this project encouraged the initiation of a new project for gas injection into a Middle Cruse reservoir in 1948 and by the end of that year the Company had injected 15 per cent. of its produced gas into secondary recovery projects.

51. Since then, increasing quantities of gas have been injected into the formation by three Companies. In the period 1945 to 1957, 8.8 per cent. of the Island's total gas production had been utilized for secondary recovery. During the year 1957 there were 14 gas injection projects in operation into which 9,529,414 M.S.C.F.* of gas or 14.6 per cent. of the Island's total production had been injected through 28 injection wells. The oil produced from these schemes amounted to 2,168,851 barrels. Fig. 1 shows the total natural gas produced, injected into the formation, and otherwise utilized, for the years 1945-57,

52. In November 1953 the Trinidad Oil Company Limited, once again took the initiative by introducing the method of waterflooding as a means of secondary recovery of oil. An experimental line flood was formulated for injecting salt water into the Gros Morne (Miocene) sands at Guayaguayare. The reservoir responded favourably to water injection, and in 1956 the Company commenced a 5 spot flood in the Forest Sands at Forest Reserve. About the same time, the Trinidad Petroleum Development Company Limited introduced an experimental "end-to-end" sweep in the Upper Cruse sands at Palo Seco. (A complete report on this project is appended).

53. During 1957 there were three waterflood schemes in operation. A total of 1,758,461 barrels of water was injected into eleven injection wells. The 23 offtake wells yielded 155,546 barrels of oil. From the inception of water injection in 1953 to the 31st December, 1957 the cumulative volume of water injected into the formation was 3,241,732 barrels.

54. There were 17 active secondary projects in operation during 1957 of which 14 were gas injection and 3 waterflood. The total oil recovered from these projects amounted to 2,324,397 barrels or 6.8 per cent. of the annual crude oil output for the Island. It is not known at this stage what proportion of this oil is secondary production. A summary of secondary recovery operations is shown in Table I.

55. It is still too early to attempt a general analysis of secondary recovery operations in Trinidad. In the older gas injection projects both gross oil production and average yield per well have shown distinct upward trends. In addition, increased reservoir pressures have brought into flowing production the majority of offtake wells which were previously on artificial lift.

56. In the case of waterflood the effect has been more dramatic. Reservoirs have reacted rather more swiftly to water than gas injection. Oil production has increased sharply and water/oil ratios have, in most cases, followed the predicted pattern. The water-flood offtake wells unlike those in the gas injection projects have not reverted to the flowing stage. This is, however, a normal characteristic of waterflood schemes introduced into highly depleted reservoirs.

57. The evidence at this stage is that the physical recovery of oil by secondary recovery techniques, additional to ultimate primary production, is now an established fact although it may be many years before the quantity of secondary production can be determined with any degree of certainty. No economic evaluations have yet been attempted, largely because most of the projects under operation are of an experimental nature. However, it may be observed that under average local conditions what advantages appear to be lost as a result of limited lateral sand continuity, might well be compensated for by the high density of productive sand lenses which generally occurs within any vertical section of a given formation. This factor facilitates expansion into new units for little additional capital investment.

58. The pertinent details of secondary recovery operations in Trinidad are listed under company headings in the succeeding paragraphs.

* M.S.C.F. = Thousands of standard cubic feet.

THE TRINIDAD OIL COMPANY LIMITED

BY G. J. MAINGOT

59. It has been mentioned that the Trinidad Oil Company Limited pioneered the introduction of secondary recovery in Trinidad. Gas injection was first introduced in the Forest Reserve Field on a limited scale in 1933 although large scale injection did not commence until 1945. Waterflood first began in Guayaguayare in 1953. Both were pilot projects designed to study the behaviour of local reservoirs under gas and water injection. Since then the results obtained have been sufficiently encouraging to warrant the expansion of both types of schemes with variation in offtake and injection patterns.

60. During the year under review the Trinidad Oil Company Limited had seven secondary recovery schemes under operation of which five were gas injection and two waterflood. At the end of the year two new waterflood schemes were opened one each in Guayaguayare and Forest Reserve both of which were, essentially, extensions of existing unit projects.

GAS INJECTION

61. The five gas injection schemes in operation were all situated on the Forest Reserve Field. The first project commenced in November, 1945 in an Upper Cruse Sand* at a depth of about 4,000 feet. Later, new schemes were developed in the Middle Cruse (1948) at 5,000 feet, Forest Sands (1955) at 2,500 feet, Upper Cruse (1956) at 2,300 feet and finally the Upper Cruse Western extension (1956). The total area under secondary influence is about 900 acres.

62. All the reservoirs except the Upper Cruse "645" Sand were partially depleted before pressure restoration commenced. Gas is injected through one or more crestal wells at a pressure of 2,000 p.s.i.g. In the case of the Forest Sands, the injection gas is taken directly from the offtake wells of other repressured reservoirs and injected without recompression into the reservoir at a pressure of 1,000 p.s.i.g.

63. In the five injection schemes, there are 15 injection and 84 offtake wells. The oil produced from these wells in December, 1957 amounted to 149,145 barrels which constituted 26.4 per cent. of the Field production and 15.8 per cent. of the total Company production.

64. In the period November, 1945 to December, 1957 T.T.O.C. injected into secondary recovery reservoirs 37.6 million M.S.C.F. of gas, or 30 per cent. of the entire company production of gas during this period. In 1957, 41.6 per cent. of the total produced gas was utilized for secondary recovery. The injection rate during December for all schemes was 26.7 million S.C.F. per day of 71.8 per cent. of Forest Reserve's gas production. The results achieved to date have been encouraging. In the older schemes not only has the decline been arrested but the upward trend of the curves for gross oil production and daily average yield per well indicates the production of significant quantities of secondary oil. In all cases reservoir pressure has reacted well to gas injection. The increased pressure has brought into flowing production the majority of wells which were on the pump before injection commenced. The rate of oil offtake from all reservoirs has followed the established trend for the past year. The gas/oil ratios have increased substantially but this is expected as reservoir pressure increases and the conditions for gas drive develop.

WATERFLOOD

65. There were two waterflood projects in operation during 1957. One was situated in Guayaguayare, the other in Forest Reserve. Towards the end of the year both the schemes were expanded. The Guayaguayare flood was extended to a Lower sand in the same formation whereas the Forest Reserve project was expanded laterally in the same sand.

66. The Guayaguayare Scheme (*see graph*) was the first waterflood project in Trinidad. It commenced in November, 1953 as a pilot scheme in a depleted reservoir with an edgewater-line-drive pattern. The reservoir is small (about 29 acres) and is situated in steeply dipping sands of the Gros Morne Sand III (Upper Middle Minocene) formation. Initially, there were 4 injection wells along the edgewater line and 10 offtake wells further up dip. The injection water is withdrawn from the sea in Guayaguayare Bay, filtered to remove solids, and chemically treated to remove dissolved oxygen before injection. Increased oil production was first observed in October, 1954, after 83,000 barrels of water had been injected and by December, 1956 it was estimated that the offtake wells were yielding about 85 barrels of oil per day over normal depletion expectations. Early in 1957, the edgewater line had advanced sufficiently up dip to affect the lowest offtake well. This well was shut-in and a new injection well put into service on the northern flank of the edgewater line. In addition, the injection rate was increased by 50 per cent. and a new offtake well drilled high up on the structure. As a result, oil production in 1957 increased by 40 per cent. over 1956; produced water decreased by 21 per cent. and the water/oil ratio was reduced from 1.61 to 0.90. It is also estimated that for December, 1957, secondary oil production averaged 147 barrels per day. By the end of 1957, 2,135,210 barrels of water had been injected into this reservoir.

*See graph

67. The Forest Reserve Scheme commenced in February, 1956 on a five-spot pattern in the Lower Forest Sands. Four injection wells form the corners of a 2-acre square with the offtake well in the centre. The reservoir was first produced in 1932 and by the end of 1955 was almost depleted by primary methods. Unlike the Guayaguayare floods, the injection water is not sea-water but connate water, produced from field wells. Before injection, the water is filtered to remove solids, chemically treated to deactivate dissolved corrosive compounds and sterilised to inhibit the multiplication of sulphate reducing bacteria. By the end of 1957, 397,254 barrels of water had been injected and over 41,000 barrels of oil produced with a cumulative water/oil ratio of 0.38. Over 200 barrels per acre-foot of secondary oil have been recovered from this project within two years. This flood is now being extended to the south-west and south-east on a continuous 2-acre spacing.

THE TRINIDAD PETROLEUM DEVELOPMENT COMPANY LIMITED

By O. O. FERNANDES

68. The Trinidad Petroleum Development Company, Limited began experiments in secondary oil recovery in 1939 by injecting relatively small quantities of natural gas (totalling 16,429 M.S.C.F.) into underground oil reservoirs which were then completing their primary phases of production. In 1953, the first large scale gas injection project was put into operation and during that year 2.5 per cent. of its total annual gas production was re-injected into Upper Cruse Sands on the Coora Field.

69. Encouraged by the satisfactory initial reaction of the unit to this type of secondary recovery, the company carried out expansion of this project and introduced several other similar projects so that by the end of December, 1957, the quantity of gas which was being injected into its six projects was more than 11 per cent. of its total gas production. During the period 1953-1957, the company has re-injected almost 7 per cent. of its total gas production.

70. In September, 1956, a pilot waterflood was introduced to determine the suitability of this alternate form of secondary oil recovery for the semi-depleted Upper Cruse Sands in the Palo Seco Area. At the end of 1957, it was too early to deduce any general conclusions from the results obtained.

71. The company now has more than 300 acres of its holdings under the active influence of secondary recovery operations and as a direct result, more than 10 per cent. of its crude oil output during 1957 was obtained from these projects.

WATER-FLOODING OPERATIONS (1957)

72. The end-to-end sweep which was introduced in September, 1956, developed steadily throughout 1957; during the year, 628,705 barrels of connate water had been injected into the unit and the cumulative total injected at 31st December, 1957 was 709,268 barrels.

73. A significant increase in the crude oil production for the unit was observed and this increase was attributed mainly to water-flooding reactions. The unit's oil output for the year 1957 at 48,192 barrels was almost double its output of 26,008 barrels for the year 1955.

74. Rapidly increasing percentages of water in the total fluids production, indicated that water channelling was occurring within the unit and at the end of the year, remedial measures were planned for repairing this irregularity. A complete report on this project is appended.

GAS INJECTION OPERATIONS (1957)

75. Production statistics from three projects continued to reflect the highly satisfactory reaction of the units to gas injection during the year. These were the pressure maintenance project in the Upper Cruse horizon at Coora (1953) and the re-pressuring projects in Upper Cruse and Morne L'Enfer Sands at Coora (1954) and Quarry (1956) respectively.

76. Summarizing for these three projects: at the year end, natural gas was being injected at a pressure of 1,500 p.s.i.g. and the average daily gas input was at the rate of 1,867 M.S.C.F. The cumulative total gas injected was 2,373,215 M.S.C.F. and the oil offtake during the year was slightly under 410,000 barrels or 9 per cent. of the company's total oil output. Their producing gas to oil ratio was under 1,000 while the volume of gas (S.C.F.) injected per barrel of oil produced was less than 2,000. Reservoir pressure build-ups were also considered to be satisfactory.

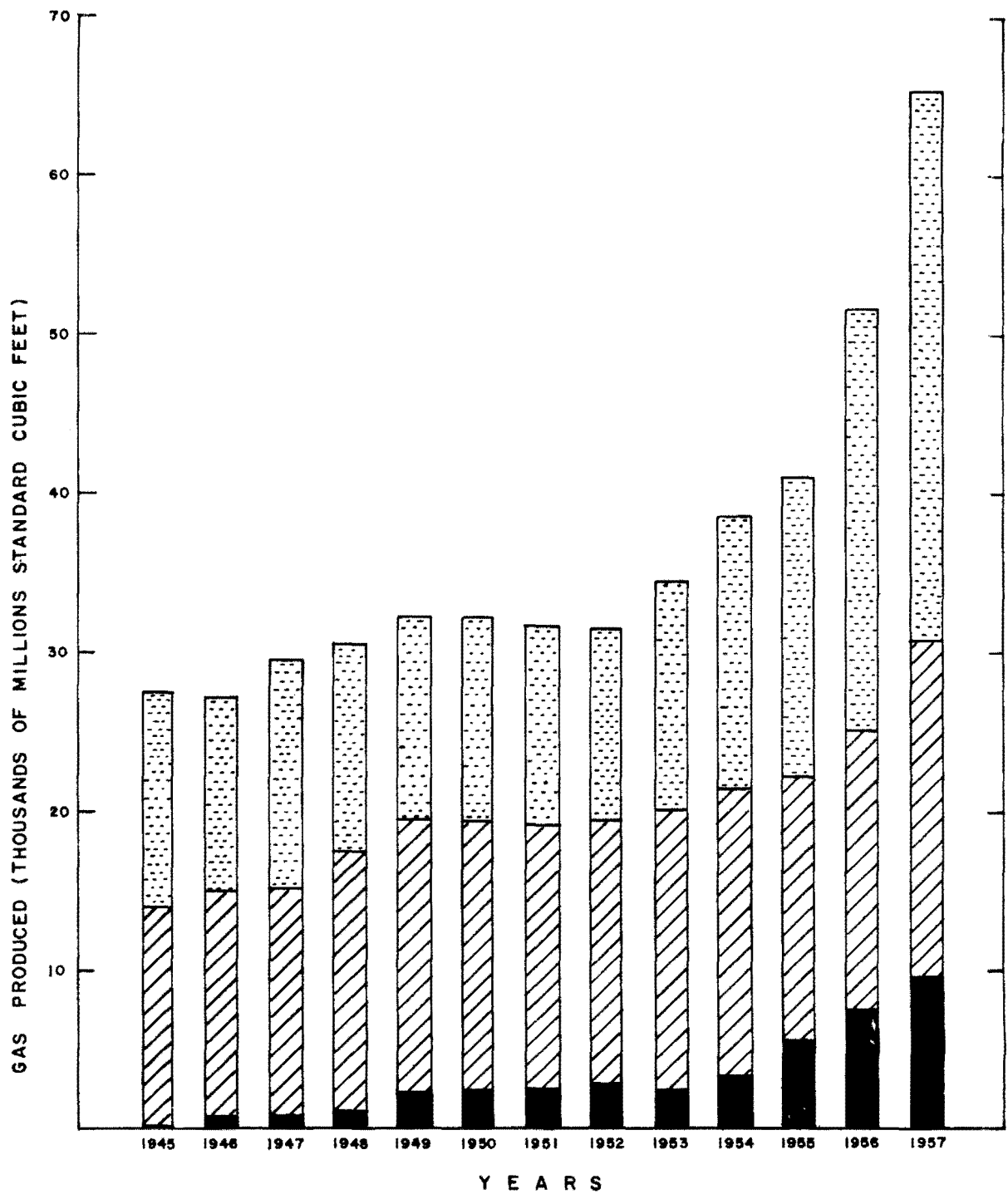
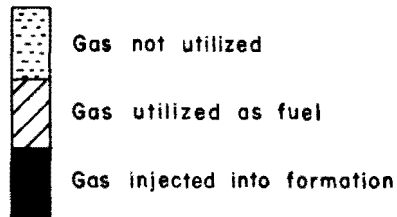
77. Gas injection was introduced into three other units during the year; in February, a low pressure sweep was started in Morne L'Enfer Sands at the Quarry Field, and two re-pressuring projects, one in Forest Sands and the other in Lower Cruse Sands were commenced on the Palo Seco Field in July and December respectively. It is too early to comment on these projects.

78. Two projects however, one in the Morne L'Enfer at Los Bajos and another in the Upper Cruse at Palo Seco, were discontinued during the year due to the insufficiency of re-pressuring facilities.

79. The total gas injected into all units during 1957 was 1,059,487 M.S.C.F. or 10 per cent. of the company's annual natural gas output. At the year end, daily gas injection was at the rate of 3,455 M.S.C.F.

NATURAL GAS PRODUCTION & UTILIZATION IN TRINIDAD FOR YEARS 1945 - 1957

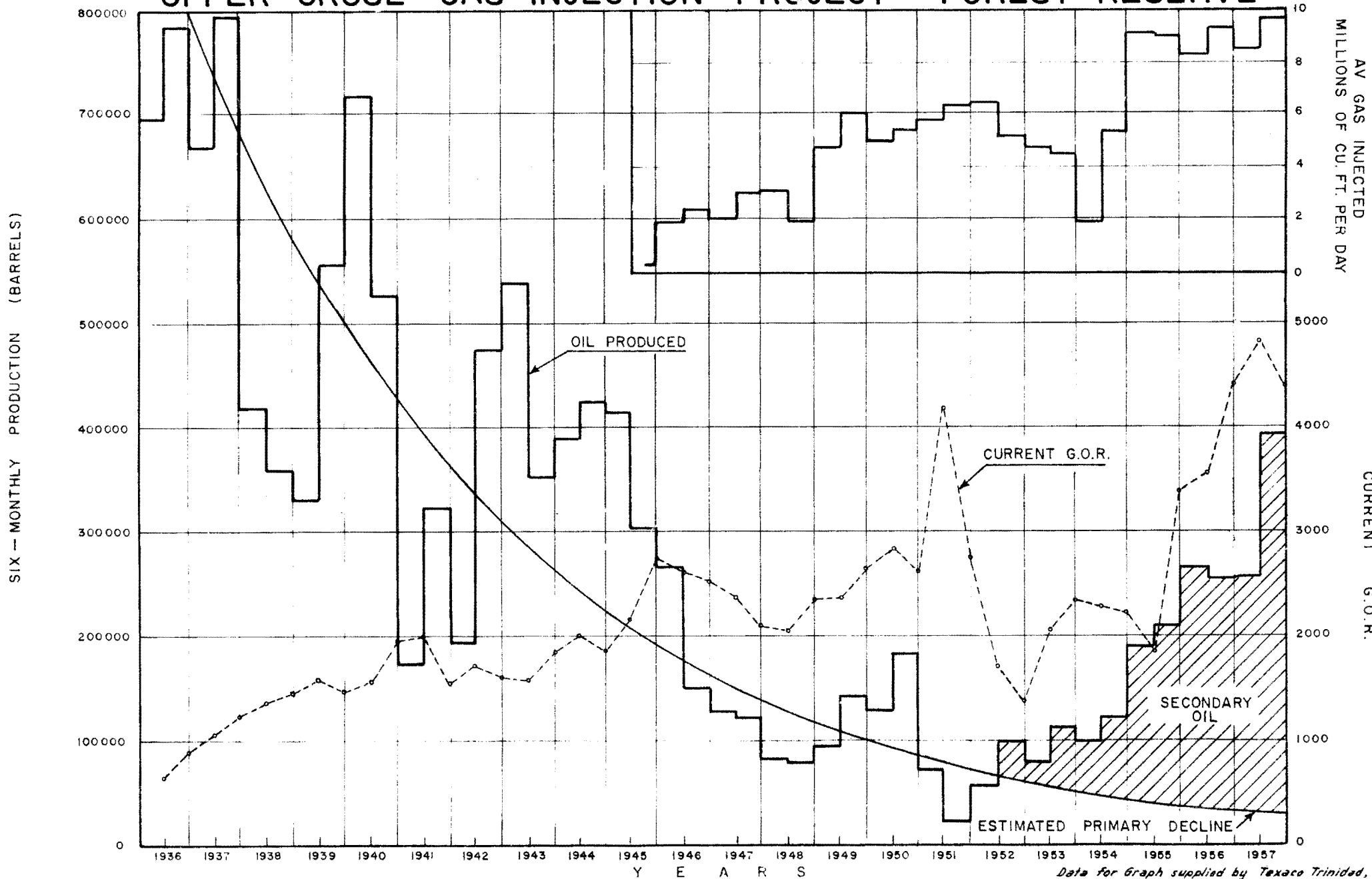
LEGEND



*Compiled by D.O. Fernandes & G.J. Maingot
Drawn by T.M. Rahaman*

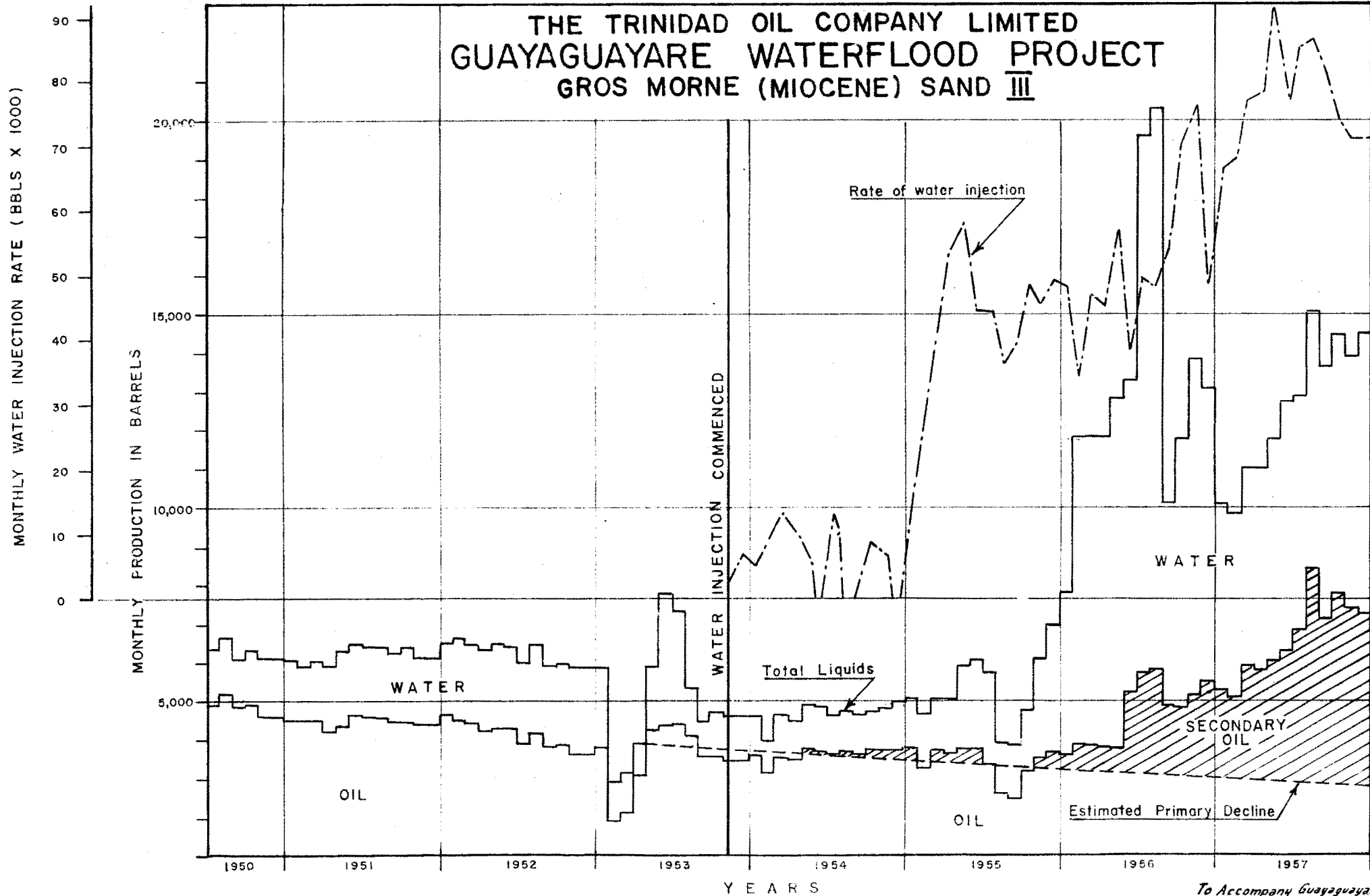
To Accompany Administration Report for 1957

UPPER CRUSE GAS INJECTION PROJECT - FOREST RESERVE



Data for Graph supplied by Texaco Trinidad, Inc.

THE TRINIDAD OIL COMPANY LIMITED
 GUAYAGUAYARE WATERFLOOD PROJECT
 GROS MORNE (MIOCENE) SAND III



Compiled by G.J. Maingot
 Drawn by T.M. Rahman

To Accompany Guayaguayare Waterflood Report

APEX GAS INJECTION SCHEMES

BY G. J. MAINGOT

80. Apex (Trinidad) Oilfields Limited commenced secondary recovery operations in July, 1951 with an experimental pressure restoration scheme in an Upper Cruse Sand. In 1952 and again in 1957, new projects of similar types were set going in Upper Forest Sands. By the end of 1957, there were three schemes in operation, covering an area of 208 acres with a total of 4 injection and 16 offtake wells. The extent of each project is small and gas injection pressures low (175-375 p.s.i.g.). Operations are conducted on a pilot plant scale with careful regulation of operating conditions in order to study reservoir behaviour.

81. In the period under study, from 1951 to 1957, 1,164,830 M.C.F. or 4 per cent. of the company's gas production had been injected into the formation. Due to the low injection pressure, the reservoirs have reacted slowly. All reservoirs have shown an increase in pressure and in the case of the Upper Cruse and first Forest Sand projects, the decline rate has been arrested and there is evidence of secondary oil production.

TABLE I

SUMMARY OF SECONDARY RECOVERY OPERATIONS IN TRINIDAD FOR THE YEAR 1957

Type of Project	No. of Projects in operation at 31.12.57	No. of Input Wells	No. of Off-take Wells	Injection Volumes for 1957 Gas—*M.S.C.F. Water—Bbls	Cumulative Volumes Injected to 31.12.57 Gas—M.S.C.F. Water—Bbls	Volume of Oil (bbls) recovered from operations during 1957	% of Total Crude production for island in 1957	No. of Acres under influence of Secondary Recovery Operation
Gas Injection ...	14	28	117	9,529,414	41,622,067	2,168,851	6.37	1,277
Water Flood ...	3	11	23	1,758,461	3,241,732	155,546	0.46	162
TOTALS ...	17	39	140	—	—	2,324,397	6.83	1,439

(* M.S.C.F. = one thousand standard cubic feet)

TABLE II

NATURAL GAS PRODUCTION AND UTILISATION IN TRINIDAD FOR THE YEARS 1945-1957

Year	Total Gas Produced (M.C.F.)	USED AS FUEL		INJECTED INTO FORMATION	
		Vol. (M.C.F.)	%	Vol. (M.C.F.)	%
1945 ...	27,502,847	13,882,193	50.5	80,000	0.3
1946 ...	27,169,521	14,191,590	52.2	827,060	3.0
1947 ...	29,617,526	14,371,413	48.5	901,593	3.0
1948 ...	30,696,567	16,429,603	53.5	1,241,273	4.0
1949 ...	32,286,794	17,270,103	53.5	2,386,480	7.4
1950 ...	32,311,651	16,770,559	51.9	2,674,012	8.3
1951 ...	31,724,755	16,616,464	52.4	2,589,645	8.1
1952 ...	31,502,833	16,870,355	53.6	2,785,623	8.8
1953 ...	34,596,614	17,677,063	51.1	2,532,439	7.3
1954 ...	38,493,715	18,178,769	47.2	3,226,603	8.4
1955 ...	40,860,323	16,825,669	43.1	5,442,069	13.3
1956 ...	51,742,518	17,701,134	37.3	7,405,856	14.3
1957 ...	65,417,972	21,210,605	32.4	9,529,414	14.6
TOTALS ...	475,923,636	217,995,520	46.0	41,622,067	8.8

I.M.C.F. = 1,000 standard cubic feet.

* These figures include negligible amounts of gas (less than 0.4%) used for interference tests or stored in the formation

REPORT ON TRINIDAD PETROLEUM DEVELOPMENT PILOT WATER-FLOOD
PROJECT AT PALO SECO FIELD

By O. O. FERNANDES, B.Sc. (*Petroleum Engineer*)

(i) SUMMARY

82. A Pilot Water-Flood was initiated in September, 1954 on a section of the Trinidad Petroleum Development, Palo Seco Field, in order to determine the floodability of the Upper Cruse Sands of the Palo Seco Area in Trinidad.

83. To date some 700,000 barrels of water have been injected into the pool, and there has been evidence of increased oil production as a direct result of water-flooding of the unit. However, this oil production has been accompanied by increasing water production. Remedial measures for reduction in water production are being implemented and the results are anxiously awaited.

(ii) GEOLOGY

84. The unit is a stratigraphic trap and consists of several almost continuous sand lenses in the Upper Cruse Horizon, extending over some one hundred and thirty acres. It lies on the eastern margin of the Palo Seco Syncline Unit of the Erin Basin. A contour map of the Upper Cruse with 25-foot isopachs super-imposed, is included in Enclosure "A".

(iii) DEVELOPMENT AND PRODUCTION HISTORY

85. The pool was discovered in 1934, when P.S. 150, a north easterly half-mile outstep to the Palo Seco Field was drilled. Development thereafter was rapid, and by 1936, thirty-two wells were drilled into the Upper Cruse and three more into the Middle Cruse. All the wells were completed with pre-perforated liners.

86. It appears from production decline studies that the operative mechanisms in the reservoir were, in the main, solution gas drive and gravity-drainage to a lesser extent. Oil Production to the end of December, 1956, was just under two and one half million barrels. Water Production was considered low at two hundred thousand barrels, almost all of which occurred during the first five years of the unit's production.

87. About half of the total oil produced was recovered by the end of 1936 and, by that time all the wells were on artificial lift. Prior to commencing water-injection in September, 1956, there were five wells on production and the yield was considered marginal at one thousand, four hundred barrels for the month of July, 1956.

88. Graphs showing annual and cumulative oil and water production from the unit are shown in Enclosure "B". The ultimate recovery during the primary phase, based on existing decline curves and current economic limits, is estimated at 2.6 million barrels.

89. Original stock tank oil in place was estimated by a volumetric method at 10.5 million barrels. The oil recovery at the end of August, 1956, represented 23½ per cent. of the original stock tank oil in place.

90. Cumulative Oil Production at 31st December, 1957, was 2,534,384 barrels. The percentage water in fluid produced for December, 1957, was 50.2 per cent.

91. Oil Production for the month of December, 1957, was 5,525 barrels, compared with 2,822 barrels for December, 1956.

(iv) TABLE OF RESERVOIR DATA AND FLUID CHARACTERISTICS

General:

Date of Discovery of Reservoir	...	...	...	...	March, 1934
Depth of Wells (feet)	...	...	...	...	2,700'-3,600'
Productive Area (acres)	...	...	...	...	131
Total No. of Wells which produced from Upper Cruse Sands in the Pool	...	...	...	...	35*
Total No. of Wells producing at 30th September, 1956	...	...	...	...	5
Stock Tank Gravity of Oil at 60 degrees F.	...	...	...	...	25.5° A.P.I.
Viscosity of Stock Tank Oil at 90 degrees F.	...	...	...	...	14.2 cps.

* Three middle cruse producers were also completed in the Upper Cruse.

Reservoir Data:

Average Effective Sand thickness	56 feet
Average Porosity per cent. (est.)	27
Average Permeability m.d. (est.)	500
Average Connate Water per cent. (est.)	20
Average Original Reservoir Pressure p.s.i.g. (est.)	1,800
Average Formation Temperature—degrees F.	113
Formation Vol. Factor (est.)	1.17
Total Stock Tank Oil originally in Reservoir	10.5 million bbls.
Initial Gas Solubility (at 1800 p.s.i.g.)	350 S.C.F./bbl.

Production Data:

Maximum Yearly Production, 1935	728,678 barrels
Statistics for Year prior to Water Injection:	
Yearly Production for 1955	25,000 barrels
Average Daily Oil Production, 1955	68 barrels
Average Daily Water Production, 1955	Nil
Statistics for First Year of Water Injection:	
Yearly Oil Production for 1957	48,192 barrels
Average Daily Oil Production, 1957	132 barrels
Average Daily Water Production	56 barrels

Recovery Statistics:

Cumulative Oil Production to 31st December, 1956	2,486,192 barrels
Average Recovery per acre-foot to 31st December, 1956	339 barrels
Recovery to 31st December, 1956, expressed as Percentage of Original Stock Tank Oil in place	23.7%

(v) WATER-FLOODING OPERATIONS

92. Water-flooding was initiated at Palo Seco in an effort to determine the floodability of Upper Cruse Sands in Trinidad. Since only 24.8 per cent. of the original stock tank oil in place would have been recovered by the end of the primary phase, it was hoped that water-flooding would produce another volume of oil equivalent to that already produced by primary methods. An "end-to-end sweep" method was adopted in an effort to create and maintain an oil-water front across the reservoir and sweep oil ahead and up dip of it to the other side of the stratigraphic trap, in the south-eastern portion of the reservoir.

93. A diagram, Enclosure "D", illustrates schematically the method of treating and injecting connate water, which is mechanically separated from field production, into the reservoir. Sulphate reducing bacteria does not occur in sufficient quantities to warrant the use of a bactericide; solids in the injection water are kept below 25 p.p.m. by use of the Paterson Pressure type, graded sand filters.

94. At the year end, tests were in progress to explore the possibility of employing sea-water for injection; the results so far have been encouraging and the company is contemplating the establishment of a water treating plant on the Palo Seco Beach.

95. Six wells were originally proposed for injection, but three of them proved unsuitable: P.S. 186 had too low an injectivity factor, P.S. 213 was mechanically unsuitable, and Well No. P.S. 183 was finally abandoned as an injection well.

96. The Triplex Injection Pump in use is capable of injecting 2,300 barrels per day at a maximum pressure of 1,240 p.s.i.g. Injection volumes are recorded continuously by means of orifice meters equipped with gas-oil seals, and suitable sizes of chokes are used to control individual well input rates.

97. Filtration is accomplished by using two filters in parallel per shift, while back-washing with compressed-air and water is carried out on the remaining pair.

98. Sodium nitrate was introduced into the injection water as a tracer at Well P.S. 198, but has not been detected in any of the effluents from the offtake wells at 31st December, 1957.

99. A series of temperature surveys were conducted for obtaining injectivity profiles on the injection wells but although the overall injection intervals were clearly demonstrated, no details within the intervals themselves could be determined with the available equipment.

100. At the end of December, 1957, a total of 709,268 barrels of water had been injected into the unit. A graph showing monthly production rates, cumulative water injected, and water per cent. in total fluid for the years 1956 and 1957 is included in Enclosure "C".

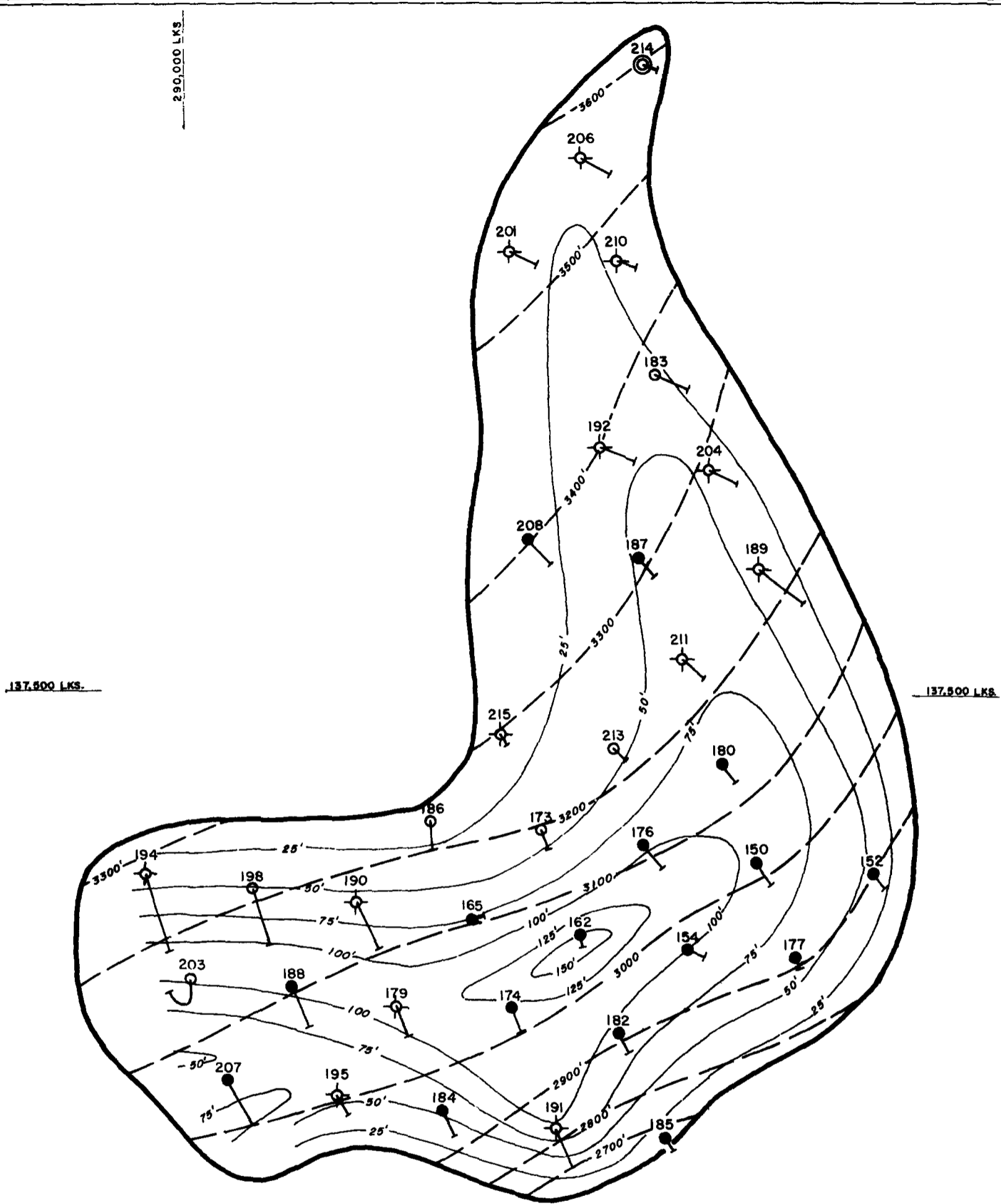
101. The decline curve imposed on this graph was plotted by integrating the extrapolated productions on the individual well-decline curves for wells in the unit and gives a fair estimate of the oil recovered which may be directly attributed to water-flooding operations.

(vi) CONCLUSIONS

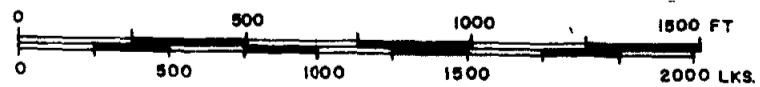
102. It is too early to draw any conclusions as to the degree of success attending the flood. Channelling of water has definitely occurred and remedial work to injection Well P.S. 173 has been planned.

ACKNOWLEDGMENT

103. The author wishes to express his appreciation to the management of the Trinidad Petroleum Development Company for their assistance and co-operation in preparing the Report on their pilot water-flood.

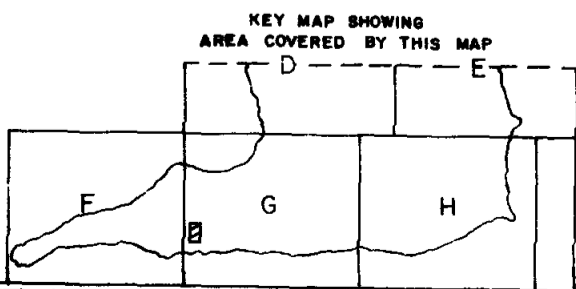


**STRATUM CONTOURS & 25 FT. ISOPACHS
ON
UPPER CRUSE SANDS (SUB-SEA)
EAST PALO SECO**



LEGEND

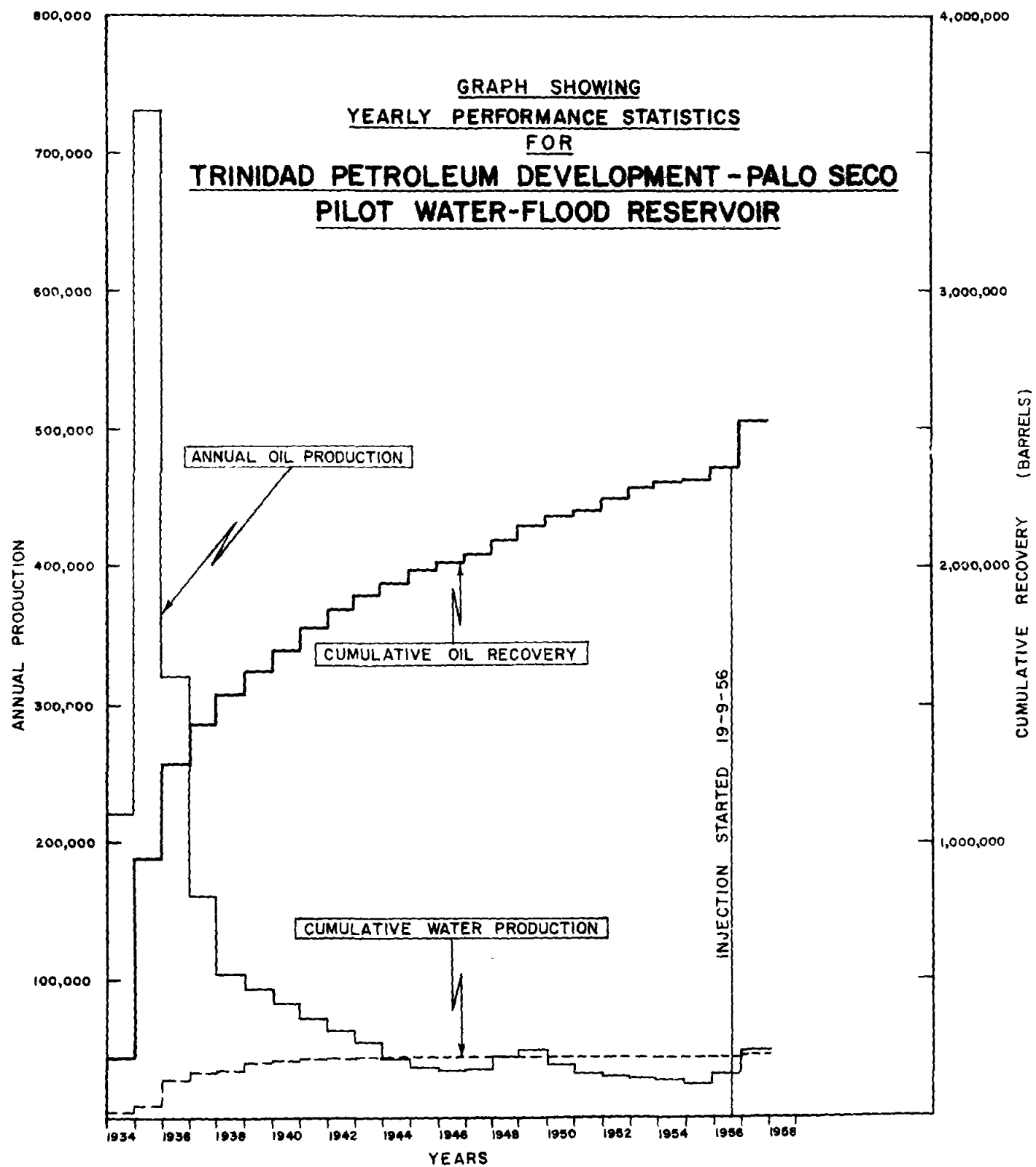
- 100 FT Contours
- - - 25 FT Isopachs
- ⊙ Wells plugged
- Wells proposed for water injections
- Wells proposed for oil production
- ⊙ Wells drilled in pool but not perforated



Author: D.O. Fernandes
Based on original maps compiled by R. Buxton (T.P.D.)
Drawn by T.M. Robinson

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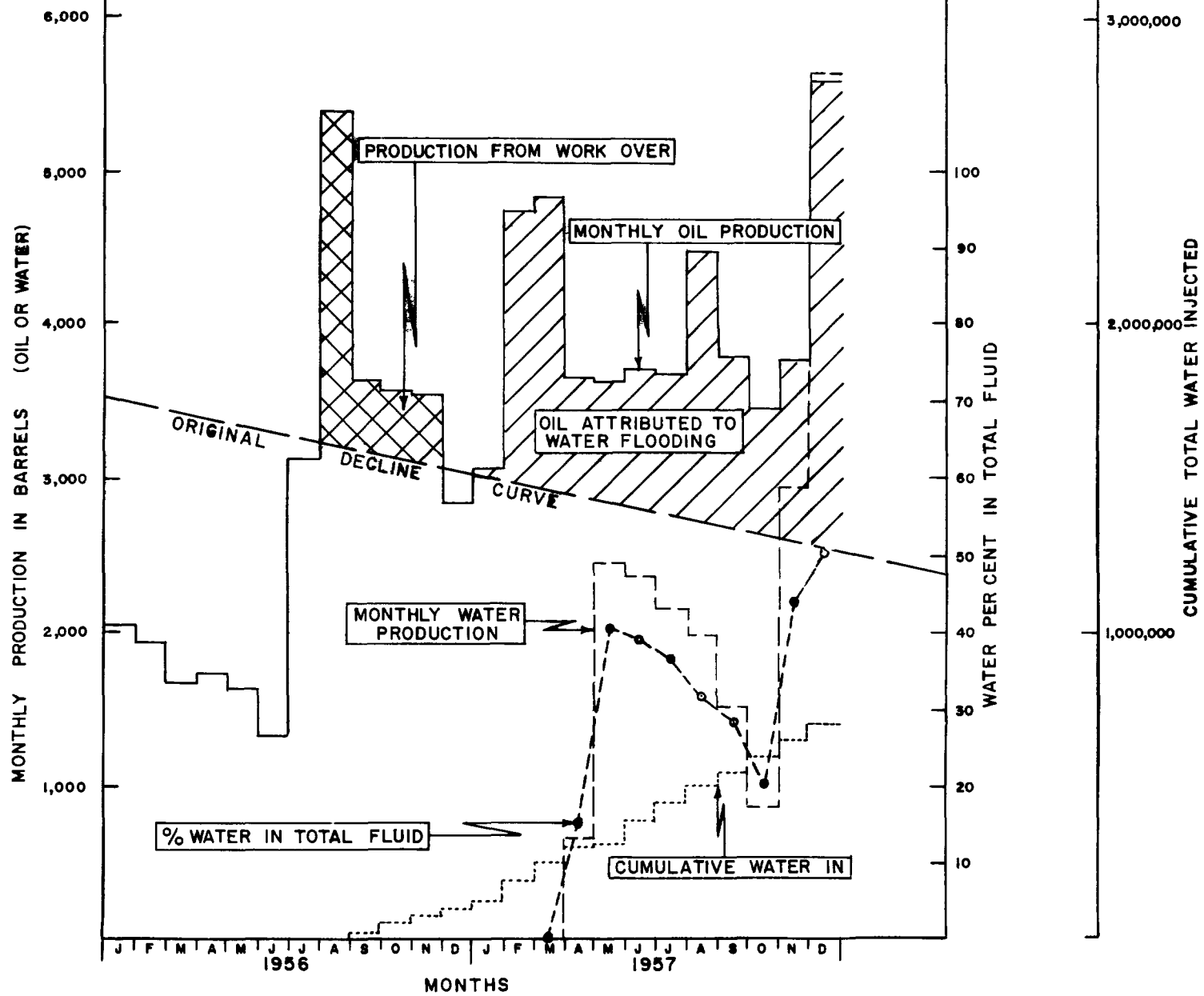
Enclosure A



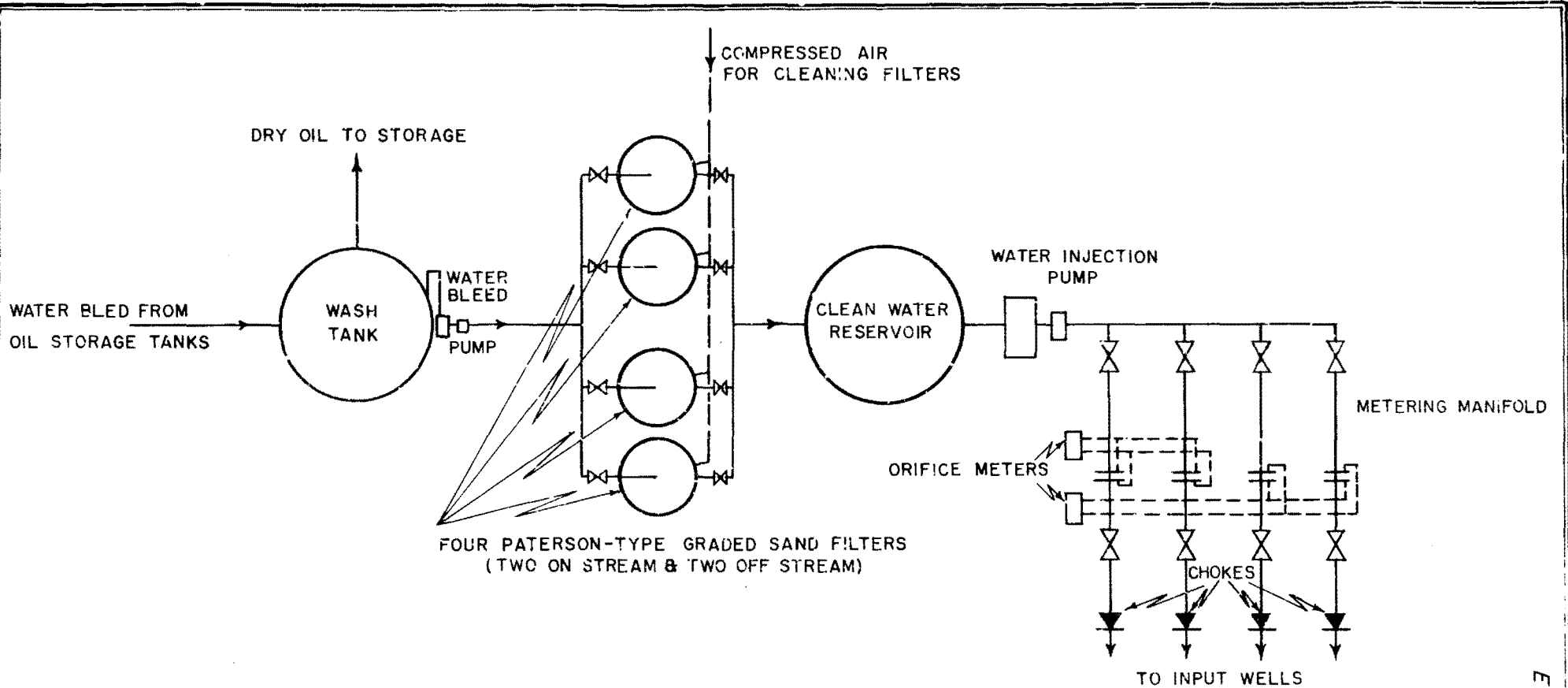
Compiled by O.G. Fernandes
Drawn by T.M. Rahmani

To Accompany Administration Report for 1957

**GRAPH SHOWING
1956 AND 1957 MONTHLY PRODUCTION STATISTICS
FOR
TRINIDAD PETROLEUM DEVELOPMENT - PALO SECO
PILOT WATER-FLOOD RESERVOIR**



Compiled by O.O. Fernandes
Drawn by T.M. Rehman.



DIAGRAMATIC SKETCH
 OF
TRINIDAD PETROLEUM DEVELOPMENT PILOT WATER INJECTION PROJECT

Enclosure D

*Author : D.O. Fernandes
 Drawn by T.M. Rahman
 To Accompany Administration Report for 1957*

TABLE I
ANNUAL STATISTICS OF PRODUCTION, DRILLING, EXPORTS AND IMPORTS

ITEM	Unit	1957	% Difference 1957/1956	1956	1955	1954	1953	1952	1951	1950	1949
PRODUCTION											
1. Crude Oil	1,000's bbls.	34,064	+ 17.8	28,929	24,896	23,629	22,346	21,258	20,843	20,632	20,617
2. Natural Gasoline	do.	265	+ 2.7	258	274	290	264	204	201	185	168
3. TOTAL CRUDE OIL AND NATURAL GASOLINE	do.	34,329	+ 17.6	29,187	25,170	23,919	22,610	21,462	21,044	20,817	20,785
4. From Crown Oil Rights	do.	28,509	+ 21.5	23,462	20,119	18,902	17,899	16,782	16,397	16,300	16,288
5. From Private Oil Rights	do.	5,555	- 3.0	5,725	5,051	5,017	4,711	4,680	4,647	4,517	4,497
6. TOTAL IMPORTS	1,000's bbls.	20,155	- 4.2	21,041	18,754	17,071	16,860	17,028	16,347	11,258	11,678
7. Imports of Refined Products (Total of Lub. Oil)	do.	29	- 9.4	*32	35	36	21	32	36	23	25
8. Imports of Crude Oil for Refining	do.	19,509	- 3.7	20,251	17,780	16,670	16,696	16,722	15,855	11,214	11,333
9. Imports of Other Oils for Refining and Blending	do.	617	- 18.6	*758	939	365	143	274	456	21	320
10. TOTAL EXPORTS	1,000's bbls.	50,254	+ 5.3	47,697	39,824	36,954	36,220	34,778	34,359	29,150	29,745
11. Exports of Crude Oil	do.	3,273	- 18.2	4,002	2,866	3,398	1,999	1,844	1,918	2,194	2,037
12. Exports of Refined Products	do.	46,981	+ 7.5	*43,695	36,958	33,556	34,221	32,934	32,441	26,956	27,708
13. Runs to Stills	1,000's	50,467	+ 12.6	44,825	40,147	36,918	37,446	36,041	35,160	29,813	29,617
14. No. of Wells started	As stated	321	+ 22.1	263	225	202	223	187	144	149	146
15. TOTAL NUMBER OF DRILLING WELLS COMPLETED	As stated	314	+ 19.8	262	215	202	224	182	140	144	144
16. No. of Drilling Wells Completed as Oil Wells	do.	†282	+ 25.9	224	191	189	211	177	131	136	130
17. No. of Drilling Wells Abandoned while drilling, &c.	do.	22	- 42.1	38	24	13	13	5	9	8	14
18. TOTAL FOOTAGE DRILLED (ALL WELLS)	Feet	1,322,483	+ 19.1	1,110,745	987,567	911,242	917,894	736,535	664,887	659,565	630,209
19. Footage Drilled on Crown Oil Rights	do.	1,071,207	+ 33.6	801,716	783,788	684,128	733,401	578,031	521,751	524,374	451,624
20. Footage Drilled on Private Oil Rights	do.	251,276	- 18.7	309,029	203,779	227,114	164,493	158,504	143,136	135,191	178,585
21. Average Dept of Completed Drilling Wells (Item 15)	Feet	4,151	- 2.0	4,237	4,372	4,544	4,026	4,286	4,480	4,436	4,065
22. TOTAL NUMBER OF WELLS PRODUCING (Average during year)	As stated	3,048	+ 6.6	2,858	2,745	2,674	2,336	2,407	2,280	2,197	2,089
23. No. of Wells Producing by Flowing (Average during year)	do.	882	+ 10.7	797	718	692	639	594	584	594	616
24. No. of Wells Producing by Artificial Lift (Average during year)	do.	2,166	+ 5.1	2,061	2,027	1,982	1,897	1,813	1,696	1,603	1,473
25. AVERAGE DAILY PRODUCTION DURING YEAR PER PRODUCING WELL	Barrels	30.6	+ 29.9	27.7	24.8	24.2	24.1	24.1	25.1	25.7	27.0
26. Average Daily Production during Year per Flowing Well	Barrels	69.0	+ 13.7	60.7	55.2	51.0	49.8	47.3	48.5	50.2	51.9
27. Average Daily Production during Year per Artificial Lift Well	do.	15.0	+ .7	14.9	14.1	14.8	15.5	16.6	17.0	16.6	16.6
28. TOTAL VALUE OF DOMESTIC EXPORTS	000\$	380,022	+ 18.0	322,049	278,985	257,178	251,258	223,331	207,584	167,562	131,790
29. TOTAL VALUE OF PETROLEUM AND ITS PRODUCTS (In Item 28)	do.	311,741	+ 19.1	261,792	212,584	193,240	194,359	175,490	161,859	129,183	99,166
30. TOTAL VALUE OF LAKE ASPHALT AND ITS PRODUCTS (In Item 28)	do.	2,698	+ 7.7	2,504	3,044	3,769	4,103	5,981	3,989	2,669	3,011
31. TOTAL NATURAL GAS PRODUCED	Millions of Cubic Feet	65,418	+ 26.4	51,742	40,860	38,494	34,597	31,503	31,725	32,312	32,287
32. Used as Fuel	do.	21,211	- 1.7	21,586	17,590	18,179	17,677	16,870	16,616	16,771	17,270
33. Replaced in Formation	do.	9,490	+ 28.1	7,406	5,442	3,227	2,532	2,786	2,690	2,674	2,387
34. Losses, Not Collected, Vented, &c.	do.	34,717	+ 52.6	22,750	17,828	17,098	14,388	11,847	12,519	12,867	12,630

*Amended Figures.

†Includes 4 Injection Wells.

TABLE II—MONTHLY ANALYSIS OF DRILLING WELLS FOR THE YEAR 1957

MONTH	Average No. of Rigs Running	No. of new Wells Started	No. of old Wells Abandoned	No. of Oil Wells Recompleted	DRILLING WELLS COMPLETED DURING 1957										MONTHLY FOOTAGE DRILLED			Average Footage drilled per day	Average Footage drilled per Rig per day	
					Completed as Oil Producers		Completed as Injection Wells		Abandoned while drilling				Left Closed in After Drilling		Total No. of completions	Crown Oilrights Feet	Private Oilrights Feet			Total Feet
					No.	Aggregate Depth in Feet	No.	Aggregate Depth in Feet	Dry Holes		Technical Causes		No.	Aggregate Depth in Feet						
									No.	Aggregate Depth in Feet	No.	Aggregate Depth in Feet								
JANUARY ...	28	21	—	21	21	84,454	—	—	—	—	—	—	2	12,231	23	68,426	27,285	95,711	3,087	110
FEBRUARY ...	28	28	—	27	24	88,502	—	—	3	15,479	—	—	2	15,179	29	82,045	27,252	109,297	3,087	110
MARCH ...	29	29	2	29	24	86,597	—	—	1	5,002	—	—	1	9,056	26	82,359	18,618	100,977	3,257	112
APRIL ...	27	26	1	27	20	83,225	—	—	1	2,932	—	—	—	—	21	83,466	14,882	98,348	3,278	121
MAY ...	29	25	1	42	21	83,379	—	—	3	9,472	—	—	2	10,000	26	97,520	24,162	121,682	3,925	135
JUNE ...	27	22	4	20	21	94,752	1	1,550	1	4,510	—	—	1	3,350	24	89,102	19,932	109,034	3,634	135
JULY ...	29	35	1	23	30	130,578	—	—	—	—	—	—	1	6,468	31	94,881	24,249	119,130	3,843	133
AUGUST ...	30	28	4	28	24	92,252	—	—	2	7,411	—	—	—	—	26	75,372	29,854	105,226	3,394	113
SEPTEMBER ...	29	28	2	26	22	80,823	1	1,860	2	14,515	—	—	1	7,918	26	93,954	25,531	119,485	3,983	137
OCTOBER ...	31	32	1	27	27	95,766	2	3,328	3	16,012	1	1,098	—	—	33	106,448	16,250	122,698	3,958	128
NOVEMBER ...	32	22	1	22	22	104,583	—	—	3	20,175	—	—	—	—	25	110,000	14,929	125,029	4,168	130
DECEMBER ...	29	25	1	12	22	103,952	—	—	2	7,015	—	—	—	—	24	87,534	8,332	95,866	3,092	107
TOTALS AND AVERAGES...	29	321	18	304	278	1,128,863	4	6,738	21	102,523	1	1,089	10	64,202	314	1,071,207	251,276	1,322,483	3,559	123
TOTALS AND AVERAGES 1956 ...	27	263	8	229	224	909,323	—	—	26	120,539	4	20,200	8	60,602	262	801,716	309,029	1,110,745	3,026	112
% DIFFERENCE 1957/1956 ...	+7.4	+22.1	+12.5	+32.6	+24.1	+24.1	—	—	-19.2	-14.9	-75.0	-94.6	+25.0	+5.9	+19.8	+33.6	-18.7	+19.1	+17.6	+9.8

+ Rig-days are defined in this calculation as all the days in which a rig is standing on location from the time of spudding in to the time of washing in to production or abandonment. Sundays and public holidays are, therefore, included.

Average Depth of Wells Completed in 1957—4,151 feet.

Average Depth of Wells Completed in 1956—4,327 feet.

TABLE III
ANALYSIS OF MONTHLY PRODUCTION FOR THE YEAR ENDED 31ST DECEMBER, 1957
All crude oil figures are for dry oil—1 barrel (bbl.)=34.9726 Imperial Gallons

MONTH	FLOWING				GAS/LIFT				PUMPING				PLUNGER LIFT				OTHER METHODS				SALT WATER				No. of Wells Produced	No. of non-producing Wells	No. of Wells Abandoned (Total)	No. of Wells Drilling at end of month	Total No. of Wells Started	Daily Average per Producing Well	Total Oil Produced Bbls.	BREAKDOWN OF TOTAL PRODUCTION					
	No. of Wells	Quantity Bbls.	% of Total Oil	Daily Average per Well Bbls.	No. of Wells	Quantity Bbls.	% of Total Oil	Daily Average per Well Bbls.	No. of Wells	Quantity Bbls.	% of Total Oil	Daily Average per Well Bbls.	No. of Wells	Quantity Bbls.	% of Total Oil	Daily Average per Well Bbls.	No. of Wells	Quantity Bbls.	% of Total Fluid Produced	Daily Average per Wet Well	No. of Wells	Quantity Bbls.	% of Total Oil	Daily Average per Well Bbls.								Crown		Private			
																																Daily Average per Prod. Well	No. of Wells	Quantity Produced Bbls.	Daily Average per Prod. Well	No. of Wells	Quantity Produced Bbls.
January ...	855	1,688,696	63.6	63.7	192	168,766	6.4	28.4	1,636	703,579	26.5	13.9	246	93,492	3.5	12.3	21	583	—	0.9	1,254	485,854	15.4	12.5	2,950	1,817	1,448	24	6,239	29.0	2,655,116	33.5	2,098	2,178,776	18.4	852	476,340
February ...	854	1,570,553	64.0	65.7	203	155,961	6.4	27.4	1,630	640,472	26.1	14.0	245	85,820	3.5	12.5	20	707	—	1.3	1,254	450,392	15.4	12.8	2,952	1,841	1,451	23	6,267	29.7	2,453,513	34.1	2,115	2,021,495	18.4	837	432,018
March ...	862	1,767,004	63.7	66.1	210	196,089	7.1	30.1	1,655	715,897	25.8	14.0	244	93,001	3.4	12.3	23	583	—	0.8	1,292	544,755	16.4	13.6	2,994	1,603	1,453	25	6,296	29.9	2,772,574	34.7	2,132	2,295,634	17.8	862	476,940
April ...	865	1,760,431	64.4	67.8	211	187,686	6.9	29.7	1,658	697,346	25.5	14.0	239	88,352	3.2	12.3	19	427	—	0.7	1,333	541,047	16.5	13.5	2,992	1,845	1,455	30	6,322	27.7	2,734,242	35.8	2,116	2,274,075	17.5	876	460,167
May ...	885	1,886,771	65.3	68.8	222	196,525	6.8	28.6	1,672	717,135	24.8	13.8	246	88,440	3.1	11.6	22	547	—	0.8	1,345	548,405	16.0	13.2	3,047	1,815	1,459	26	6,347	30.6	2,889,418	36.1	2,161	2,420,346	17.1	886	469,072
June ...	895	1,910,007	66.8	71.1	213	183,974	6.4	28.8	1,662	675,958	23.6	13.6	244	90,340	3.2	12.3	19	971	—	1.7	1,305	535,775	15.8	13.7	3,033	1,849	1,464	23	6,369	31.4	2,861,250	36.9	2,168	2,399,025	17.8	864	462,225
Production 1st Jan., 1957 to 30th June Totals ...	—	10,583,462	—	—	—	1,089,001	—	—	—	4,150,387	—	—	—	539,445	—	—	—	3,818	—	—	—	3,106,228	—	—	—	—	—	—	—	16,366,113	—	—	13,589,351	—	—	2,776,762	
July ...	907	1,972,111	66.9	70.1	219	192,383	6.5	28.3	1,685	689,400	23.4	13.2	244	94,696	3.2	12.5	22	544	—	0.8	1,281	533,189	15.3	13.4	3,077	1,835	1,466	26	6,404	30.9	2,949,134	36.6	2,174	2,470,177	17.1	903	478,957
August ...	897	1,957,985	66.3	70.4	237	207,252	7.0	28.2	1,687	691,703	23.4	13.2	249	97,806	3.3	12.7	18	320	—	0.6	1,290	524,407	15.1	13.1	3,088	1,845	1,472	25	6,430	31.0	2,955,066	36.5	2,197	2,484,354	16.8	891	470,712
September ...	898	1,908,410	66.0	70.8	226	209,980	7.3	31.0	1,693	673,904	23.3	13.3	253	97,439	3.4	12.8	29	886	—	1.0	1,290	521,625	15.3	13.5	3,099	1,857	1,474	28	6,458	31.1	2,890,619	37.0	2,187	2,427,999	16.8	912	462,820
October ...	902	1,974,617	65.7	70.6	236	227,596	7.6	31.1	1,719	699,423	23.3	13.1	256	102,742	3.4	12.9	17	492	—	0.9	1,328	575,681	16.1	14.0	3,130	1,851	1,479	30	6,490	31.0	3,004,870	36.5	2,240	2,530,545	17.0	890	474,325
November ...	881	1,884,939	64.7	71.3	237	233,325	8.0	28.8	1,713	689,692	23.7	13.4	255	102,891	3.5	13.4	17	570	0.1	1.1	1,338	549,720	15.6	13.4	3,103	1,901	1,482	26	6,512	31.3	2,911,417	37.0	2,216	2,462,316	16.8	887	449,101
December ...	879	1,933,531	64.7	71.0	243	225,035	7.5	29.9	1,707	721,722	24.1	13.6	262	105,749	3.5	13.0	22	691	0.2	1.0	1,327	602,241	16.8	14.6	3,113	1,913	1,485	26	6,537	31.0	2,986,728	36.9	2,226	2,544,005	16.1	887	442,723
Production 1st July, 1957 to 31st Dec. Totals ...	—	11,631,593	—	—	—	1,295,571	—	—	—	4,165,844	—	—	—	601,323	—	—	—	3,503	—	—	—	3,306,863	—	—	—	—	—	—	—	17,697,834	—	—	14,919,396	—	—	2,778,438	
Year's Production Totals ...	—	22,215,055	—	—	—	2,384,572	—	—	—	8,316,231	—	—	—	1,140,768	—	—	—	7,321	—	—	—	6,413,091	—	—	—	—	—	—	—	34,063,947	—	—	28,508,747	—	—	5,555,200	
Daily Averages ...	—	60,863	—	69.0	—	6,533	—	29.6	—	22,784	—	13.6	—	3,125	—	12.6	—	20	—	1.0	—	17,570	—	13.5	—	—	—	—	30.6	93,326	36.0	—	78,106	17.3	—	15,220	
Averages during year	882	—	65.2	—	221	—	7.0	—	1,676	—	24.4	—	248	—	3.4	—	21	—	0.0	—	1,303	—	15.8	—	3,048	—	—	—	—	—	—	—	2,169	—	—	879	—

TABLE IIIA
ANALYSIS OF PRODUCTION FOR 1957 BY OPERATING COMPANIES
(All Crude Oil Quantity Figures are for Dry Oil)

COMPANY	FLOWING		GAS/AIR LIFT		PUMPING		PLUNGER LIFT		OTHER METHODS		SALT WATER				Average No. of Wells Produced	Daily Average per Producing Well	Total Oil Produced (Barrels)	PRODUCTION FROM CROWN OIL RIGHTS			PRODUCTION FROM PRIVATE OIL RIGHTS		
	Average No. of Wells	Quantity (Barrels)	Average No. of Wells	Quantity (Barrels)	Average No. of Wells	Quantity (Barrels)	Average No. of Wells	Quantity (Barrels)	Average No. of Wells	Quantity (Barrels)	Average No. of Wells (Wet)	Quantity (Barrels)	% of Total Fluid Production	Daily Average per Wet Well				Daily Average per Producing Well	No. of Wells	Production (Barrels)	Daily Average per Producing Well	No. of Wells	Production (Barrels)
Antilles Petroleum Company (Trinidad) Limited	87	2,385,173	22	104,707	64	172,948	—	—	2	630	115	240,438	8.3	5.7	175	41.7	2,663,458	90.8	60	1,988,455	16.1	115	675,003
Apex (Trinidad) Oilfields Limited	76	1,107,900	57	377,630	267	1,365,968	24	182,048	—	—	162	706,575	18.9	11.9	424	19.6	3,033,546	24.5	167	1,492,870	16.4	257	1,540,676
Dominion Oil Limited	1	660	—	—	—	—	—	—	—	—	—	—	—	—	1	1.8	660	1.8	1	660	—	—	—
Kern Trinidad Oilfields Limited	89	783,756	—	—	106	309,562	—	—	—	—	27	189,751	14.8	19.3	195	15.4	1,093,318	19.6	58	415,035	13.6	137	678,283
Premier Consolidated Oilfields Limited	5	45,190	—	—	168	360,840	—	—	11	1,280	38	211,526	34.2	15.3	184	6.1	407,310	3.7	67	89,571	7.4	117	317,739
Trinidad Central Oilfields Limited	30	1,226,604	—	—	128	585,499	—	—	—	15	80	399,343	18.1	13.7	158	31.4	1,812,118	31.4	158	1,812,118	—	—	—
The Trinidad Oil Company Limited	221	6,815,872	22	423,533	602	3,287,667	—	—	—	192	570	1,974,172	15.8	9.5	845	34.1	10,527,264	34.2	774	9,657,929	33.5	71	869,335
Trinidad Northern Areas Limited	15	1,030,239	—	4	—	—	—	—	—	—	3	50,184	4.6	45.8	15	188.2	1,030,243	188.2	15	1,030,243	—	—	—
Trinidad Petroleum Development Company Limited	144	2,444,910	71	874,087	40	177,896	224	948,079	—	—	98	1,020,248	18.7	28.5	479	25.4	4,444,972	26.4	448	4,317,170	11.3	31	127,802
Shell Trinidad Limited	214	6,374,751	48	604,611	301	2,055,851	1	10,641	8	5,204	210	1,620,854	15.2	21.1	572	43.4	9,051,058	50.1	421	7,704,696	24.4	151	1,346,362
TOTAL	882	22,215,055	220	2,384,572	1,676	8,316,231	249	1,140,768	21	7,321	1,303	6,413,091	15.8	13.5	3,048	30.6	34,063,947	36.0	2,169	28,508,747	17.3	879	5,555,200

Natural Gasoline Production, 1957

COMPANY	CROWN OIL RIGHTS	PRIVATE OIL RIGHTS	TOTAL
	Barrels	Barrels	Barrels
Apex (Trinidad) Oilfields Limited	43,756	58,974	102,730
The Trinidad Oil Company Limited	42,534	—	42,534
Trinidad Petroleum Development Company Limited	116,897	3,289	120,186
TOTAL	203,187	62,263	265,450

TABLE IV
PRODUCTION AND DISPOSAL OF NATURAL GAS
(All figures of gas production in thousands of cubic feet)

1957	Crude Oil Production (Barrels)	Average G.O.R. (c.ft./bbl.)	Natural Gas Production	NATURAL GAS DISPOSAL									NATURAL GAS RECOVERY			Inter-Oil Company Sales and Transfer†
				Sales to Other Companies *	Replaced in Formation	Converted to C.H.P.S.	USED AS FUEL		Vented as Surplus	Pipeline Losses and unaccounted for	Not Collected	Natural Gas treated	Average Plant Recovery I.G./M.C.F.	Natural Gasoline Produced (Bbls.)		
							In Fields	At Refineries								
January	2,655,116	1,798	4,772,810	152,064	743,651	24,494	661,339	866,650	1,288,161	181,414	855,037	974,534	0.81	22,658	544,664	
February	2,453,513	1,832	4,495,314	155,457	676,453	22,827	634,719	861,208	1,196,038	161,563	787,049	915,917	0.81	21,145	558,320	
March	2,772,574	1,852	5,135,883	116,828	731,511	25,349	691,167	978,927	1,354,281	267,148	970,672	1,037,106	0.79	23,522	666,162	
April	2,734,242	1,864	5,096,083	160,097	685,256	25,124	651,979	1,012,198	1,358,488	233,571	969,370	1,045,109	0.78	23,252	588,635	
May	2,889,418	1,849	5,341,613	165,415	728,035	25,402	674,128	1,004,070	1,421,086	297,796	1,025,681	1,067,609	0.77	23,544	655,602	
June	2,861,250	1,887	5,399,322	161,315	746,906	23,710	663,265	931,884	1,489,397	357,307	1,025,538	1,012,565	0.77	22,286	639,014	
1st Half-Year Totals ...	16,366,113	1,848	30,241,025	911,176	4,311,812	146,906	3,976,597	5,654,937	8,107,451	1,498,799	5,633,347	6,052,840	0.79	136,407	3,652,397	
July	2,949,134	1,940	5,720,676	172,100	761,627	24,831	625,449	1,053,902	1,863,843	374,936	843,988	1,041,456	0.77	22,820	729,507	
August	2,955,066	1,990	5,880,323	168,383	789,741	22,374	611,714	988,660	1,823,548	317,144	1,158,759	952,351	0.79	21,594	553,863	
September	2,890,619	2,000	5,781,359	167,249	851,923	23,510	615,467	962,052	1,744,546	302,153	1,114,459	962,707	0.78	21,373	524,746	
October	3,004,870	1,961	5,893,435	180,793	928,176	24,159	651,436	965,086	1,689,263	254,614	1,199,908	1,011,346	0.77	22,362	534,002	
November	2,911,417	2,010	5,850,745	159,317	913,597	23,044	683,294	880,005	1,747,420	210,243	1,233,825	936,769	0.78	20,831	474,995	
December	2,986,728	2,026	6,050,409	190,074	972,538	21,535	655,662	937,252	1,827,983	210,192	1,235,173	899,765	0.80	20,463	486,104	
2nd Half-Year Totals ...	17,697,834	1,988	35,176,947	1,037,916	5,217,602	139,453	3,843,022	5,786,957	10,696,603	1,669,282	6,786,112	5,804,394	0.78	129,443	3,303,217	
YEAR'S TOTAL	34,063,947	1,920	65,417,972	1,949,092	9,529,414	286,359	7,819,619	11,441,894	18,804,054	3,168,081	12,419,459	11,857,234	0.78	265,850	6,955,614	
PERCENTAGE DISPOSAL FOR YEAR ... ..	...	...	100.0%	3.0%	14.6%	0.4%	12.0%	17.5%	28.7%	4.8%	19.0%				

*These sales and transfers are included under the several heads of Natural Gas Disposal.

†Sales to the T.T.E.C., Trinidad Cement Limited and Trinidad Oilfields Service.

TABLE V
RETURN OF PRODUCTION STOCKS AND DISPOSAL OF PETROLEUM DURING THE YEAR ENDED 1957
(All Figures in Barrels)

	Crude and Process Oils	REFINED PRODUCTS													
		AVIATION SPIRIT		Motor Spirit	White Spirit	Burning Oil	Vapourising Oil	Gas and Diesel Oils	Fuel Oils (All Grades)	Lub. Oil and Greases	Bitumen	Other Finished Products	Liquified Petroleum Gas	Feed or Blending Stocks for Transfer	TOTAL (All Products)
		100 Octane	Other Grades												
1. OPENING STOCKS 1ST JANUARY, 1957 ...	1,706,486	21,955	129,153	790,368	5,864	51,766	54,635	731,198	817,714	17,491	34,857	109,296	1,348	322,929	3,088,574
2. CRUDE OIL PRODUCTION INCLUDING CASING HEAD PETROLEUM SPIRIT ...	34,329,641	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. IMPORTS:															
Venezuela ...	17,004,795	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Colombia ...	2,324,036	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other Countries ...	180,185	—	—	—	—	—	—	617,371	—	6,524	—	—	—	—	623,895
TOTAL IMPORTS ...	19,509,016	—	—	—	—	—	—	617,371	—	6,524	—	—	—	—	623,895
4. RUNS TO STILLS ...	50,467,062	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5. PRODUCTION OBTAINED ...	—	381,061	2,582,194	8,734,362	31,590	1,008,709	2,236,690	10,618,000	21,956,375	3,416	359,038	864,918	22,691	244,572	49,043,616
6. CONSUMPTION:															
Trinidad and Tobago ...	50,457	—	—	741,235	726	217,775	—	275,615	465,084	1,881	2,304	148,913	15,338	7,685	1,876,556
Bunkers ...	—	67,602	52,283	—	—	—	—	2,090,695	6,769,232	—	—	—	—	—	8,979,812
Refinery Fuel ...	—	—	—	—	—	—	—	—	11,502	—	—	—	—	—	11,502
TOTAL CONSUMPTION ...	50,457	67,602	52,283	741,235	726	217,775	—	2,366,310	7,245,818	1,881	2,304	148,913	15,338	7,685	10,867,870
7. SHIPMENTS:															
Sterling Areas ...	—	54,760	3,616	5,196,267	26,905	392,955	1,696,339	3,158,611	8,606,214	1,431	292,799	268,918	7,720	155,501	19,862,036
North America ...	3,272,848	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other American Countries ...	—	—	—	—	—	—	—	—	—	—	—	9,919	—	—	9,919
Western Hemisphere ...	—	242,510	200,605	943,065	—	245,147	—	995,848	2,051,556	—	2,899	79,537	—	—	4,761,167
O.E.E. Countries ...	—	5,778	2,298,153	1,446,913	5,906	142,361	390,197	2,226,405	3,284,366	—	39,292	379,592	—	—	10,218,963
Rest of the World ...	—	10,205	5,987	33,137	—	10,819	—	2,442,568	618,749	—	22,906	4,722	—	—	3,149,143
Total Shipments ...	3,272,848	313,253	2,508,361	7,619,382	32,811	791,282	2,086,536	8,823,432	14,560,885	1,431	357,896	742,688	7,720	155,501	38,001,178
8. CLOSING STOCKS—31ST DECEMBER, 1957 ...	1,624,699	22,161	150,703	1,164,113	3,917	51,418	204,789	776,827	967,386	506	33,695	82,613	981	404,315	3,863,424
9. BALANCE NOT SPECIFICALLY ACCOUNTED FOR ...	130,077	—	—	—	—	—	—	—	—	*23,613	—	—	—	—	*23,613

Imports of Tucupita Fuel Oil for Transshipment amount to 3,027,810 barrels and are not included in the above return.

*Figures of Lub. Oil are obtained from the local producing companies. The figures from the local distributing companies are no longer included hence the figures of Stock Adjustment.

TABLE VI

STATEMENT SHOWING CONTRIBUTIONS BY THE OIL INDUSTRY TO COLONY REVENUE AND GOVERNMENT OPERATED SERVICES

(Marketing Companies not included)

Item	Head or Sub-Head	1957	% difference 1957/56	1956	1955	1954	1953	1952	1951	1950	1949	1948
	CROWN ROYALTIES, TAXATION, ETC.	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1	Customs	2,267,204	+ 65.3	1,371,241	1,097,527	1,270,440	1,191,346	1,204,736	697,095	974,118	1,238,426	778,276
2	Excise Duty on Petroleum Spirit	129,093	+ 5.6	122,243	124,304	136,257	141,361	132,817	90,291	115,637	36,910	—
3	Land and Building Taxes	209,973	+ 3.4	203,086	200,413	199,263	228,180	113,301	100,526	101,203	84,754	145,874
4	Vehicles, Licences and Registration	130,267	— 3.0	134,227	137,441	85,439	118,741	107,868	90,885	107,647	69,371	—
5	Taxes on Income	27,666,940	+ 40.9	19,630,291	18,827,104	14,692,510	15,574,972	17,091,094	13,715,292	8,704,846	13,292,777	7,441,508
6	Reimbursements—Petroleum Department	11,525	— 77.0	50,025	50,546	40,613	32,644	27,750	30,287	32,151	24,611	30,071
7	Earnings of Government Departments	50,726	+ 0.8	61,466	33,013	11,470	9,436	17,784	10,804	10,504	5,045	1,934
8	Sundries	61,241	+ 117.5	38,857	32,456	30,797	39,592	42,365	28,177	31,917	64,386	5,204
9	Royalty on Oil	13,935,103	+ 36.2	10,227,905	8,706,169	8,231,840	7,011,584	6,592,399	6,508,520	5,823,226	3,596,251	4,030,076
10	Royalty on Gas	111,394	+ 18.5	94,016	91,096	72,417	68,255	85,031	99,189	81,233	74,217	—
11	Forests—Sale of Timber	157,505	— 17.5	156,295	140,206	138,594	68,174	61,701	42,594	68,899	38,715	43,693
12	Exploration Licences	12,073	+ 57.6	5,549	3,437	5,687	4,356	14,192	3,366	9,797	3,864	15,222
13	Harbour Dues on Crude Oil and products	1,016,102	— 10.6	1,136,310	953,586	872,334	809,507	753,598	732,802	587,516	585,901	557,040
14	Sub-Totals Item 1-13	45,759,146	+ 37.7	33,231,511	30,397,298	25,787,661	25,298,148	26,244,636	22,149,828	16,648,694	19,115,228	13,048,898
	VARIOUS SERVICES											
15	Wharves and Harbours (Rentals, &c.)	93,102	+ 24.4	74,846	58,347	92,493	82,279	74,499	37,029	27,182	26,350	39,027
16	Post Office	58,510	+ 20.6	48,496	52,490	47,559	45,613	50,154	43,140	30,529	34,656	25,061
17	Rent of Government Property	17,774	+ 16.3	15,287	16,811	12,175	10,320	10,732	9,523	5,588	11,151	4,174
18	Government Railway and Telegraph	140,469	+ 24.4	112,900	104,698	123,726	119,097	165,312	151,930	137,501	115,539	101,209
19	Fees and Payments for Specific Services	44,988	— 4.7	47,215	23,742	29,578	35,258	29,609	22,600	26,146	12,308	9,294
20	Sub-Totals Items 15-19	354,843	+ 18.8	298,744	256,088	305,531	292,567	330,306	264,222	226,946	200,004	178,765
21	GENERAL TOTAL	46,113,989	+ 37.5	33,530,255	30,653,386	26,093,192	25,590,715	26,574,942	22,414,050	16,875,640	19,315,232	13,227,663
	A—Total Revenue of Colony and Government Operated Services	110,954,729	+ 14.4	96,951,614	89,991,040	80,154,136	74,535,864	73,013,672	65,215,814	56,038,019	58,391,567	49,593,902
	B—Percentage of 'A' contributed by the Oil Industry	41.5		34.6	34.1	32.6	34.3	36.4	34.4	30.1	33.1	26.6
	C—Percentage of 'A' less Items 13, 15 and 18 contributed by the Oil Industry	42.0		36.1	36.0	34.0	36.1	38.3	36.3	31.9	36.5	27.7
	D—Excise collected on Gasoline and propane (including duty shown under Item 2 above)	2,381,018	+ 8.9	2,186,203	1,985,082	1,891,322	1,714,221	1,560,225	1,454,567	1,367,860	2,394,109	2,381,909

TABLE VII

STATEMENT SHOWING THE AMOUNT OF MONEY DISBURSED IN THE COLONY AND ON OVERSEAS PURCHASES OF MATERIALS BY THE OIL INDUSTRY

(Marketing Companies not included)

	1957	% difference 1956/57	1956	1955	1954	1953	1952	1951	1950	1949	1948
MONEYS EARNED OR PAYABLE IN THE COLONY											
1. Total Contribution to Government Revenues (Item 21, Table VI) ...	\$ —	\$ —	\$ 33,530,255	\$ 30,653,386	\$ 26,093,192	\$ 25,590,715	\$ 26,574,942	\$ 22,414,050	\$ 16,875,640	\$ 19,315,232	\$ 13,227,663
2. Payments to Employees* ...	37,552,028	+ 5.2	35,700,911	34,557,926	31,040,008	29,164,141	24,743,598	20,918,670	18,839,945	17,081,804	16,201,000
3. Payments to Contractors* ...	17,069,310	+ 30.9	13,042,638	10,643,977	9,465,908	7,439,632	7,604,548	7,527,758	6,125,164	4,488,089	3,543,432
4. Local Purchases of Materials ...	9,210,891	+ 13.5	8,116,298	7,217,873	7,026,657	5,862,292	5,662,114	4,837,764	3,946,065	4,336,776	3,929,831
5. Rents and Royalties on Private Leases ...	2,404,042	+ 9.3	2,199,038	13,819,910	13,220,262	11,527,727	13,095,125	10,361,590	8,456,079	7,080,430	3,817,212
6. All other local Expenditure ...	18,251,497	+ 37.5	13,271,528								
7. Sub-Total ...	—	—	105,860,668	96,893,072	86,846,027	79,584,507	77,680,327	66,059,832	54,242,893	52,302,331	40,719,138
OVERSEAS PURCHASES OF MATERIALS (C.I.F. VALUATION)											
8. Importation from the United Kingdom ...	37,197,160	+ 55.0	23,994,740	24,760,317	23,833,618	23,439,951	22,888,622	17,208,625	14,690,802	14,161,158	8,515,146
Canada ...	1,065,175	— 16.5	1,275,812	930,113	1,143,337	1,065,818	927,095	944,464	724,216	516,130	5,690,016
United States of America ...	5,859,427	+ 8.6	5,394,161	5,184,603	3,651,034	4,329,858	6,217,177	3,401,644	5,469,200	7,766,696	
Other Sources ...	3,090,064	+ 53.8	2,008,580	425,181	1,594,177	2,032,287	1,432,977	773,214	947,512	1,012,427	
9. Sub-Total ...	47,211,826	+ 44.5	32,673,293	31,300,214	30,222,166	30,867,914	31,465,871	22,327,947	21,831,730	23,456,411	14,205,162
10. GENERAL TOTAL ...	—	—	138,533,961	128,193,286	117,068,193	110,452,421	109,146,198	88,387,779	76,074,623	75,758,742	54,924,300

* These amounts include hidden contributions to the direct revenue of the Colony in the form of Customs Duties, Income Tax, Licences, &c.

TABLE VIII

LIST OF OIL OPERATORS IN TRINIDAD, SHOWING THE AREA HELD UNDER MINING LEASE AND EXPLORATION LICENCES

Item	COMPANIES	LANDS HELD UNDER EXPLORATION LICENCE			OILRIGHTS HELD UNDER REGISTERED MINING LEASE OR MARINE LICENCE																		
		Crown Surface Crown Oilrights			Crown Surface Crown Oilrights			Private Surface Crown Oilrights			Private Surface Private Oilrights			Territorial Waters			High Seas Areas			TOTAL			
		A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	
1	ANTILLES PETROLEUM CO. (TRINIDAD) LTD.																						
	Holdings as at 31.12.56 ...	—	—	—	18,855	2	10	5,900	2	38	17,491	3	00 7/12	15,344	0	00	—	—	—	57,592	0	08 7/12	
	Holdings acquired during 1957 ...	—	—	—	—	—	—	67	1	37	5,222	0	38 3/10	—	—	—	—	—	—	5,289	2	35 3/10	
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Holdings as at 31.12.57 ...	—	—	—	18,855	2	10	5,968	0	35	22,713	3	39	15,344	0	00	—	—	—	62,881	3	04		
2	APEX TRINIDAD OILFIELDS LIMITED																						
	Holdings as at 31.12.56 ...	—	—	—	23,548	2	15	19,865	0	17	9,153	1	35	—	—	—	—	—	—	52,567	0	27	
	Holdings acquired during 1957 ...	—	—	—	7,775	3	35	2,448	1	23	437	3	00	—	—	—	—	—	—	10,662	0	18	
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Holdings as at 31.12.57 ...	—	—	—	31,324	2	10	22,313	2	00	9,591	0	35	—	—	—	—	—	—	63,229	1	05		
3	DOMINION OIL LIMITED																						
	Holdings as at 31.12.56 ...	81,058	0	36	67,605	3	03	28,648	0	38	132,115	0	00	191,330	0	00	352,652	0	00	853,409	0	37	
	Holdings acquired during 1957 ...	—	—	—	76,357	2	08	1,156	0	18	12,049	0	00	—	—	—	—	—	—	89,562	2	26	
	Holdings surrendered during 1957 ...	*81,058	0	36	—	—	—	—	—	—	24,376	0	00	—	—	—	—	—	—	105,434	0	36	
Holdings as at 31.12.57 ...	—	—	—	143,963	1	11	29,804	1	06	119,788	0	00	191,330	0	00	352,652	0	00	837,537	2	27		
4	KERN TRINIDAD OILFIELDS LIMITED																						
	Holdings as at 31.12.56 ...	—	—	—	347	2	23	619	1	06	8,754	1	33	5,760	0	00	—	—	—	15,481	1	22	
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	5	3	33	—	—	—	—	—	—	5	3	33	
Holdings as at 31.12.57 ...	—	—	—	347	2	23	619	1	06	8,748	2	00	5,760	0	00	—	—	—	15,475	1	29		
5	PREMIER CONSOLIDATED OILFIELDS LTD.																						
	Holdings as at 31.12.56 ...	—	—	—	10,718	2	09	2,640	1	13	6,414	1	37	—	—	—	—	—	—	19,773	1	19	
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	534	2	30	—	—	—	—	—	—	534	2	30	
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	464	2	31	—	—	—	—	—	—	464	2	31	
Holdings as at 31.12.57 ...	—	—	—	10,718	2	09	2,640	1	13	6,484	1	36	—	—	—	—	—	—	19,843	1	18		
6	TIMOTHY ROODAL																						
	Holdings as at 31.12.56 ...	—	—	—	—	—	—	9	2	12	—	—	—	—	—	—	—	—	—	9	2	12	
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Holdings as at 31.12.57 ...	—	—	—	—	—	—	9	2	12	—	—	—	—	—	—	—	—	—	9	2	12		
7	SIPARIA TRINIDAD OILFIELDS LIMITED																						
	Holdings as at 31.12.56 ...	—	—	—	2,029	3	01	10,976	3	28	79	2	17	—	—	—	—	—	—	13,086	1	06	
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Holdings surrendered during 1957 ...	—	—	—	2,029	3	01	10,976	3	28	79	2	17	—	—	—	—	—	—	13,086	1	06	
Holdings as at 31.12.57 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

TABLE VIII—CONTINUED

LIST OF OIL OPERATORS IN TRINIDAD, SHOWING THE AREA HELD UNDER MINING LEASE AND EXPLORATION LICENCES—Continued

Item	COMPANIES	LANDS HELD UNDER EXPLORATION LICENCE			OILRIGHTS HELD UNDER REGISTERED MINING LEASE OR MARINE LICENCE																				
		Crown Surface Crown Oilrights			Crown Surface Crown Oilrights			Private Surface Crown Oilrights			Private Surface Private Oilrights			Territorial Waters			High Seas Areas			TOTAL					
		A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.			
8	TRINIDAD CENTRAL OILFIELDS LIMITED																								
	Holdings as at 31.12.56 ...	—	—	—	6,996	2	31	—	—	—	35	2	01	—	—	—	—	—	—	—	—	—	7,032	0	32
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Holdings as at 31.12.57 ...	—	—	—	6,996	2	31	—	—	—	35	2	01	—	—	—	—	—	—	—	—	—	7,032	0	32
9	TRINIDAD NORTHERN AREAS LIMITED																								
	Holdings as at 31.12.56 ...	—	—	—	32	3	33	—	—	—	85	0	35	147,723	0	00	83,434	0	00	—	—	—	231,275	0	28
	Holdings acquired during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Holdings as at 31.12.57 ...	—	—	—	32	3	33	—	—	—	85	0	35	147,723	0	00	83,434	0	00	—	—	—	231,275	0	28
10	THE TRINIDAD OIL COMPANY LIMITED																								
	Holdings as at 31.12.56 ...	—	—	—	103,835	1	32	16,428	3	05	†9,129	2	36	—	—	—	—	—	—	—	—	—	†9,129	2	36
	Holdings acquired during 1957 ...	—	—	—	2,258	0	01	11,034	1	14	22,840	1	18 2/3	—	—	—	—	—	—	—	—	—	143,104	2	15 2/3
	Holdings surrendered during 1957 ...	—	—	—	—	—	—	—	—	—	1,537	2	35	—	—	—	—	—	—	—	—	—	14,830	0	20
	Holdings as at 31.12.57 ...	—	—	—	106,093	1	33	27,463	0	19	+9,126	0	32	—	—	—	—	—	—	—	—	—	+9,126	0	32
											%24,835	0	05	—	—	—	—	—	—	—	—	—	158,391	2	17
11	TRINIDAD PETROLEUM DEVELOPMENT COMPANY, LIMITED																								
	Holdings as at 31.12.56 ...	—	—	—	32,268	2	20½	10,662	0	14	20,612	1	20	134,000	0	00	91,000	0	00	—	—	—	288,543	0	14½
	Holdings acquired during 1957 ...	—	—	—	94	2	00	206	1	33	343	1	21	—	—	—	—	—	—	—	—	—	644	1	14
	Holdings surrendered during 1957 ...	—	—	—	5,664	0	00	160	0	12	—	—	—	—	—	—	—	—	—	—	—	—	5,824	0	12
	Holdings as at 31.12.57 ...	—	—	—	26,699	0	20½	10,708	1	35	20,955	3	01	134,000	0	00	91,000	0	00	—	—	—	283,363	1	16½
12	SHELL TRINIDAD LIMITED																								
	Holdings as at 31.12.56 ...	—	—	—	76,566	0	00	17,381	1	00½	†549	3	18	—	—	—	—	—	—	—	—	—	†549	3	18
	Holdings acquired during 1957 ...	—	—	—	1,206	3	17	12,374	1	38	11,441	2	10	—	—	—	—	—	—	—	—	—	105,388	3	10½
	Holdings surrendered during 1957 ...	—	—	—	1,203	0	06	12,369	1	04	220	0	34	—	—	—	—	—	—	—	—	—	13,801	2	09
	Holdings as at 31.12.57 ...	—	—	—	76,569	3	11	17,386	1	34½	1,220	0	00	—	—	—	—	—	—	—	—	—	14,792	1	10
											†549	3	18	—	—	—	—	—	—	—	—	—	†549	3	18
											10,441	3	04	—	—	—	—	—	—	—	—	—	104,398	0	09½
	GRAND TOTAL ...	—	—	—	421,601	2	31½	116,913	1	10½	223,679	1	36	494,157	0	00	527,086	0	00	—	—	—	1,783,437	1	38

*Of this acreage 75,736a. 0r. 28p. were converted to Mining Lease;
 4,055a. 0r. 16p. are acreage applied for but not yet granted;
 1,266a. 3r. 32p. were surrendered.

†Acreages held jointly by S.T.L. and T.T.O.C.

+ Difference of 3a. 2r. 04p., due to adjustment to previous year's holdings.

%Difference of 456a. 3r. 21p., due to adjustment to previous year's holdings.

TABLE IX

IMPORTANT EXPLORATION OR OUTSTEP WELLS AND DEEP EXPLOITATION WELLS DRILLED DURING 1957

Company	Field and Well No.	Total Depth (Feet)	Remarks	Map Reference Appendix I
Antilles Petroleum Company (Trinidad) Ltd. ...	Trinity ... A.T. 3	2,506	Completed as a Producer from Shallow Herrera Sands	J-2
Apex (Trinidad) Oilfields Limited	Cedros ... C2/ 624	13,045	At the end of the year—Testing Lengua Sands	D-2
Dominion Oil Limited	Couva, Couva Flank 2	6,000	Tested Upper Oligocene—Closed In	H-6
	Esperance ... 1	6,231	Tested Upper Oligocene—Closed In	H-3
	Chickland ... 1	9,065	Tested Brasso Sands—Closed In	I-6
	Cocal 1	5,000	Tested Nariva Sands—Closed In	N-6
	Tamba... .. 1	5,000	Tested Herrera Sands—Closed In	N-5
	Colenso ... 1	3,350	Tested Nariva Sands, Oil Show—Closed In	L-5
	Mayo 1	6,468	Tested Brasso and Nariva Sands—Closed In	I-5
	Mahaica ... 3	4,500	An Outstep to Mahaica Gas Wells 1 and 2—Plugged Back	K-8
	Puerto Grande ... 1	7,918	Tested Brasso Sands—Closed In	I-8
Flanagin ... 1	7,002	Tested Manzanilla and Brasso Sands—Closed In	J-6	
Kern Trinidad Oilfields Limited	Lothians 1	6,010	Abandoned—No Commercial Oil Sands	I-4
Premier Consolidated Oilfields Limited	Siparia... .. S. 4	9,375	Producer from Herrera Sands	H-2
Shell Trinidad Limited	Catshill ... CO. 55	5,001	South-easterly Outstep from the Eastern Productive Area of the Catshill Field—Abandoned: Wet	L-3
	do. ... CO. 73	2,932	Outstep suspended in Karamat—No Commercial Oil Sands	K-3
	do. ... CO. 74	3,321	Outstep on North Flank—Abandoned: Wet	L-3
	do. ... CO. 74A	3,489	Updip deviation of CO 74—Poor Producer from L. Cruse Sands	L-3
	do. ... CO. 77	8,169	Abandoned in well developed but wet Herrera Sands	L-3
	do. ... CO. 77A	8,039	Updip deviation of CO 77—Poor Producer	L-3
	Lizard Springs ... O.L. 1	5,003	Abandoned in Lower Miocene—Wet	M-3
	Penal P. 236	10,000	Producer from O.U. Herrera Sands	H-2
	do. P. 237	9,650	Testing O.U. Herreras at the end of the year	H-2
do. P. 233	10,344	Poor Producer from O.U. Herrera Sands	H-2	

TABLE IX—CONTINUED

IMPORTANT EXPLORATION OR OUTSTEP WELLS AND DEEP EXPLOITATION WELLS DRILLED DURING 1957—Continued

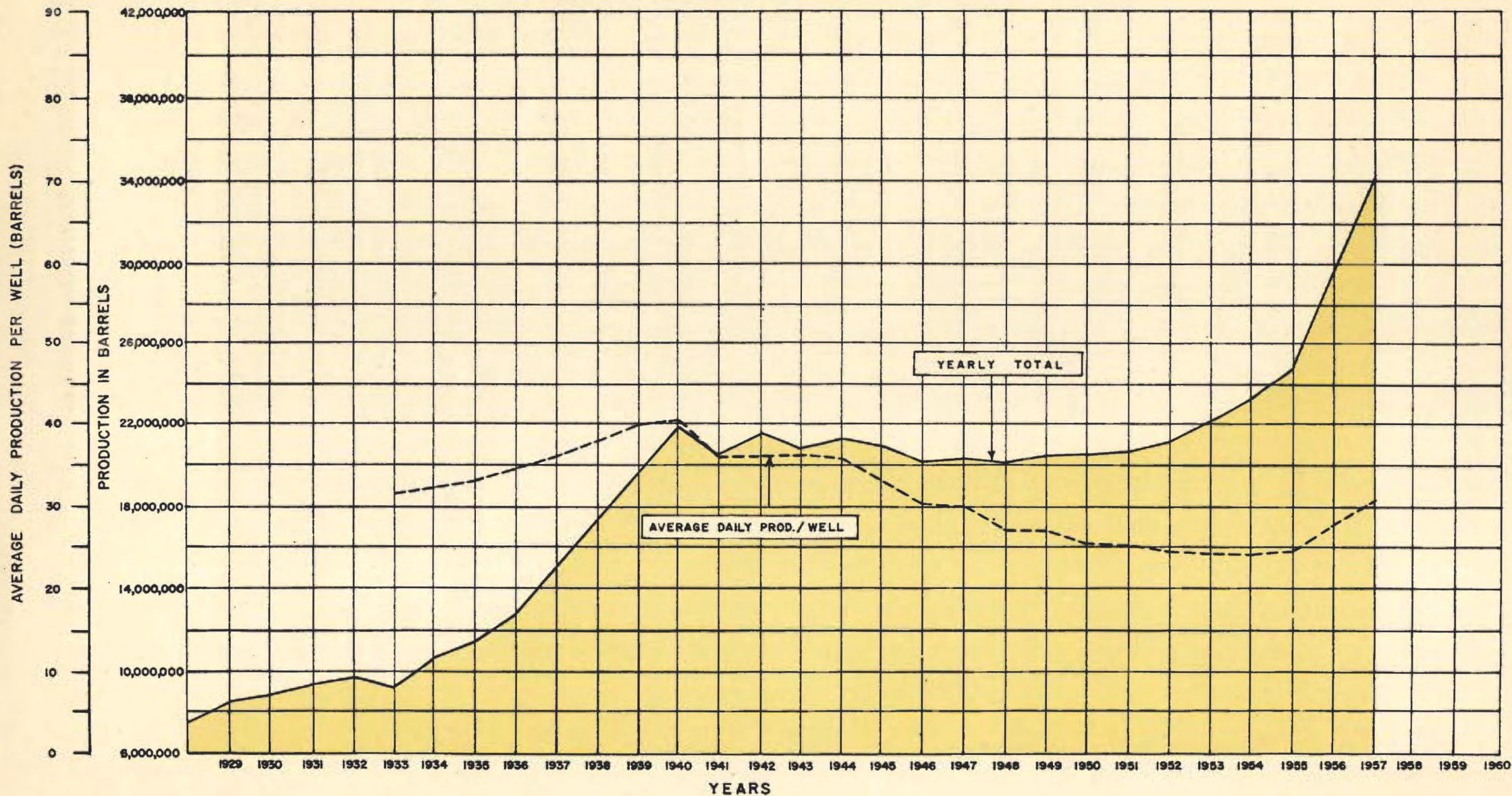
Company	Field and Well No.	Total Depth (Feet)	REMARKS	Map Reference Appendix I
Texaco Trinidad Incorporated	Forest Reserve 1057	2,700	Southern Outstep of Main Field Forest Sands—Producer	F—2
	do. 1071	2,800	Northern Outstep of Bernstein L. Cruse Sands—Producer	G—2
	do. 1078	2,930	Northern Outstep of Bernstein L. Cruse Sands—Producer	G—2
	Guayaguayare ... 219	5,115	At the end of the year—Testing Cretaceous in the Marcelle Valley	M—2
	do. 221	2,096	Western Outstep in the Marcelle Valley—Producer from Gros Morne Sands	M—2
	do. 225X	3,460	Eastern Outstep in the Marcelle Valley—Producer from Gros Morne Sands...	M—2
	do. ... 231	1,803	Northern Outstep in the Goudron Field—Producer from Goudron Sands ...	M—2
	Palo Seco ... S. 85	7,456	North-western Outstep for Upper Cruse Sands—Producer	F—2
	do. ... S. 93	6,741	Southern Outstep for Upper Cruse Sands—Producer	F—2
	do. ... S. 94	8,000	Western Outstep for Upper Cruse Sands—Producer	F—2
	Barrackpore ... 369RD.	10,614	Producer from Herrera Sands	I—2
	do. ... 371	9,987	North-eastern Outstep from Siparia 4 for Herrera Sands—Producer	H—2
do. ... 373	9,575	Outstep to B.P. 371 Herrera Sands—Producer	H—2	
do. ... 374	10,730	Outstep to B.P. 369 Herrera Sands—Producer	I—2	
Trinidad Petroleum Development Company Limited	Moruga West (Rock Dome) 45	8,604	This Exploration Well proved the Cretaceous Wet but opened up prospects for production from shallow Oligocene Sands. The Well justified further Cretaceous Tests in the area	I—2
	Cedros ... C.d. 7	8,800 (5,994 PL)	Exploration was suspended as a result of difficulties encountered while penetrating unstable formations	D—1
	Palo Seco ... 418	11,788	Exploration of deeper horizons in the area exposed undeveloped Oligocene Sands South of the Main Fault—Producer from Cruse Sands	G—2
	Erin ... 7	4,500	Outstep Well—Proved shallow Miocene Production	F—1
	Erin ... 9	5,100	Outstep Well—Poor Producer from Cruse Sands	F—1
	Moruga East ... 39	4,730	A Westerly Outstep—Abandoned as a Dry Hole	K—2
	Los Bajos ... 58	9,632	Proved deeper Miocene Sands North of the Main Fault to be Watered-Producer from Forest Sands	G—2

TABLE X

SUMMARY OF CROWN (ROYALTY) CRUDE OIL ASSESSED OR SOLD WITH PRICES AND ANALYSES
 (For Half-Yearly Assessment Periods ended 30th June and 31st December, 1957)—1 Barrel = 34.9726 I.G.

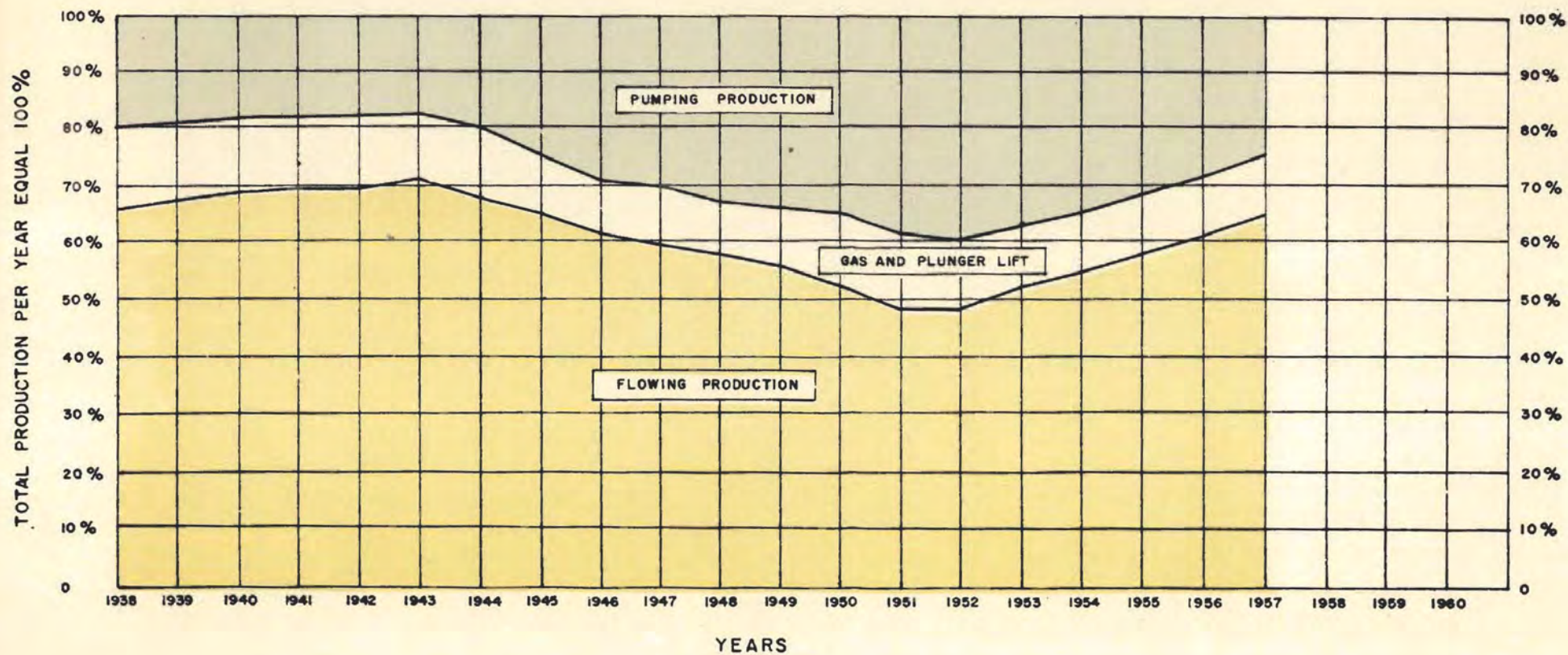
COMPANY	Net Royalty on Production Bbls.	ROYALTY			SUB-DIVISION OF (ROYALTY) CRUDE INTO PRODUCTS AS PER R.L.R.I. ANALYSES										
		10% Assessed or taken in kind and sold to Producer Bbls.	Value \$ c.	Average Price per Barrel \$ c.	LIGHT FRACTIONS			GAS OILS			TOTAL GAS OILS		FUEL OIL		
					Quantity Bbls.	Percentage	Tetra Ethyl lead to blend to 70/72 Oct. Gasolene Millilitres	53-57 D.I. Bbls.	48-52 D.I. Bbls.	43-47 D.I. Bbls.	No. 2 Fuel Bbls.	Quantity Bbls.	Percentage	Quantity Bbls.	Percentage
HALF-YEARLY ASSESSMENT PERIOD ENDED 30TH JUNE															
Antilles Petroleum Company (Trinidad) Ltd.	852,353	55,235	447,233 76	5 23	18,877	22.2	1,105,384	131	16,427	—	771	17,329	20.3	49,029	57.5
Apex (Trinidad) Oilfields Limited ...	730,098	73,010	386,112 94	5 29	9,276	12.7	85,342	—	—	—	22,654	22,654	31.0	41,080	56.3
Kern Trinidad Oilfields Limited ...	210,164	21,016	94,770 78	4 51	1,735	8.9	32,306	378	—	—	—	378	1.8	18,903	89.9
Premier Consolidated Oilfields Limited ...	37,203	3,720	18,968 99	5 10	234	6.3	367	—	—	18	1,067	1,085	29.2	2,401	64.5
Estate of Timothy Roodal ...	2,493	249	1,258 07	5 06	6	2.4	—	—	—	—	77	77	30.9	166	66.7
Shell Trinidad Limited ...	3,690,263	369,026	2,054,520 60	5 57	84,413	22.9	2,840,286	77,772	13	17,928	20,653	116,366	31.5	168,247	45.6
Trinidad Central Oilfields Limited ...	921,668	92,167	490,643 52	5 32	20,627	22.4	503,442	—	21,427	—	—	21,427	23.2	50,113	54.4
Trinidad Northern Areas Limited ...	509,526	50,953	283,619 37	5 57	11,964	23.5	420,025	—	15,886	—	—	15,886	31.2	23,103	45.3
Trinidad Petroleum Development Company Limited ...	2,092,355	209,236	1,110,910 23	5 31	37,391	17.9	728,325	—	—	6,196	50,248	56,444	27.0	115,401	55.1
The Trinidad Oil Company Limited ...	4,494,241	449,424	2,363,566 93	5 26	65,019	14.5	680,272	—	—	9,783	115,864	125,647	27.9	258,753	57.0
Siparia (Trinidad) Oilfields Limited ...	Included in the above	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS AND AVERAGES FOR FIRST HALF-YEAR ...	13,540,364	1,354,036	7,251,605 19	5 36	249,542	18.4	6,395,749	78,231	53,753	33,925	211,334	377,293	27.9	727,201	53.7
HALF-YEARLY ASSESSMENT PERIOD ENDED 31ST DECEMBER															
Antilles Petroleum Company (Trinidad) Ltd.	1,135,617	113,562	572,105 98	5 04	27,038	23.8	1,297,386	143	17,947	—	9,256	27,346	24.1	59,178	52.1
Apex (Trinidad) Oilfields Limited ...	760,928	76,093	374,253 47	4 92	10,041	13.2	151,659	—	—	—	23,378	23,378	30.7	42,674	56.1
Dominion Oil Limited ...	345	34	205 76	6 05	6	17.6	176	24	—	—	—	24	70.6	4	11.8
Kern Trinidad Oilfields Limited ...	204,871	20,487	86,978 02	4 25	1,721	8.4	34,648	34	328	—	—	362	1.8	18,404	89.8
Premier Consolidated Oilfields Limited ...	48,202	4,820	24,482 16	5 08	944	19.6	9,708	—	—	440	1,034	1,474	30.6	2,402	49.8
Estate of Timothy Roodal ...	1,673	167	781 52	4 68	4	2.4	—	—	—	—	52	52	31.1	111	66.5
Shell Trinidad Limited ...	3,971,990	397,199	2,082,896 33	5 24	95,090	24.0	3,184,625	86,587	12	40,274	340	127,213	32.0	174,896	44.1
Trinidad Central Oilfields Limited ...	890,450	89,045	448,706 57	5 04	21,963	24.7	533,733	—	2,565	—	17,985	20,550	23.1	46,532	52.2
Trinidad Northern Areas Limited ...	520,717	52,072	271,870 62	5 22	12,776	24.5	491,662	—	26,123	—	—	16,123	31.0	23,173	44.5
Trinidad Petroleum Development Company Limited ...	2,205,763	220,576	1,091,115 24	4 95	38,149	17.3	588,374	—	—	9,510	49,984	59,494	27.0	122,933	55.7
The Trinidad Oil Company Limited ...	5,129,287	512,929	2,526,409 82	4 93	89,218	15.6	876,787	—	401	13,404	123,966	142,771	27.9	289,940	56.5
TOTALS AND AVERAGES FOR SECOND HALF-YEAR ...	14,869,843	1,486,924	7,479,805 49	5 03	287,950	19.4	7,171,258	86,788	37,376	63,628	230,995	418,787	28.1	780,247	52.5
YEAR'S TOTALS AND AVERAGES ...	28,410,207	2,841,920	14,731,410 68	5 19	537,492	18.9	13,567,007	165,069	91,129	97,553	442,329	796,080	28.0	1,507,448	53.1

ANNUAL CRUDE OIL PRODUCTION



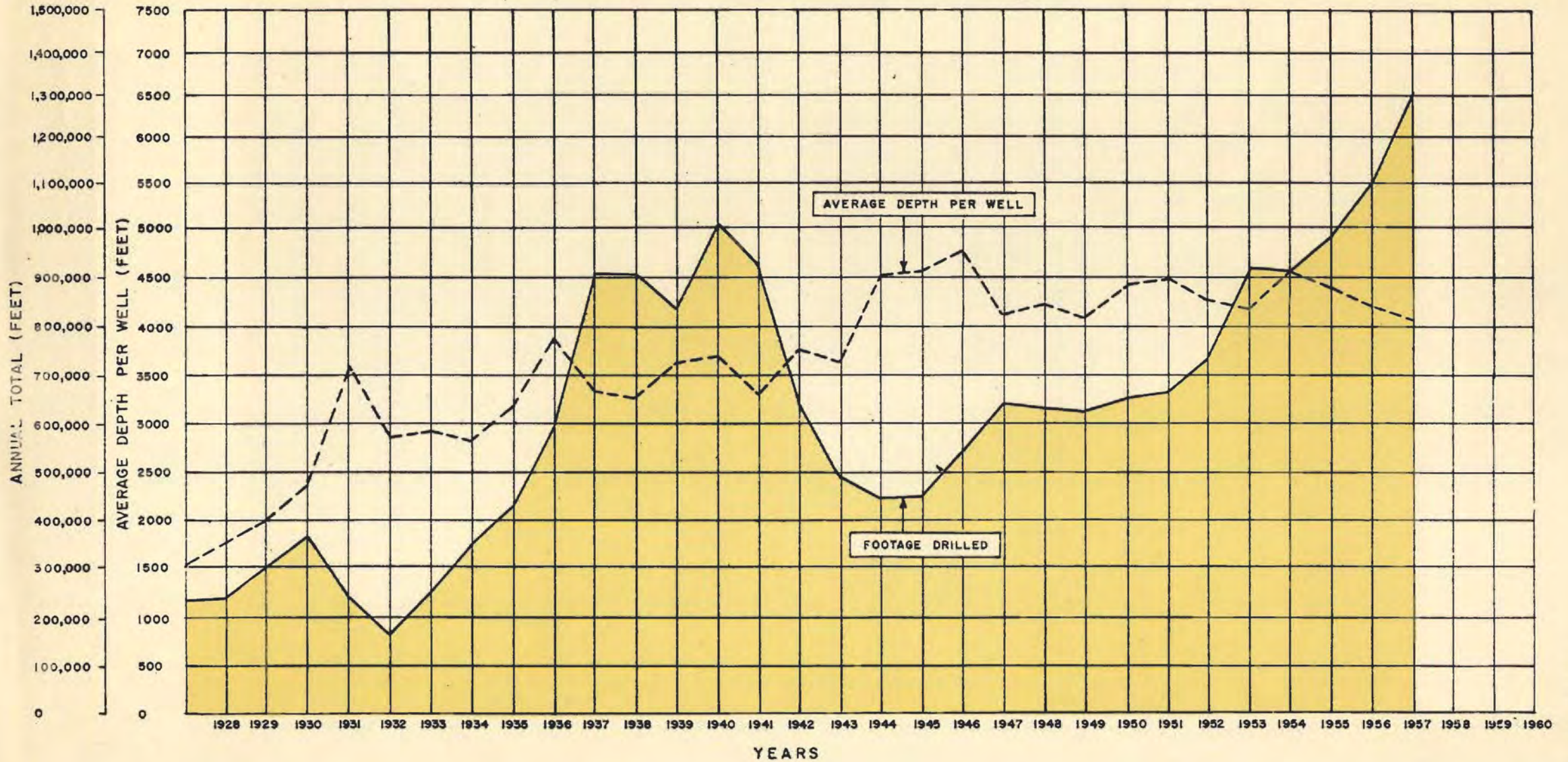
CRUDE OIL PRODUCTION METHODS

RELATIVE PROPORTIONS OF ANNUAL PRODUCTION (100%) OBTAINED BY THE THREE PRINCIPAL PRODUCING METHODS



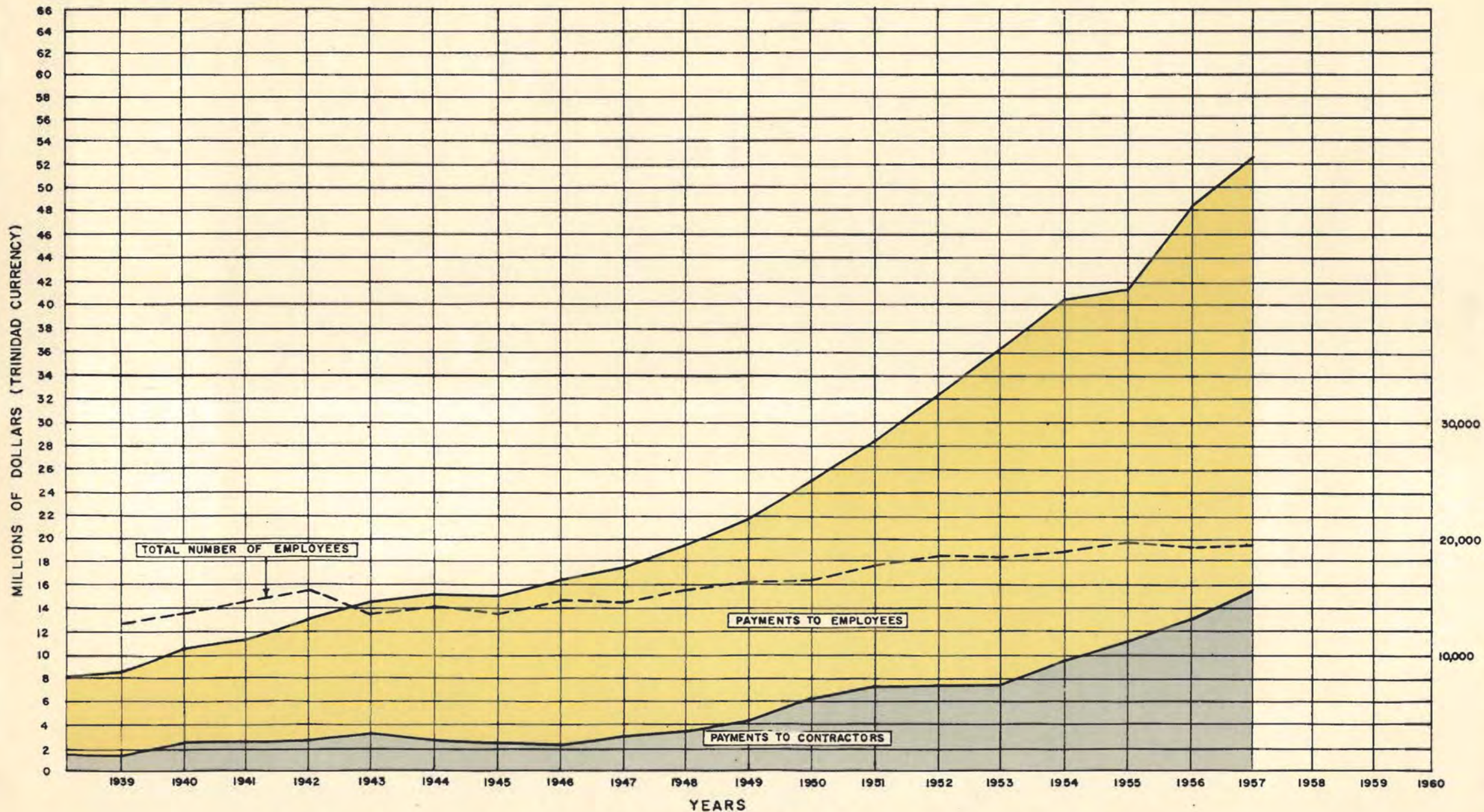
See table III for detailed figures for 1957

ANNUAL DRILLING FOOTAGE



For figures used in constructing graph see table I - Items 18 and 21

OIL COMPANIES ANNUAL PAYMENTS TO CONTRACTORS AND EMPLOYEES



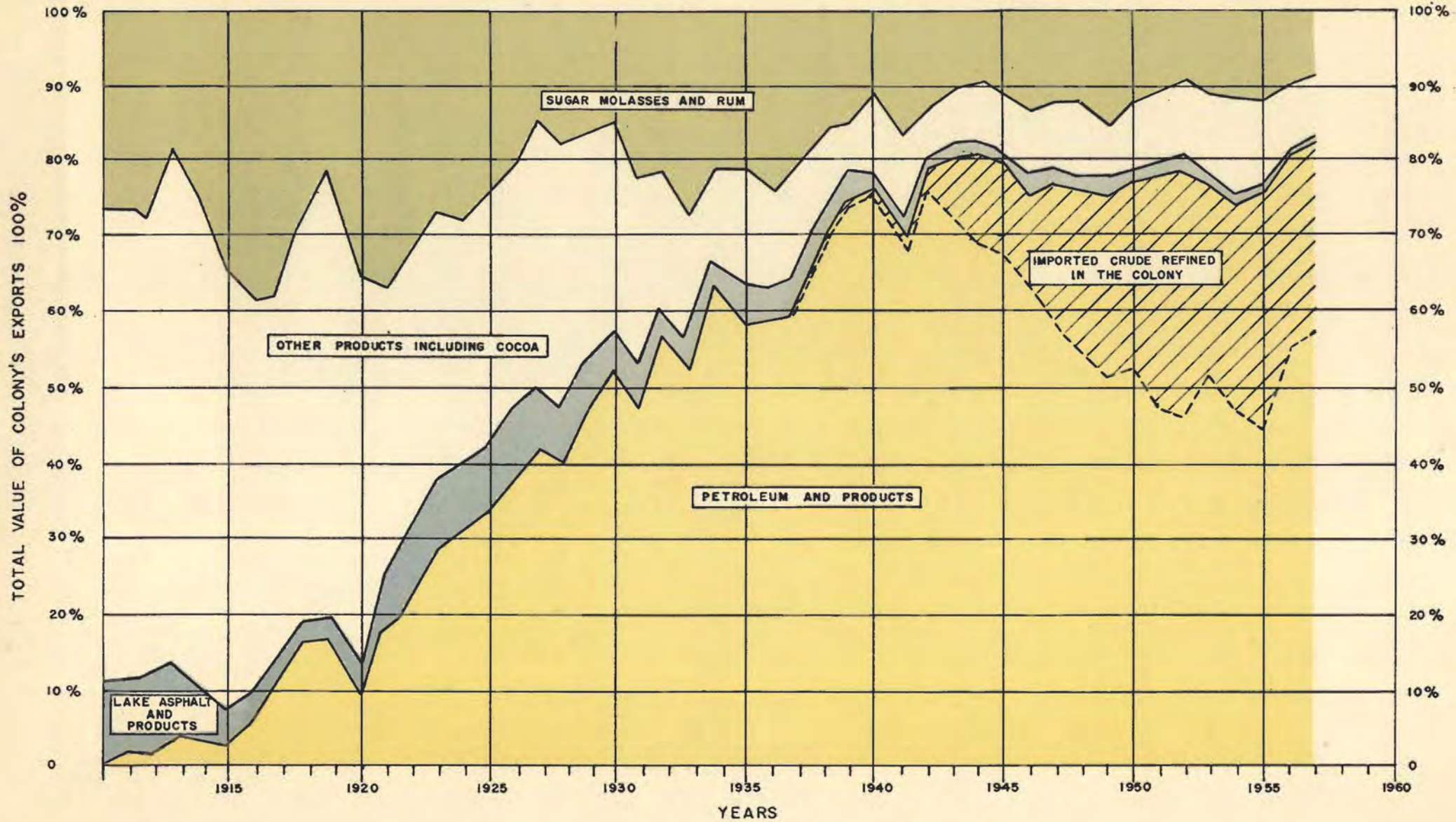
For figures used in constructing graph see table 7 Items 2 and 3. N.B. Payments to contractors are mainly wages

TOTAL NUMBER OF EMPLOYEES

APPENDIX

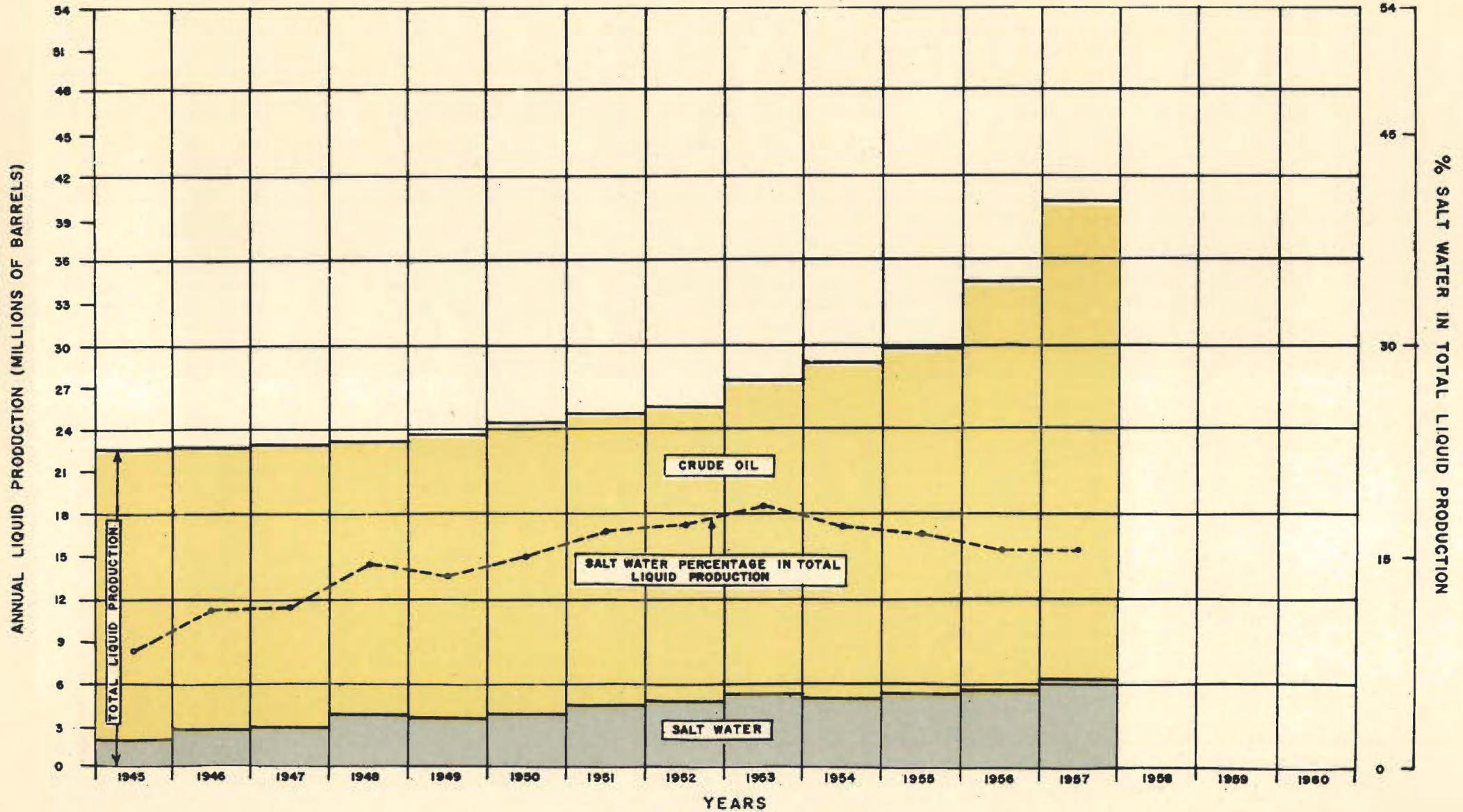
D

PERCENTAGE DISTRIBUTION OF TOTAL VALUES OF COLONY'S EXPORTS



For values in dollars see table 1-Items 28, 29 and 30

PRODUCTION OF SALT WATER



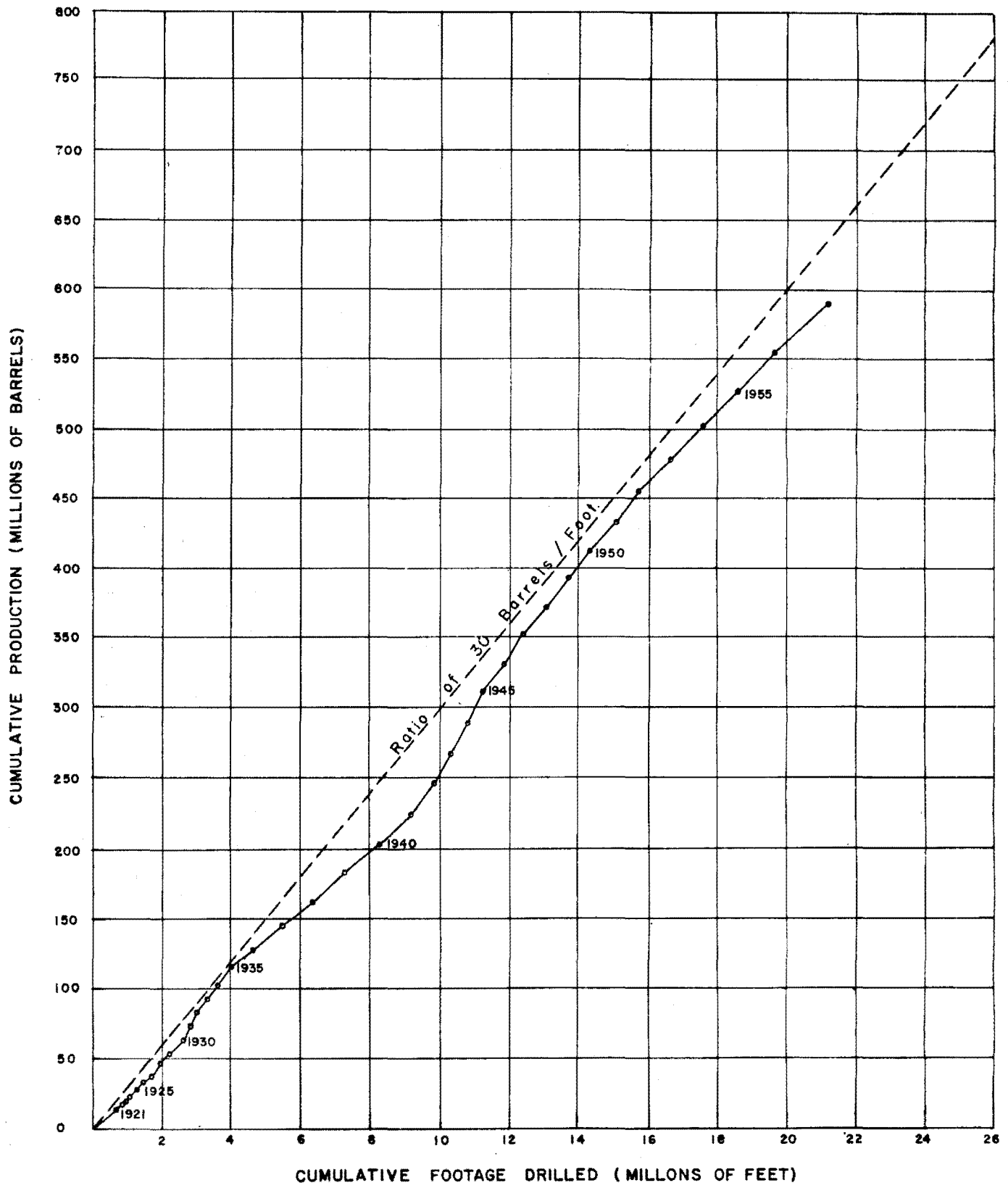
See table III for 1957 figures in detail

CUMULATIVE PRODUCTION & FOOTAGE

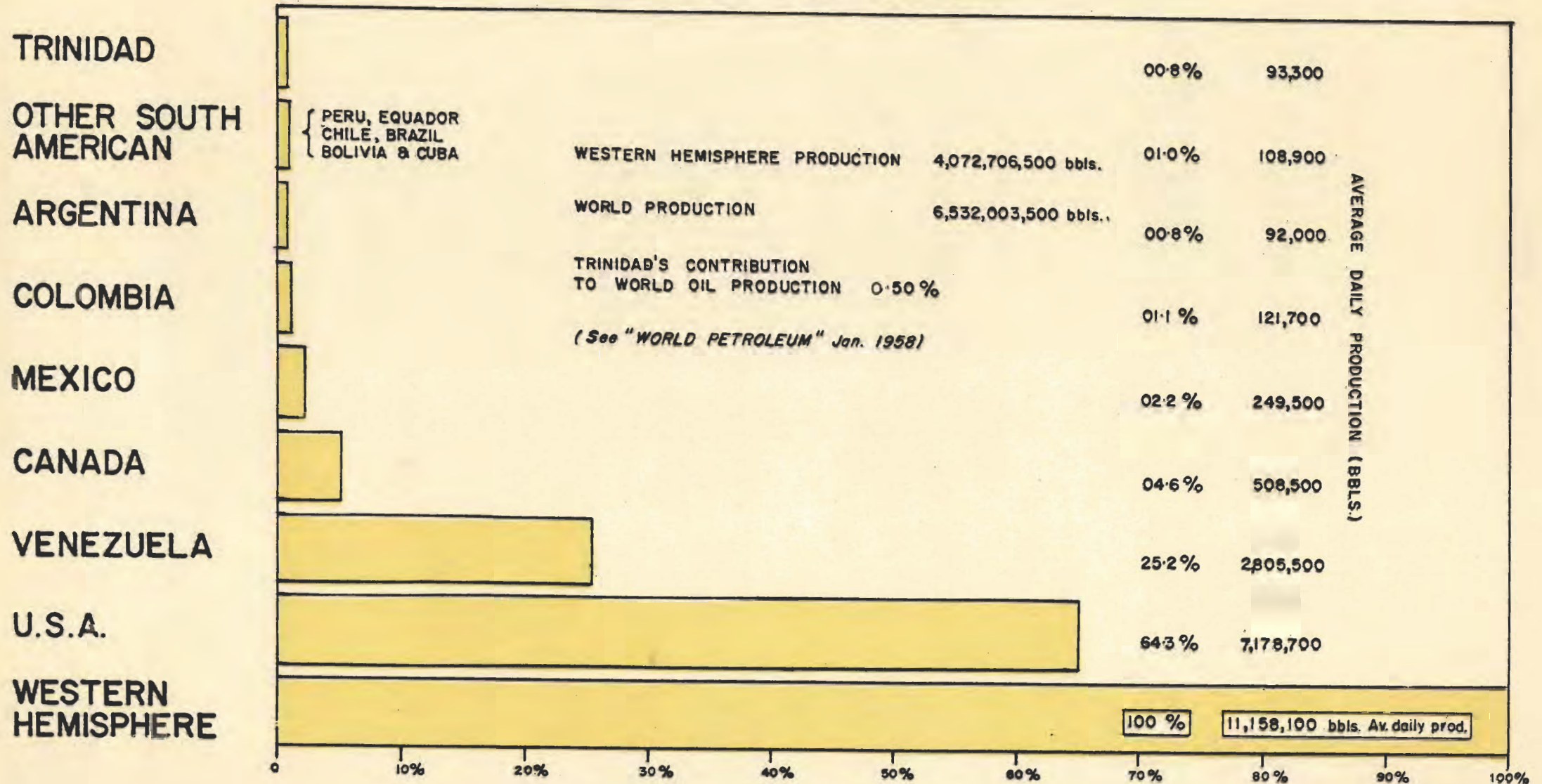
TO 31st DECEMBER 1957

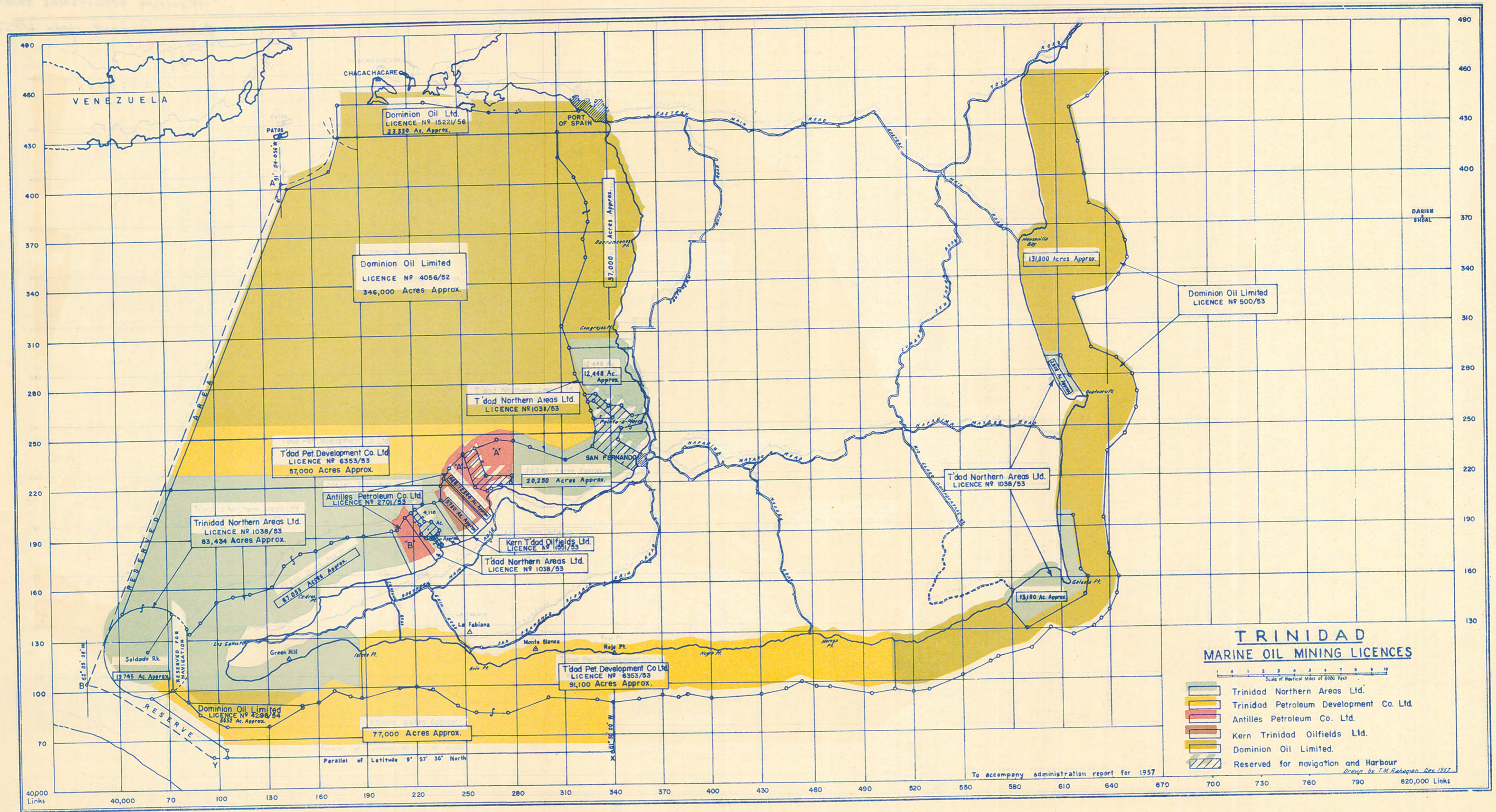
Cumulative Production 589,552,418 bbls.

Cumulative Footage Drilled 21,033,754 ft.



TRINIDAD'S CONTRIBUTION TO WESTERN HEMISPHERE OIL PRODUCTION IN 1957





**TRINIDAD
MARINE OIL MINING LICENCES**

Scale of Nautical Miles of 6000 Feet
0 1 2 3 4 5 6 7 8 9 10

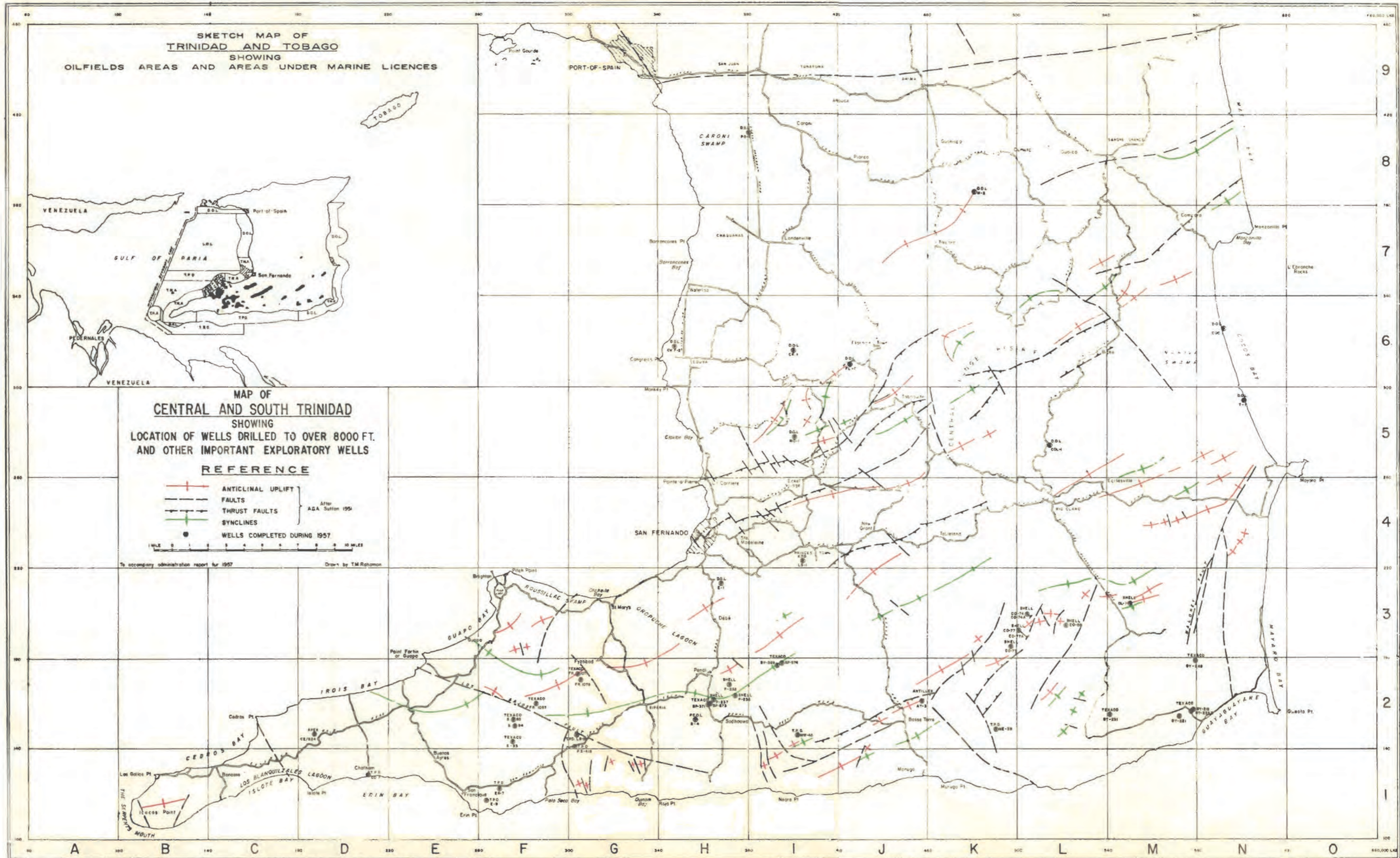
- Trinidad Northern Areas Ltd.
- Trinidad Petroleum Development Co. Ltd.
- Antilles Petroleum Co. Ltd.
- Kern Trinidad Oilfields Ltd.
- Dominion Oil Limited.
- Reserved for navigation and Harbour

Drawn by T.M. Robinson Dec 1957

To accompany administration report for 1957

40,000 Links 40,000 70 100 130 160 190 220 250 280 310 340 370 400 430 460 490 520 550 580 610 640 670 700 730 760 790 820,000 Links

Parallel of Latitude 9° 57' 30" North



9
8
7
6
5
4
3
2
1

A B C D E F G H I J K L M N O

GOVERNMENT PRINTING OFFICE, TRINIDAD, W.I.—1959

[Price 90c.]

Trinidad—A. 11/58.