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NATIONAL ELECTRICITY BOARD

of the

STATES OF MALAYA

THE SEVENTEENTH

ANNUAL REPORT

1st September, 1965 : : 31st August, 1966

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Cheras Road, Kuala Lumpur.

The Board

Chairman:

DATO KURNIA JASA HAJI OSMAN BIN TALIB.
S.P.M.P., D.P.M.PS.

Deputy Chairman:

Y.M. RAJA ZAINAL BIN RAJA SULAIMAN,
J.M.N., J.P., M.I.E. (M)

Members:

Y.B. TAN SRI T. H. TAN, P.M.N., C.W.E., M.P.

MR. P. P. NARAYANAN.

THE HON'BLE TENGKU INDERA PETRA, TENGKU BESAR INDERA RAJA IBNI AL-MARHUM SULTAN IBRAHIM, D.K., P.M.N. (until 30.11.1965)

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MR. CHONG HON NYAN, K.M.N.

TAN SRI NIK MUSTAPHA FATHIL BIN HAJI NIK MAHMUD,
S.P.M.K., P.M.N., P.S.D., D.J.M.K., S.K. (from 1.4.1966)

MR. F. R. Wardrop, C.B.E., was appointed Temporary Deputy Chairman and Temporary Member of the Board with effect from 14th June 1966 during the absence from the States of Malaya of Y.M. Raja Zainal bin Raja Sulaiman, J.M.N., J.P.

Chief Executive Officers of the Board

General Manager:

Y.M. RAJA ZAINAL BIN RAJA SULAIMAN, J.M.N., J.P., M.I.E. (M.)

Adviser:

F. R. WARDROP, C.B.E., B.Sc. (Eng.), C. Eng., M.I.E.E., M.I.E. (M.)

ENGINEERING DIVISION:

Deputy General Manager (Engineering)	...	A. A. ALLEN, C. Eng. M.I.E.E., A.M.I.E. (M.) (until 13th January, 1966). R. A. SAVAGE, C. Eng. M.I.E.E., M.I.E. (M.).
Chief Engineer (Generation)	...	G. R. GOODALL, M.Sc. (Eng.), C. Eng., M.I. Mech. E., M.I.E.E.
Chief Engineer (Distribution)	...	CHAN KHEE POH, B.Sc. (Eng.), C. Eng. A.M.I.E. (M), A.M.I.E.E. (from 14th January, 1966).
Deputy Chief Engineer (Planning)	...	WONG KIH HONG, B.E.E., C. Eng., M.I.E. (M), A.M.I.E.E.
Deputy Chief Engineer (Electrical/Mechanical)	...	H. SYKES, B.Sc. (Eng.), C. Eng., M.I. Mech. E., A.M.I.E.E., M.I.E. Aust.
Deputy Chief Engineer (Generation — Steam)	...	A. RAMANATH, B.Sc. (Eng.), C. Eng., M.I.E. (M), A.M.I.E.E., A.M.I. Mech. E.
Deputy Chief Engineer (Meters, Protection & Test)	...	LYE FAH YEW, C. Eng., A.M.I.E.E.
Senior Engineer, Head Office	...	WONG WAI KHEONG, C. Eng., A.M.I.E. (M), A.M.I.E.E.
Commercial Manager	...	FOO YEOW SAH, B.Sc. (Eng.), C. Eng., M.I.E. (M), A.M.I.E.E.

Area Managers	...	S. R. COGLIN, C. Eng., A.M.I.E.E.
		Y.M. TENGKU DAUD BIN TENGKU BESAR BURHANUDDIN, D.L.C., A.M.I.E. (M).
	...	E. R. J. ANNIS, B.Sc., C. Eng., M.I.E. (M), A.M.I.E.E. (until 9th July, 1966).
	...	LEE SIAW PHIN, B.E., A.M.I.E. (M), A.M.I.E. Aust.
	...	M. RAJENDRA, C. Eng., A.M.I.E.E.

HYDRO-ELECTRIC DIVISION:

Deputy Chief Engineer (Hydro)	...	P. G. D. SHALLOW, M.A., C. Eng. M.I.C.E., M.I.W.E., F. ASCE.

FINANCIAL DIVISION:

Deputy General Manager (Finance)	...	A. R. SINCLAIR, M.A., B.Com, F.C.A.

ADMINISTRATIVE DIVISION:

Secretary	...	G. R. WHEELER, M.M., B.Sc. (Econ.)

INSPECTORATE DIVISION:

Chief Electrical Inspector	...	ABU ZARIM BIN HAJI OMAR, D.L.C., C. Eng., M.I.E. (M), A.M.I.E.E.

Consultants to the Board

PRINCIPAL CONSULTANTS

MESSRS. PREECE, CARDEW AND RIDER, LONDON AND KUALA LUMPUR.

CIVIL ENGINEERING CONSULTANTS

MESSRS. BINNIE AND PARTNERS, LONDON AND KUALA LUMPUR.

MESSRS. FREEMAN, FOX AND PARTNERS, LONDON.

MESSRS. SIR BRUCE WHITE, WOLFE BARRY AND PARTNERS, LONDON.

Auditors to the Board

MESSRS. PRICE WATERHOUSE & CO., KUALA LUMPUR.

Contents

Appendices

Abbreviations

AC	=	Alternating Current.
BHP	=	Brake Horse Power.
BPS	=	Bungsar Power Station.
BS	=	Bulk Supply.
BTU	=	British Thermal Unit.
CBPS	=	Connaught Bridge Power Station.
DC	=	Direct Current.
D/C	=	Double Circuit.
HE	=	Hydro Electric.
HV	=	High Voltage.
IBRD	=	International Bank for Reconstruction and Development.
IFOV	=	Impulse Flash Over Voltage.
KED	=	Kinta Electrical Distribution Co., Ltd.
kV	=	Kilovolt (1,000 Volts).
kVA	=	Kilovolt Ampere
kW	=	Kilowatt (1,000 Watts).
kWh	=	Kilowatt Hour (1 Board of Trade Unit).
LV	=	Low Voltage.
MVA	=	Megavolt Ampere (1,000 Kilovolt Amperes).
MW	=	Megawatt (1,000 kilowatts).
NEB	=	National Electricity Board.
OCB	=	Oil Circuit Breaker.
OE	=	Oil Engine.
O/H	=	Overhead.
PRHEP	=	Perak River Hydro-Electric Power Co., Ltd.
PS	=	Power Station.
p.s.i.g.	=	Pounds per square inch gauge.
PVC	=	Polyvinychloride.
PWD	=	Public Works Department.
RHT	=	Rahman Hydraulic Tin Ltd.
SCA	=	Steel cored aluminium.
ST	=	Steam Turbine.
s.w.g.	=	Standard wire gauge.
TC	=	Transformer Capacity.
U/G	=	Underground.
ULPS	=	Ulu Langat Power Station.
V	=	Volts.
VHF	=	Very High Frequency.

Pendahuluan

KELUARAN ini ia-lah keluaran Penyata Tahunan yang ke-Tujoh Belas bagi "Lembaga Letrik Negara, Tanah Melayu" atau dalam Bahasa Inggeris "The National Electricity Board of the States of Malaya". Pertukaran nama yang dahulu-nya Lembaga Letrik Pusat Persekutuan Tanah Melayu yang di-tubohkan di-bawah Ordinance Letrik No. 30 tahun 1949 telah di-kuat-kuasakan mulai 22hb. Jun 1965 oleh suatu Act Parlimen yang telah mendapat Persetujuan Di-Raja.

Anggota Lembaga pada masa ini terdiri daripada sa-orang Pengurusi, Timbalan Pengerusi dan sembilan orang ahli2 yang lain. Di-bawah Ordinance itu tidak lebeh daripada dua orang daripada ahli2 yang lain itu di-benarkan dari-pada pegawai2 awam. Ordinance itu menyerahkan kapada sa-orang Menteri tugas bagi melantek ahli2 Lembaga dan pada masa ini Menteri Perdagangan dan Perusahaan menjalankan kewajipan ini.

Pengerusi Lembaga yang pertama ia-lah Inche W. D. Godsall (1949-1952) yang pada masa itu memegang jawatan Setia Usaha Kewangan Kerajaan Perse-kutuan Tanah Melayu. Inche O. A. Spencer (1952-1955) dan sa-lepas itu Inche C. G. Harrison pula mengambil tempat Inche Godsall. Pada 1hb. September, 1956, Inche O. A. Spencer (kemudian-nya Dato O.A. Spencer, P.M.N., C.M.G.) telah di-lantek sa-mula menjadi Pengerusi dan telah terus memegang jawatan tersebut hingga 31hb. Mach, 1960 manakala beliau telah meninggalkan Tanah Melayu untok bersara daripada perkhidmatan Kerajaan Persekutuan. Dato Kurnia Jasa Osman bin Talib yang terdahulu daripada itu telah memegang jawatan sebagai sa-orang daripada dua orang Timbalan Pengurusi Lembaga, telah di-lantek sebagai Pengerusi mulai 1hb. April, 1960.

Tujuan dan tugas2 Lembaga ada di-bentangkan dalam Sekshen 15 Ordinance Letrik dan ia-lah untok: —

(a) mengurus dan menjalankan pembekalan2 letrik yang di-pindahkan kapada Lembaga oleh Ordinance tersebut dan pembekalan2 dan alat2 perkakas lain yang sa-umpama itu yang di-ambil aleh oleh Lembaga di-bawah sharat2 Ordinance tersebut.

(b) menuboh, mengurus dan menjalankan pembekalan2 letrik sa-umpama itu yang mana pada fikiran Lembaga mustahak di-tubohkan.

(c) memaju serta menggalakkan penjanaan tenaga letrik dengan tujuan untok mengembangkan ekonomi Persekutuan Tanah Melayu.

(d) menetapkan bekalan tenaga letrik dengan harga yang berpatutan.

(e) menubohkan peratoran2 mengikut charat2 Ordinance tersebut menguasai penjanaan kuasa, pengaliran, pembahagian dan penggunaan tenaga letrik.

(f) menasihati Menteri atas segala perkara berkaitan dengan penjanaan kuasa, pengaliran, pembahagian dan penggunaan tenaga letrik.

Bagi maksud pentadbiran dan perjalanan kerja2, Lembaga telah menubohkan empat kawasan seperti yang di-tunjokkan di-dalam peta pada penghabisan Penyata ini. Ibu Pejabat-nya di-tubohkan di-Kuala Lumpur, ia-itu Ibu Kota Tanah Melayu di-mana kawalan pusat bagi kewangan di-jalankan (termasok membeli dan setor) penjanaan kuasa di-setesen2 janaletrik besar (Jambatan Connaught, Cameron Highlands, Melaka, Johor dan Ulu Langat), pengaliran dan kawalan, perancheng dan kerja2 pembinaan yang besar, reka bentok dan pembinaan semua bangunan, jangka tenaga dan pelindongan, pentadbiran 'am, kakitangan dan kebajikan serta pentadbiran Ordinance Letrik.

Lembaga berkuasa mengeluarkan lesen2 kapada orang2 untok menjalankan pembekalan2 letrik untok membekalkan tenaga letrik bagi kegunaan sendiri atau orang ramai, dan di-kehendaki menyatakan di-dalam lesen2 itu tempoh lesen itu, kawasan bekalan-nya, volta yang di-akui dan perubahan yang di-benarkan dari-pada-nya, harga tertinggi di-bayar oleh pengguna2, dan perkara2 lain sa-umpama itu yang di-fikirkan oleh Lembaga patut di-masokkan. Sementara itu, charat2 khas ada termaktub dalam Ordinance tersebut yang membolehkan Majlis Bandar Raya George Town meneruskan perjalanan usaha2-nya sendiri.

Banyak lesen2 telah di-keluarkan oleh Lembaga bagi pembekalan berbagai2 chara di-dalam Tanah Melayu, pemegang2 lesen yang utama bagi bekalan untok orang ramai ia-lah:—

Sharikat Kuasa Letrik Haidero Sungei Perak Berhad.
Sharikat Pengeluaran Letrik Kinta Berhad.

Lembaga mengeluarkan kira2 57.6% daripada jumlah bekalan tenaga letrik di-Tanah Melayu dalam tahun yang di-kaji sa-mula ini. Penyata ini, pada am-nya, terhad kapada urusan2 Lembaga dan tidak menyatakan tentang hal ehwal Pelesen2, kechuali dalam Bab IX, Pertadbiran Ordinance Letrik dan dalam Lampiran VI, XIII, XV dan XVI.

Introduction

THIS is the Seventeenth Annual Report of the "Lembaga Letrik Negara, Tanah Melayu", or in English "The National Electricity Board of the States of Malaya". This change of name from the then Central Electricity Board of the Federation of Malaya which was established under the Electricity Ordinance No. 30 of 1949 was effected on 22nd June 1965 by an Act of Parliament which has received the Royal Assent.

Membership of the Board at present comprises a Chairman, a Deputy Chairman and nine other members. Under the Ordinance not more than two of the other members may be public officers. The Ordinance lays upon the Minister the duty of appointing Board members and at present the Minister of Commerce and Industry exercises this function.

The first Chairman of the Board was Mr. W. D. Godsall (1949-1952), then Financial Secretary of the Government of the Federation of Malaya. Mr. O. A. Spencer (1952-1955) and Mr. C. G. Harrison in turn succeeded Mr. Godsall in office. On 1st September, 1956, Mr. O. A. Spencer (later Dato O. A. Spencer, P.M.N., C.M.G) was reappointed Chairman and continued to hold office until 31st March, 1960, when he left Malaya on retirement from the service of the Federation Government. Dato Kurnia Jasa Osman bin Talib, who had previously served as one of the two Deputy Chairman of the Board, was appointed Chairman from 1st April, 1960.

The functions and duties of the Board are set out in Section 15 of the Electricity Ordinance and are:

(a) to manage and work the electrical installations transferred to the Board by the Ordinance and such other installations and apparatus as may be acquired by the Board under the provision of the Ordinance;

(b) to establish, manage and work such electrical installations as the Board may deem it expedient to establish;

(c) to promote and encourage the generation of energy with a view to the economic development of the Federation;

(d) to secure a supply of energy at reasonable prices;

(e) to make regulations, in accordance with the provisions of the Ordinance, governing the generation, transmission, distribution and use of energy;

(f) to advise the Minister on all matters relating to the generation, transmission, distribution and use of energy;

For administrative and operational purposes the Board has established four Areas which are shown on the map at the end of this Report. Its Head Office is established at Kuala Lumpur, the capital of the States of Malaya, where centralised control is maintained of finance (including purchasing and stores), generation at the major power stations (Connaught Bridge, Cameron Highlands, Malacca, Johore, and Ulu Langat), transmission and control, planning and major construction work, the design and erection of all buildings, meters and protection, general administration, personnel and welfare and administration of the Electricity Ordinance.

The Board is empowered to grant licences to persons to operate electrical installations for the supply of electrical energy for private or public purposes, and is required to set out in such licences the period of duration of the licence, the area of supply, the declared voltage and the variation permitted therefrom, the maximum charges payable by consumers, and such other matters as the Board may consider desirable. Special provision, however, was made in the Ordinance which enables the City Council of George Town, to continue operating its own undertaking.

Many licences have been granted by the Board for supplies of various types in the States of Malaya, the principal holders of licences for public supplies being: —

The Perak River Hydro-Electric Power Co., Ltd.

The Kinta Electrical Distribution Co., Ltd.

The Board distributed about 57.6 per cent of the total electricity supplies of the States of Malaya during the year under review. This Report is, in general, confined to the activities of the Board and does not deal with the affairs of Licensees, except in Chapter IX, Administration of the Electricity Ordinance and in Appendices VI, XIII, XV and XVI.

Chapter One. General Review

THE year ending 31st August 1966 was yet another successful year for the National Electricity Board judging from the achievements in the various fields of operations of the Board.

The report on the feasibility study of the Hydro-Electric Development of the Upper Perak River was formally handed over to Y.B. Dr. Lim Swee Aun, the Minister of Commerce and Industry by the Canadian High Commissioner, Mr. B. C. Butler on 24th May 1966. The study, carried out under Canada's contribution to the Colombo Plan indicated that a potential power development of the order of 625 MW on the Upper Perak River could be harnessed economically in three stages with dams sited at Temengor, Bersia and Kenering.

Following the economic assessment prepared by Board Engineers on the feasibility of developing the hydro potential of the Sia, Liang and Sempam rivers in the District of Raub, a firm of Japanese Consultants, sponsored by the Japanese Government under its special aid programme, undertook a survey of this area from March to May 1966 with the view to submitting a Project Report later in the year.

Following the Board's Hydro-Electric Division preliminary investigations on the development of power from the Pergau River in Kelantan, the Snowy Mountains Hydro-Electric Authority of Australia offered to evaluate the project in order to justify the need for detailed site investigations. Subsequently an investigating team supplied by the Authority visited the site of the scheme and a report on their investigations is now awaited.

The total number of units generated in the States of Malaya for the year amounted to 2,418 million units (2,127 million units in 1964/65). This represents an increase of 13.7% as compared to 14.9% in the previous year. The Board's share of units generated and purchased amounted to 1,417 million units, an increase of 14.3% over the 1,240 million units generated and purchased in 1964/65.

Units sold by the Board amounted to 1,228 million units as compared to 1,073 million units in the preceeding year representing an increase of 14.4%. The number of consumers rose from 314,050 to 338,674 representing an increase of 7.8%. Central Area took the lead in registering a percentage increase in sales this year at 15.6% closely followed by Southern Area with 13.44% and Northern Area with 12.78%. The increase in sales in Eastern Area showed a modest rise of 6.7% compared to last year's figure of 13.7%. This is attributable to some extent by severe floods in the wake of the monsoon in December 1965.

Capital Development

Capital expenditure during the year amounted to $114.5 million compared to $84.0 million during the previous year. Of this sum, $79.9 million was spent on the Batang Padang and Prai Power Development, bringing total expenditure on the project up to 31st August 1966 to $154.3 million.

The Batang Padang Hydro-Electric Scheme which forms the largest of the schemes already completed in the Cameron Highlands continued to make satisfactory progress with the bulk of the civil engineering works associated with the driving of the 9-mile long Menglang Tunnel and the Woh Tunnel in the final stages of completion. Excavation works in the Woh underground power station which will accommodate three 50 MW generating sets had been completed. The electrical and mechanical works in connection with the installation of these sets have already commenced.

At the new Prai Thermal Power Station, the installation of plant associated with the two 30 MW generating sets forming the first phase of the Power Development Programme in the North is nearing completion.

Transmission projects which are complementary to the Batang Padang and Prai Power Development Scheme are well under way. These projects will provide a 132 kV transmission network in the northern half of the west coast of the country extending from the Cameron Highlands to Alor Star with a 33 kV submarine cable interconnection between the Board's Power Station at Prai and the Penang City Council's Glugor Power Station, a 66 kV interconnection with the Perak River Hydro-Electric Power Company's system at Papan, and a 132 kV interconnection with the Board's Central Network at the site of the new hydro station at Woh. Completion of this network will enable the Board to shut down diesel stations at Taiping, Butterworth, Alor Star, and Arau. It will also serve to promote industrial development around the larger towns in the North and assist in accelerating the pace of rural electrification.

The Board with the assistance of the Government was successful in securing a third loan from the I.B.R.D. amounting to $111 million. This sum will finance the foreign exchange element of the South Malaya Power Development which will provide for a third 50 MW generating set at Woh and a third 1.4 MW generating set at Odak for the Batang Padang Hydro-Electric Scheme as well as the first and second extensions at Sultan Ismail Power Station, Johore Bahru consisting of a 30 MW steam generating set each, a new thermal power station at Port Dickson consisting of two 60 MW generating sets initially (planned for an ultimate capacity of 600 MW), and associated transmission projects from Johore Bahru to Kluang and from Port Dickson to Seremban and to Kuala Lumpur.

Rural Electrification

During the year under review another 52 villages received supply under the final phase of the Government Second Five-Year Development Plan, 1961/65, Furthermore, construction work was in progress to supply 33 villages and planning action to supply a further 55 villages was well in hand.

In the First Malaysia Plan, 1966/70, a total sum of $15 million is to be

spent on the electrification of 343 villages. Out of this sum the Federal Government is to contribute $12 million and the balance of $3 million is to be met by the Board. During the first year of the Plan (1966), some 69 villages benefiting 31,332 people are scheduled to be supplied with electricity at a total cost of $2 million with the Board's contribution estimated at $1 million.

Financial Results

The financial results for the year have once again proved to be most satisfactory. The Board, after meeting its operating expenses and capital charges, earned a net revenue of $17.3 million which will be utilized for financing the Board's Capital Development projects.

Income from sales of electricity for the year amounted to $110,551,216 ($97,829,831) and other income to $2,923,291 ($2,588,975), making a total income of $113,474,507 ($100,418,806). Operating expenses amounted to $76,467,476 ($70,208,274) including depreciation of $19,043,995 ($17,296,192) while interest of $19,732,447 ($18,657,805) was paid on loan capital, ordinary stock and bank overdraft. Of the balance of $17,274, 584 ($12,012,727), $15,974,584 ($10,612,727) was transferred to Capital Development Account and $1,300,000 ($1,400,000) to General Reserve. The figures shown in brackets refer to the corresponding amounts for the year ended 31st August 1965.

New Head Office Building

A notable event of the year was the official opening of the new multi-storey National Electricity Board Head Office Building at Jalan Bangsar in Kuala Lumpur by Y.T.M. Tengku Abdul Rahman Putra Al-Haj, K.O.M., C.H., the Prime Minister of Malaysia on 26th March 1966.

For the first time since the inception of the Board in 1949, the Head Office Engineering, Administrative and Financial Divisions as well as other ancilliary Departments are now accommodated within the same building thus contributing immensely to the overall efficient functioning of the Board.

Electrical Accidents

Once again it is most gratifying to note a further decline in the number of both fatal and non-fatal electrical accidents. Of the total of 49 accidents reported to the Inspectorate Division, 4 were subsequently found to be non-electrical. The reduction in the total number of electrical accidents compared to last year's figure was 21. Fifteen accidents proved to have been fatal resulting in the death of 12 persons as well as 5 animals. The main causes of these accidents as reported by the Chief Electrical Inspector were again due to carelessness on the part of individuals, the use of faulty apparatus, unauthorised extensions and ignorance of the inherent danger of electricity.

Staff and Malayanisation

The total number of staff employed by the Board increased from 7,899 to

8,500 representing an increase of 7.6%.

15 Pupil Engineers and 2 Cadet Administrative Officers completed their post-graduate training during the year and were promoted to Division I posts. In addition to this, 4 Pupil Mechanical Maintenance Engineers completed their training and were promoted to Division I senior timescale posts according to their scheme of service.

At the close of the year, there were altogether 81 Malaysians undergoing academic training in Malaya and overseas. Of this number, 75 were studying in engineering institutions in the United Kingdom and the balance of 6 in the University of Malaya.

At the end of the year, 13 Pupil Engineers were undergoing post-graduate practical training in the United Kingdom and 2 in Sweden while 3 Pupil Engineers, 2 Pupil Accountants and 1 Cadet Administrative Officer were undergoing their post-graduate training in Malaya. In addition the Board organised short training courses for serving officers to keep them up to date with modern trends in the technical and managerial fields. Consequent to this, 2 Senior Engineers of the Meters, Protection and Test Department went overseas for specialised training in Sweden and the United Kingdom, 2 Mechanical Engineers were sent to Japan and 1 Civil Engineer to Padua University, Italy for a short post-graduate course in hydrology. The Board's Chief Accountant attended a Residential Public Administration Course at the Australian Administrative Staff College in Melbourne.

The total number of Malayan and Expatriate officers as at 31st August 1966, was 216 and 21 respectively as compared to 206 and 45 in the previous year. It is the Board's declared policy to complete its Malayanisation programme by the end of 1967.

Meetings of the N.E.B. Joint Industrial Council were held regularly throughout the year. In all negotiations an atmosphere of cordiality and mutual understanding prevailed, for which credit must be given to the patience and tolerence of the representatives both of Management and of the Staff Side.

Once again the Board wishes to express its great appreciation of the loyal and conscientious work put in by its staff at all levels, which has enabled the rapid expansion of the undertaking to take place without loss of efficiency in the maintenance of existing services. In particular, tribute must be paid to all those, including the Resident Engineers of the Consultants and of the Contractors, who have been engaged upon the Hydro-Electric Schemes, Thermal Power Stations and associated Transmission projects undertaken during the year.

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Chapter Two. Hydro - Electric Development

Batang Padang Hydro-Electric Scheme

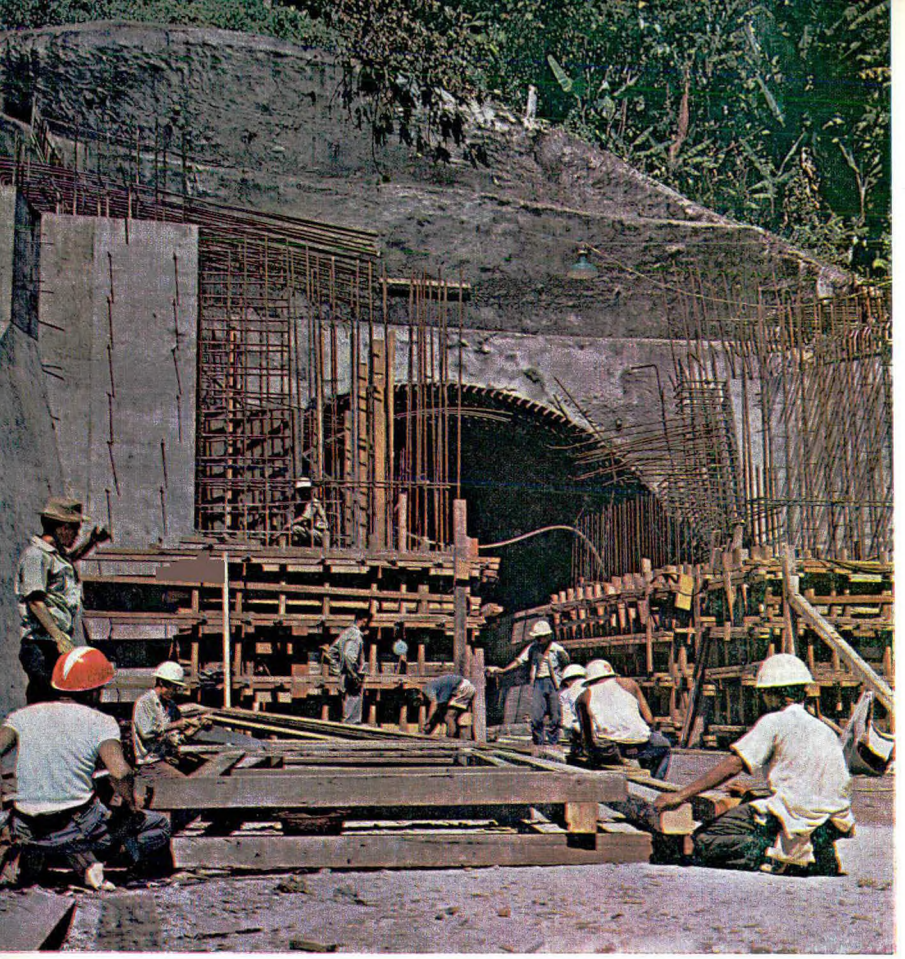
THE Batang Padang Scheme with a total generating capacity of 154.2MW is the largest, lowest and last of the hydro-electric schemes which follow the Cameron Highlands road from 5,000 feet above sea level at the Kelantan border down to Tapah in the plains.

The construction of this $142 million scheme has now been in progress for just over two years and the total number employed at the site reached a peak of 2,897 in July 1966. It is anticipated that the first of the three 50MW sets will be commissioned in the main underground power station at Woh before the end of 1967.

The civil engineering contractor (Hochtief-Holzmann of Germany) has worked steadily through his programme for the year. At the Jor reservoir site, the Sungei Batang Padang was diverted through the spillway tunnel on 21st October 1965, and embanking for Jor Dam started immediately afterwards; by the end of August 1966, 400,000 cubic yards of material had been placed and the dam had been built to just half its final height of 150 ft.

Driving of the 9 mile long Menglang Tunnel has been in four sections: from the two ends and in both directions from a working adit near the mid-point. The two southern sections connected up with commendable accuracy ($\frac{1}{2}$ inch in line and $\frac{1}{4}$ inch in level) on 6th May 1966. Guniting and placing of invert concrete is now in progress. Two of the sidestream intakes are complete and work on two others has started.

Batang Padang Hydro-Electric Scheme — Access Tunnel — view of Roadway from upper end.

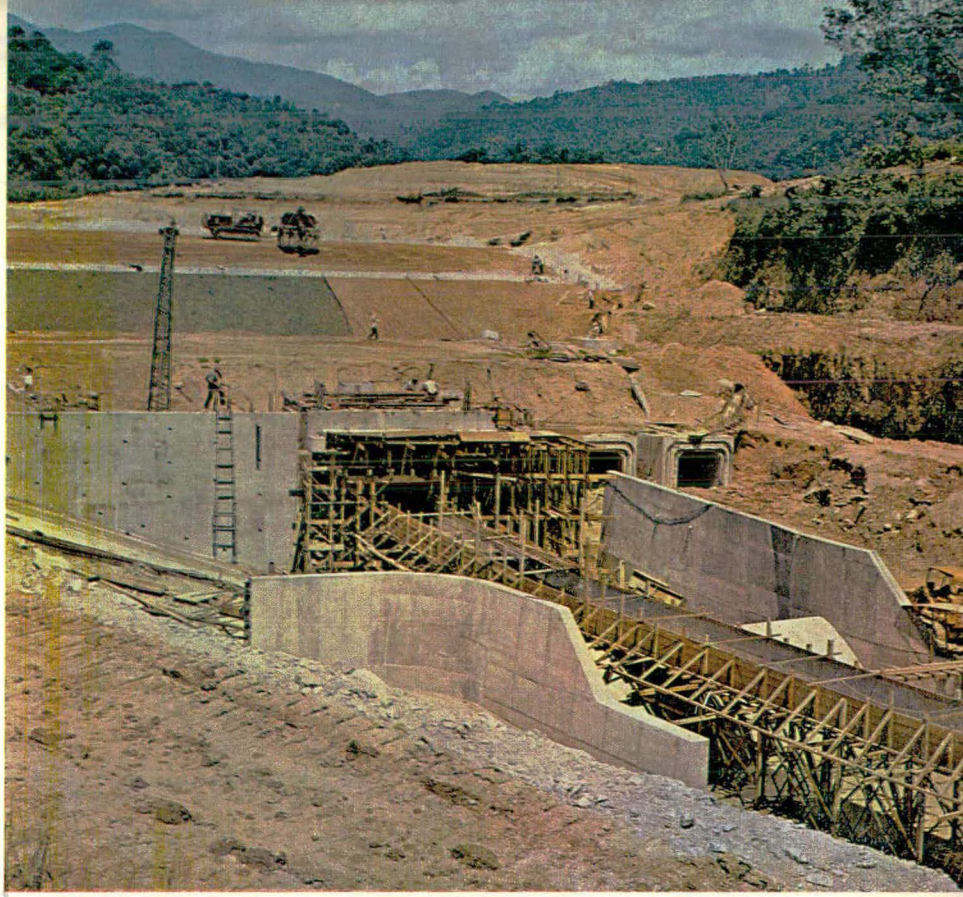


Woh Access Tunnel Portal.

On two occasions driving of Woh Tunnel (the two mile tunnel to divert water to Menglang Tunnel from Sungei Woh) had to be abandoned and resumed on a new line following inflows of silty sand; fortunately the tunnel had been started well ahead of the programmed date and by the end of August the contractor was only one month behind schedule with one third of the tunnel driven.

At the southern (downstream) end of Menglang Tunnel excavation of the upper surge shaft has been virtually completed. From this point the water will flow down two shafts, inclined at 47 degrees to the horizontal, to Woh power station. Excavation of these shafts was completed on 17th December 1965, and installation of steel linings was well advanced by the end of August. Valve chambers at the upper and lower ends of the shafts are complete.

Concrete work in Woh Power Station started in December, 1965 and excavation was completed in July 1966. The access tunnel broke through on 11th February. By the end of August the draft tubes, loading bay, transformer hall, crane beams and columns and the access tunnel were substantially complete. The electrical and mechanical contractor for Woh Power Station (Fuji Electric of Japan) arrived on site in March 1966, and by the end of August had installed the three draft tube liners, one of the spiral casings, the 125 ton power station crane and the gate gallery rails and hoist. The crane was officially tested on 1st August.



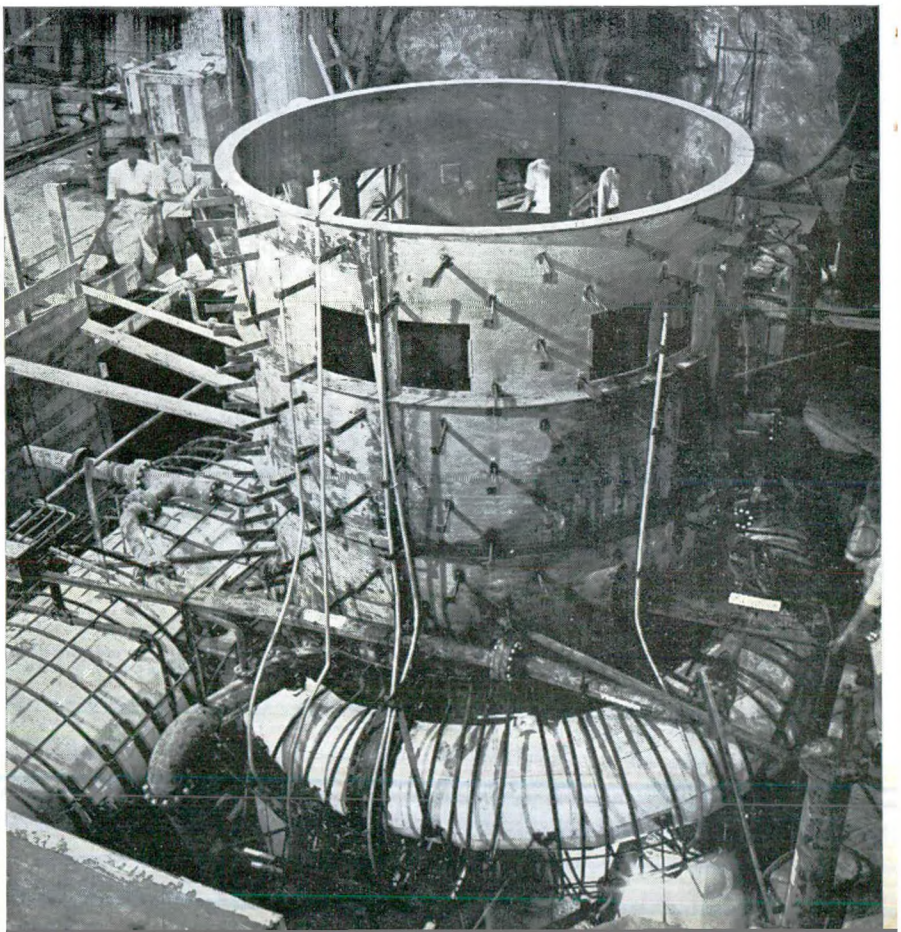
Mahang Dam Outfall Structure.

In the tailrace basin area embanking for Mahang Dam started at the beginning of January and by the end of August the dam had reached three-quarters of its final height over two-thirds of its length. Work on the remaining third will start shortly when the temporary road and rail track have been relocated. The culverts under the dam are substantially complete; work on the intake at the upstream end and on the bellmouth spillway has continued intermittently.

Civil work has started at Odak power station and the electrical and mechanical contract has been awarded to Salzgitter of Germany.

H.H. The Sultan of Perak is seen studying the sketch plan of the Batang Padang Hydro Electric Scheme.

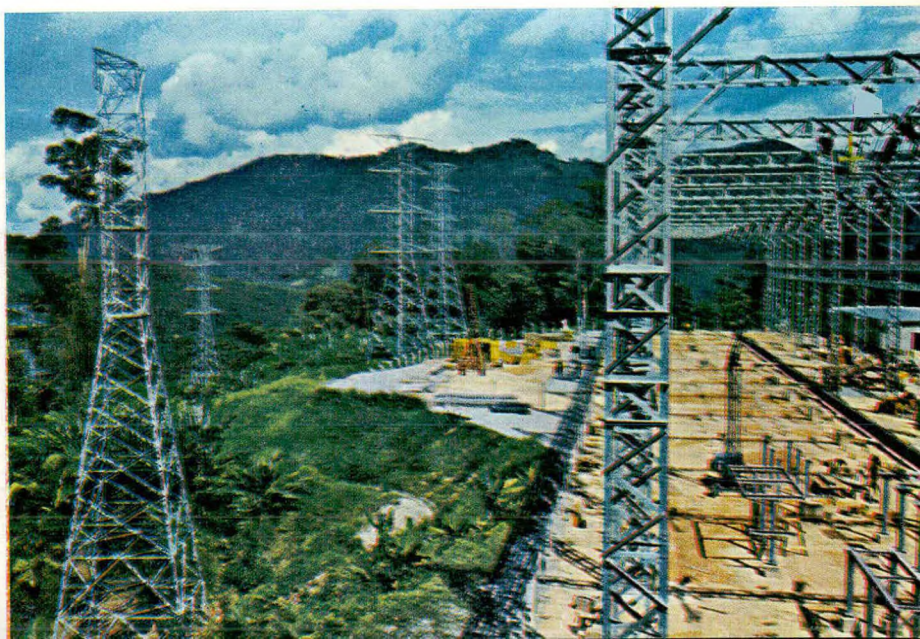
Placing earthfill in Jor Dam.



Woh Power Station view of No. 1 Machine from upstream during concreting round spiral casing to R.L. 213.

Jor Dam Siphon Bellmouth Spillway. — Blockwork commenced — upstream. Portal of Spillway Tunnel in background.

Of the total length of 12 miles of private roads 8 miles have been completed. Civil work at Woh Switchyard, the point at which the output of Cameron Highlands and Batang Padang schemes will be fed into the grid, is almost complete and the switchgear contractor (A.S.E.A. of Sweden) has started work there. The transformer contractor (Savigliano of Italy) and the cabling contractor (A.E.I. of Great Britain) are expected on site shortly.



Woh Switchyard.

View of Jor Dam at early stage of constructions.

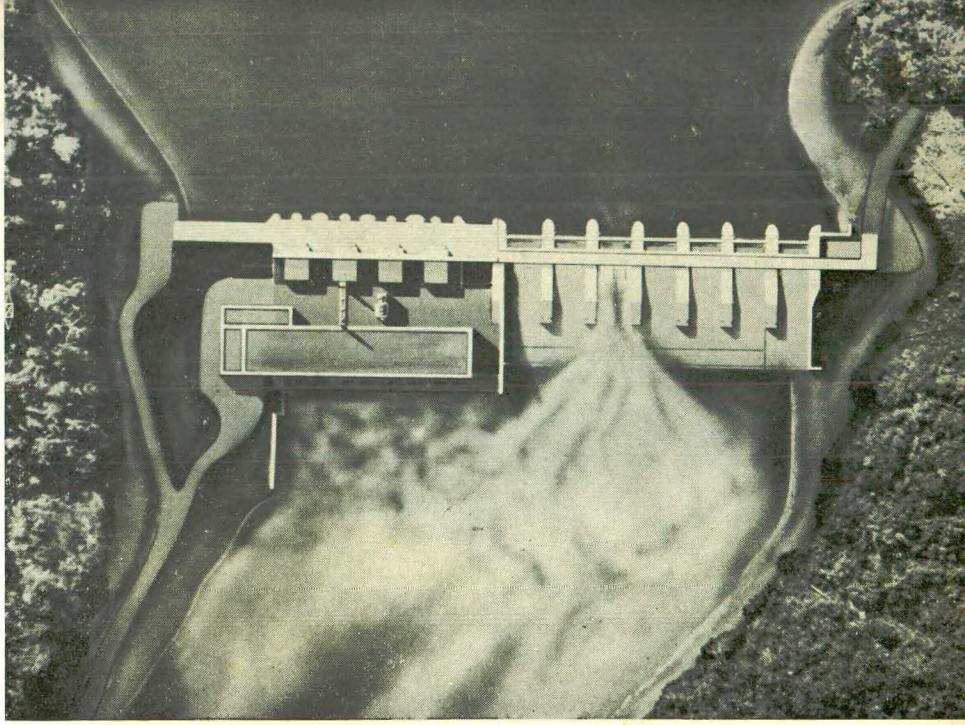
Upper Perak River Hydro-Electric Development

The report on the feasibility study of the Hydro-Electric Development of the Upper Perak River was formally handed over to Y.B. Dr. Lim Swee Aun, the Minister of Commerce & Industry, by the Canadian High Commissioner, Mr. B. C. Butler, at a ceremony held in the National Operations Room on 24th May 1966.

The study, carried out over the last two years under Canada's contribution to the Colombo Plan, established that 625,000 kilowatts of power can be developed economically on the Upper Perak River.

The report recommends developments at three sites with the initial construction of a dam at the most northern site, Temengor. Here, an 8,000,000 cubic yard rockfill dam is proposed which will raise the present water level by 353 feet and form a lake 50 miles long. An intake on the right bank of the dam would direct the flow through power tunnels and steel penstocks to a conventional power station situated downstream of the dam, whose initial installed capacity would be 192 MW.

The Honourable Minister for Commerce & Industry Dr. Lim Swee Aun, and the Canadian High Commissioner at the handing-over ceremony of the Upper Perak Feasibility Report.



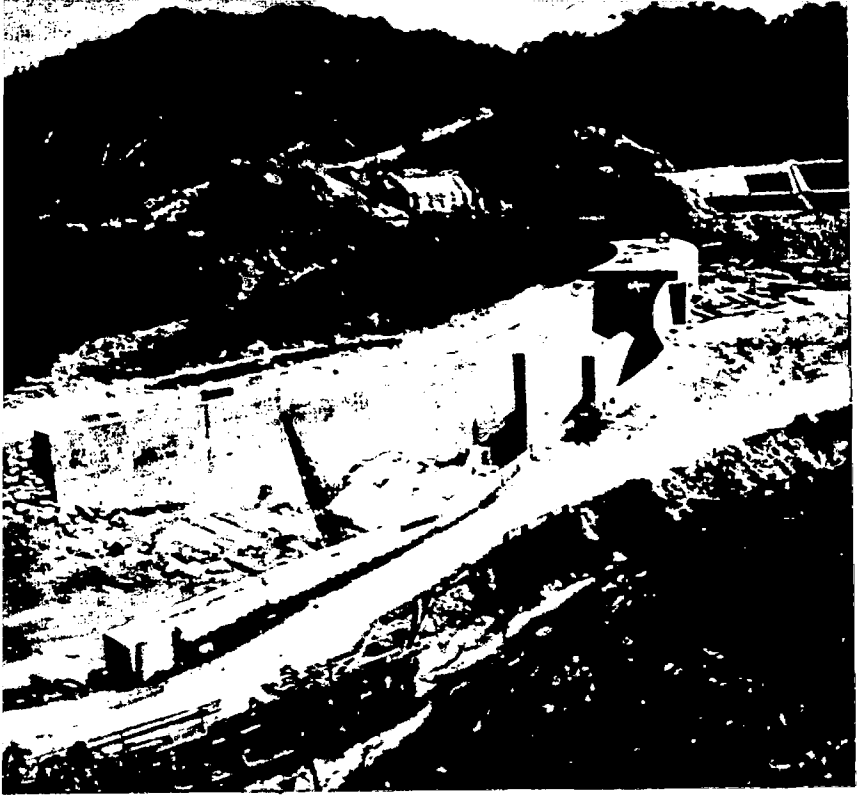
Artist impression of Bersia Dam.

The regulated outflows from Temengor could be further utilized to form the energy available at two potential sites downstream, Bersia and Kenering.

A concrete dam 110 feet high and 810 feet long across the Perak River at Bersia would raise the water level 89 feet, creating a lake 12 miles long and reaching upstream to the Temengor site. A spillway with gates would be able to discharge 265,000 cusecs. An intake adjacent to the spillway would direct the flow through 18 feet diameter steel penstocks to a conventional power station with an ultimate installed capacity of 84 MW.

The Kenering Development would be similar to the Bersia Development with a concrete dam 120 feet high and an ultimate installed capacity of 157 MW. The spillway gates would be designed to discharge 390,000 cusecs.

Model of Temengor Dam.



Jor Stilling Basin Structure.

The key to the Upper Perak Development is the creation of over one million acre feet of live storage in the Temengor reservoir. This will be sufficient to regulate the combined output of all the Board's hydro stations. By compensating for the considerable variations in daily output from Cameron Highlands and Batang Padang, a flexible system of hydro operation will be achieved, thus improving the overall efficiency of the Board's thermal stations.

General Investigation of Hydro-Electric Resources

The table attached to the end of this Chapter of the Annual Report shows the considerable progress made with the development of hydro-electric resources since the end of the Emergency. The table details the schemes which have been constructed and are under construction as well as the schemes for which detailed investigations have been completed. It shows that an ample supply of power will be available for the western side of the country for many years to come.

The table does not indicate the schemes in other parts of the country which preliminary investigations have shown will be economic to build in the future when load demands have risen well above their present level. In order to determine the future pattern of development of hydro-electric resources throughout the country, arrangements were made during the year for a further study of some of these schemes.

Additional sources of energy will be required for the North-East coast in 1975. The Hydro-Electric Division therefore undertook further studies on the development of power from the Pergau River in Kelantan. This was followed up by a visit in July and August of an Investigating Engineer and Engineering Geologist from the Snowy Mountains Hydro-Electric Authority of Australia with the object of assessing the scheme and making recommendations as to whether detailed site investigations are justifiable.

With a catchment area of over 36 square miles in a region of high rainfall, an excellent dam site with sufficient storage capacity to augment and control the flow during the driest year and a useful head concentration of over 1,600 feet immediately downstream of the dam site, the Sungei Pergau appears very favourable for Hydro-Electric Development. Power would be generated in an underground station similar to that at Cameron Highlands. There are possibilities of increasing the flow available for power generation by diversion of additional water from adjacent catchments.

The Japanese Government, under their special fund aid programme, undertook a survey of the hydro-electric potential of the Sia, Liang and Sempam rivers in the District of Raub. The survey team arrived in Malaysia on March 1st, and returned to Japan on 25th May. It is anticipated that a Project Report will be submitted during October 1966. The Raub Development would be on a run-of-river basis similar to the Bentong Development. The purpose of these developments is to supply power to West Pahang and to feed any surplus power to the main load centre at Kuala Lumpur.

The Perting and Benus schemes of the Bentong Development, originally scheduled to commence construction in 1967, have been temporarily deferred. In the meanwhile, instructions have been given to the Consulting Engineers to prepare a draft specification for the power house plant, to carry out essential site investigation, and to complete tender drawings for the Perting scheme.

A preliminary study was made of the possibility of developing a multi-purpose scheme on the Trengganu River for flood control, irrigation and hydro power, although it is not envisaged that power will be required from this source until the 1980's. This study was undertaken for the Board and the Drainage & Irrigation Department by the Ministry of Overseas Development, under U.K. Colombo Plan Aid.

The final report by Sir William Halcrow & Partners on the feasibility of generation of power at the Pedu dam of the Muda River Irrigation Project has confirmed that this would not be an economic proposition; primarily due to the spasmodic availability of water for power generation and also to the relatively high cost of transmitting the power to the various load centres.

Field surveys have also been undertaken by the Hydro-Electric Division in connection with Rek Scheme in Kelantan and the Piah scheme in Perak.

TABLE OF HYDRO-ELECTRIC DEVELOPMENT

Station	Installed Capacity kW	Gross Head Feet	Catchment Area Sq. Miles	Output kWh	Date of Commissioning
IN OPERATION					
Robinson Falls	3 × 300	770	8.3	7 × 10^6	1959
Sultan Yussuf	4 × 25,000	1,350	70.7	324 × 10^6	1963
Habu	2 × 2,750	320	51.2	34 × 10^6	1964
Kampong Raja	1 × 800	277	11.9	6 × 10^6	1965
Kuala Terla	1 × 500	131	16.7	4 × 10^6	1965
UNDER CONSTRUCTION					
Woh	3 × 50,000	1,360	151.9	480 × 10^6	1967/68
Odak	3 × 1,400	40	152.1	14 × 10^6	1967/68
DETAILED INVESTIGATION COMPLETED					
Perting	3 × 4,000	680	34	62 × 10^6	
Benus	2 × 4,000	734	36	36 × 10^6	
Temengor	6 × 64,000	353	1,310	928 × 10^6	
Bersia	4 × 21,000	89	1,390	231 × 10^6	
Kenering	5 × 31,300	96	2,140	367 × 10^6	
TOTAL	906,400 kW			2,493 × 10^6	

Chapter Three. Planning and Construction

P l a n n i n g

Generation :

Thermal Power Stations

Port Dickson Power Station

This station is now planned for an ultimate capacity of 600 MW.

It is envisaged that the first phase of the station which will accommodate four units of 60 MW each will need to be completed in 1971/72. The date for implementation of the second and final phase which will increase the station capacity by 360 MW (three 120 MW units) has yet to be decided.

Sultan Ismail Power Station

In view of the present load trend, it is anticipated that a second unit of 30 MW will need to be commissioned toward the end of 1969.

Diesel Power Stations

Plans are now almost finalised for the maximum utilisation of diesel plant which will be rendered surplus by Bulk Supply arriving at Butterworth, Taiping and Kluang in early 1967. The plant capacity of Diesel Power Stations in Pahang, Trengganu, and Kelantan, will have to be considerably increased next year, and all the necessary additional generating sets required will be available from existing stations to be shut down. Almost 8000 kW of diesel plant will be transferred during 1966/67. It has also been decided to transfer the 2 × 3000 kW Free Piston Gasifyer sets from Butterworth to Lemal Power Station, Kelantan.

In planning these transfers, due consideration is being given to utilising the more economical residual fuel burning engines as much as possible and to reducing the numerous makes of diesel engines to a minimum in order to economise spare parts.

As the output of individual diesel sets being transferred to Eastern Malaya is generally larger than sets already operating there, a considerable amount of work on power station buildings, cooling water plant, fuel storage, and switchgear extensions is also involved.

132 kV Transmission Line Tower Erection near Woh.

Transmission

The maximum demand on the Central Network during the year increased by another 20 MW to 175.45. This figure would have been higher, if it were not for the setbacks in the construction programme of extending bulk supply to a number of diesel stations resulting from delays in delivery of construction materials and equipment from overseas. Now that the political air has been cleared by the ending of Confrontation and the imminent resumption of friendly ties with Indonesia, a greater increase in industrial activity is anticipated for the next few years. Existing generating facilities in the Central Network in the event of dry weather may prove inadequate to satisfy a greatly stepped up demand for next year before the commissioning of the Batang Padang Scheme in early 1968 and to meet such a contingency arrangements have been made to interconnect the Central Network with the Northern Network in early 1967 so as to obtain a limited import from the new Prai Power Station into the Central Network, should the need arise.

Transmission projects which are complementary to the Batang Padang and Prai Power Development Scheme are well under way. These projects will provide a 132 kV transmission network in the northern half of the west coast of the country extending from the Cameron Highlands to Alor Star with a 33 kV submarine cable interconnection between the Board's power Station at Prai and the Penang City Council's Glugor Power Station, a 66 kV interconnection with the Perak River Hydro-Electric Power Company's system at Papan, and 132 kV

interconnection with the Board's Central Network at the site of the new hydro station at Woh. Completion of this network will enable the Board to shut down diesel stations at Taiping, Butterworth, Alor Star, and Arau. It will also serve to promote industrial development around the larger towns in the North and assist in accelerating the pace of rural electrification.

Recent studies have been made with the help of our Consultants to appraise future generation and transmission requirements to meet anticipated load growth in the Western part of the country up to 1975. The projects to meet the country's needs up to 1970 are grouped under what is now known as the "South Malaya Power Development" and can be subdivided into two parts, the Port Dickson Development and the Johore Bahru Development. Under the former, the associated transmission projects have been designed to distribute the output of Port Dickson Power Station (120 MW when commissioned in 1969, with ultimate capacity of 600 MW) to load centres in the Kuala Lumpur area and in the Seremban/Malacca and North Johore region. Depending on the construction programme of the Upper Perak Hydro-Electric Development which is now under study, the Port Dickson/ Kuala Lumpur Lines may be called upon to transmit some 500 MW to the Kuala Lumpur area by 1984. A decision will soon be made on the choice of the next step in transmission voltage which will probably be 275 kV. In making the final choice, future needs for voltages higher than 132 kV throughout the States of Malaya must receive consideration, in particular the transmission voltage to be adopted for the Upper Perak Hydro-Electric Development. Reinforcement to the 66 kV transmission network in the Seremban/Malacca/North Johore area will be effected by 2-132 kV double circuit transformer fed lines with .15 sq. in. conductors to be erected between Port Dickson and Seremban with step down 132/66 kV transformers at Seremban.

The transmission programme associated with the Johore Bahru Development seeks to distribute the output of Sultan Ismail Power Station (90 MW by 1970 and ultimate 150 MW) to load centres in Southern Johore. On the basis that 60 MW of the station's output can be ultimately distributed at 22 kV to Johore Bahru Town, the present plans envisage that the remaining 90 MW output will be sent out at 66 kV over a Double Circuit 2 line to a switching station near Scudai with provision for a future teed circuit to Johore River Waterworks and Kota Tinggi. At Scudai, a 66/22 kV substation will be established to reinforce the Johore Bahru 22 kV network and to provide supply to a future feeder to Pontian at 66 kV or 22 kV. Initially the 132 kV double circuit line from Scudai to Kluang will operate at 66 kV. It is foreseen that by the late 1970s voltage regulation difficulties will arise in meeting the Kluang & Batu Pahat loads over two 66 kV circuits from Johore Bahru and present plans provide for the upgrading of these circuits to 132 kV working on a transformer feeder operation basis from Scudai.

By 1969 with the completion of the transmission projects to be undertaken under the South Malaya Power Development, an interconnected grid will be established throughout the Western half of the country which will extend from Kangar and Arau in Perlis in the North to Johore Bahru in the South. Studies have been made to assess the economics of extending the grid to Kuantan on the East Coast via Bentong and Mentakab. Such an extension will be economically feasible in the near future if undertaken in conjunction with the Bentong & Raub Hydro Schemes which are now under active investigation.

Distribution

Central Area — The load growth in Kuala Lumpur and Petaling Jaya continued to maintain a high rate of increase which is likely to be maintained over the next few years judging by the number of applications and enquiries for electricity from industrial, commercial, domestic as well as tin mining consumers. Stage II of the Kuala Lumpur 33 kV Underground System Development will be completed by the end of 1966 with the commissioning of Jalan Pahang 2 × 15 MVA, 33/11 kV Substation, and Stage III is now scheduled for completion by mid-1967, with the establishment of Bungsar and Jalan Penchala 33/11 kV substations and extension at the 33 kV underground network by another 21,000 yards. Plans have been formulated to proceed with Stage IV which involves laying approximately 9250 yards of 33 kV 30 MVA oil filled cable from Segambut to a 33/11 kV Substation to be established at the old Gombak Lane office site, and thence to Rodger Street Substation. This scheme is scheduled for commissioning by January, 1968.

To control and operate the increasing complex of Kuala Lumpur and Petaling Jaya underground 33 kV and 11 kV distribution networks, a new Regional Control Centre is to be set up above the Bungsar 33/11 kV Substation, which is now under construction and is situated adjacent to the existing Bungsar offices. The equipment therein for which orders have been placed, will employ the latest solid state techniques in the field of remote supervisory control, communications and operations of substations. This new Control Centre is due for commissioning about mid-1967 and will replace the existing Regional Control Room at the Central Area offices. It will provide facilities to supervise directly all the 33/11 kV intake substations and some of the more important 11 kV substations, besides exercising general centralised control of the 33 kV and 11 kV networks around Kuala Lumpur.

The first factory in the Batu Tiga Industrial site is nearing completion, and construction work has already started on the Royal Mint and several other factories. There is an approved scheme to lay a .2 sq. in. 11 kV ring in this Industrial area which initially will be supplied by teeing off the existing .2 sq. in. interconnector between C.E.P.S. and International Airport but finally from the proposed 2 × 13 MVA 66/11 kV substation to be established on the opposite side of the Federal Highway by the end of 1967. Additional 11 kV rings will be laid in the northern site earmarked for the New State Capital, commercial centre and residential areas.

Northern Area — As planned, the straggly 11 kV reticulation around Butterworth has been reinforced by a 33 kV network and 33/11 kV Substations established at Sungei Dua (commissioned on 1st August, 1965) and Bukit Mertajam (commissioned on 22nd June, 1966). The old Bukit Mertajam/Kulim/Lunas cable of .0225 sq. in. has been replaced by a .1 sq. in. cable and the numerous substations en-route have been rehabilitated, most of them with new switchgear. As a result, voltage regulation on this feeder has improved considerably and has rendered redundant the Kulim 11 kV voltage regulators of 1500 kVA capacity. Reorganisation of the Butterworth 11 kV distribution system to accept three new 11 kV feeders from Prai Power Station is progressing satisfactorily, and the work will be completed in time for the commissioning of Prai Power Station towards the end of 1966. Similarly, at Taiping and Parit Buntar, virtually all the 11kV cables for interconnecting the 132/11 kV Bulk Supply Substation with the existing 11 kV reticulation have been laid, but further progress has been held up awaiting the completion of the 132/11 kV Bulk Supply substations.

Development of the factory sites in the Mak Mandin Industrial Area in Butterworth has not come up to expectations, but with the State Government giving every encouragement to would-be investors, many light industries are expected to be set up in the near future. Plans have been drawn up to establish a 11 kV ring in the area, which will initially be fed by a .1 sq. in. 11 kV cable from the Butterworth system, but eventually reinforced by a 33/11 kV substation tapped off the 33 kV Prai — Sungei Dua feeder.

In Taiping, a scheme has been formulated to supply the Kamunting Industrial area initially by tapping off the .1 sq. in. Krian Waterworks feeder, and later on duplicating this 11 kV feeder direct from the bulk supply point. Agreement has been reached with Anglo Oriental Ltd., to provide a bulk supply of about 4.5 MW to Kamunting Tin and Taiping Consolidated Tin in early 1967, by which time the Taiping M.D. will be almost double the present diesel station M.D. of 5370 kW. Two translay protected .2 sq. in. 11 kV feeders will be laid direct from the 2 × 15 MVA 132/11 kV Bulk Supply Substation to a new 11 kV substation to be erected adjacent to the existing Taiping Consolidated Tin Substation.

A preliminary survey has been carried out and plans have been finalised to proceed with the 33 kV extension from Alor Star to Kangar, a distance of about 28 miles, with a .15 sq. in. heavy duty line and the establishment of a 2 × 3 MVA 33/11 kV Substation at Kangar. The proposed 33 kV line route will follow roughly the new Alor Star — Kangar coast road, and several villages enroute will be given supply for the first time when the scheme is commissioned towards the end of 1967. A preliminary enquiry has been received from a cement clinker company for a load of 5.5 MW towards the end of 1968, and approximately 11 MW by 1970/71, for their proposed factory at Bukit Ketri, approximately $7\frac{1}{2}$ miles from Kangar. Owing to the excessive voltage drop that would be experienced on a 33 kV extension from the Alor Star — Kangar line, investigations into the technical and economic feasibility of extending the 132 kV Grid from Alor Star to Bukit Ketri are actively being pursued.

Southern Area — The Jalan Tampoi Industrial Area in Johore Bahru is developing steadily and in anticipation of further load increases, a 7.5 MVA 22/6.6 kV substation will be established in the Industrial Area by the latter part of 1967. It is envisaged that one more 22 kV .2 sq. in. underground feeder may be laid at some future date from the Power Station to the Industrial Area Substation, to reinforce the 22 kV network, but further increases in load could be supplied more economically by establishing one or two suitably located 66/22 kV injection points, thus obviating the necessity of laying long and expensive 22 kV feeders out of the Power Station. It would be possible to establish the 66/22 kV Substations after the 66 kV double circuit interconnector between S.I.P.S. and Kluang is commissioned in 1969/70.

In Seremban, a 11 kV Bulk supply will be extended to Rembau before the end of 1966 thus enabling the existing uneconomic diesel station to be shut down. Gemas and Segamat are also scheduled to receive 11 kV bulk supply when the Gemas 66/11 kV Substation is commissioned in April, 1967.

Eastern Area — In Kuantan, plans for supplying the proposed R.M.A.F. Base at 11 kV, by laying approximately 11 miles of 11kV .15 sq.in. cable direct from the Power Station have been finalised and the target date for completion of the scheme is December, 1966. Investigations are being carried out to look into the possibility

Supply given to fully electrically operated Pre-Mix plant at P.W.D. Quarry, Kuantan.

of operating the existing 6.6 kV grade cables at 11 kV, and if found suitable, a programme will be drawn up for the changeover to 11 kV operation.

The Kuala Trengganu 11 kV system will be extended by 11 kV cables north of the Sungei Trengganu sometime next year, and a military camp, P.W.D. quarry and several villages will be given supply for the first time. Our investigations into the feasibility of laying a submarine cable across the Sungei Trengganu lead us to believe that an elaborate scheme would have to be devised to anchor the cable to the muddy river bed which tends to shift owing to swift currents and severe flooding during the monsoon seasons. Taking into account the high cost of the submarine cable and the extra expense of anchoring the cable, it has been decided to span the river with an overhead line crossing and proceed north thereafter by underground cable.

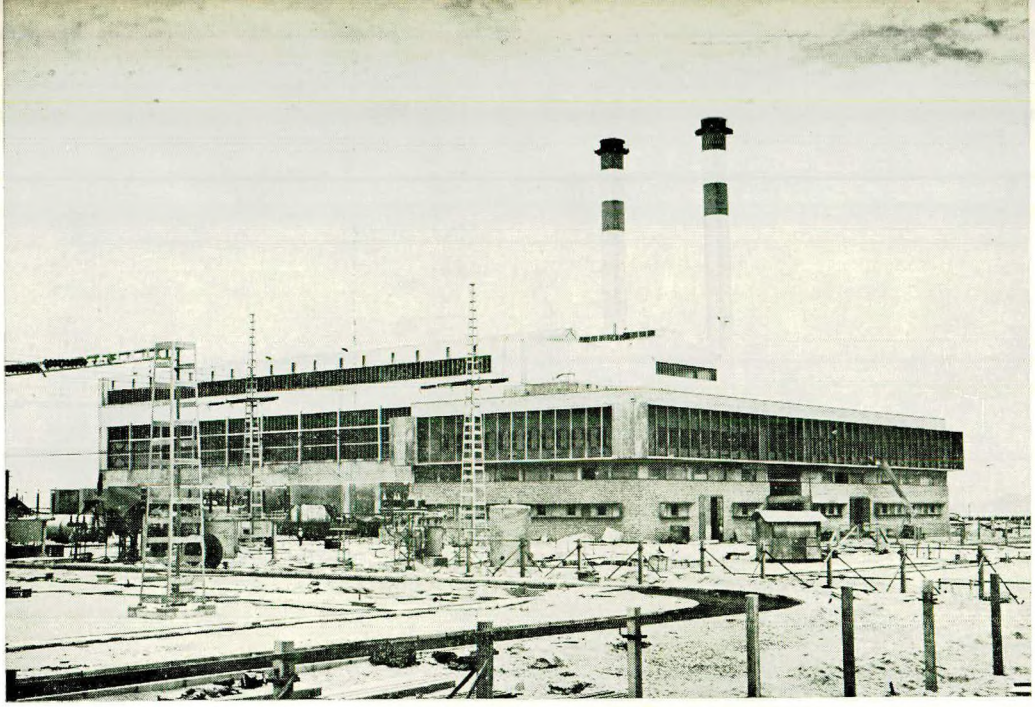
C o n s t r u c t i o n

Generation

Thermal Power Stations

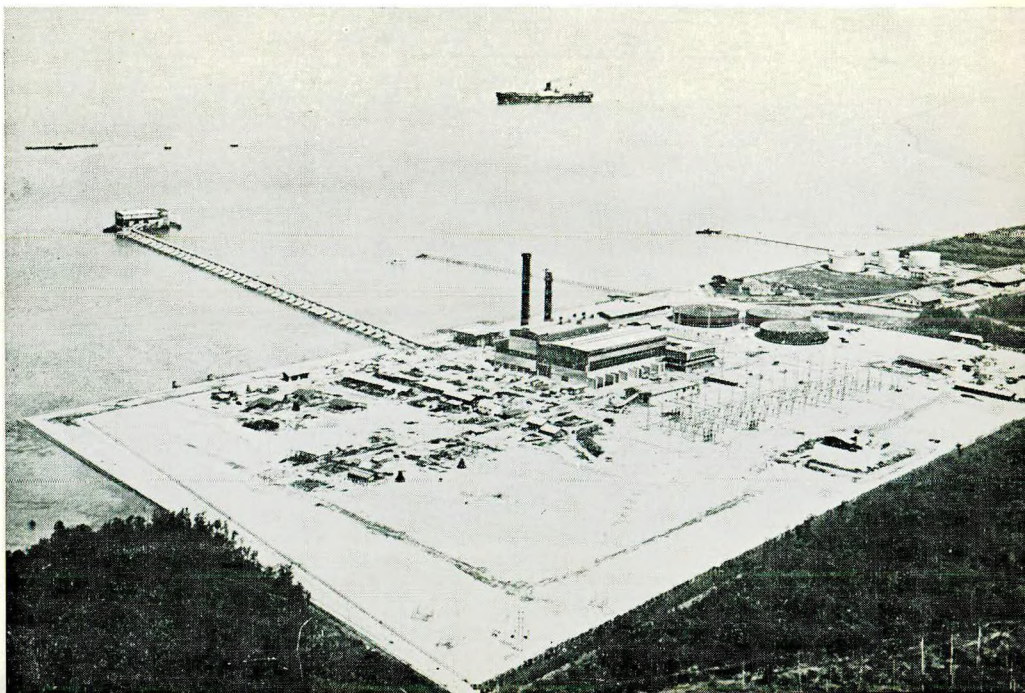
Prai Power Station — The first phase of this station consists of two oil-fired 300,000 lb/hr. boilers and two 30 MW turbo-alternators. Civil work and erection of boilers and turbo-alternators are almost completed. The first set is scheduled to be commissioned towards December 1966. The station is expected to go on commercial operation early next year.

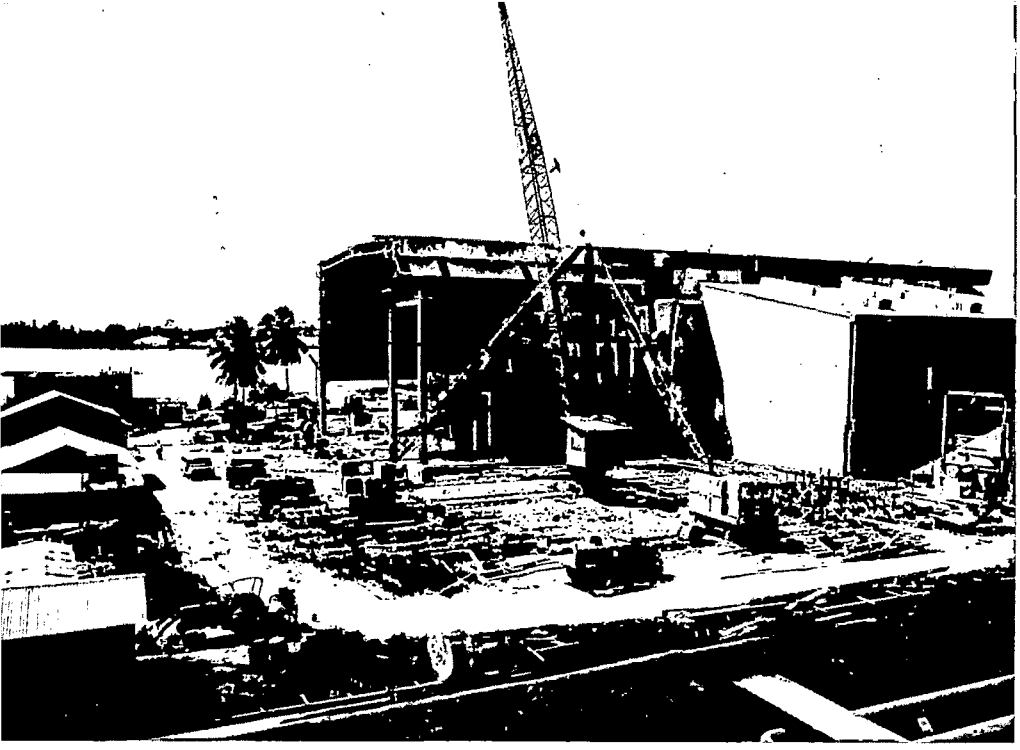
Malacca Power Station — The final extension consisting of a fourth 10 MW turbo-alternator and 130,000 lb/hr. boiler is completed. The boiler and turbine completed their reliability tests and were taken over by the Board on 9th and 12th August, 1966 respectively.



Prai Power Station general view from north east.

Aerial view of Prai Power Station from south east.





Sulian Ismail Power Station — first extension. General view of site from north-east corner.

Sulian Ismail Power Station — The first extension of the station consists of one 30 MW turbo-alternator and 300,000 lb/hr. boiler. Civil works are in progress and turbo-alternator erection is expected to commence in October 1966.

Port Dickson Power Station — The first phase of this station consists of two 550,000 lb/hr. oil-fired boilers and two 60 MW turbo-alternators with steam conditions of 900 p.s.i.g./900° F at the turbine stop valve. The station is anticipated to be commissioned in 1969.

Site reclamation work commenced in July 1966 but filling was delayed due to difficulties being experienced in obtaining filling material.

Diesel Power Stations

Lemal Power Station (Pasir Mas, Kelantan) — The second 3 MW Mirrlees-National KVSS I6 Diesel Generating Set was commissioned in September 1965. The power station building was extended to accommodate the 2 × 3 MW Free Piston Gasifyer sets that will be transferred from Butterworth next year. Excavation of the clay strata commenced in May, for the construction of the reinforced concrete raft foundations of the Free Piston plant, and by 31st August, all steelwork and shuttering were in situ prior to concrete pouring. By that time also, the four Gasifyers of No. 2 Free Piston set at Butterworth had been dismantled and loaded on to railway wagons at Prai for transit to Lemal. The original air intake system installed at Butterworth is to be discarded and an improved system, developed by S.I.G.M.A. of France, installed at Lemal.

Movements of diesel plant during the year were as follows: -

(i)	New Plant installed and commissioned	1-3020 kW Set at Lemal 1- 750 kW Set at Alor Star 1- 750 kW Set at Taiping
(ii)	New Plant on order at 31.8.66	Nil
(iii)	Plant transferred and commissioned	1- 975 kW Set to Alor Star 1- 490 kW Set to Mentakab 1- 400 kW Set to Bentong 1- 400 kW Set to Sitiawan 1- 200 kW Set to Arau 2- 100 kW Sets to K. Klawang 1- 100 kW Set to Dungun 1- 55 kW Set to Fraser's Hill 1- 50 kW Set to Rembau
(iv)	Plant in course of transfer at 31.8.66	1-2800 kW Set (Free Piston) to Lemal 1- 690 kW Set to Kuantan 1- 250 kW Set to Arau
(v)	Old or inefficient plant sold	1- 180 kW Set at Sungei Patani 1- 140 kW Set at Sungei Patani 1- 136 kW Set at Kuala Pilah 1- 135 kW Set at Kuala Pilah 2- 65 kW Sets at Kuala Pilah 2- 22 kW Sets at Kuala Klawang 2- 22 kW Sets at Kuala Selangor
(vi)	Diesel Stations given Bulk Supply	Bahau and Kuala Pilah

Stations which had their capacity increased during the year are as shown in the following table: -

Station	Plant Capacity in kW as at 31st August		% Increase
	1965	1966	
Arau	500	700	40%
Alor Star	4175	5900	41%
Sitiawan	820	1220	49%
Kuala Klawang	249	405	63%
Rembau	125	175	40%
Mentakab	1236	1551	26%
Fraser's Hill	300	355	18%
Dungun	530	630	19%
Taiping	5675	5735	1.07%
Bentong	947	1347	42%
Lemal	3020	6040	100%

Transmission

Construction work during the year continued to be hampered by wayleave difficulties in obtaining entry into transmission lines. With rubber planting and tin mining being the main industries, it is inevitable that transmission lines have to be routed through land utilised for such purposes if reasonable accessibility and transport facilities are to be provided. Wayleave applications are encountering increasing objections from landowners. The current prevailing practice of remining old tin tailings has also placed restrictions on the possible choice of routes. From national interest points of view, it is obvious that routeing of lines through paddy fields, where possible, is the obvious answer, even though considerable additional foundation expenditure may have to be incurred. In the vicinity of large towns, it is virtually impossible to avoid squatters and land with potential building value or on which housing estates have been planned. In such cases, instead of seeking a wayleave free of all houses, it is now the practice to allow houses to remain or to be built within the rentis provided the statutory clearances can be obtained.

During the year there were numerous cases for legitimate complaints against overseas suppliers for late and short deliveries of essential constructional materials with the result that many a completion programme had to be retarded by several months. Strikes by U.K. and Japanese seamen and other strikes in transformer factories in Italy have contributed towards the inability of manufacturers to meet target delivery dates.

Batang Padang & Prai Power Development — Due to wayleave difficulties, the completion of the Segambut/Pudu Ulu/K. Lumpur South lines have been delayed by about a year to mid-1967. The diversion of men and equipment to the Prai/Taiping/Papan lines has enabled progress to match with that achieved at Prai Power Station. Thus, these transmission lines, in spite of exceptionally poor soil conditions between Prai and Taiping which has necessitated a four fold increase in heavy concrete piling than originally allowed for, will be available by the time that Prai Power Station is commissioned in November, 1966. Late delivery of switchgear and transformers is, however, giving cause for concern; so much so, it is now anticipated that the substations at Papan and Taiping will be some two and four months behind the required programme to provide full loading of the Prai turbo-alternators.

About 4,400 yards of 30 MVA 33 kV oil filled cables from Prai Power Station Switchyard to the Penang/Prai submarine cable terminations and 1,600 yards of 20 MVA to the 33 kV overhead line terminal towers together with the associated pilot control cable were laid and commissioned. Arrangements were also completed for the Contractors for the Penang/Prai submarine cables to pressurise the accompaning pilot cable with nitrogen so as to limit the extent of moisture entry should the cable sheath suffer a leak.

The route of the lines North to Sg. Patani and Alor Star traverse paddy fields most of the way. In view of the very heavy expenditure associated with the foundations of D/C 2 towers through somewhat similar paddy land around Prai, alternative quotes for D/C 2 and two single circuit construction were called for in the tender. Subsequent soil tests, however, showed that poor soil conditions in the vicinity and South of Prai would not be encountered in the North with the

result that the tender for D/C 2 construction was finally accepted. Profile survey was completed and pole position were selected. Foundation piling is in progress and 132 kV bulk supply should be available at Sungei Patani and Alor Star by March and August 1967 respectively.

Schemes Directly Engineered by Board's Staff

Overhead Lines and Cables — During the year, preliminary route surveys for the following proposed transmission lines were completed:

(i) 275 kV line from Port Dickson to Kuala Lumpur (South) Substation. Route length 45 miles.

(ii) 132 kV line from Scudai, Johore, to Kluang. Route length 43½ miles.

(iii) 66 kV line from Johore Bahru to Scudai. Route length 12½ miles.

The 66 kV line from Seremban to Kuala Pilah, 21 miles long, construction of which was completed during the last financial year, was commissioned in September, 1965.

Despite the many difficulties, e.g. delay in the arrival, short delivery and damage, of transmission line material, the 31 miles of 0.1 sq. in. copper equivalent SCA single-circuit 66 kV line on B.I.C.C. "P.U." poles, from Batu Pahat to Kluang, is nearing completion, and scheduled for commissioning by the end of September, 1966. Wooden crossarms were used on this line to increase its insulation level.

The rentis clearing for a similar line of 32 miles from Kuala Pilah to Gemas is nearly completed. Materials for the second circuit, 132 kV Muda River to Sungei Patani line, have been indented and are starting to arrive.

Substations — At Kuala Pilah, a three isolator substation, equipped with a 3 MVA, 66/11 kV transformer protected by 66 kV HRC fuses and fault thrower and 11 kV switchgear, was commissioned in September, 1965.

Work at the 66/11 kV Main Intake Substation at Kluang is well in hand. Mainly as a result of the delay in the delivery of the 2 × 10 MVA, 66/11 kV transformers, the substation is to be commissioned using a 1.8 MVA transformer (ex-Alor Gajah), as a temporary measure in early October, 1966. This decision has been taken because the supply position in Kluang is acute.

Civil works in connection with the 1 × 3 MVA, 66/11 kV Main Intake Substation at Gemas are nearing completion.

A new 7.5 MVA, 66/11 kV transformer was installed and commissioned at Bona Vista Substation, Malacca, to provide a firm supply to the town.

A new 66 kV AEG 90-115 amps. arc suppression coil was installed and commissioned at Connaught Bridge Power Station. The old Hackbridge Hewettic 50 amps. coil was dismantled and is due to be reinstalled at Seremban S/S, in 1968/69 when the latter substation will be reinforced from the 132 kV System.

Distribution

Central Area — 33 kV Overhead Lines and Underground Cables — The 33kV 0.1 sq. in. conductor line of 9 miles from Ayer Hitam Substation to give supply to Selangor Dredging, Kuala Langat, with a 0.025 sq. in. T-off line of 2 miles, was completed and commissioned. The light T-off line to Petaling Tin could not be completed at the same time due to wayleave difficulties. The extension of the 0.1 sq. in. line to Sungei Manggic was surveyed.

A short stretch of the 33 kV overhead line at the 4½ Mile Ampang Road, Kuala Lumpur, was undergrounded using 750 yards of 33 kV 0.3 sq. in. 3-core solid cable, to make way for the 132 kV overhead line from Segambut Substation to Pudu Ulu.

The routes and profiles for Stage III of the Kuala Lumpur 33 kV underground oil-filled cable system from Petaling Jaya Main Intake Substation to Kuala Lumpur (South) Substation, and from Kuala Lumpur (South) Substation to Bungsar 33/11 kV Substation, were surveyed. Contracts for supply and laying of these cables of approx. 21,000 yards in length together with associated switchgear and 33/11 kV transformers at substations have been placed.

33 kV Substations

Four 33/.4 kV substations were constructed to give supply to tin-mines. The total capacity was 2,350 kVA. A 2 [illegible] 1200 kVA 33/6.6 kV substation was constructed to give supply to Selangor Dredging, Kuala Langat.

Four other 33/.4 kV substations with a total capacity of 350 kVA were also constructed for normal distribution purposes. Included in this was a 50 kVA substation for rural electrification for the Malay and Indian Settlements, Batu Caves, Kuala Lumpur.

Two 33/.4 kV substations, 4½ Mile Ampang Road and Kg. Pandan, with a total capacity of 400 kVA were converted to 11/.4 kV substations with a combined capacity of 500 kVA.

Four 33/.4 kV substations with a total capacity of 825 kVA were increased to a combined capacity of 1,750 kVA.

The erection of the new 7.5 MVA, 33/11 kV transformer at Kajang was completed and commissioned.

The installation of the second 15 MVA, 33/11 kV transformer at Jalan Sungei Besi 33/11 kV Substation was completed and commissioned.

Civil works in connection with Jalan Pahang 33/11 kV substation were completed and the 11 kV switchgear installed. The installation of the 33 kV switchgear was programmed to commence as soon as labour is available. However, delay in the delivery of the two 15 MVA, 33/11 kV transformers has put the target date for commissioning the substation back to early 1967.

Piling for the Bungsar Regional Control and 33/11 kV substation has commenced and is progressing satisfactorily. Work on the building super structure is expected to commence in November.

11 kV System — At Kuala Lumpur and Petaling Jaya, thirty-seven substations, with a total capacity of 19,300 kVA were installed. There was a total increase of 4,550 kVA in transformer capacity as a result of installing larger transformers in 17 existing substations, and the conversion of a 2-33 kV substations to 11 kV. One 750 kVA substation was re-sited. Huttenbachs Ice Factory substation, of 300 kVA, was dismantled. A 200 kVA transformer was installed at RMAF Substation "D", Kuala Lumpur, on a rechargeable basis.

In the Kuala Lumpur Outstations, supply was given to (a) Ulu Yam Lama by laying 1,912 yds. of 0.0225 sq. in. 11 kV cable from Batang Kali Substation which had two Statter "OD" added, and constructing a 50 kVA outdoor substation; (b) Ulu Yam Bahru by laying 7,645 yds. of 0.0225 sq. in. 11 kV cable from Batang Kali Substation, and constructing a 100 kVA outdoor substation; and (c) Subang New Village by laying 1,299 yds. of 0.06 sq. in. 11 kV cable, constructing a 50 kVA outdoor substation, and a switching station on the west side of Subang Airport. The 50 kVA Montfort Boy's Home S/S., Batu Tiga, was completed and commissioned. A 11/.4 kV 50 kVA substation was erected at the Kuang 33/11 kV 500 kVA substation to give supply to Kg. Batu 18, Kuang.

In Klang District, five substations with a total transformer capacity of 2,100 kVA were erected. A total of 17,435 yds. of 11 kV underground cables of various sizes were laid in connecting these substations. There was a net increase of 700 kVA when four substations had larger transformers installed. The 500 kVA temporary substation at Chemical Co. of Malaysia was dismantled and the 11 kV cable feeding it was swung into the permanent substation with the installation of an additional BVP3 switchgear panel. 613 yds. of 0.1 sq. in. cable was laid along the Klang Bridge to enable the suspect 444 yds. of 0.1 sq. in. old cable to be dismantled. The laying of 2 × 2,141 yds. of 0.2 sq. in. cable from the Batu Tiga Road T-off to Central Substation was completed. A second submarine cable, 0.04 sq. in. and 754 yds. long, was laid across the river at Kuala Selangor to provide it with a secure supply. A start was made on the 11 kV 0.2 sq. in. cable ring at the Batu Tiga industrial site with the erection of a 4 Statter "OD" switching station by the Federal Highway and the laying of the first leg of the cable to supply the Matsushita Factory.

Northern Area

Butterworth District — 23,912 yds. of 0.1 sq. in. 11 kV cable were laid from Cherok Tokun to Lunas to rehabilitate the 11 kV system. New 11 kV switchgear in two substations were installed, and the construction of five substations was carried out in connection with this project. The District carried out the alterations to the L.V. mains, and dismantling of the H.V. overhead line.

From Prai, 5.93 miles of 33 kV 0.15 sq. in. Silmalec conductor line, using tubular-steel pole construction was completed to supply the new 33/11 kV 5,000 kVA Bukit Mertajam Main Intake Substation. A total of 5,633 yds. of 0.1 sq. in. 11 kV cable was laid to connect the Main Intake Substation to the existing 11 kV system. Additional 11 kV switchgears were installed at Aston Road, and King Cross Substations, and the New Cherok Tokun Substation constructed, to facilitate the connection.

A total of 5,179 yds. of 0.2 sq. in. 11 kV cable and 2,551 yds. Pilot cable were laid from Prai Power Station to Prai Village Substation: and 683 yds. of 0.2 sq. in. cable were laid from Prai Power Station to Caltex Substation. Reinforcement of the rest of the Butterworth 11 kV system was held up pending the approval of the cable routes by the appropriate authorities. However, work on adding extra H.V. switchgear in the respective substations was carried out.

At Parit Buntar, 3,750 yds. of 0.1 sq. in. 11 kV cable were laid and jointed in anticipation of connecting the Main-Intake Substation with the existing 11 kV system.

Taiping District — In anticipation of bulk supply, 7,732 yds. of 0.1 sq. in. 11 kV cable were laid, jointed, but not commissioned due to unavoidable delays in commissioning of the Main Intake Substation.

Supply was given to Jelutong by laying 2,618 yds. of 0.0225 sq. in. 11 kV cable from Changkat Jering Substation and the construction of a 25 kVA outdoor substation.

Ipoh District — The Main Intake Substation at Telok Anson was extended and its capacity was increased by the addition of a 2,000 kVA 22/11 kV transformer.

Rentis clearing for the 11 kV overhead line from Kg. Raja Intake to the Blue Valley Tea Estate in the Cameron Highlands was completed. Plans for the line construction are well in hand.

Southern Area

Seremban District — The 15.162 miles of 0.06 sq. in. 11 kV cable from Kuala Pilah to Bahau, and the 500 kVA substation at Bahau Power Station, were commissioned with the commissioning of the Kuala Pilah 66/11 kV Main Intake Substation.

4,355 yds. of 0.2 sq. in. 11 kV cable were laid from the Seremban 66/11 kV Main Intake Substation to Hose Road Substation for system reinforcement. An A.E.I. QA switchgear panel and two Statter "OD" Isolators were added to the Main Intake and Hose Road Substation, respectively.

In anticipation of bulk supply to Gemas, 23,750 yds. of 0.1 sq. in. 11 kV cable were laid towards Segamat via Batu Anam and Buloh Kasap to give the latter three towns a bulk supply. Cable-laying is nearing completion.

To give bulk supply to Rembau the laying of 7,000 yds. of 0.04 sq. in. 11 kV cable was completed from Senawang Estate towards Rembau. Further work is however, held up pending the completion of road works.

Supply to the Linggi Waterworks was given by laying 258 yds. of 0.06 sq. in. 11 kV cable and constructing a substation comprising 2 × 1,000 kVA 11/3.3 kV and 1 × 500 kVA 11/.4 kV transformers, and 11 kV 4 OCB panel.

Malacca District — Supply to Kemendore Estate, Jasin, was given with the commissioning of the cable, switching station and substation, which were completed last financial year.

In Muar about 15,000 yds. of various sizes of 11 kV cable were laid but not commissioned in preparation for the change-over to 11 kV operation. The transformers are to be changed during a planned period early in September, 1966. Two AEI QA OCB panels were added to the 11 kV switch panel in the Main Intake Substation.

Johore Bahru District — A 4.5 MVA 21/6.6 kV transformer was installed and commissioned at Central Substation, Johore Bahru. A 6.6 kV 4 OCB panel was erected by contract in the same substation. A 3 MVA 21/6.6 kV transformer was installed at Tampoi No. 2 Substation, Johore Bahru. Due to the late delivery of the 22 kV O.C.B. panel, it has not yet been commissioned.

Work on the 22 kV overhead line from F.E.T.C. to the Johore River Water-Work is well in hand. Rentis clearing is nearly completed and about one-third of the tubular-steel poles erected.

Work has also started on the laying of the second 0.2 sq. in. 22 kV cable from Sultan Ismail Power Station to Tampoi No. 2 Substation. 5,400 yards of cable have been laid and work is continuing.

Eastern Area

Of the four rural electrification projects involving 33 kV overhead mains extension, all, except one, i.e. supply to Kg. Perupok and Kg. Beris Kubor Besar, Kelantan, could not be proceeded with because of wayleave difficulties.

Wayleave difficulties have also delayed the start on the urgently required 33 kV 0.15 sq. in. overhead inter-connector between Lemal and Lundang, Kelantan.

Generation (Diesel Power Station).

At Fraser's Hill Power Station a 200 kVA 0.415/2.2 kV step-up transformer and L. V.panels were installed.

At Alor Star Power Station, two A.E.I. 11 kV BVP3 panels and a V.T. were installed.

Chapter Four. Operation: The Central Network

Generation

Thermal and Hydro-Electric Power Stations

The number of units generated during the year by the thermal and hydro-electric power stations connected to the Central Network totalled 1,029,355,533 which is an increase of 15% over the units generated for the preceding year. The maximum demand increased by 12.9% to 175.45 MW. The network load factor for the year was 67%. The thermal efficiency (on unit sent out basis) was 23.4%.

The Central Network capacity has increased by 10 MW with the completion of Malacca Power Station final extension.

Connaught Bridge Power Station (80 MW)

422,905,940 units were generated during the year which represents an increase of 10.7% over the previous year. The overall thermal efficiency was 24.97% as compared to 24.95% last year.

Fuel Oil

Fuel oil storage tank No. 1 at the Camp Road installation and the four storage tanks at the station were inspected and desludged.

Boilers

Routine overhaul of boilers continued throughout the year and Nos. 5, 6, 7 and 8 were duly surveyed by the Inspector of Machinery and their certificates of fitness renewed.

An oxygen analyser and recorder used to carry out checks on the flue gases of two boilers registered oxygen levels of 4% to 5%. The boiler controls were adjusted to increase the percentage of CO_2 measured at the economiser outlet from 12 to 12.75%. The oxygen content dropped to 3% — 4% without adverse effect on combustion. After 5 months steaming under the new condition, Boiler No. 2 was overhauled. It was observed that deposits on the gas side were light and dry throughout compared with the usual sticky heavy deposit on the upper generating bank.

One superheater element was cut out of Boiler No. 1 for investigation into the efficient cleaning of gas surfaces. Both steam cleaning and water washing were

found to give excellent results. The latter method has now been adopted in all the boilers, using a canvas drain through to drain the water safely away and prevent splashing on adjacement refractories.

Rehabilitation of the carriages and casings of the air pre-heaters is now carried out by station staff resulting in substantial saving in cost of spares.

Internal inspection of all four stacks showed that deterioration of the lining of No. 1 stack had advanced lower down though the linings of the others appeared to be in the same condition as the previous year.

Turbo-Alternators

No. 1 Turbo-Alternator gave cause for concern with the recurrence of excessive vibration at loads below 15 MW. On the recommendation of the manufacturers the turbine spindle was checked in a lathe and machined true to existing centres. Dynamic balancing of the machine was subsequently carried out by an engineer from the manufacturers with satisfactory results.

Electrical

The 66 kV oil circuit breakers of all four machines were overhauled and the oil in all four generator transformers filtered. Due to high acidity the oil in all four station transformers was renewed.

General

The graphite anode bed for protection of the fuel oil pipeline at Port Swettenham had deteriorated badly and was replaced with a bed of silicon iron anodes.

Renewal of the weather proofing layer of the flat roof of the station building was completed in January 1966.

Malacca Power Station (40 MW)

The total units generated during the year were 160,060,470 giving an annual increase of 10.51%. The overall thermal efficiency was 24.38% as compared with 24.30% in the previous year.

Fuel Oil

The fuel oil submarine pipeline which was damaged due to a tanker berthing accident was repaired.

Boilers

Leakage from the expanded tube ends in the Superheater Primary Headers was observed during the overhaul of boilers Nos. 1, 2 and 3. On boiler No. 3 thirty-two leaking tube ends were cut off, new lengths welded on and the ends expanded into the header. This has successfully stopped leakage at the present but the condition is being kept under observation.

No. 4 boiler was taken over by the Board on the 9th August 1966 on completion of reliability tests.

Circulating Water System

The modification work to the Circulating Water Culvert intakes has been postponed as it has been found that chlorination has effectively rid the culverts of mussels and the problem of siltation has been contained by regular culvert cleaning.

Turbo-Alternators

The last stage moving blades on Turbo-Alternators Nos. 1, 2 and 3 were inspected from the steam side of the condensers. The blades were found to be in a satisfactory condition save that some wastage was noted on the leading edges. This will be investigated further during forthcoming overhauls.

Ultrasonic testing was carried out on the condenser water-boxes of Sets Nos. 1 and 3 to determine the degree of graphitic corrosion. This will serve as a datum to measure the effectiveness of cathodic protection.

The Automatic Voltage Regulators of Sets Nos. 1, 2 and 3 were inspected by the manufacturer's engineer in conjunction with the commissioning of No. 4 set.

No. 4 turbine was taken over by the Board on the 12th August 1966 on completion of reliability tests.

General

The surge, town water and diesel engine water cooling tanks were sandblasted and repainted.

Sultan Ismail Power Station (30MW)

The station maintained continuous supply to Johore Bahru and the outlying districts except for one occasion when a shutdown occurred.

114,598,650 units were generated during the year which represents an increase of 15.75% over the units generated the previous year. The maximum demand increased by 3.3% to 19.3 M.W. and the overall thermal efficiency of 24.79% as compared to 24.74% last year.

Boilers

All the boiler induced draught fans have been fitted with hydraulic coupling drive. The boiler automatic combustion controls have been commissioned and are operating satisfactorily.

Rehabilitation of boiler casing and inculation has been completed by the contractor on all boilers. To arrest the egress of combustion gas, a sealing cover plate has been welded round the buckstay which is pressurised up to the junction between the economiser and superheater by means of hot air tapped off from the boiler wind boxes.

The pressure reducing valves supplying low pressure steam have been fitted with byepass valves.

Turbo-Alternators

The slipring carbon brushes on Turbo-Alternator No. 1 broke down due to poor contact between the carbon and pigtail caps causing the brushes to overheat. Tests carried out on these locally purchased carbon brushes showed the brush resistance to be much greater than the resistance of those brushes originally supplied by the manufacturers.

The low insulation resistance of the main exciter of Turbo-Alternator No. 3 was traced to contamination by oil from a leaking flanged joint. The exciter armature was cleaned and commutator risers varnished and dried out resulting in improved insulation resistance.

All the alternator stator temperature indicating equipment have been recalibrated.

Cathodic Protection

Investigations into the blackening of the platinum plated titanium anodes confirmed that this was not due to the loss of platinum but to the formation of oxide coating which was readily removed using concentrated hydrochloric acid. The anodes are however under constant inspection for evidence of erosion.

Work is in hand to provide cathodic protection for the Tanker Mooring dolphins and jetty piles.

General

The battery trickle charger broke down due to the failure of a resistor, the surge suppression capacitor and two silicon rectifiers. Replacement fuses of a special design have been installed on the rectifier output side while additional fuses have been installed on the A.C. line input to the rectifier.

The nylon tubes conveying air for operation of the demineralit water treatment plant which were prone to failure have been replaced with a superior grade of nylon tubing.

Graphitic corrosion in the oil, air, and exciter cooler water box covers has been successfully checked using sacrificial anodes. Investigations are being made into the use of anti-corrosive paints.

The oil purifier carbon steel bowls and hoods have been subjected to pitting and corrosion. Replacement with stainless steel bowls and hoods in one purifier has effectively stopped corrosion in this unit.

Diesel Power Stations

At the end of the year, the total diesel plant capacity including stand-by plant, was 53,110 kW, and 145,744,225 units were generated during the year.

All plant continued to operate in a satisfactory manner and there was no serious breakdown throughout the year.

Hydro-Electric Power Stations

Sultan Yussuf Power Station, Jor, Cameron Highlands (100 MW)

The station generated 373,703,175 units during the year which were about 13% above estimated average despite a period of shutdown of Telom Tunnel. Very high river flows recorded during November, December and January accounted for the high station output.

The Telom Tunnel was de-watered from 15th October to 1st November for removal of accumulated sand in the enlarged section of the tunnel and guniting of the tunnel at chainage 13,340 feet.

A comprehensive inspection and overhaul was carried out on Nos. 1, 3 and 4 machines subsequent to the failure of the turbine end bearing on No. 4 machine on 7th April 1966. This bearing showed "holidays" in the top and bottom bushes where the white metal had bulged off the cast steel shell. Extensive subsurface cracking extending to a depth of 4 inches was also observed on the crown of the top half cast steel shell in the region of the locating dowel.

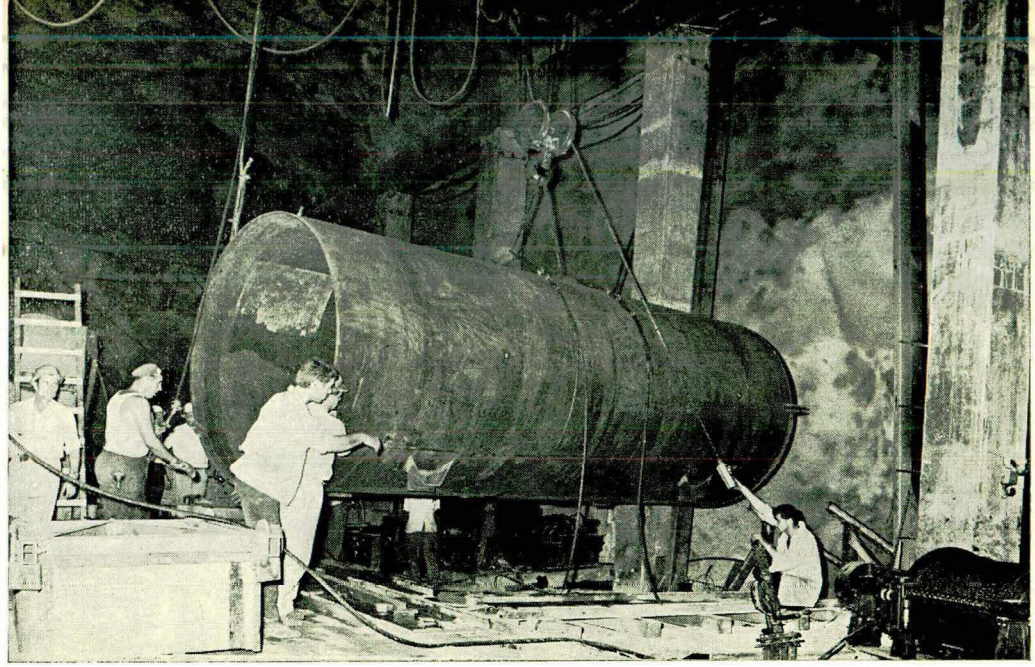
The overhaul on Nos. 1, 3 and 4 machines involved complete dismantling of bearings, cleaning and painting the internal surface of bearing pedestals and main lubricating oil tanks, cleaning of oil and air coolers and renewing the lubricating oil. The Pelton wheels were inspected and found in good condition. Machine bearing pedestals alignment and levels were checked. Opportunity was also taken to check and clean the alternator and exciter rotors and stator windings.

White metal "holidays" similar to those on No. 4 machine were also observed on the turbine end bearing of No. 1 alternator during the overhaul. The damaged top half bearing was remetalled in Singapore and refitted in the machine. Subsequent advice from the plant manufacturers indicated that these "holidays" are caused by hydrogen gas escaping from the cast steel shell.

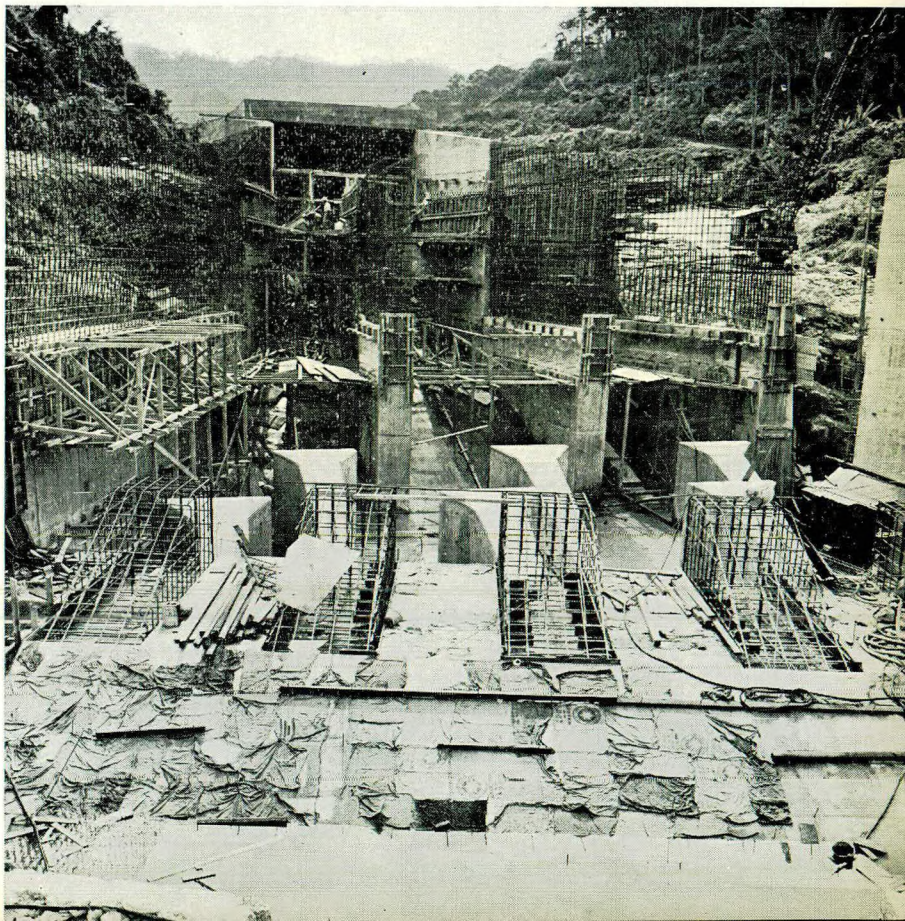
The intermittent knocking noise on No. 4 machine was traced to the slack fitting clipring sleeve which was not registering against the spigot. This defect was remedied by bolting two 55° sector plates to the sleeve and locating these plates on the shaft by means of grub screws.

Complete overhauls were carried out on the station drainage pumps and alternator cooling water pumps.

The rigorous implementation of routine monthly maintenance of all brush gear, electrical control relays, limit switches, contactors and AVR have resulted in trouble free operation.



Upper Valve Chamber—Tunnel Lining Section being transferred to slipway in pressure shaft No. 2.



Jor Dam stilling basin — view. Looking upstream overhill.

Habu Power Station, Cameron Highlands (5.5 MW)

This station generated a total of 39,186,100 units during the year and was shut down during the Telom Tunnel outage.

A complete inspection and overhaul was carried out on No. 1 machine during the station shut down. Excessive wear due to sand in the water was observed in the bronze wearing and sealing rings and bushes. Modifications have been proposed for sealing the diaphragm plate and fitting stainless steel sleeves to the shaft.

The ventilation openings in the alternator end shields of both machines were modified resulting in the lowering of the stator temperature by about 6°F.

Due to frequent choking of the bearing cooling water strainers and occasional blockage of the spiral casing cooling water tap-off pipe, the strainers were replaced with larger ones and the cooling water tap off position was changed to the centre line of the inlet pipe.

Robinson Falls Power Station, Cameron Highlands (0.9 MW)

This station generated 7,092,950 units during the year.

No. 1 and 2 machines were overhauled in June and July 1966 respectively. The bearings and spear tips were renewed, the worn spear rods were rebuilt and the machines realigned. Extensive wear of the Pelton wheels was observed and the No. 1 unit Pelton wheel was replaced. The rate of wear has increased considerably over the past 18 months.

Aluminium stop logs have been fabricated and are used at the Intake Chamber during spate conditions which previously have caused blockage of the Chamber with sand which could only be removed after the flood waters had receded.

Kampong Raja Power Station, Cameron Highlands (0.8 MW)

This station generated 6,399,570 units at a station load factor of 91.32%.

The machine was opened up for general inspection and overhaul after 12 months normal operation. There was no excessive wear of the runner and the wearing rings.

Kuala Terla Power Station, Cameron Highlands (0.5 MW)

This station generated 3,942,420 units at a station load factor of 90%.

An inspection and overhaul after 12 months operation was carried out on this machine as for the Kampong Raja machine with similar results.

Ulu Langat Power Station (2.288 MW)

The total units generated during the year was 11,059,908 which was an increase of about 34% over the previous year.

The Pelton Wheels at Lower and Upper Stations were inspected and the injector spears and seats were renewed. The spears and packing rings of the relief valves were also replaced. The alternator windings were cleaned, and varnished. Air filters have been fitted on both alternators to reduce the outage time for removal of insects from the rotors and windings. The 27" Auto Sluice Valve at Lower Station was overhauled.

The two 10 kVA 3.3/.4 kV Station Transformers at Upper Station were replaced by a single 20 kVA transformer. The wiring of the Lower Station lighting system has been renewed. All 33 kV O.C.B and potential transformers were dismantled, overhauled and recharged with fresh oil.

Transmission

Overhead Lines

Regular patrolling of the 132 kV and 66 kV transmission line rentis was carried out throughout the year. Each line was patrolled on the average of once every four weeks. Rentis clearing was carried out on contract, except through some of the large rubber estates where the estate owners maintained the rentises on behalf of the Board.

A large number of trees considered to be a danger to the Transmission Lines have been felled, and rentises widened in some places. Chemicals are being used to eradicate bamboo and other fast growing plants.

Soil erosion still remains a problem due to changing river courses. Minor erosions have been attended to by Transmission Staff but major ones have been repaired with the help of the D.I.D. At the moment, work is in hand for the diversion of a river, away from a tower leg, near Slim River Village.

A great many stay rods and plates were found to have been corroded on the 66 kV line between Muar and Malacca. Bitumin treated rods and plates were used to replace the corroded ones without interruption to the supply. These rods and plates were standing up well so far.

As in previous year, snakes climbing on to the lines caused several trippings on the 66 kV Rantau/Alor Gajah lines.

In May 1965, an unfortunate accident occured at Kuala Sawah, in Negeri Sembilan. A crane driver was killed when the boom of his crane came in contact with the 66 kV overhead line and caused a conductor to break.

A bulldozer working in front of the new Head Office building damaged the No. 2 oil-filled 66 kV cable of the Connaught Bridge Power Station/Bungsar interconnector. Transmission staff working 24 hours a day on shift for eighteen days managed to save the cable by continuous circulation and application of high vacuum to the cable oil. Only a short length of cable had to be replaced with

the aid of British Inculated Callenders Cables Company Ltd. who had to send a cable jointer by air from Hong Kong to make two straight-through joints.

In March 1966 a rubber tree broke off near the ground during a severe storm and was blown on to the No. 1 Rawang/Jor line near Slim River. The line was subsequently repaired by the Construction Department.

A line Maintenance Gang has now been formed for the repair and maintenance of the transmission lines and towers. They have been sent to Taiping to work in conjuction with the Resident Engineer of Preece, Cardew & Rider to familiarize themselves with the construction techniques used by the Japanese Contractors and to help in the checking of the newly erected towers and lines on the 132 kV Papan/Prai and Prai/Sg. Dua Lines.

Bulk supply was given to Kuala Pilah via a newly constructed 66 kV transmission line from Seremban Substation.

Substations

Routine maintenance and overhaul of all equipment in the 132 kV and 66 kV Substations were carried out throughout the year. Details are as follows: —

Equipment	No. of Routine Maintenance Operations	No. of Overhaul Operations
132 kV O.C.B.'s	21	1
66 „ „	55	29
33 „ „	15	54
11 „ „	5	24
132 kV Transformer	13	2 (Divertors only)
66 „ „	41	13 („ „)
33 „ „	12	2 („ „)
11 „ „	2	—
Potential Transformer		
132 kV	9	
66 „	11	
33 „	4	
Isolators 66 kV	—	21
Arc Suppression Coils		
66 kV	3	—
33 kV	3	—
Synchronous Condenser		
11 kV	4	—
Capacitor Bank 11 kV	14	—

Two 132 kV Capacitor Voltage Transformers at Rawang broke down during the year. Heavy sludging in the oil tanks was suspected to have been the root cause of the trouble. Investigations by the manufacturer are still in progress.

The Synchronous Condensers at Rawang and Bungsar are now being maintained by the Transmission Staff. The electronic circuitory of the Rawang machine, however, is still maintained by the Meters and Protection Department, as in the past.

Control

Grid Control

During the year there were 7 trippings on the 132 kV system. Four of these were transient faults due to lightning; 2 were caused by spurious signals being received on the carrier system, whilst the other one was due to suspected mal-operation of protective gear.

Of these trippings only the last one caused supply interruptions. The fault in itself was a very peculiar one. A rubber tree, well outside the rentis, on high ground, snapped and was blown on to the line during a severe gale. One of the Oil Circuit Breakers controlling this circuit failed to clear the fault and consequently total generation was lost at Cameron Highlands and part generation was lost at Connaught Bridge by the operation of back-up protection relays. To complicate matters, the Power Line Carrier (PLC) communications also failed at the same time due to switching surges. Consequently electricity supply to the whole of Negeri Sembilan and almost the whole of Selangor was interruppted for about an hour on the afternoon of the 17th March, 1966. Only Kuala Lumpur (South) and Klang District which are fed direct from the Connaught Bridge Busbars had their supplies uninterrupted. Apart from this one shut-down, there were no prolonged supply interruptions elsewhere at any other times.

The auto-reclose feature on the 132 kV line Oil Circuit Breakers which was removed on 23.11.64 was re-commissioned on 18.4.66 after modifications were carried out. It is gratifying to note that since then it has operated satisfactorily.

On the 66 kV system there were 68 trippings and 144 operations of the arc suppression coil giving a coil efficiency of 52.7%.

The rate of tripping per hundred route miles of 66 kV lines was 25 and that for the 132 kV lines was 2.

Regional Control (Central Area)

On the Kuala Lumpur and District 33 kV overhead system there were a total of 442 Arc Suppression Coil operations where the fault current exceeded 20% of the coil setting and of these 366 were successfully suppressed. This gave a total of 76 outages representing a coil efficiency of 82.6%. The total number of 33 kV Oil Circuit Breakers trippings due to permanent and transient faults was 426. Of this figure 69 were due to permanent faults which required the calling out of breakdown gangs.

Communications

The VHF and Power Line Carrier communications systems operated satisfactorily throughout the year.

Chapter Five. Area Reports

Central Area

General

The continued prosperity of the capital of Malaysia was reflected in the amount of work carried out on the Central Area distribution system and the increases in sales over the previous year to domestic, commercial and industrial and mining consumers, were 11.44%, 18.4% and 15.2% respectively. The total growth in sales in Central Area was 15.6% compared to a figure of 14.9% for the preceeding year. Sales to the tin industry continued to show growth but it was noted that the increase was confined to gravel pump mines whilst sales to tin dredges remained approximately unchanged from the previous year.

The newly installed 33kV underground oil filled cable system proved its worth in distributing power throughout the capital, some substations being almost loaded to capacity. This eventuality was foreseen and additional stepdown substations around the outskirts of Kuala Lumpur scheduled to be commissioned shortly will enable a change in load distribution to take place. Unfortunately the new oil filled cable was not entirely trouble free throughout the year. A disconcerting fall in oil pressure was noticed first in one section and then in another and towards the end of the year a considerable volume of oil had to be injected into the cable in order to prevent the pressure from dropping to a dangerously low level. By constant attention the cable was fortunately kept in commission throughout the whole year. Investigations are in progress to locate the oil leaks.

The Sungei Besi Road 33/11kV stepdown substation was completed during the year by the installation of the second 15 MVA transformer. Further similar main bulk substations are planned in other parts of Kuala Lumpur and Petaling Jaya.

The Consumers Department connected a total of 3,850 new consumers within the town of Kuala Lumpur, which number shows a growth of 6.85% over the previous year and represents a slightly faster rate of increase. A feature noticeable in recent years is the size of some private consumers installations. It is usually adequate for a domestic installation to be supplied by a single phase supply but during the year 23 domestic premises had to be converted from a single to a three phase supply whilst 41 new 3 phase domestic consumers were connected up.

A welcome trend is for large buildings to be equipped with bulk air-conditioning rather than a multiplicity of small window units. Apart from enhancing the appearance of the building the bulk method of air-conditioning is far more efficient and is preferable from the electrical distribution engineer's point of view. It is now fairly rare for a building of any size to be air-conditioned in small sections.

Rescuing a 33 kV cable from the ravages of the Sungei Kroh, Kuala Lumpur.

The Consumers Department operates an active hiring section but again this year a slight reduction in its operations was noticeable. Consumers increasingly prefer to purchase their own equipment and small decreases in the numbers of all types of appliances on hire resulted.

Kuala Lumpur District (North)

In this district during the year twelve substations were commissioned and a further twelve had alterations made to their transformer capacity. A net increase of 8,820kVA was commissioned and over 5 miles of 11kV underground cables were laid. The low voltage overhead mains were increased by nearly 5 miles, the low voltage underground mains by 6 miles and 1960 applications for supply were received.

A 33kV oil filled underground cable from Segambut substation to Rodger Street substation, carrying a sizeable proportion of the total Kuala Lumpur demand passes through District (North). It runs for several hundred yards along the bank of the Sungei Kroh and owing to river deviation work by landowners, the route became endangered in no less than five places. It was necessary for the N.E.B. Hydro Engineering Department to carry out urgent repairs to the river bank and in one place 250 yards of the cable including a straight through joint were recited higher up the bank. This delicate operation was completely successful and furthermore the repaired banks have shown no further signs of erosion.

A considerable amount of deviation work of both overhead and underground mains was done at the General Hospital site where work was started by Government on the construction of the new General Hospital. Similar work was also undertaken to allow the construction by P.W.D. of the main Kuala Lumpur through road to proceed. A considerable amount of mains reinforcement work was also necessary in various parts of the district to maintain voltage to the required level.

Kuala Lumpur District (South)

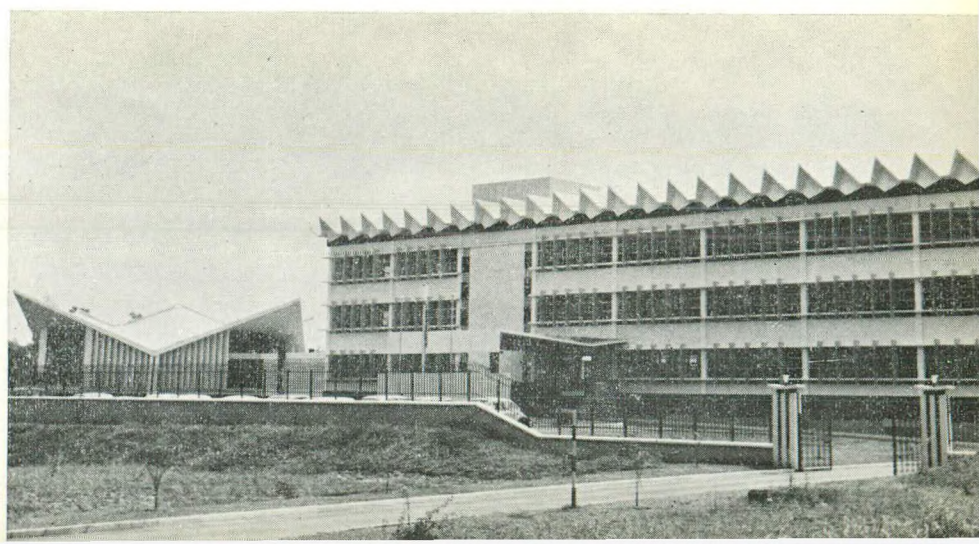
During the year under review, the District continued to expand although not quite at the same pace as the last two or three years. Both industrial and housing development had its fair share of expansion although it was noted that the rate of occupation of the completed dwelling units was more leisurely than before.

During the early part of the financial year the second 15 MVA 33/11kV transformer at Sg. Besi Road Substation was commissioned and this was followed by the gradual reinforcement of the 11kV system in the Sg. Besi Road/Chan Sow Lin Road industrial area. Although the last phase of this system improvement will not be completed till early next financial year, the completed work already provides better security of supply for this particular area. Furthermore, the 11kV system connecting Bungsar Substation, Rodger Street Substation, Sg. Besi Road Substation and Pudu Road Substation was also improved considerably thus affording better security and flexibility.

In conjunction with the construction of the overhead 132kV line from Segambut to Pudu Ulu, two 33/0.4 kV outdoor substations had to be converted to 11/0.4kV operation so that the 33kV line could make way for the 132kV line. These substations were Kg. Pandan New Village Substation and Ampang 4th Mile Substation and opportunity was also taken to increase the capacity of the latter from 200kVA to 300kVA.

Throughout the year, a total of 13 new substations were commissioned having a total transformer capacity of 4450kVA while 13 existing substations had their capacities increased by a total of 3400kVA. This latter figure could have been greater had the delivery of transformers from overseas been better.

Within this same period, more than 12,700 yards of 11kV cable and about 7,000 yards of L.T. cable were laid. Overhead L.V. mains erected amounted to about 10,400 yards, nearly 1300 new services were erected, 306 services had their capacities increased while 506 perished services were renewed.



Supply given to Ministry of External Affairs, Kuala Lumpur.

Petaling Jaya

Although considerable development continued to take place in Petaling Jaya during the year, it is not expected that the pace will be maintained next year, particularly with reference to industrial development, as industrial land is getting short.

In all, twelve new substations were commissioned having a total transformer capacity of 4750kVA while six existing substations had their capacities increased making available an extra 1500kVA. About 6,000 yards of 11kV cable and 5,600 yards of L.V. cable were laid while approximately 10,500 yards of overhead L.V. mains were erected.

During the year under review, the number of consumers rose from 10,120 to 12,170 while the units sold increased by 13.990 million giving a revenue increase of $1.135 million.

H. V. Distribution

This section maintains the 33kV distribution system surrounding the outskirts of Kuala Lumpur and extends as far as Tanjong Malim in the north and Kuala Langat in the south. The electrical tin mining load in Selangor is almost entirely served from this system and an increase of 33% in the sales to gravel pump mines was noticed over the figure for previous year. The sales to dredges, however, remained approximately the same but two new electrically driven dredges were about to go into operation at the end of the year.

To supply the tin industry the Board must be prepared to continually deviate overhead lines, dismantle and re-erect substations to follow the continually shifting pattern of mining operations. In the course of the year 17 substations were erected and 18 were dismantled and in several others, transformer capacities were changed.

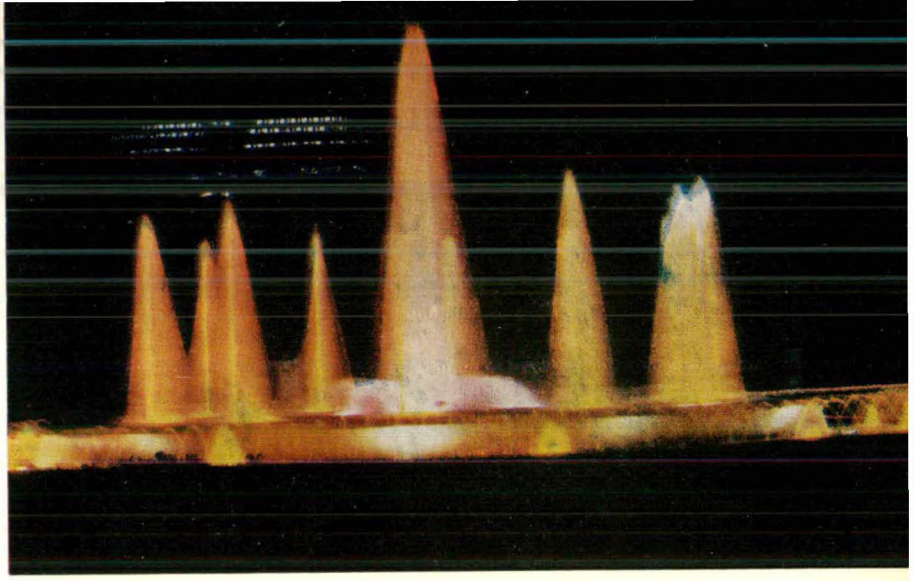
Maintenance of the 33kV system was continued in the course of which 65 oil circuit breakers and 19 isolating switches were overhauled and in 42 substations the 33kV fuses were converted to a type having a higher rupturing capacity.

The occurence of thefts of copper wire continued during the year, the thieves going to the extent of breaking into 33kV outdoor substations and digging up the few feet of copper wire used for the earth connection. To forestal these activities 85 substations had copper earth wires replaced by galvanised steel wires.

In the course of the year 9.7 miles of new 33kV line in the Kuala Langat area was handed over to Central Area by the Construction Department. Approximately 14 miles of existing overhead line were overhauled by the replacement of damaged insulators and corroded earth conductors and the installation, where necessary, of an improved earth wire supporting bracket designed to give greater protection from lightning strikes.

Street Lighting

During the year, considerable work was undertaken to improve the street lighting in Kuala Lumpur and Petaling Jaya and our men were also kept busy



Supply given to Merdeka Roundabout Kuala Lumpur.

dealing with street lighting columns and "Keep Left" signs damaged by motorists. The Board acts on behalf of the Municipality in matters of street lighting within the Municipal limits but is not in control of street lighting design and policy. The recent expansion of the suburbs of Kuala Lumpur however, has created an urgent demand for street lighting in areas not controlled by the Municipality, and, in many instances, not controlled by any other public authority. The Board has consequently been approached by many housing developers, consumers associations and private individuals to instal public lighting. The Board is currently reviewing its street lighting policy to decide whether it should enter into agreements with private bodies for public lighting, the lack of a public authority to control these areas making this development necessary.

In all, approximately 11, 600 yards of street lighting cables were laid, 1042 new lanterns were installed and 375 were dismantled in Kuala Lumpur and Petaling Jaya. Routine maintenance was carried out throughout the area and more than 12,000 lamp replacements were made.

Breakdown Service

The Breakdown Section of the Board is the one which perhaps is in closest contact with the public of all the Board departments. A number of favourable comments and letters of appreciation on the work performed by these men were received during the year from civic minded consumers who felt that prompt and courteous service deserved congratulation.

The efficiency of this section in Kuala Lumpur is greatly increased by its employment of V.H.F. radio communication. During the year 19,488 service calls were attended, which figure represents a 8.5% increase over those attended in the previous year.

Klang District

The district of Klang including Port Swettenham and extending as far as Batu Tiga in the east, Banting in the south and Kapar in the north was provided with a total of nine new substations during the year under review. Over eleven

miles of 11kV cables were laid and low voltage overhead mains were increased by about two miles. There was an increase of over 10% in the number of consumers connected and an increase of nearly 40% in sales. The enormous growth in units sold was due mainly to the start of large scale production at the Chemical Company of Malaysia which also resulted in the maximum demand being increased by over 2 MW to 9.5 MW. The establishment of a new industrial area at Batu Tiga will ensure that rapid growth will continue in the Klang district. At the end of the year the first factory in this new estate had been given power supply. Several other applications are already being dealt with and the Board's long term planning for the area envisages industrial and housing development on a scale approaching that of Petaling Jaya.

Kuala Selangor

Supplies were also given to two rubber estates, a complex of low cost housing flats at Pandamaran and a large flour mill at Port Swettenham area. While doing the latter project, the opportunity was taken of closing the high voltage distribution ring main in the old port area, so that a greater security of supply could be achieved for all consumers at the port.

A second 11 kV submarine cable was laid under the river in order to safeguard supply to the town in the event of damage to the one existing cable.

An increase in the number of consumers of 12% was recorded during the year and sales of electricity showed an increase of 45%. The large increase in sales compared to the increase in consumers is accounted for by the fact that a few industrial consumers are establishing themselves in the district.

Outstations District covers electricity services to those towns and villages in Selangor which are not served by the Kuala Lumpur or Klang Organisations.

In Kajang a 46% increase in electricity sales was achieved due mainly to the full operation of the new Radio Malaysia overseas transmitting station. The growth of load in this area necessitated the installation of a new 7.5 MVA 33/11kV step-down transformer. A second similar unit is planned for the coming year so that transformer capacity should be adequate to meet the Kajang demand for many years to come. It is at present in the region of 3MVA. Two enquiries from large industrial consumers have been received. The numbers of consumers increased by about 4% over the previous year, 15 street lights were installed and 2½ miles of low voltage overhead mains were erected.

In Tanjong Malim and Kuala Kubu districts both sales and numbers of consumers increased by 17%, 23 new street lights were installed during the year and from plans received from the Town Planning Authority it would appear that steady development in the District will continue.

General

A steady expansion was maintained during the year under review. Sales for the Area increased by 12.78%. Butterworth District again took the lead with an increase in sales of 20.77%. This year's expansion is marked by the large number of rural projects undertaken.

Ipoh District

The units sold in Ipoh rose from 51,262,809 to 56,692,003 representing an increase of 10.59% as against 6.62% for the preceding year. The number of consumers rose from 23,375 to 24,326, an increase of 4.07% compared with 5.53% for the preceding year. The maximum demand for Ipoh Town rose from 10,690 kW to 11,815 kW, an increase of 1,125 kW.

The Ipoh Town supply was interrupted for a total duration of 28 minutes on 11 occasions due to failures of bulk supply from the P.R.H.E.P. Co. Similarly, in Batu Gajah there were two interruptions of supply, of which one affected the Batu Gajah Town area for a period of 3 hours 20 minutes. During the year 2 new substations were erected and commissioned and, in addition, the transformer capacity of one substation was increased resulting in an overall increase of 600kVA in capacity.

Over 2.21 miles of L.V. overhead mains and 0.13 miles of 11 kV overhead mains were erected and approximately 2.15 miles of L.V. underground cables and 1.31 miles of 11 kV underground cables were laid during the year.

At Sitiawan the units sold rose from 2,208,291 to 2,382,035, an increase of 7.87%. The number of consumers rose from 3,197 to 3,384, an increase of 5.85% compared with 2.76% for the preceding year. The power station operated efficiently throughout the year with no major breakdown and no interruption of supply. The maximum demand rose from 717 kW to 796 kW.

Units sold in Cameron Highlands rose from 3,317,412 to 3,396,776, an increase of 2.69%, after a decrease of 5.9% last year. The number of consumers rose from 1,279 to 1,356, an increase of 6.02% compared with 7.93% for the preceding year.

At Teluk Anson (including Langkap, Sg. Tukang Sidin and Hutan Melintang) the units sold for the year totalled 6,524,802 compared with 5,956,731 for last year. This represents an increase of 11.21%. The number of consumers rose from 6,228 to 6,619, an increase of 6.37%. The station's maximum demand recorded was 1,751 kW.

There were altogether 36 interruptions of supply affecting the station, the longest being 6½ hours pre-arranged shutdown by P.R.H.E.P. Co. on 10th of March, 1966.

One new substation was erected during the year with a capacity of 50 kVA. Three substations had their capacities increased by a total of 850 kVA.

Butterworth District

Twelve new substations with a total capacity of 7,100 kVA were commissioned. Eight other substations had their capacities increased but one substation was dismantled resulting in an increase of 850 kVA.

On 22nd June the 33/11 kV 5 MVA step-down substation at Bukit Mertajam was commissioned and put on commercial load, feeding into the Bukit Mertajam and Kulim H.V. network. Supplies from Prai Village Substation via Bukit Tengah Tower was switched off.

The conversion of Sungei Patani 3.3 kV distribution system to 11 kV operation is in its final stages with only Jalan Pegawai Substation to be converted, Kampong Bahru Substation and Pekan Lama Substation to be rebuilt.

All 11 kV substation work was carried out by the District Staff which also arranged and supervised the laying of about 9 miles of 11 kV underground cable in connection with these projects.

Almost 39 miles of L.V. overhead mains were constructed, about 25 miles being in the rural areas and the remainder for new housing estates. More than 5,100 yards of L.V. mains were rehabilitated. 3,725 new services were installed and 1,215 services were renewed.

The combined maximum demand reached 13,178 kW in August with Sungei Patani converted to bulk supply. The units sold for the year increased by 20.77% from 48,256,228 to 58,278,880. The number of consumers increased by 8.01% from 35,417 to 38,254.

There were 25 reported outages due to faults on the Province Wellesley H.V. system. The outages were due to varying causes such as trees (4), overhead faults (3), cable faults (3), vehicles (2), vermin (1) and 12 other outages due to lightning and earth faults or unknown causes, all of short duration. There were still considerable number of outages on the Penaga and Parit Buntar H.V. feeders due to shedding at times occasioned by trouble with free piston gasifyers at Butterworth Power Station.

The respective District Councils maintained keen interest in street lighting; 54 new mercury vapour fittings and 32 filament fittings were installed, and 4 filament fittings were converted to mercury vapour fittings.

Enquiries continue to be received from prospective firms proposing to erect factories in Mak Mandin Industrial Estate and Prai. In most cases terms and conditions of supply, tariff rates etc. were made available to these firms. Steady progress continues in the work of connecting industrial consumers such as the Malaysia Weaving Factory, Southern Iron & Steel Works, Blood Protection Co., Peninsular Coir Co. and others. It is expected, however, that in the next financial year there will be substantial increases in industrial units sold to consumers such as Malaya Flour Mills, Butterworth Ice Works, Din Wai Electric Co. and Pacific Garments etc.

A very substantial increase in load is expected from the Malayawata Steel Mills which is in its final stages of construction. The new Deep Water Wharf is also under construction and will require supplies by the end of the next financial

year. The connection of supplies to Ulu Tiram Estate and Harvard Estate, Sungei Patani will also contribute to a considerable increase in load.

Taiping District

The growth in Taiping is gradual. Units sold increased by 5.39% from 22,579,657 to 23,796,963. The number of consumers increased by 9.53% from 11,059 to 12,113. The maximum demand rose from 5,180 kW to 5,300 kW.

During the year under review the Maximum Demand crept up close to the generating capacity of the power station. As a result, there was no spare generating set. Maintenance of generating sets had to be carried out during off-peak periods, quite often after mid-night. In February, 1966 the No. 4 set failed and load restriction had to be applied until a new English Electric set was installed in April, 1966. Despite all the difficulties the power station operated efficiently.

One substation only with a capacity of 25 kVA was constructed and commissioned under Rural Electrification Scheme during the year. The scheme involved the laying of a total of 2,680 yds. of 11 kV underground cable and the construction of a total of 5,178 yds. of L.V. overhead mains. Preparatory work on the introduction of bulk supply to Taiping was commenced. A total of 7,479 yds. of .1 sq. inch 3 core 11 kV underground cable was laid. Work was still continuing and it is expected to be ready according to schedule.

At Klian Intan the units sold rose by 8.78% from 68,708 to 74,651. The number of consumers rose by 1.32% from 227 to 230. Bulk supply from Messrs. Rahman Hydraulic Tin Ltd. was satisfactorily maintained throughout the year.

Alor Star District

In Alor Star the number of units generated was 18,958,671 and the units sold was 16,090,104, representing an increase of 17.41% and 15.69% respectively. The maximum demand recorded was 4,266 kW representing an increase of 18.14% over last year. The number of consumers increased by 567 to 14,367.

New 814 kV English Electric set recently commissioned at Alor Star Power Station.

To meet the rising demand a 1,000 kW English Electric set was transferred from Butterworth Power Station and commissioned in December, 1965, and another 814 kW new English Electric Set was installed and commissioned in May, 1966. Problems were still experienced with the quality of fuel oil received from the Middle East but this was considerably overcome by the deep stelliting of exhaust valves, the overhaul of fuel injection equipment and the constant check on temperatures of fuel oil and exhaust. A considerable amount of work was carried out on the Bellic and Morcom sets which are now in a satisfactory condition. No serious breakdown was experienced during the year under review.

With the expectation of receipt of Bulk Supply in 1967, the first phase of the reorganisation of the 11 kV system in Alor Star was carried out, involving the laying of 3,132 yds. of .1 sq. in. 11 kV underground cable from the Power Station to Sungei Korok No, 1 Substation including improvements to 3 other substations. Six new substations were commissioned and the capacity of 1 substation increased. Construction of 5 other substations was in progress and, when these are completed, a further increase of 1,450 kVA would be expected.

At the request of the Town Council, 83-250 W mercury vapour lamps have been installed along Jalan Langgar and along Jalan Sungei Korok, replacing the existing outmoded street lighting. A further request for replacement of street lighting has been received and will be carried out during the forthcoming year. With the installation of these 250W mercury vapour street lighting lamps, the illumination of Alor Star town has been improved tremendously.

At Arau/Kangar the units generated increased from 2,400,136 to 2,808,585 while the units sold increased from 2,060,695 to 2,330,701. The number of consumers increased from 2,036 to 2,119. The Power Station step-up transformer was uprated from 500 kVA to 702 kVA. An additional generating set of 220 kW was commissioned in September, 1965. Work on the foundation of an additional 250 kW generating set transferred from Sungei Patani Power Station is scheduled to begin soon. The Power Station operated satisfactorily throughout the year.

Southern Area

General

The rate of growth of electricity supplies in Southern Area has been well maintained in this financial year, the number of consumers having increased by 9.17% to 91,991. The total units sold has also increased by 13.44% to 252.6 million units, there being an all round increase of units sold to all types of consumers with the exception of mining consumers, where there was a drop in sales.

The number of new factories and housing estates being erected in Johore Bahru is still on the increase. In Malacca District the number of domestic consumers has increased tremendously mainly due to the extension of supplies to Housing Estates and Rural Electrification Schemes.

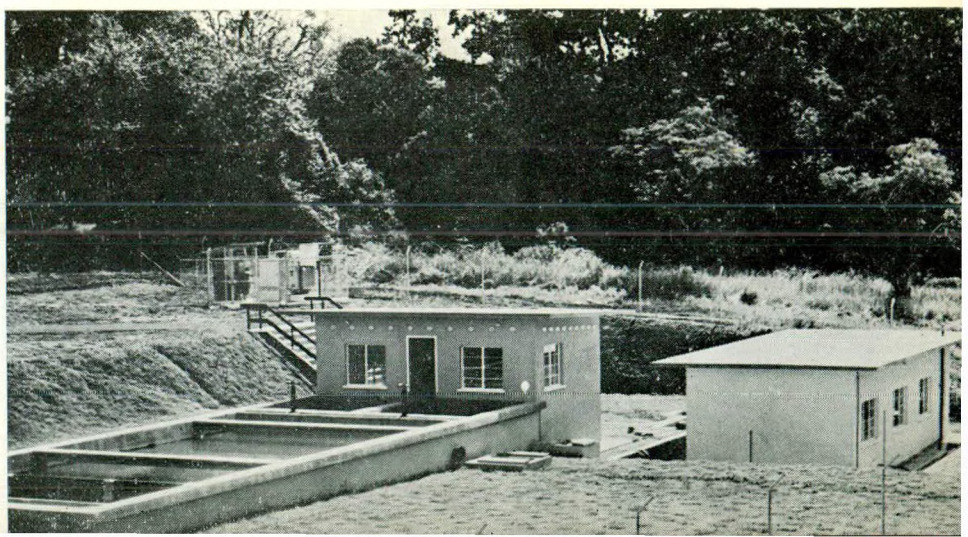
The most important event this year was the establishment of bulk supplies at Kuala Pilah and Bahau in September, 1965, resulting in the closing down of these two Diesel Stations. The work on the erection of the 66 kV Transmission Line from Batu Pahat to Kluang is almost completed and it is hoped that bulk supply will be established early in the next financial year. Other stations which are scheduled to be connected to the Central Network next year are Segamat, Gemas, Rembau and Kota Tinggi. Work on these projects is already in an advanced stage.

Municipal Flats showing Sub-station in foreground—Malacca.

Malacca District

There has been a steady progress in the extension and development of electricity supplies in this district, especially so in the supply to new housing estates and rural areas. Projects in the rural areas cover both Federal and State Schemes.

Fifteen substations were erected during the year with a total capacity of 2,685 kVA. One 66/11 kV 7.5 MVA English Electric transformer was installed at Bona Vista Substation as an alternative and standby supply to the existing 2 × 0.2 sq. in. 11 kV cable from Malacca Power Station, thus allowing flexibility



Water pumping station — Ayer Keroh, Malacca. Out-door type Substation in background.

in feeding Malacca Town in case of a cable breakdown. There has been a considerable increase in the number of consumers mainly due to Rural Electrification Schemes, the actual increase being 2,762 and the total now stands at 38,535. The total units sold has increased by 11.13% from 66.144 to 73.541 million units. There has been an appreciable increase in units sold to commercial and industrial consumers, the increase being 14.97% and 13.2% respectively. There are 13 New Villages in Malacca District, as compared to 14 last year, and three Rural Stations. The decrease is due to the take-over of Ayer Keroh New Village with the establishment of bulk supply to this village in December 1965.

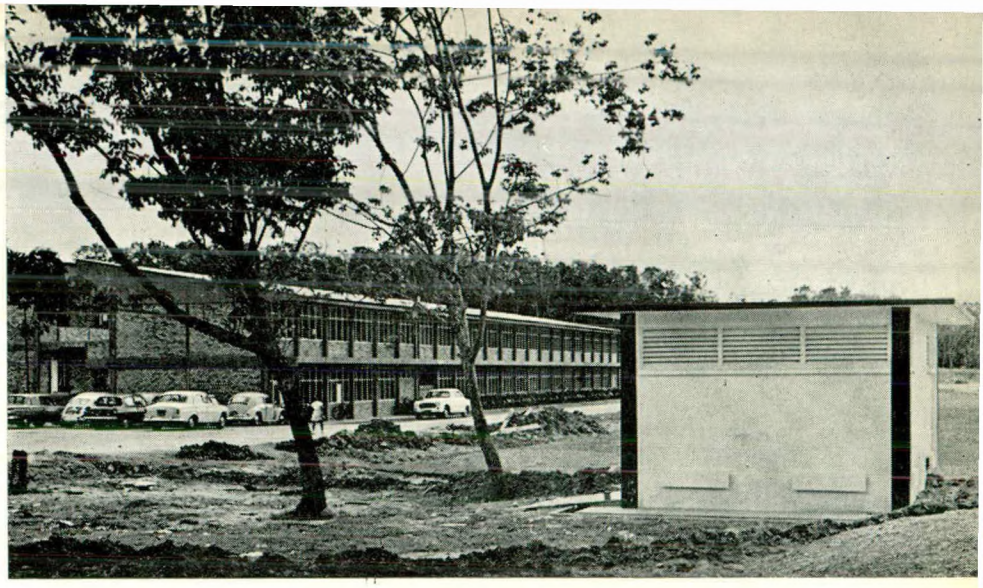
In Malacca itself, ten new substations with a total capacity of 1,825 kVA were erected. One substation had its capacity increased from 100 to 200 kVA and one decreased from 750 to 500 kVA. The total substation capacity installed is now 18,607 kVA. The number of consumers had increased by 10.55% to 19,200, and the sales of electricity correspondingly increased by 10.14% to 51,723,025 units. The maximum demand rose from 10,487 kW to 11,599 kW. Approximately 12.44 miles of 11 kV Underground Cable were laid bringing the total length laid to 123.08 miles. Seven rural schemes were carried out giving supply to approximately 293 consumers.

At Muar the number of consumers increased from 10,401 to 10,970, an increase of 5.47% over the previous year. The sales of electricity increased correspondingly by 11.6% to 8.237 million units. The maximum demand also increased from 2,400 kW to 2,900 kW. One new substation was commissioned during the year, bringing the total substation capacity installed to 5,590 kVA for 32 substations. Two 30 kVA Tail-End Boosters were installed temporarily at Jalan Sungei Abong to improve the poor voltage conditions there prior to the installation of a substation. About 1.63 miles of H.V. Underground Cable and 1.97 miles of L.V. Overhead Mains were installed during the year. The length of H.V. Underground Cable mentioned does not include those cables laid by the Construction Department for the conversion of the H.V. system from 6.6 kV to 11 kV, the work on which was almost completed before the end of the financial year. It is anticipated that the changeover would be completed in the early part of the next financial year.

The total generating capacity at Segamat remained at 1,090 kW. During the year, one existing 25 kVA 11/0.4 transformer at Pekan Jabi substation was replaced by a 50 kVA transformer, thus bringing the total substation capacity installed to 1,400 kVA for six substations. About 1.85 miles of L.V. Overhead Mains were erected, bringing the total length to 28.65 miles. The number of consumers increased to 2,686, an increase of 109 over the previous year. The total units sold during the year only showed a small increase of 2.55%. The maximum demand attained during the year was 760 kW.

The work on the establishment of Bulk Supply to both Segamat and Gemas was in progress and the installation of the 66/11 kV Main Intake Substation at Gemas was almost completed. There was no other major work being carried out in Gemas during the year. However, the operation of the generating sets was satisfactory and that the total sales of electricity increased by 6.02% with a corresponding increase in the number of consumers from 1,152 to 1,171. The maximum demand recorded was 348 kW.

At Tangkak/Jasin one new substation with a capacity of 200 kVA was erected, bringing the total substation capacity installed to 925 kVA for five sub-



Alor Gajah School Substation.

stations. About 3.5 miles of 11 kV Underground Cable were laid, making a total of 13.31 miles. The number of consumers increased slightly by 5.59% but the increase in the sales of electricity was high being 22.53%. The maximum demand rose from 428 kW to 515 kW.

In Tampin/Alor Gajah Station three new substations with a capacity of 500 kVA were erected and one substation had its capacity increased from 500 kVA to 750 kVA. The total number of substations now stands at 22 with a total substation capacity of 3,750 kVA. The total units sold during the year increased appreciably from 6.613 to 7.968 million units, an increase of 20.48%, while the number of consumers increased by 128 to 2,576. The maximum demand recorded was 1,780 kW, an increase of 180 kW over the previous year.

Seremban District

The progress in Seremban District has been reasonably steady and the total number of consumers increased by 10.6%. The total units sold increased by 9.2% bringing the present total to 49.23 million units.

During the year 29.07 miles of 11 kV Underground Cable were laid and 12.87 miles of L.V. Overhead Mains were erected. The total number of substations in the District now stands at 153 with a total capacity of 33,037 kVA.

At Seremban, the number of consumers increased from 13,320 to 14,202, an increase of 6.6% and the sales of electricity increased from 28.645 to 30.272 million units or 5.7%. The maximum demand has correspondingly increased from 6.4 MW to 7.16 MW. Six new substations were erected during the year bringing the present total to 69, four of these substations being erected for supplying Housing Estates.

At Port Dickson, there was an increase of 10.9% in the number of consumers and the present total now stands at 3,216. The sales of electricity also increased by 14.8% to 15.555 million units. Five new substations were erected bringing the present total to 61. It may be noted that supply has been provided to Linggi Waterworks where 2 × 1,000 kVA and 1 × 500 kVA transformers have been installed. The Waterworks is not in full operation yet, but it is expected to boost up the maximum demand at Rantau Substation from 3.6 M.W. to 4.04 M.W.

With the establishment of bulk supply at Kuala Pilah and Bahau at the beginning of September 1965, it was decided to amalgamate these two stations into one, since it was not practicable to separate the units sold at these two stations. The total number of substations now stands at 15. The number of consumers has increased by 9.07% to 2,910, and the corresponding increase in sales of electricity is 409,932 units, an increase of 13.3% bringing the total units sold to 2,643,298.

The number of consumers at Kuala Klawang had almost doubled during the year under review. This was due to the take-over of the electricity supply at Titi from the Public Licensee, supply being given from Kuala Klawang by H.V. Cable extension. The number of consumers increased from 617 to 1,224, an increase of 98.4%. Another substation was established at Jelebu Estate New Village, which was on the route of the cable to Titi. The generating capacity at Kuala Klawang was increased by 156 kW partly to cater for the supply of electricity to these two villages.

The rate of development at Rembau has been well maintained, the number of consumers having increased by 14.8% bringing the present total to 456. The sales of electricity have also increased by 17.1%.

Batu Pahat District

Batu Pahat District continues to progress as in previous years and supply from the Central Network has been well maintained. The standby generating sets have come in useful especially when maintenance of the 66 kV Transmission Line and of the Main Intake Substation has to be carried out. The total number of consumers increased by 5.19% to 15,108. Correspondingly, the number of units sold increased by 3.513 to 30.424 million units or 13.05%. The total number of substations is now 48 with a total capacity of 17,715 kVA.

At Batu Pahat, the number of consumers increased by 5.66% to 6,184 and the annual units sold increased by 17.87% to 9,307,016. The maximum demand recorded was 2,250 kW, which was an increase of 250 kW over the previous year. The total length of 11 kV cable laid was 3.28 miles, of which 3,000 yards were utilised in giving supply to Tawakal Rubber Factory, where a 300 kVA Outdoor substation was erected. A Rural Electrification project for giving supply to Parit Bilal and Tongkang Pechah involving two pole mounted substations is under construction and should be completed by the end of 1966.

In Kluang, the sale of electricity increased by 13.1% to 18.641 million units. The number of consumers increased by 3.96% to 5,335. The maximum demand was 3,920 kW which did not include 150 kW generated by Rivertex Factory during the peak period. This was due to the restriction of load during the peak period necessitated by a shortage of generating capacity at Kluang Power Station. Three substations with a total transformer capacity of 1,200 kVA were commissioned during the year; one 300 kVA transformer was dismantled and one substation had its capacity increased by 200 kVA. The total substation capacity is now 10,865 kVA. The length of L.V. Overhead Mains was increased by 2.37 miles to 59.36 miles and there was a slight increase in the length of H.V. Underground Cable by 1.01 miles to 30.3 miles. The number of street lights was increased by the installation of 58 lamps, making a total of 1,208 lamps installed.

The number of consumers at Mersing increased by 5.1% to 1,427 and the annual sales has correspondingly increased by 7.6% to 876,277. The maximum demand recorded was 312 kW. There was an increase of 1.08 miles of L.V. Overhead Mains which was mainly for the extension of supply under the First Malaysia Plan Rural Electrification Scheme to Pengkalan Batu. The operation of the generating sets had been satisfactory, there being no major breakdowns.

At Pontian, the number of consumers increased by 7.03% to 2,162. However, the annual sales of electricity decreased by 6.68% to 1,600,486, being due to the curtailment of production at Kayar Factory which was our single largest consumer at Pontian. There was a slight increase in the length of L.V. Overhead Mains erected and in the number of new street lights installed.

Johore Bahru District

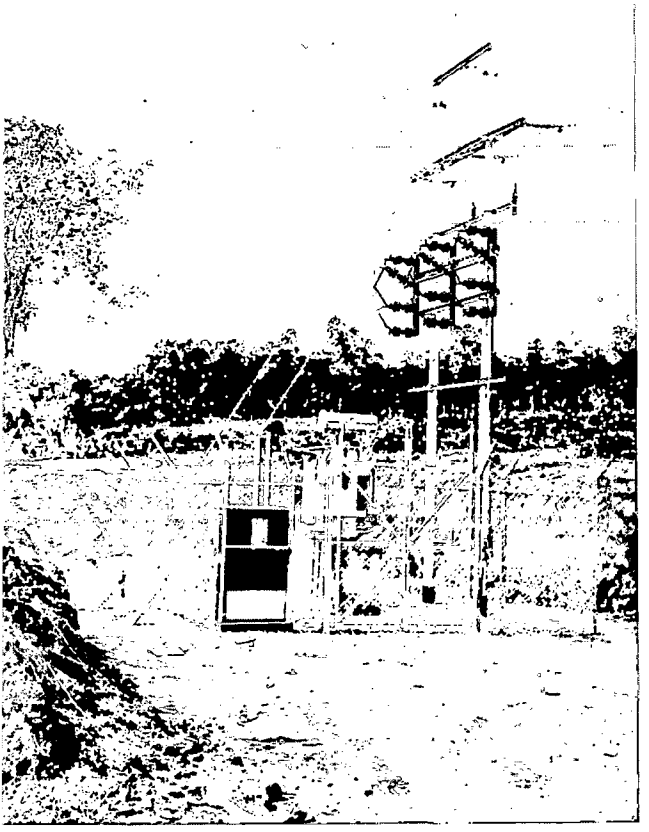
During the year under review Johore Bahru District continued to make steady progress in the sales of electricity and in the extension of supply to new consumers. The rate of development in the Tampoi Industrial Area had slowed down and only a few enquiries for supply to proposed factories were received during the year. Plans were being finalised for the proposed supply to Fiat and Lambretta Assembly Plants, Poly Plastics (M) Ltd. and Godrej (M) Office Equipment Ltd. during the next financial year. Development and demand for electricity in Housing Estates, however, had proceeded at a satisfactory rate.

In Johore Bahru, the sales of electricity increased by 17.6% rising from 83.795 to 98.524 million units, giving a corresponding increase in revenue of 14.5%. The total number of consumers connected is now 15,172, an increase of 15.6% over the previous year. The maximum demand rose to 19.2 M.W. from 17.6 M.W. during the year. With the exception of one major bulk supply failure which affected the whole town of Johore Bahru for a short duration of 24 minutes, satisfactory supply was received from the Sultan Ismail Power Station .

The 6.6 kV and L.V. Distribution Systems were satisfactorily maintained throughout the year and only one major interruption of supply occurred, which was due to a fault on the 22 kV busbar chamber at Central Substation during the commissioning of the third 4.5 MVA 22/6.6 kV transformer. A notable event was the take-over of the Public Licensee supply at Ulu Tiram Village in July, 1966, where a 300 kVA 22/0.4 kV Substation was installed for the project. At present well over 300 consumers had already taken supply.

Four new 6.6/0.4 kV substations with a total installed capacity of 900 kVA were commissioned during the year, while the capacity of three other substations was increased by 500 kVA. Projects to increase the capacity of another eight substations could not be carried out during this financial year due to the delay in the delivery of transformers.

Approximately 2.11 miles of 6.6 kV cables were laid and about 17 miles of L.V. overhead mains were constructed as well as laying of about 1.6 miles of L.V. Underground Cable. About 3,000 yards of L.V. Overhead mains were also rehabilitated. A total of an additional 145 Mercury Vapour Lamps were installed in Johore Bahru Town this year.



300kVA, 22/.4kV Substation at Ulu Tiram Village near Johore Bahru.

In Kota Tinggi there was some improvement in the sales of electricity, there being an increase of 15.8% to 833,581 units, with a corresponding increase of 11.5% in revenue. The number of consumers increased slightly by 69 to 1,118. The Diesel Station operated satisfactorily and there was no breakdown during the year. At present work on the extension of the 22 kV Overhead Transmission Line from Ulu Tiram to the Johore River Waterworks Scheme near Kota Tinggi was being carried out by the Construction Department and that plans for giving bulk supply to Kota Tinggi from the Waterworks was well in hand.

Eastern Area

General

Taking Eastern Area as a whole the total units sold increased by 6.7% whilst the number of consumers increased by 3.1%. However, when the percentage increase in sales is compared with that of last year which recorded 13.7% increase, it will be seen that the results for the year under review are disappointing. The main cause of this is due to the severe floods in December which affected the major parts of Eastern Area. Kota Bharu District in particular was badly hit by the prolonged monsoon rains and floods. Supply to Pasir Puteh had to be cut off for one week because the Pasir Puteh substation was completely submerged by water. Likewise, the Rural Station at Jertah was shut down for 10 days due to the power station being flooded.

The generating plant at all stations has been well maintained and operation throughout the year has been satisfactory.

Kota Bharu District

The units sold in Kota Bharu increased by 6.8% to 19,440,755 whilst the number of consumers increased by 6.8% to 19,853.

Although the sales were affected by the December floods the growth in Kota Bharu has been satisfactorily maintained. The maximum demand rose from 4,760 kW to 5,394 kW — an increase of 13.3%

At Lemal Power Station a second 3 MW set was commissioned in October 1965.

Six new substations with a total capacity of 850 kVA were erected during the year and two substations had their capacity increased.

Approximately 1.1 miles of 33 kV line were erected for the extension of supply to the new Lee Rubber Factory at Tanah Merah. In addition, 2.224 miles of 6.6 kV underground cable were laid to give supply to the New Market in Kota Bharu town and Pasir Tumboh.

Several street lighting projects were carried out in Kota Bharu town, of these the most prominent being the lighting for the newly completed dual carriage way at Jalan Ibrahim with the installation of 67 lights.

At Kuala Trengganu the units sold increased by 11.7% to 6,126,501 and the number of consumers increased by 10.9% to 6.671. However, the Maximum Demand recorded only an increase of 50 kW to 1,750 kW. Four new substations with a total capacity of 700 kVA were erected during the year. The transformer capacity of the Hospital Substation was increased from 100 kVA to 300 kVA. The distribution system was extended by about 1.8 miles of 11 kV underground cable, 1.7 miles of L.V. overhead mains, and 0.5 miles of L.V. underground cable.

At Dungun the result achieved for this year is slightly better than that of last year. The sales increased by 6.3 % to 1,178,971 units whilst the number of consumers increased by 5.4% to 2,002. The Maximum Demand rose by 14 kW to 448 kW. An additional 100 kW set was commissioned in the Power Station. One new substation with a capacity of 200 kVA was erected at the Rural Hospital. Approximately 0.74 miles of 3.3 kV overhead line were dismantled and replaced by 1.19 miles of underground cable.

This year marks the end of Kuala Trengganu as part of Kota Bharu District. From next year onwards Kuala Trengganu will operate as a separate district under a District Manager.

Kuantan District

Sales of electricity in Kuantan continued to be quite satisfactory as shown by the increase of 15.5% to 6,592,191 units, whilst the Maximum Demand rose from 1,561 kW to 1,710 kW representing an increase of 9.6%. This is mainly due to the

commissioning of supply to the Radio Malaysia Transmitting Station and the Technical and Trade School. The number of consumers increased by 8.4% to 4,649.

Three new substations with a total capacity of 300 kVA were commissioned. The distribution system was extended by 3,070 yards of H.V. underground mains and 14,227 yards of L.V. mains. A total of 4,750 yards of L.V. mains were rehabilitated.

At Pekan units sold increased by 11.8% to 756,441 and the number of consumers increased by 9.3% to 961. Over 10,500 yards of L.V. mains were rehabilitated.

At Kemaman the units sold increased by 10.4%, which is considerably better than the previous year's figure of 5.5%. The number of consumers increased by 4.3% to 1,398. Over 7,000 yards of L.V. mains were rehabilitated.

Raub District

There is very little development in Raub during the year and the units sold increased by 4.6% whilst the number of consumers increased by only 1.7%

The generating capacity of Raub Diesel Station, which is being operated as a standby to the Sempan Hydro Station, was reduced to 760 kW by the dismantling of one 100 kW set which was transferred to Dungun.

The rehabilitation of L.V. mains in Sungei Lui was completed and a total of 326 services renewed.

At Bentong the sales increased by 2.8% and the number of consumers increased by 3% to 2,678. No major construction work was carried out during the year.

At Mentakab/Temerloh the sales increased by 3% and the number of consumers increased by 3.3% to 2,280. The 190 kW set in the Power Station was replaced by one of 500 kW capacity, making a total generating capacity of 1,700 kW for the station. The Maximum Demand increased by 10.4% to 900 kW.

A 300 kVA substation was erected to give supply to a sawmill in Mentakab. Two other projects for extension of supply to the Mentakab New Pump House and the A.M.F.C. Temerloh Air Strip were in progress.

At Kuala Lipis the sales increased by 2.5% and the number of consumers increased by 2%. Comparing with the results achieved during the previous year with 12.6% and 4% respectively, the recorded increase for this year is rather disappointing.

At Fraser's Hill four new consumers were connected, making a total of 184, and the sales were increased by 11.5% over the previous year.

A temporary additional set of 50 kW was installed in the Power Station pending the arrival of a permanent set, and this increased the total capacity in the station to 355 kW.

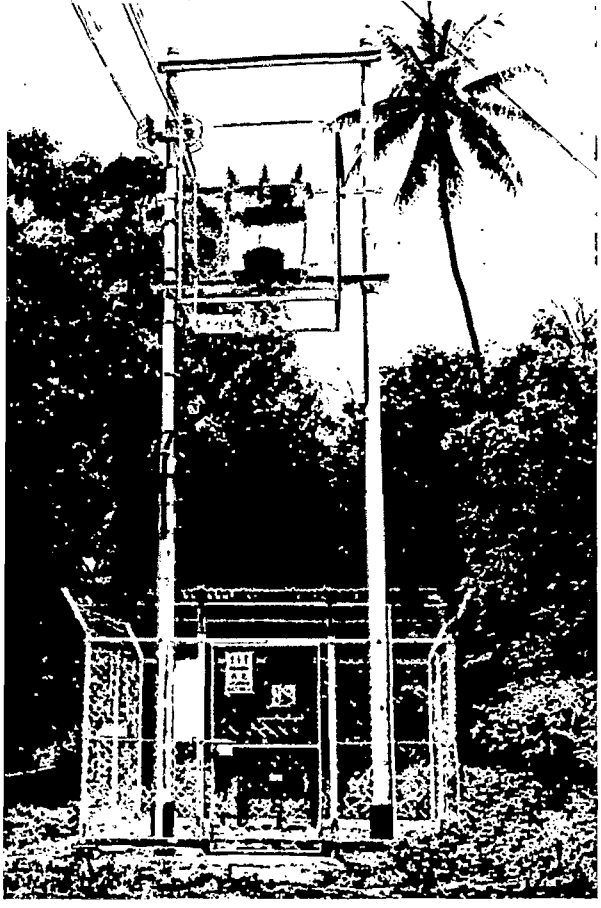
Chapter Six. Rural Electrification

The Board's financial year 1965/66 covers the end of the Federal Government's Second Five Year Development Plan 1961/65 and the beginning of another five year development programme under the First Malaysia Plan 1966/70. The Federal Government allocated under the First Malaysia Plan a sum of $1 million for the calendar year 1966 as its contribution towards the capital costs of the rural electrification schemes. The Board's share towards these schemes amounted to $915,036 while the Negeri Sembilan State Government, the Penang State Government and the Penang City Council contributed $22,700, $44,200 and $4,469 respectively towards the schemes for electricity supply to villages in their States. The Kinta Electrical Distribution Company also expended the sum of $40,280 for rural electrification schemes in the areas under their supply.

In the Federal Government's 1966 rural electrification programme it was originally proposed to give electricity supply to 65 villages but 4 more villages were later included, making a total of 69 villages. It was estimated that 5,222 consumers would be connected and approximately 31,332 of the rural population would receive the benefits of an electricity supply. Unfortunately due to great difficulties in obtaining suitable substation sites, agreement on wayleaves and compensation to be paid, electricity supply was given to 52 villages during the year. 4,147 consumers were connected, giving benefits to approximately 24,882 of the rural population. The total expenditure incurred was $2,330,340.

At the end of the year the supply to 33 villages was under construction whilst the planning of the supply to a further 55 villages was in the final stage. It is expected that many of these remaining schemes will be completed in the early part of next financial year.

Rural Distribution — Kampong Gunong, Kelantan.



Rural Electrification Kampong Londang Substation — Malacca.

Some of the major rural schemes completed during the year under the development programme included the supplies to Lahar Kapah, Simpang Lima, Paloh, Telok Manic, Ulu Yam Bahru and Pulau Ruca. Three Government New Villages and three licenced supplies whose licences had expired were taken over by the Board and connected to its network at an approximate cost of $450,000 to give benefit of a 24-hour supply to 1,213 consumers or 7,278 of the rural population. They were the New Villages of Subang, Jelebu Estate and Ayer Kroh and the rural townships of Titi, Batu Kikir and Ulu Tiram.

The rehabilitation of Government New Village installations programme started in 1964 was almost completed. The main cause for the delay in completion of this programme is due to difficulties in acquiring suitable sites for the rural station.

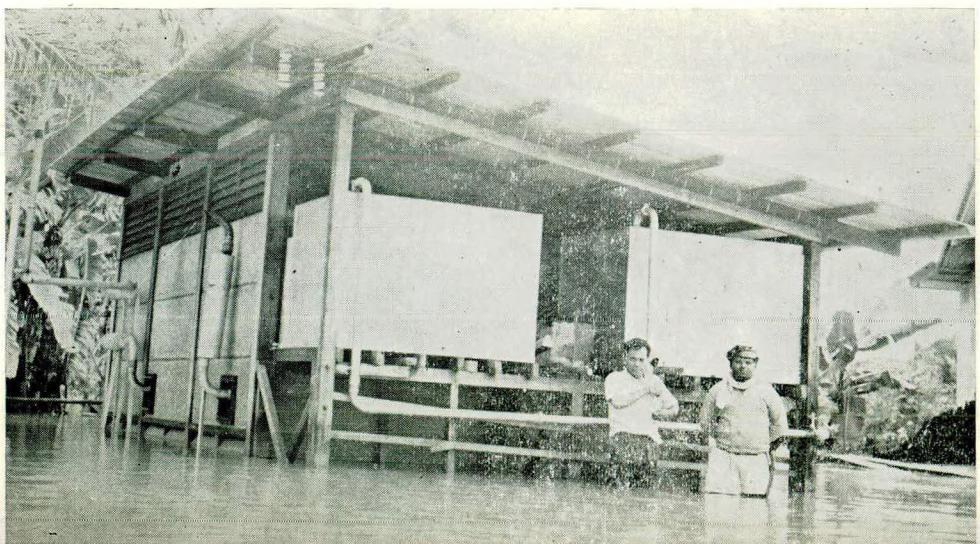
The Board is at present operating 25 of its own rural stations which are installed with semi-automatic generating sets. In addition it is operating on behalf of the Federal Government 43 Government New Village installations which have been rehabilitated and 7 Government New Village installations which have not been rehabilitated. It is intended that the Board should take over the latter 7 installations. Messrs. Kinta Electrical Distribution Co. is also operating 7 Government New Village installations.

Forty-four old water-cooled generating sets and one alternator from the rehabilitated Government New Village installations have been sold by public tender, whilst one generator was transferred for use on a Government project.

A view showing one section of Ulu Tiram Village which was taken over by N.E.B. from Public Licensee's Supply on 12.7.66.

During the severe monsoon flood which ravaged the greater parts of Kelantan and Trengganu in December 1965, the rural station at Jerteh was almost under water. The generating sets had to be salvaged and replaced before supply could be restored after the water level had subsided.

Maintenance of the Board's semi-automatic generating sets was carried out by the local agent of the manufacturers.



Board's Rural Station, Jerteh during the floods.

The following list gives details of the rural electrification schemes which have been completed, those which are under construction and those which are under final stages of planning at the end of the Board's financial year 1965/66: -

PERLIS	Completed — Nil Under Construction — Nil Under Planning — — Jalan Kaki Bukit.
KEDAH	Completed — Batu 8½/8¾ Tol: Jelai, Batu 13/14 Jalan Changloon, Batu 2½/3¼ Jalan Langgar. Under Construction — Ayer Puteh & Permatang Junjong. Under Planning — Batu 5/6 Jalan K. Kedah/Batas Paip, Haji Kudong, Permatang Kelompang & Sungei Derhaka, Sungei Lallang, Bedong, Ulu Tiram & Harvard Estate.
PENANG (Penang City Council)	Completed — Nil Under Construction — Telok Tempoyak, Jalan Permatang Damar Laut. Under Planning — Nil.
PROVINCE WELLESLEY	Completed — Sungei Duri, Sungei Bong, Datoh, Lahar, Lahar Ikan Mati, Permatang Tiga Ringgit, Permatang Tinggi, Paya Keladi, Lahar Kapah, Setol, Permatang Panjang, Siam/Kebun Sireh, Bukit Changkat, Permatang Rambai. Under Construction — Lahar Tabut/Titi Mukim, Telok Wang. Under Planning — Trans Krian/Krian Estate, Permatang Pak Maras, Tanah Liat Hujong, Menghuang Titi, Sungei Buaya.
PERAK (NEB)	Completed — Lower Semanggol, Bukit Semanggol, Simpang Lima, Jelutong, Kg. Paya, Kg. Hujong Matang, Kg. Bengali, Kg. China, Kg. Batu 11. Under Construction — Ayer Panas. Under Planning — Batu 3, Parit Kasar & Simpang 4, Jenderatta & Simpang 4, Pasir Bogak.
PERAK (KED)	Completed — Tanjong Aur, Paloh, To' Manic, Lambor Kanan Pekan, K. Pari Hilir, Kopisan N.V. Under Construction — Tambun Malay Reserve, Talang Dusun 'A' Under Planning — Nil

SELANGOR	Completed — Olak Limpit, Ulu Yam Bahru, Ulu Yam Lama, Batu Caves, Gumut, Kelumpang, Pasir Bahru, Petaling, Permatang, Subang *. Under Construction — Bukit Changgang, Batu 18 Kuang, Rantau Panjang. Under Planning — Telok Gadong, Sungei Jenderam, Jenderam Hilir, Dusun Nanding, Rantau Panjang.
NEGERI SEMBILAN	Completed—Linggi, Pekan Linggi, Batu Kikir, Titi, Jelebu Estate*. Under Construction — Gemencheh, Gedong Lama. Under Planning — Batang Melaka, Gedok, Kayu Ara, Senaling.
MELAKA	Completed — Bukit Tembakau, Solok Pengkalan Batu, Padang Temu, Bukit Piatu Solok, Pengkalan Lanjut Lereh, Solok Bukit Rambai 1, Ayer Keroh *. Under Construction — Pernu, Umbai, Kandang, Telok Mas, Semabok, Serkam, Tanjong Rimau & Batu 21/21¾, Bukit Bringin/Londang, Tedong, Batu 19½ Rim Road, Kg. Sungga/Clinic. Under Planning — Berangan Enam, Ayer Molek.
JOHOR	Completed — Kg. Melayu, Ayer Bemban, Pengkalan Batu, Ulu Tiram. Under Construction — Jalan Ibrahim, Pagoh 1, Segamat, Solok, Tangkak. Under Planning — Bentong, Kluang, Parit Hj. Hashim, Jalan Hj. Abdullah, Permatang Nipah Darat, Parit Tarom, Parit Bilal, Tongkang Pechah, Pontian Besar Kiri.
PAHANG	Completed — Nil. Under Construction — Nil. Under Planning — Pengsenam, Buntut Pulau, Parit Tengah, Tanjong Lumpur.
TRENGGANU	Completed — Pulau Rusa. Under Construction — Nil. Under Planning — Alor Lintah, Jerteh, Balai Besar, Batu 49/50½ Jalan Paka, Bunga Raya & Pa' Sabah, Kawasan Perusahaan.

KELANTAN	Completed — Gunong, Pasir Tumboh. Under Construction — Pangkal Meleret. Under Planning — Puah Lima, Perupok, Sungei/Beris Kubor Besar, Kusial Bahru, Kijang/Kedai Buloh, Majlis Tempatan Temangan.

List of Government New Village Installations in the Rehabilitation Programme

KEDAH	Kejai
PROVINCE WELLESLEY	Wellesley Estate.*
PERAK	Tacek, Pelawan, Batu Duabelas, Behrang Ulu, Kg. Batu Dua, Redang Panjang, Lasah, Lintang, Padang Gajah, Sungei Rotan & Sungei Kroh.
SELANGOR	Subang.*
NEGERI SEMBILAN	Durian Tipus, Jelebu Estate*, Broga, Pantai.
MELAKA	Taboh Naning, Lendu, Machap Bharu, Machap Umbor, Pondok Batang, Parit Keliling & Ayer Kroh*.
JOHOR	Kg. Tengah, Bukit Siput, Kebun Bahru, Sagil, Chamek, Lam Lee, Kangkar Bharu, Bukit Batu, Sedenak, Ayer Bemban, Sengkang, Telok Sengat, Ban Foo, Saleng, Kangkar Pulai & Ulu Choh.
PAHANG	Penjom, Sungei Chetang, Kerdau, Lanchang, Sungei Dua, Bukit Tinggi, Telemong, Mengkarak, Kerayong, Manchis, Mengkuang & Kemayan.
KELANTAN	Gua Musang.

*Bulk Supply.

List of Government New Village Installations to be taken over by the Board

PROVINCE WELLESLEY	Sungei Lembu
PERAK	Simpang Lima
MELAKA	Paya Mengkuang
JOHOR	Batu Anam & Jementah
PAHANG	Karak & Triang.

Chapter Seven. Head Office Departments

Meters, Protection & Test Department

With the completion of the Cameron Highlands Hydro-Electric Project (Stage I), the emphasis this year on the work of this Department was one of consolidation and preparation. Consolidation was made in respect of carrying out the first maintenance of protective and control equipment associated with the above Project and also in respect of commissioning of various substations built as a result of the general power expansion. Preparation had also to be made in respect of Stage II of the Project now in progress known as the Batang Padang and Prai Power Development. Under this latter scheme there will be a substantial increase of new and specialised types of protective gear, power line carrier equipment, and remote supervisory control gear, as well as an N.E.B. telecommunications network. Preparations have therefore been made to train Engineers and recruit other staff for the specialised work associated with these equipment during the future installation and commissioning stages. Most of this work concerns electronic equipment, thus opening an entirely new field for the Engineers of this Department to tackle.

The Measurements Section was under very heavy pressure during the year under review. This was brought about by very substantial demands for meters from the various Districts, in particular Johore Bahru, Butterworth and Raub. Besides the increased rate of connecting consumers, due probably to the housing boom and the appearance of multi-storey flats, Districts are also now being actively engaged in the routine changing of meters on circuit. This resulted from the issue of 7,138 (3,518) routine change notices from this Department which involved the changing of some 70,227 (34,385) meters. (Last year's figures in brackets). Comparative figures of meters repaired and tested for the past five years are shown in the following table: -

Year	Meters		Instruments		Meter Delivery Service, Miles
	Repaired	Tested	Repaired	Tested	
1961/62	32,605	36,133	981	1,424	35,429
1962/63	41,816	57,528	952	1,368	61,352
1963/64	36,074	55,572	1,042	1,096	56,321
1964/65	37,130	78,375	916	1,072	63,085
1965/66	48,731	96,060	1,193	1,496	72,895

The substantial increase of work of between 23%—40% over last year's figures, however, was effectively met by only increased efforts and overtime work of existing staff and equipment. A close watch is however being kept on whether or not this trend in meter demands is abnormal and can be regarded only as temporary. Some preliminary investigations have, nevertheless been made on the possibility of using more modern and quicker techniques in meter testing, especially with some new types of test equipment now being developed by some leading meter manufacturers. This, it is believed, would be more expedient than the alternative of increasing the staff, test room space and present types of test equipment. The increases of meters owned by the Board are 37,978 single phase and 1,571 three phase, compared with last year's figures of 40,375 single phase and 354 three phase. The Board now owns a total of 402,309 single phase and 15,626 three phase meters at the end of the year under review.

With the extension of the 132 kV Grid northwards from Jor, our Ipoh subsection will be faced with increased commitments. Steps have therefore been taken to expand this subsection. For this year, cable faults, extensive checking of Large Power Consumers installations and commissioning of substations and Diesel Generating Sets were the most prominent amongst activities of this Subsection. Most of the work has been centred around Alor Star District, but H.V. cable faults have also entailed frequent journeys to Taiping, Telok Anson and Butterworth Districts. Among the major commissioning works done were Bukit Mertajam 33 kV Substation, Sungei Patani Main Intake Substation, the Standby 2 MVA Transformer at Telok Anson and tests for line constants of the 132 kV Muda River/Sungei Patani Overhead Line built by the Construction Department.

The Power Line Carrier Section is now emerging from its infancy. In the very near future it will have to deal with the commissioning stages of the new K.L. Regional Supervisory Control System and also those of the new Power Line Carrier System of the Batang Padang and Prai Power Development. Four Engineers of this Department have now been trained for this new work. During the year under review, the Power Line Carrier (PLC) and associated equipment continued to perform satisfactorily. Regular maintenance has been rigidly adhered to. Noise interference in the speech channels persisted but has been considerably reduced when a co-axial cable joint fault was discovered and repaired at Jor.

Comparative figures of faults attended to are as follows: -

Year	H.F. Equipt.	V.F.T. Equipt.	Remote Supervisory	Tele-metering
1963/64	50	21	19	29
1964/65	29	18	14	22
1965/66	28	26	25	29

The Large Power Consumers' metering section continued to be as busy as ever. There is now a tendency for the larger industrial and commercial consumers to take power at high voltage. Government organisations, e.g. The Telecoms. Training Centre and the Federal Teaching Hospital, are also taking power at high

voltage for their own H.V. networks. Thus another new class of consumer has made an appearance and is being metered at H.V. with precision grade meters, consistent with the load taken. Results for the year are 1,096 items installed as compared to last year's figure of 1,167 items. Some 724 items were removed against some 604 items removed last year. There were also 26 requests for installation of recording instruments for load investigations, and 13 tests made for power factor.

The Protection & Test Section was able to concentrate more on maintenance work this year whilst keeping up with pressure for commissioning work and cable fault location. The new class of consumers taking power at high voltage, mentioned earlier, has also given this Section work in connection with commissioning of H.V. Switchboard, transformers and cables for the consumers installations on a rechargeable basis. Such work has been completed for Chemical Company of Malaysia, International Airport and Federal Teaching Hospital. The programme for maintenance testing of all 132 kV Substation relays including those at Sultan Yussuf Power Station, Jor, was successfully completed. Results for the year are 1,839 (943) relays tested, over 300 (278) miles of H.V. cables and 421 (404) O.C.B.'s were pressure tested, and also 544 (490) oil samples were tested for dieletric strength. Some 120 (105) substations involving 74,019 (108,733) kVA of transformer capacity were commissioned; 310 (375) H.V. Liquid Fuses repaired and 38 (45) cable faults located. (Last year's figures in brackets).

The number of consumers' L.V. O.C.B.'s tested and protection set for consumers was 87 this year against last year's figure of 92. The number of specimens of new electrical equipment, imported from various countries other than Commonwealth countries, sent in for approval type tests increased to 77 from 26 for the year under review. These included ceiling fans, P.V.C. cables, motor starters, water heaters, fluorescent lamp fittings, submersible water pumps and small motors.

Commercial Department

Tables relating to the Board's commercial operations are grouped together in Appendix VII: —

Table I — Units generated or purchased, sent out and sold.

Table II — Sources of Supply.

Table III — Daily units generated or purchased during the month of August.

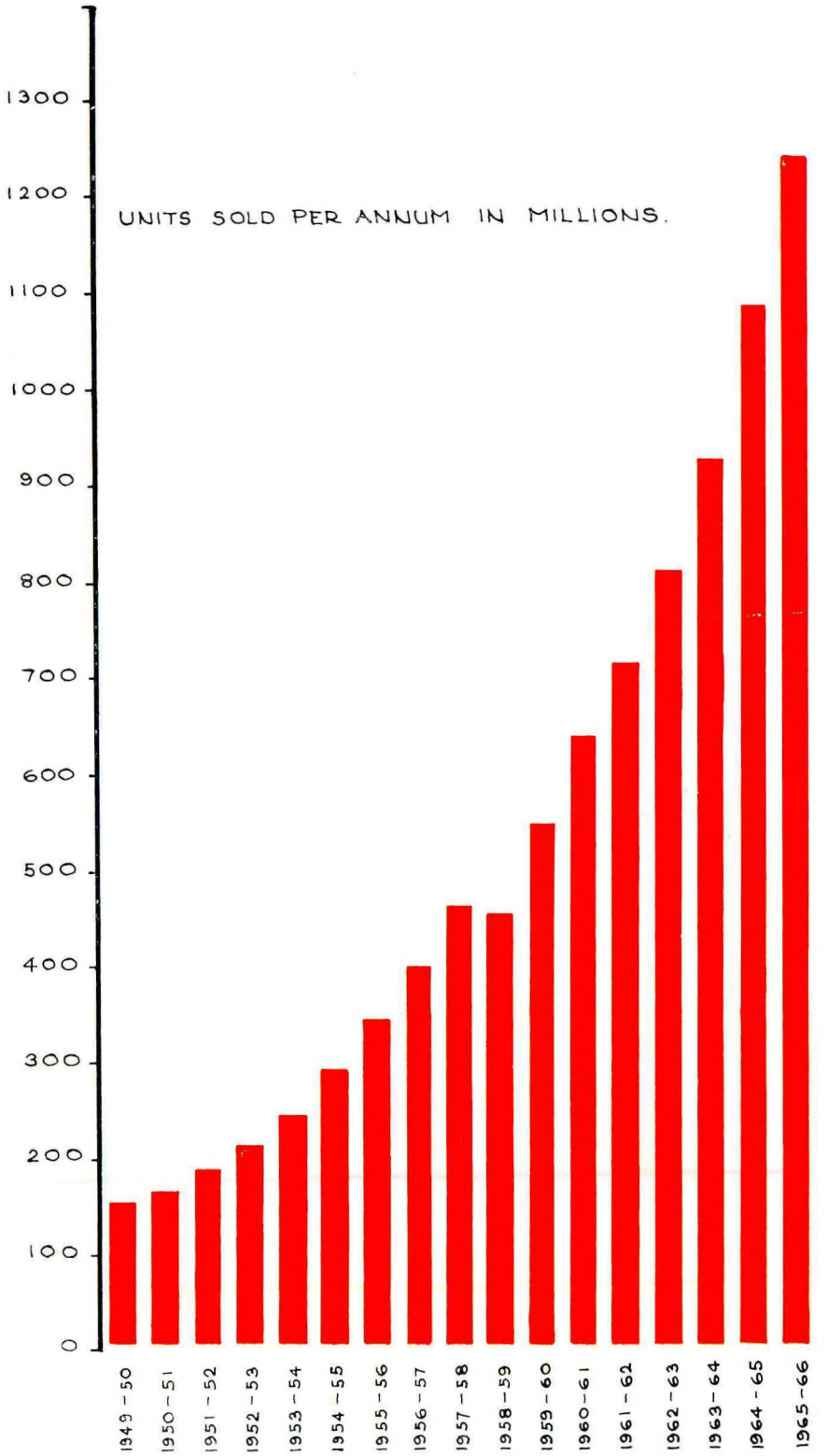
Table IV — Classification of sales.

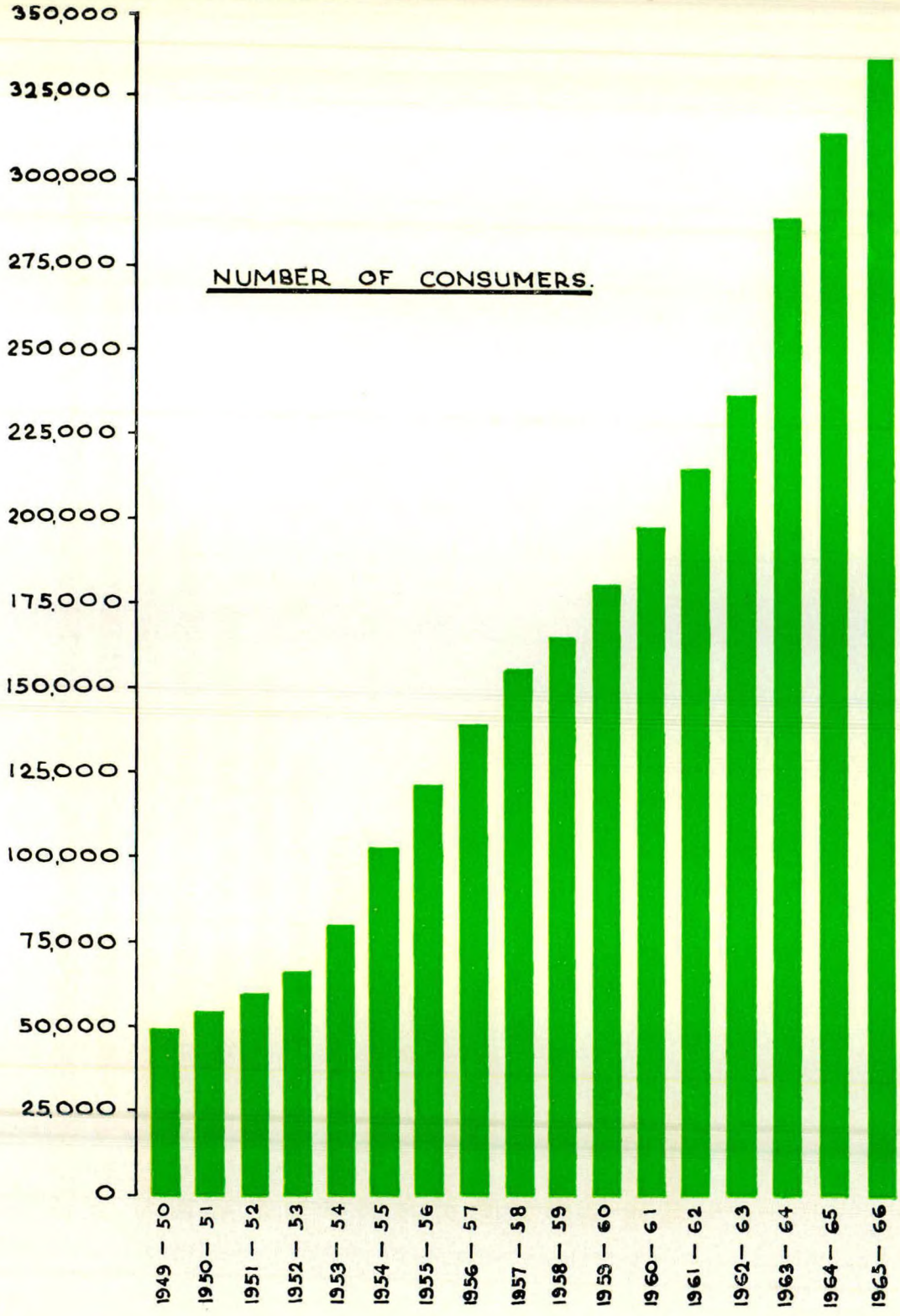
Table V — Number of Consumers.

Table VI — Hire of apparatus.

Table VII — Monthly output from the Board's stations and the monthly bulk purhases.

The overall sales of electricity of approximately 1,227 million units showed an increase of 14.4% from the previous year. On the Central Network, the maximum demand recorded from the system was 175.4 MW occurring at 7.45 p.m. on 26.8.66 as compared to 156 MW in the previous year. Typical load curves are shown in Appendix X. In the States of Malaya there are no seasonal variations and


UNITS SOLD PER ANNUM IN MILLIONS.
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1949 - 50
1950 - 51
1951 - 52
1952 - 53
1953 - 54
1954 - 55
1955 - 56
1956 - 57
1957 - 58
1958 - 59
1959 - 60
1960 - 61
1961 - 62
1962 - 63
1963 - 64
1964 - 65
1965 - 66


NUMBER OF CONSUMERS.
350,000
325,000
300,000
275,000
250,000
225,000
200,000
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
1949 – 50
1950 – 51
1951 – 52
1952 – 53
1953 – 54
1954 – 55
1955 – 56
1956 – 57
1957 – 58
1958 – 59
1959 – 60
1960 – 61
1961 – 62
1962 – 63
1963 – 64
1964 – 65
1965 – 66

the form of curves is fairly consistent throughout the year. The annual load factor for Central Network rose from 65.8% to 67.0%. The rapid increase in maximum demand through the year caused this figure to be lower than the daily load factor which ranged from 66.3% on 24.1.66 to 30.9% on 5.4.66. In diesel stations, the annual load factor ranged from 19.0% to 60.5%. The average load factor of 40% can be assumed for the majority of the diesel stations.

The Board continued to buy energy for distribution from Perak River Hydro-Electric Power Co. Ltd. at Ipoh and Teloh Anson and from the City Council of George Town at Butterworth. During the year under review, import at Butterworth from the City Council of George Town rose from 29.4 million units in the previous year to 56.1 million units this year.

The Central Network system was extended further south to Kuala Pilah on 19.9.65 and to Bahau on 21.9.65.

Electrical Contract Works for Government

The year 1965/66 was another busy year for the Contracts Section of the Commercial Department especially the New Works Section in Head Office. A summary of New Works undertaken by the various sub-sections is appended below: —

Section	Value of work completed	Value of work in hand
New Works	$1,576,705	$ 7,305,791
Armed Forces Works	126,865	188,378
Jurutera Kerja Raya (P.W.D.) (Selangor)	54,370	14,388
International Airport	—	27,535
Southern Area	114,558	58,707
Northern Area	107,026	80,281
Consultants	1,085,001	13,436,585

As the staff problem in this Section is still acute, maintenance work covering the Eastern Area and Batu Pahat District in the Southern Area has still not been taken over.

Purchasing and Contracts Department

The Purchasing and Contracts Department continued to undertake directly all purchasing and letting of contracts within the States of Malaya. The details of the values of contracts placed locally as well as through the Crown Agents are as follows: —

(*a*) Total value of orders placed with Suppliers in Malaya $31.14 million

(*b*) Total value of orders placed with the Crown Agents $19.41 million

The Board continued to purchase locally made goods in preference to imported goods provided the tenders submitted were reasonable and the materials offered were of the required standard.

The Crown Agents continued to invite tenders on an international basis wherever possible for materials ordered by the Board through them. The Board has given instructions to the Crown Agents that international tenders should be invited for the undermentioned items:—

(*a*) Underground L.V. and H.V. Cables.

(*b*) Transformers.

(*c*) P.V.C. Insulated Aluminium Cables.

(*d*) A.C.S.R. Conductors.

(*e*) Stranded Bare Aluminium Conductors.

Architect's Department

The New Head Office Building was officially opened by the Hon. The Prime Minister of Malaysia Tengku Abdul Rahman Putra Al-Haj, K.O.M., C.H., on 26th March 1966 and was first occupied on 15th April 1966. All head office departments are accommodated in the new building.

One senior officers' quarters at Malacca and five quarters at Butterworth for Prai Power Station staff were completed.

30 junior officers' quarters were completed during the year at Lemal Power Station in Kelantan, Jor in Cameron Highlands, Johore Bahru and Prai Power Station area.

Three bulk supply substation buildings were constructed at Gemas, Kluang and Bukit Mertajam.

A 33/11 kV substation building has been completed at Pahang Road, Kuala Lumpur.

Earthworks, roadworks etc. at Prye Estate, Prai have been completed during the year and seven Type IC quarters are under construction on this site.

Piling work in connection with the foundation of the new 33/11 kV substation and Regional Control Room at Jalan Bungsar was started in June 1966.

Bungsar Workshops

During the period under review the Workshops were kept busy on a wide variety of maintenance and production work. A total of 4,265 jobs passed through the various sections.

The transformer shop which undertakes repairs and maintenance of all transformers has been kept busy all the year round dealing with about 250 transformers. The electrical repair section, as in the past, was responsible for repair and maintenance of all Board's domestic apparatus, motors, alternators, switchgears etc. In-

stallation and removal of hired appliances were also the responsibility of this section. Service was also extended to various Government Departments and private firms to help maintain their electrical installations.

The fitting, machine and structural shops were fully engaged to meet the demands of the Central Stores, Central Area, Construction Department etc.

In addition to servicing and minor repairs to all Board's Vehicles stationed in Kuala Lumpur, the motor vehicle repair section was responsible for major overhauls of all Board's vehicles stationed in all the four Areas.

The Carpentary Shop mainly undertook minor repairs to Board's quarters and damaged vehicle bodies, manufacturing of wooden backings, pegs and workmens tool boxes, and building of bodies for new vehicles etc.

The Apprentices Basic Training Centre is now manned by five trade instructors, three mechanical and two electrical. Trainees are now expected to spend a full year here, six months on a fitters bench and the other six months on an electrical trade. A total of 60 trainees passed through this centre during the year.

Chapter Eight. General Administration

New Head Office

The new Head Office Building was officially opened by Y.T.M. Tunku Abdul Rahman Putra Al-Haj, K.O.M., C.H., the Prime Minister of Malaysia, on 26th March, 1966, before a gathering of distinguished visitors.

Assets Transferred from the Former Electricity Department

By virtue of Sections 28 and 29 of the Electricity Ordinance 1949, by which the Board was established, the undertakings of the former Electricity Department were vested in the Board. The Johore State Government has now agreed to issue grants free of premium at a nominal rental with the condition that the land alienated be used for the public undertaking of the Board and purposes connected therewith and that the land shall not be alienated charged, leased or otherwise disposed of. The Board has, as yet, not been able to obtain from the State Governments other than the State Government of Johore, certificates of title to its assets in these States in an acceptable form.

The Board has made a fresh approach to the Ministry of Commerce & Industry on the whole question of transferred lands but a decision has not been reached.

The Board has, nevertheless, issued to the Central Government Ordinary Stock Certificates to the value of $30 million as compensation for transferred undertakings under Section 32 of the Electricity Ordinance.

The Honourable Prime Minister of Malaysia Tengku Abdul Rahman Putra Al-Haj, delivers his speech at the opening ceremony of the New National Electricity Board Head Office building.

The Chairman of The Board presenting a memento to the Prime Minister after the opening ceremony of the new National Electricity Board Head Office Building.

World Power Conference

The Board continued to be the Secretaries and Treasurers to the Malaysian National Committee of the World Power Conference. The Deputy Chief Engineer (Hydro) attended the 33rd Executive Council Meeting of the International Commission on Large Dams in Laucanne, Switzerland, from 5th to 7th September, 1965.

The Prime Minister of Malaysia in a happy mood is seen touring the new National Electricity Board Head Office building after the official opening ceremony.

Honours

During the year, Honours were bestowed on Members of the Board as follows: —

D.Y.M.M. Sri Paduka Baginda Yang Di-Pertuan Agong in his Birthday Honours List bestowed: -

(a) Kesastria Mangku Negara on Mr. W. H. P. Fitzpatrick, Station Superintendent, Connaught Bridge Power Station, Klang.

(b) Ahli Mangku Negara on Mr. Ng Ah Loong, Senior Field Construction Engineer, Deputy Chief Engineer (Planning) Office, Head Office.

(c) Ahli Mangku Negara on Mr. Yong Piang Chong, Area Accountant, Southern Area, Malacca.

(d) Pingat Pangkuan Negara on Mr. M. G. Michael, Senior Foreman, Central Area, Kuala Lumpur.

Her Majesty Queen Elizabeth II in the Queen's Birthday Honours 1966 made Mr. F. R. Wardrop, the Adviser to the Board, a Commander of the Most Excellent Order of the British Empire.

His Royal Highness the Sultan of Pahang, in his Birthday Honours List 1966, bestowed the Dato Kurnia Bistari on Y.B. Tuan Haji Abdul Aziz bin Ahmad, a Member of the Board.

His Royal Highness the Raja of Perlis, in his Birthday Honours List 1966, bestowed the Dato Paduka Mahkota Perlis (D.P.M.Ps.) on Dato Kurnia Jasa Haji Osman bin Talib, the Chairman of the Board.

Public Relations

During the period under review, the Information Officer issued nearly 100 press statements on various activities of the Board covering such items as "3000 men now working on the Batang Padang Hydro-Electric Project", "Contract for N.E.B. Giant Underground Power Station Plant Signed", "N.E.B. to expand in Northern Malaya", "Canada to train Board's Engineers", "N.E.B. Engineer for Padua University" and "World Bank approved loan of $111 million to N.E.B."

The Board has continued to received much assistance from the Government Information Services, Radio Malaysia, Talivision Malaysia, Filem Negara and the Malaysian Press.

Many visitors from overseas have again visited the Board's installations particularly those associated with the Cameron Highlands and Batang Padang Hydro-Electric Scheme including one Soviet Journalist from Tass Agency, one Journalist from Ethiopia and a group of 7 Journalists from Indonesia.

New Head Office Building — by day.

National Language

The Board, as part of its contribution towards the success of the 1966 Bulan Bahasa Kebangsaan, erected, at its principal offices, Neon Signs bearing the words "*GUNAKAN-LAH BAHASA KEBANGSAAN.*" It also organised Oratory and Essay Writing contests in the National Language throughout the States of Malaya, the finals of which were held in Kuala Lumpur. Prizes of National Language textbooks were distributed by the Chairman of the Board to the successful contestants.

The N.E.B. Exhibition Section at the Gerakan Maju Exhibition in Stadium Negara.

THE NATIONAL ELECTRICITY BOARD OF THE STATES OF MALAYA

SUPPLEMENT TO THE ANNUAL REPORT AND ACCOUNTS FOR THE YEAR ENDED 31st AUGUST 1966

LEMBAGA LETRIK NEGARA TANAH MELAYU

TAMBAHAN KAPADA PENYATA TAHUNAN DAN KIRA2 BAGI TAHUN YANG BERAKHIR 31 HARIBULAN OGOS 1966

This Supplement does not form part of the Board's Official Annual Report and Accounts and is issued with the compliments of the National Electricity Board for information and guidance only.

Tambahan ini bukan satu bahagian Penyata Tahunan dan Kira2 Lembaga, dan hanya-lah di-terbitkan dengan ehsan Lembaga Letrik Negara, bagi penerangan dan panduan sahaja.

THE BOARD

The Board was established under the Electricity Ordinance 1949 on 1st September 1949. At 31st August 1966, it had 344,930 consumers (including Rural Stations) and 8,500 employees. Its Annual Report is made to His Majesty The Yang di-Pertuan Agong and laid before Parliament.

This Supplement has been prepared by way of explanation of the accounts in the Board's Annual Report for the year ended 31st August 1966.

The members of the Board serving during the year were: —

Chairman — Dato Kurnia Jasa Haji Osman bin Talib, S.P.M.P., D.P.M.PS.

Deputy Chairman — Y. M. Raja Zainal bin Raja Sulaiman, J.M.N., J.P., M.I.E.(M).

Inche F. R. Wardrop, C.B.E., B. Sc. (Eng.), C.Eng., M.I.E.E., M.I.E.(M).
(from 14th June 1966 to 31st August 1966)

Members — Y. B. Tan Sri T. H. Tan, P.M.N., C.W.E., M.P.

Inche P. P. Narayanan

The Hon'ble Tengku Indera Petra, Tengku Besar Indera Raja Ibni Al-Marhum Sultan Ibrahim, D.K., P.M.N.
(to 30th November 1965)

Y. B. Dato Kurnia Setia Jasa Tan Cheng Swee, J.P.

Inche Lee Hee Seng, F.C.I.S., F.A.S.A., F.B.S., M.B.I.M.

Y. B. Inche Chan Keong Hon, S.M.S., A.M.N., P.J.K., M.P.

Y. B. Dato Haji Abdul Aziz bin Ahmad, D.K.B., A.M.N., J.P.

Inche Mohd. Taib Sabre bin Abu Bakar, P.J.K.

Inche Chong Hon Nyan, K.M.N.

Tan Sri Nik Mustapha Fathil bin Haji Nik Mahmud. S.P.M.K., P.M.N., P.S.D., D.J.M.K., S.K.
(from 1st April 1966)

The chief executive officers of the Board were: —

General Manager — Y. M. Raja Zainal bin Raja Sulaiman, J.M.N., J.P., M.I.E. (M).

Adviser — Inche F. R. Wardrop, C.B.E., B.Sc. (Eng.), C. Eng., M.I.E.E., M.I.E.(M).

Deputy General Manager (Engineering) — Inche A. A. Allen, C. Eng., M.I.E.E., A.M.I.E. (M). (until 13th January 1966)

Inche R. A. Savage, C. Eng., M.I.E.E., M.I.E.(M). (From 14th January 1966)

Deputy General Manager (Finance) — Inche A. R. Sinclair, M.A., B.COM., F.C.A.

Chief Engineer (Distribution) — Inche R. A. Savage, C. Eng., M.I.E.E., M.I.E. (M). (until 13th January 1966)

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(from 14th January 1966)

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Secretary — Inche G. R. Wheeler, M.M., B.Sc. (Econ.)

Chief Electrical Inspector — Inche Abu Zarim bin Haji Omar, D.L.C., C. Eng., M.I.E. (M)., A.M.I.E.E.

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Inche Mohd. Taib Sabre bin Abu Bakar, P.J.K.

Inche Chong Hon Nyan, K.M.N.

Tan Sri Nik Mustapha Fathil bin Haji Nik Mahmud. S.P.M.K., P.M.N., P.S.D., D.J.M.K., S.K.
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Chief Electrical Inspector — Inche Abu Zarim bin Haji Omar, D.L.C., C. Eng., M.I.E. (M)., A.M.I.E.E.

How the Board Stood Financially on 31st August 1966

		$	$
IT HAD	Cash	1,638,947	
	Owing to the Board	15,698,460	
	Stores	25,310,444	
	Power stations, transmission lines, mains, services, land, buildings, quarters, etc.	541,086,165	583,734,016
IT OWED	Trade creditors	30,329,052	
	Consumers for deposits	12,105,315	
	Its bankers	2,023,284	
	Stockholders for interest	4,989,923	
	Others	8,478,542	57,926,116
IT HAD LEFT as capital employed in the business			525,807,900

Where This Capital Came From

	$	$
SHARE CAPITAL		
Government of Malaysia	119,319,000	
Government of the State of Pahang	3,000,000	122,319,000
LOANS		
Government of Malaysia	91,592,234	
International Bank for Reconstruction and Development	162,814,052	
Commonwealth Development Corporation	53,175,425	
Employees Provident Fund Board	10,000,000	
Commonwealth Development Finance Company, Ltd.	4,285,714	321,867,425
RESERVES PLOUGHED BACK INTO THE BUSINESS		81,621,475
		525,807,900

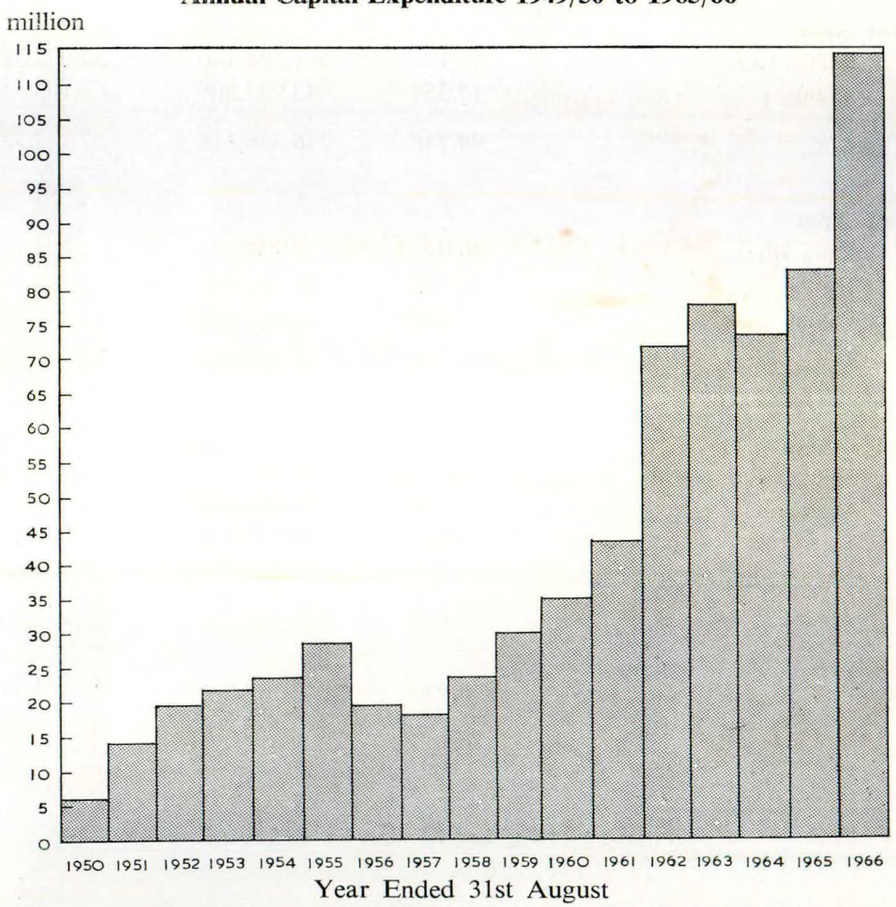
Capital Expenditure 1965/66

The demand for electricity is continually rising. To meet it the Board must continually invest new capital in generating plant, transmission and distribution lines, substations and so on.

During 1965/66 the Board's capital expenditure was as follows: —

	$
Generating plant	65,375,003
Transmission lines	22,943,569
Distribution lines and equipment	19,806,635
Rural electrification	1,913,981
Staff housing and welfare	669,829
Office accommodation and equipment	3,663,992
Other items	110,210
	114,483,219

Annual Capital Expenditure 1949/50 to 1965/66



Further Details of Sales and Income in Districts

	No. of Consumers at 31st August 1966	Sales of Electricity 1965/66	
		Units	$
Northern Area			
Ipoh	35,685	81,803,201	8,393,597
Butterworth	38,254	58,279,288	6,574,052
Taiping	12,343	23,871,704	2,963,094
Alor Star	16,566	18,420,805	2,788,436
	102,848	182,374,998	20,719,179
Central Area			
Kuala Lumpur	85,194	701,388,206	52,932,285
Klang	14,554	44,937,909	4,185,436
	99,748	746,326,115	57,117,721
Eastern Area			
Kota Bharu	29,974	27,192,393	4,278,191
Raub	10,290	10,264,400	1,707,373
Kuantan	7,464	8,222,009	1,308,763
	47,728	45,678,802	7,294,327
Southern Area			
Johore Bahru	16,832	99,599,976	7,924,554
Malacca	40,086	73,975,710	8,285,663
Seremban	22,008	49,230,322	5,375,463
Batu Pahat	15,680	30,563,714	3,834,309
	94,606	253,369,722	25,419,989
Total	344,930	1,227,749,637	110,551,216

Printed by Heng Lee Printing Co. K. L.

LEMBAGA LETRIK NEGARA
Tanah Melayu

Surat Pekeliling Ibu Pejabat Bil.12/67

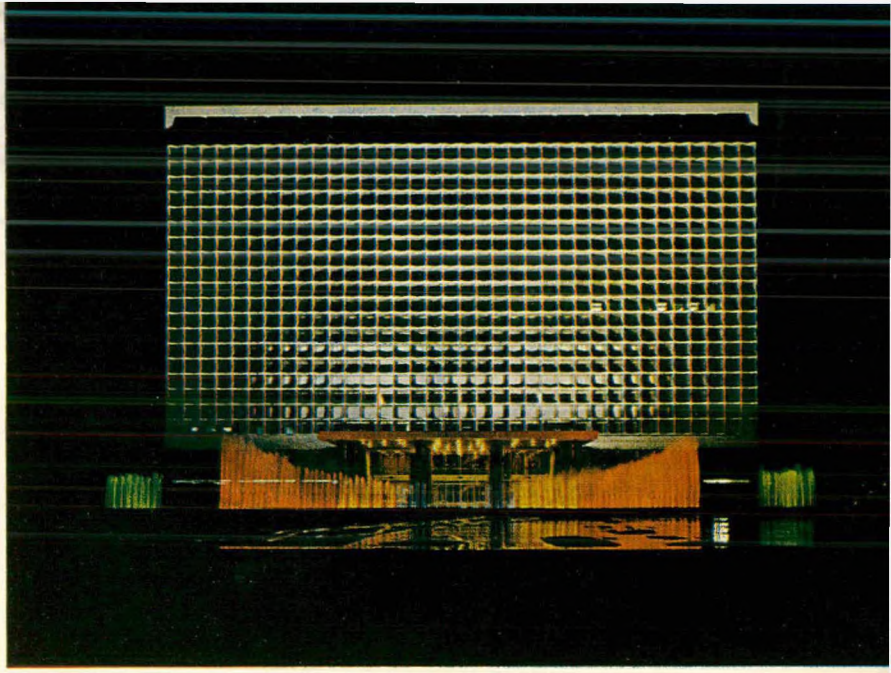
Bil. LLN.1/12/148

PENYATA TAHUNAN 1965/66

.... Saya sertakan bersama2 ini sa-naskhah Penyata Tahunan yang ke-17 untok maalumat dan simpanan tuan sendiri.

(C. Somaskanthan)
b/p Setia Usaha,
Lembaga Letrik Negara.

Kuala Lumpur,
15hb. Jun, 1967.



New Head Office Building — by night.

The Information Officer acted as Secretary of the National Language Month Committee and is also the Secretary of the Committee for the implementation of the National Language in the Board.

The Board continues with its National Language Classes throughout the States of Malaya three times a week, using half an hour of the office time for such classes. Instructors for these classes work on part time basis and are paid a standard rate of allowance. Many of the Board's staff have appeared for the National Language examinations conducted by the Ministry of Education and Dewan Bahasa dan Pustaka.

Festival of Books and Publications

The Board again participated in the 1966 Festival of Books and Publications in the National Language held at the Dewan Bahasa dan Pustaka. Specimen forms such as bills, contract agreements, envelopes and files, commendation certificates and brochures on the Cameron Highlands Hydro-Electric Scheme, the Sultan Ismail Power Station and Lemal Power Station were displayed. A descriptive model of the Underground Power Station, Cameron Highlands Hydro-Electric Scheme, was also exhibited. The Information Officer of the Board was on the sub-committee which organised this festival.

Progress Exhibitions "Gerakan Maju"

The Board participated in the above exhibitions at National, State and District levels. The principal theme of the Board's exhibition was the rapid progress achieved since it was established as a corporation in 1949 and more specifically since the achievement of Merdeka.

Staff Magazine

The Staff Magazine "POWER" continued to maintain its high standard of presentation and popularity with the staff. The circulation has now reached 8,200 copies.

Land Requirements

Notices under the Electricity Ordinance in respect of the Board's entry into State and alienated lands required for the 66/132kV Transmission Lines from Johore Bahru to Kluang were issued during the year in addition to a number of notices for other 11kV and 33kV Transmission Lines. The total distance covered by these lines amounts to 110 miles. 33 sites were either leased or acquired for new Offices, Quarters, Substations and for other purposes.

Delays have been experienced in obtaining the necessary statutory consents for the Board's land requirements. As a result, it has not been possible to attain the target dates for some of the Board's projects.

A comparatively small number of appeals have been lodged by land owners against the amount of compensation awarded to them by the Collectors of Land Revenue in respect of the Board's entry on their land for the purpose of constructing the Port Dickson Power Station and the transmission lines associated with the Batang Padang Hydro-Electric Scheme and the Prai and Port Dickson Power Stations. These appeals are being considered by the Statutory Authority.

The Board wishes to express its appreciation of the co-operation and assistance given by the District Officers and Collectors of Land Revenue in obtaining approval for entry onto State land and in resolving amicably a number of objections by owners to the Board's entry upon alienated lands.

Prosecutions

A number of prosecutions for offences against the Electricity Ordinance 1949 and the Electricity Regulations 1951 by consumers were conducted by the Police. Most common offences were theft of electricity and unauthorised wiring extensions.

Staff Position

The total number of personnel employed by the Board on 31st August, 1966 was 8,500, an increase of 601 over the number in service on the same date in the preceding year. This represents an increase of 7.6% as compared with the increase of 7.8% in the number of consumers for the same period. The overall staff position is shown in the following table:—

Analysis of Staff at 31st August, 1966

	Malays	Chinese	Indians	Eurasian & Others	Europeans	Total
Senior Officers Division I	37	94	66	19	21	237
Monthly paid Technical	566	613	493	82	—	1754
Monthly paid Non-Techincal	582	481	578	70	—	1711
Industrial & Manual Group	2539	545	1655	59	—	4798
	3724	1733	2792	230	21	8500

Long Service Awards

The Board presents Long Service Awards to members of its staff who have completed 25 years of continuous and meritorious service. During the year, 64 members of the staff qualified for Long Service Awards which were presented to them on the occasion of the 10th N.E.B. Federation Sports held on 9th July, 1966.

Staff Training

The Board spent over $2,600,000/- to cover the cost of training students and trainees of various grades for the year.

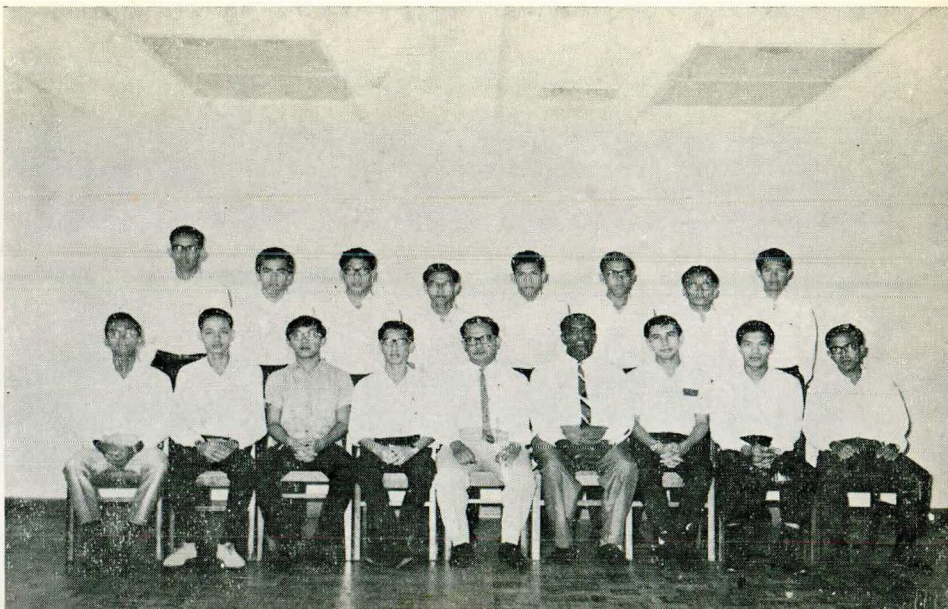
Training for Senior Posts

During the year, 14 Engineering students completed their academic studies and commenced their post-graduate training with manufacturing firms and the generating boards in the United Kingdom, and a further 25 students were sponsored, 24 to the United Kingdom and one to the University of Malaya. There was a total of 81 Engineering students studying at the end of the year, six in Malaysia and 75 in the United Kingdom.

Fifteen Pupil Engineers and 2 Cadet Administrative Officers completed their post-graduate training during the year and were promoted to Division I Timescale 'B' posts. In addition to this, 4 Pupil Mechanical Maintenance Engineers completed their pupilage training and were promoted to Division I Timescale 'A' posts according to their scheme of service.

Three Pupil Engineers and one Cadet Administrative officer were recruited locally during the year.

Two Pupil Engineers were sent to Sweden for nine months for their pupilage training, 3 to Japan for six months and one each to Italy and Germany for three months.



A group of N.E.B. scholars pictured after a briefing by Senior Board Engineers before leaving for United Kingdom for Electrical Engineering Studies.

At the close of the year arrangements were in hand to send two Pupil Engineers to Sweden for training in Power Line Carriers.

There were at the end of the year 13 Pupil Engineers doing their post-graduate training in the United Kingdom and 2 in Sweden and 3 Pupil Engineers, 2 Pupil Accountants and one Cadet Administrative Officer doing their post-graduate training in Malaya.

Training for Shift Engineers Posts

There were 6 Shift Engineer Trainees undergoing a three year period of training at the Board's Power Stations at the end of the year. The training course approved by the Machinery Department prepares the trainees for the Steam Engineers Examinations set by the Machinery Department.

Training at Technical College, Kuala Lumpur

Five students graduated during the year and were appointed as Technical Cadets for their post-graduate training for a period of two years, and a further 10 students were awarded scholarships to the College for the 1966/67 academic year.

There were 34 students at the College and 17 Technical Cadets under training at the end of the financial year.

Junior Technical Assistants Training

Candidates training under this scheme are selected from students who passed from Secondary Technical Institutes in West Malaysia. They are trained as J.T.A. Cadets for a period of three years after which they have to pass the stipulated test before being promoted as Junior Technical Assistants.

Twenty J.T.A. Cadets completed their training during the year and 20 new Cadets were recruited. There were 58 Junior Technical Assistant Cadets undergoing training at the end of the year.

Central Apprenticeship Board Training Scheme

The Board continued to train its apprentices under the Central Apprenticeship Board Training Scheme during the year. The Apprentices were allowed two months release to attend their course of training at the Industrial Training Institute.

Twenty-two apprentices completed their five years apprenticeship under this scheme during the year, and fifty-six new Apprentices were recruited.

The Apprentices who passed the prescribed examinations of the Industrial Training Institute were offered employment with the Board as Tradesman with every opportunity for promotion to higher grades. A number of them are already being given further training as Junior Technical Assistant Trainees with a view to eventual promotion as Junior Technical Assistants.

The total number of Apprentices in the scheme at the end of the year was 136.

Other Training Schemes

The Board has various other training schemes for training its own junior technical staff. There were three hundred Apprentices and Trainees receiving training under these schemes throughout the year.

Short Training Courses For Serving Officers

In order to keep abreast with modern trends in the technical and managerial fields, the Board provided a number of short training courses to its serving officers, locally and overseas.

Two Senior Engineers of the Meters, Protection & Test Department were sent overseas for three months training in Sweden and the United Kingdom. Two Mechanical Engineers were sent to Japan for four months. One Civil Engineer was sent to Padua University, Italy for six months post-graduate course in hydrology.

The Board's Chief Accountant attended a Residential Public Administration Course at the Australian Administrative Staff College, Melbourne.

The Government Staff Training Centre, Petaling Jaya also provided training facilities to a number of the Board's senior and junior officers during the year.

The Board also sent a number of its officers for short training courses in management at the National Productivity Centre, Petaling Jaya. In-plant training courses on supervision organised in conjunction with the Centre were also started in the Eastern and Southern Areas.

Clerical Courses were also organised within the Board. These were conducted on the basis of one hour per week, initially for clerical staff in the Kuala Lumpur area.

Training for Non-N.E.B. Personnel

The Board continued to give training facilities to personnel other than Board employees during the year. This included training facilities given to engineering students from the Kuala Lumpur Technical College and the University of Malaya.

Five private engineering students were also given post-graduate training facilities with the Board.

Personnel from the Sabah Electricity Board and the Port Swettenham Authority were also accepted for training for short periods.

Pension Scheme

On 31st August, 1966, there were 1967 members of the staff on the Pensionable Establishment, an increase of 257 during the year.

Widows & Orphans' Provident Fund Scheme

The total number of members in this scheme on the 31st August, 1966 was 1869, an increase of 276 members.

Staff Relations

Regular meetings with the various Staff Unions both at Joint Industrial Council and Sectional Panel levels were held throughout the year. In all, there were 18 meetings.

The meetings, on the whole were very cordial and a number of major and minor grievances were settled amicably. Amongst the items that were settled at Joint Industrial Council level were Compensation for Field Staff, e.g. Meter Readers in the event of dog bites, Insurance cover for staff outside the scope of the Workmen's Compensation Ordinance, Alterations to Kilat Bungalow, Port Dickson, N.E.E. Rules and Regulations, and Medical Examination for Board Staff driving the Board's vehicles. A request for the adoption and implementation of an Agency Scheme in place of the Assisted Home Ownership Scheme was discussed during the year and it is hoped that the new scheme will be finalised very soon.

The Sectional Panel of the Joint Industrial Council met on 12 occasions. Three meetings were held with each of the following Staff Sides — the Senior Officers' Association, the Junior Officers' Union, the Technical Services' Union and the Employees Union. Subjects that were settled with Senior Officers' Association were Additional Chalets for the Holiday Bungalow at Port Dickson and a New Holiday Bungalow at Penang, the Provision of burglar-proof devices on the ground floors of quarters, Alternate Claims as provided in Personnel Circular 407, Seniority List of Division I Officers, Additional Ceiling Fans for Board Quarters, Provision of chain fences (complete with gates) for Board Quarters, and the question of the probationary period to be served by officers who are promoted to Timescale 'B'.

Matters relating to training courses for Clerical Staff, Tuition fees for Office Boys were discussed and resolved with the Junior Officers' Union at Sectional Panel meetings during the year.

Amongst the items that were discussed and resolved at Sectional Panel Meetings with the Technical Services Union were a special case for an allowance for moving from a private rented house to Board Quarters, the Installation of Telephone in the Quarters of Shift Charge Engineers at Connaught Bridge Power Station, Malacca Power Station, Sultan Ismail Power Station and Sultan Yussuf Power Station and the Installation of Telephone for Switching Station Operators at Batang Berjuntai.

Some of the subjects that were resolved at the Employees Union level were modifications to Board quarters, payment of wages to the Industrial and Manual Group once a month at the end of each month and a number of individual problems involving members of the Union.

Assisted Home Ownership Scheme

In collaboration with the Malaya Borneo Building Society, the Board operates an Assisted Home Ownership Scheme for its staff. Loans amounting to $341,285/- were granted during the year. Since the introduction of the scheme in 1953, a total of 159 members of the staff have been granted assistance to purchase houses. Loans so far granted amounted to $2,607,320/-. The Board is greatly appreciative of the assistance given to members of the staff by the Malaya Borneo Building Society.

Medical Facilities

Whenever possible, the Board seeks the assistance of private medical practitioners to provide medical treatment for its staff. The number of doctors appointed by the Board to serve the various districts rose from 30 to 32 at the end of the year.

Social and Recreational

Seven Holiday Bungalows, two at Port Dickson, one at Batu Ferringghi, Penang and four at Cameron Highlands continued to be very popular with the staff during the period under review, and arrangements are in hand to provide another bungalow in Penang. There is no increase in the number of Kilat Clubs which have been established to provide recreational and social facilities for staff in the States and the number remained at 21 as in the previous year.

The Best Kept House Award introduced in 1959, continued to have a beneficial effect on the standard of upkeep of Board quarters. In addition to the award of $50/- for the best kept house, an award of $30/- is made for the second best kept quarter. Twenty-four officers, six from each Area received these awards together with certificates at the 10th N.E.B. Annual Federation Sports Meeting.

The 10th N.E.B. Annual Federation Sports Meeting was held on 8th and 9th July, 1966. Performances showed considerable improvement and Northern Area once again emerged as Area Champions. The four Areas of the Board held Sports Meets at Kuala Lumpur, Ipoh, Malacca and Kota Bharu.

Co-operative Thrift and Loan Society

The Board's Co-operative Thrift and Loan Society showed steady progress during the year. The total number of members increased from 2384 to 2618 and the total subscriptions at the close of the financial year stood at $1,982,564/-. The Society's investments in Government Loans and Other Stock amounted to $744,000/-.

Death Levy Fund

This Fund was established by the staff themselves to provide immediate cash relief to the widow (or nominated beneficiary) of any employee member who dies in service. During the year under review, 16 employees died and a total of $61,161/- was distributed to their widows or nominated beneficiaries. Membership of the Fund continued to increase and as at 31st August, 1966, it stood at 4150, an increase of 407 over the membership on the same preceding year.

Effective from 1st July, 1966, the registration of the N.E.B. Employee Death Levy Fund was cancelled by the Registrar of Societies as in his opinion, the operation of this Fund was not in accordance with the Societies Act 1966 which came into force on 1st February, 1966. The Committee of Management however, decided to submit a memorandum to the Minister of Commerce and Industry requesting him to use his good offices to approach the Minister of Home Affairs to give favourable consideration to exempt this organisation from the provisions of the new Societies Act 1966 and it is hoped that the outcome will be favourable.

Chapter Nine
Administration of the Electricity Ordinance

General

The Division I staff employed in the Inspectorate Division during the period under review was as follows: -

Chief Electrical Inspector
Senior Electrical Inspector (North)
Senior Electrical Inspector (Central)
Electrical Inspector (South)
Electrical Inspector (East)

The post of Assistant Electrical Inspector (Central) in the Complement continued to remain unfilled. The smooth functioning of the Inspectorate was affected by changes of most of the senior staff proceeding either on promotion or on transfer.

Inspection of Installations

156 installations were inspected during the year showing no increase over the previous year. Details of the various types of installations inspected are given below: -

Registered Installations	78
Unregistered Installations	26
Public Licences	45
Private Licences	7
TOTAL:	156

Registered Installations

Altogether 77 new electrical installations with generating plant of over 10 kW in capacity were registered during the year while over the same period 37 which ceased operation had their certificates cancelled. By the end of August there were 725 installations including 61 owned by Government which were exempted from registration.

Resulting from inspections of installations which were passed, 16 Certificates of Registration were issued and the original Provisional Certificates withdrawn.

Examination for Certificates of Competency

Examinations for Certificates of Competency as Chargemen and Wiremen were held at 6 centres, viz., Kuala Lumpur, Ipoh, Johore Bahru, Kota Bharu, Butterworth and Kuantan. They were conducted at these centres as and when sufficient applications were received. One examination was held in Ipoh for the Certificate of Competency as an Electrical Engineer.

The table below gives details of the examinations held: -

Examination	Certificate issued without examination	Total No. of Applications Approved	Passed	Failed	Absent
Electrical Engineer ... 1st Grade	5	12	7	1	4
Electrical Engineer ... 2nd Grade	—	40	20	12	8
Chargeman	—	60	31	23	6
Removal of Restriction (Chargeman)	—	24	15	9	—
Wireman	—	222	112	73	37
Removal of Restriction (Wireman)	—	73	27	35	11
TOTAL	5	431	212	153	66

Registered Writing Contractors

At the end of the financial year 41 new wiring contractors were registered while 25 existing contractors were deleted from the register. The total number of wiring contractors registered at the end of the year was 445, an increase of 16 over the previous year.

Two of them had their Certificates suspended during the year for not having suitable premises to conduct their business.

Private Licensed Installations

The number of Private Installations in operation increased by 3 during the year to 120 with 5 new Licences being issued and 2 being cancelled. 58 Licences were renewed during the year.

Public Licensed Installations

Applications were received for Public Licences to supply electricity to 9 villages and these were still under investigation. Two licences were approved and issued, while 6 were cancelled, resulting in a net decrease of 4 over the previous year's total figure of 137 Public Licences.

Of the 6 which were cancelled during the year, 5 were taken over by the Board, i.e. Titi and Batu Kikir in Negeri Sembilan, Ulu Tiram in Johore and Ulu Yam and Sungei Way Rubber Estate in Selangor, while one was cancelled and converted to a Private Licence.

Investigation of Accidents

49 accidents which were reported to the Electrical Inspectorate were investigated and 4 were found to be non-electrical. This when compared with the previous year's figure of 66 shows a reduction of 21 which is most encouraging. Of the accidents reported 15 were fatal resulting in loss of life to 12 persons and killing of 5 animals. The remaining 30 accidents were non-fatal.

The main causes of these accidents were found to be due to: -

Unauthorised extensions

Faulty apparatus

Carelessness

Ignorance

Further investigations were held by the Chief Electrical Inspector on 14 of the accidents in accordance with Section 30 (3) of the Electricity Ordinance 1949. In 7 of them, it was considered that criminal proceedings could be brought against the persons concerned and the reports of the further investigation were forwarded to the Public Prosecutor.

A total of 43 fires were reported during the year but only 10 of them were found to have been caused by electricity. The main causes of these were due to overheating of apparatus, short circuit in wiring and loose connections.

Infringement of the Electricity Ordinance

Prosecutions were instituted during the year for infringement of the Electricity Ordinance and details of these are as follows: -

Prosecutions instituted during the year	—	4
Cases brought forward from previous year	—	5
Cases acquitted	—	2
Cases tried	—	4
Cases convicted	—	2
Cases carried forward to next year	—	5

Statistics

Statistics of monthly units generated in this country by Supply Authorities and Private Installations as well as units used for various purposes were compiled by the Inspectorate and the information submitted monthly to the Chief Statistician (Malaysia), Department of Statistics, Kuala Lumpur.

This, together with other statistical information required for compilation of the United Nations Year Book, were forwarded to the Chief of the Electrical Power Section, Industry & Trade Division, Economic Commission for Asia and the Far East, Bangkok.

Chapter Ten. Finance And Accounts

THE accounts and associated information for the seventeenth year of the Board's operation are given in Appendix I, which contains the following statements:

Statement 1 — Revenue Account

2 — Balance Sheet

3 — Notes on the Accounts

4 — Report of the Auditors

5 — Sales of Electricity

6 — Other Income

7 — Rechargeable Work Account

8 — Hire of Apparatus Account

9 — Operating Expenses

10 — Fixed Assets

11 — Provision for Depreciation

12 — Contributions from Consumers to Capital Works

13 — Capital Employed — Movement during the year

14 — Financing of Capital Requirements

Revenue Account

Total income for the year amounted to $113,474,507 and operating expenses to $76,467,476 (including depreciation of $19,043,995) leaving an operating surplus of $37,007,031. From this operating surplus of $37,007,031 there falls to be deducted interest payable amounting to $19,732,447 leaving net revenue of $17,274,584. Of this net revenue of $17,274,584, $15,974,584 was contributed to Capital Development Account and $1,300,000 to General Reserve.

As explained in the Annual Report for the year ended 31st August 1963 the balances as at 31st August 1963 on the Board's former capital reserves — the reserve for increased cost of replacement of fixed assets, insurance reserve and amortisation reserve — together with the balance on net revenue account as at 31st August 1963 and amounting in total to $30,846,759 were transferred on 31st August 1963 to the newly-opened Capital Development Account and these former capital reserves were then closed. The amounts contributed to reserves during the past five years are shown in Table 1 below:

TABLE 1

Contributions to Reserves (in thousands of dollars)

Reserve	Year ended 31st August				
	1962	1963	1964	1965	1966
Capital Development Account	—	8,055	5,033	10,613	15,975
Reserve for increased cost of replacement of fixed assets	4,100	—	—	—	—
Insurance Reserve	100	—	—	—	—
Amortisation Reserve	1,900	—	—	—	—
General Reserve	1,800	800	900	1,400	1,300
TOTAL	7,900	8,855	5,933	12,013	17,275

Interest on Ordinary Stock

The Board has declared a rate of interest of 5 per cent per annum for the year ended 31st August 1966 on its ordinary stock of $122,319,000; interest amounting to $4,989,923 will be paid on 28th February 1967. This is the fourth year in which interest at the rate of 5 per cent per annum has been paid on ordinary stock. During each of the first thirteen years of the Board's existence it paid interest at the rate of 4 per cent per annum on its ordinary stock. Out of the ordinary stock of $122,319,000 an amount of $119,319,000 is held by the Malaysian Government and the remaining $3,000,000 by the Government of the State of Pahang.

Financial Policy

In its 14th Annual Report for 1962/63 the Board reviewed and restated its general financial policy; this restatement is repeated here for convenient reference:

(1) The Board will fix its tariffs so that its total revenues will be sufficient to earn a return of not less than 8 per cent per annum on the average

value of its net fixed assets in operation during any financial year after meeting all operating expenses, including depreciation based on historical cost.

(2) The amount so earned will be used to meet interest charges, including interest on ordinary stock, and to make contributions to Capital Development Account and to General Reserve so that the amounts contributed to reserves, together with sums set aside for depreciation provision and other internal resources, will finance a reasonable proportion of capital expenditure, a reasonable proportion to be generally regarded as not less than 40 per cent or not more than 50 per cent of capital expenditure, taking one year with another.

(3) In allocating net revenue as between the Capital Development Account and General Reserve, the Board's aim will be to maintain the General Reserve at an amount approximately equal to 10 per cent of annual income from sales, the balance of net revenue to be placed to Capital Development Account.

Sales of Electricity

Income from sales increased during the year by $12,721,385 or 13.0% to $110,551,216. The annual growth of income from sales of electricity during the past five years is indicated in Table 2 below:

TABLE 2

Income from Sales of Electricity

Year ended 31st August	Income	Increase over preceding year
	$ million	%
1962	66.893	12.2
1963	75.094	12.3
1964	84.424	12.4
1965	97.830	15.9
1966	110.551	13.0

While income increased by 13.0% over the previous year, sales of units increased by 14.4% (see Table 3 below). This resulted in a fall in income per unit sold from 9.12 cents to 9.00 cents.

TABLE 3

Units Sold and Income from Sales — Increases over Previous Year

Class of Consumer	Units sold		Income	
	Units	Increase	Amount	Increase
	million	%	$ million	%
Domestic Light and Power	249.623	13.0	32.670	11.9
Commercial and Industrial:				
Lighting	93.268	8.7	19.855	8.4
Power	569.964	17.3	41.718	15.9
Dredges and Mines	314.895	12.3	16.308	13.8
TOTAL	1,227.750	14.4	110.551	13.0

Operating Expenses

Total operating expenses increased by $6,259,202 to $76,467,476 representing an increase of 8.9%. Operating expenses per unit sold decreased from 6.54 cents to 6.23 cents.

Generation costs rose by $919,794 to $31,324,172 but there was a fall in generation costs per unit sold from 3.07 cents to 2.81 cents, arising mainly from an increase in units sold from the Board's power stations from 990,243,381 units to 1,115,911,784 units. Fuel costs per unit sold fell by 0.09 cents from 1.42 cents to 1.33 cents. This fall was due partly to an increase in the number of units generated and sold from hydro-electric sources, namely from 329 million units to 397 million units, following the commissioning of the Cameron Highlands Hydro-Electric Scheme on 21st March 1963, (against which there are no fuel costs); it was also due in part to the favourable diesel fuel prices which came into effect from 1st September 1965. The average fuel cost per unit sold from thermal stations was 1.94 cents for stations using boiler fuel and 2.67 cents for stations using diesel fuel. Fuel duty remained unchanged during the year at $15 per ton on boiler fuel oil and 8 cents per gallon on diesel fuel oil.

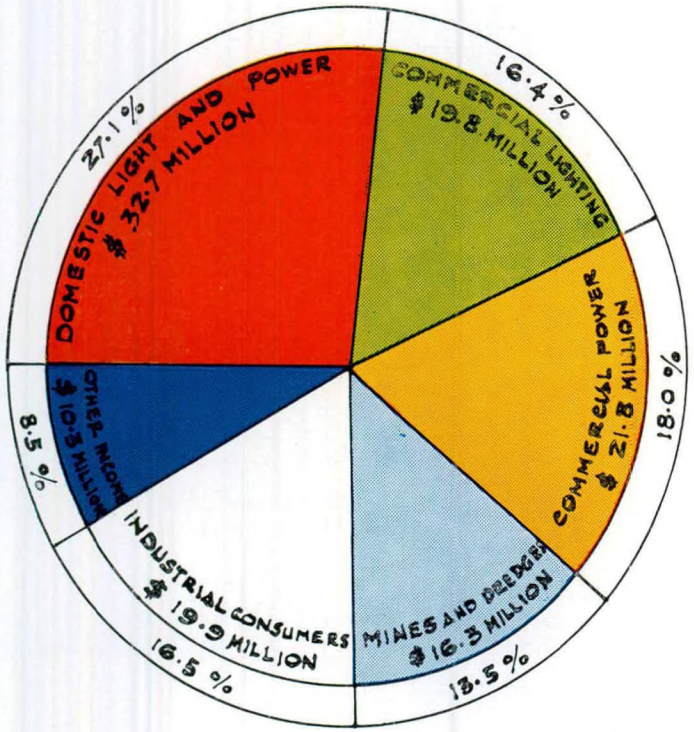
Bulk purchases of electricity rose by $968,848 to $5,246,102 following an increase in the sale of units purchased in bulk by 29,006,237 units to 111,837,853 units. As a result the cost of electricity purchased in bulk fell from 5.16 cents to 4.69 cents per unit sold.

Transmission expenses increased by $359,741 to $3,721,812 due mainly to the expansion of the transmission system to Bahau and Kuala Pilah. Transmission costs per unit sold fell from 0.31 cents to 0.30 cents.

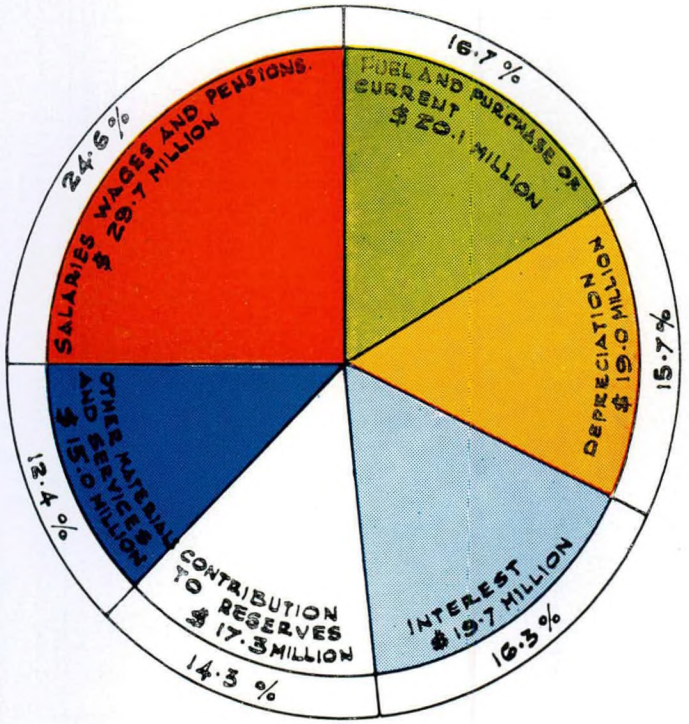
INCOME AND EXPENDITURE DIAGRAMS

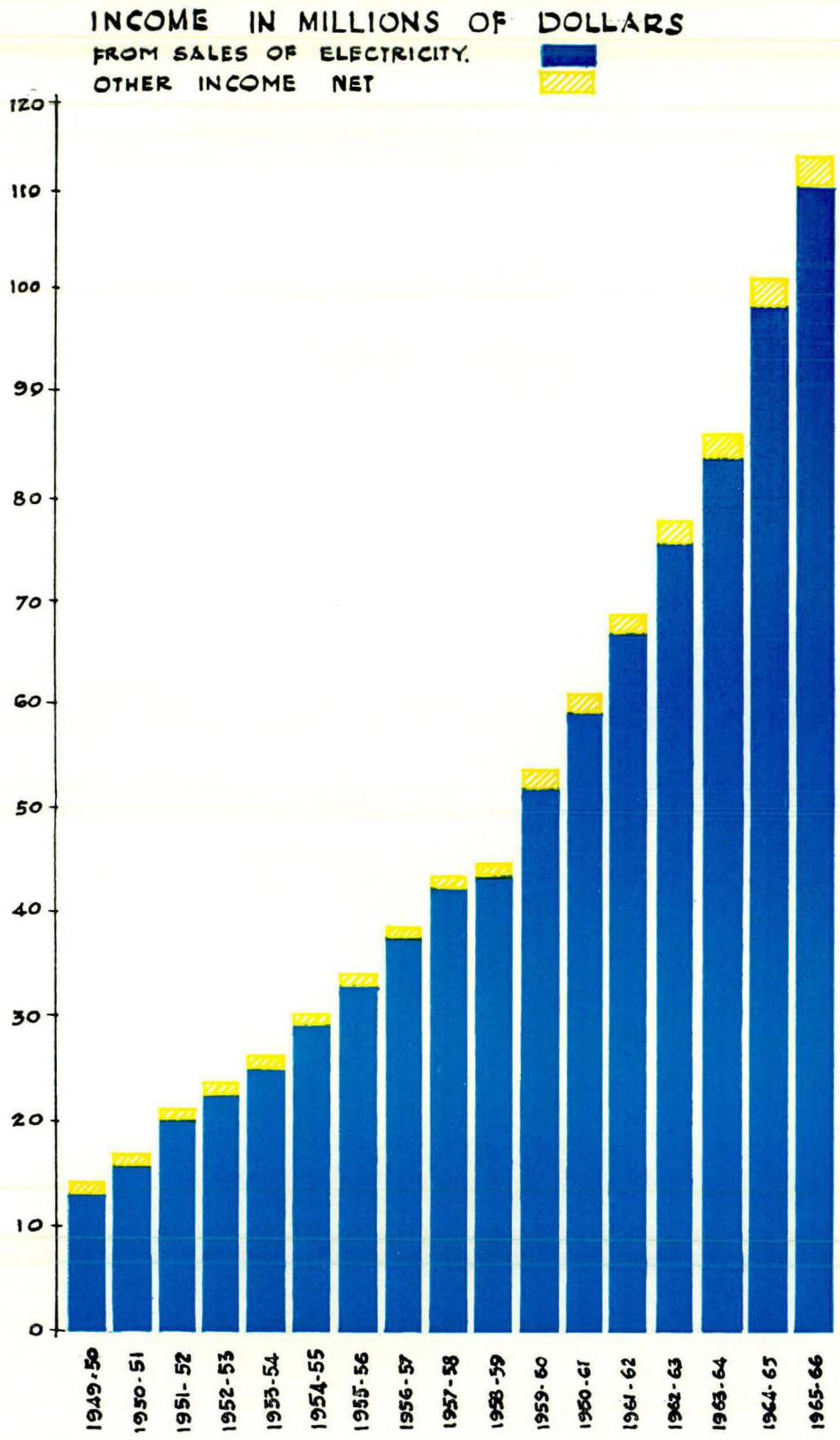
SHOWING THE RELATIVE PROPORTIONS OF THE MAIN CLASSES OF GROSS INCOME AND EXPENDITURE FOR THE YEAR 1965/66

INCOME



EXPENDITURE




INCOME IN MILLIONS OF DOLLARS
FROM SALES OF ELECTRICITY.
OTHER INCOME NET
120
110
100
90
80
70
60
50
40
30
20
10
0
1949-50
1950-51
1951-52
1952-53
1953-54
1954-55
1955-56
1956-57
1957-58
1958-59
1959-60
1960-61
1961-62
1962-63
1963-64
1964-65
1965-66

Distribution expenses increased by $2,102,576 to $17,474,083 due mainly to the continued extension of the distribution system. Distribution costs per unit sold fell from 1.43 cents to 1.42 cents.

The cost of consumers' service increased by $217,113 to $2,257,276. Consumers' service costs per unit sold fell from 0.19 cents to 0.18 cents.

The expenses of meter reading, billing and collection of accounts increased by $255,546 to $4,155,932. In cost per unit sold they fell from 0.36 cents to 0.34 cents.

Training and welfare expenses increased by $128,119 to $3,278,321. Training and welfare costs per unit sold fell from 0.30 cents to 0.27 cents.

Administration expenses increased by $243,762 to $3,113,845 but expressed in cents per unit sold fell from 0.27 cents to 0.26 cents.

General expenses after apportionment to rechargeable work increased by $1,063,703 to $5,895,933 representing an increase in cost per unit sold from 0.45 cents to 0.48 cents.

Fixed Assets

Capital expenditure for the year, less disposals of fixed assets, amounted to $112,154,998 bringing the amount of the Board's fixed assets at cost, less disposals, to $684,349,780. Of this capital expenditure of $112,154,998, an amount of $3,553,054 was incurred in respect of the first stage of the Cameron Highlands Hydro-Electric Scheme and projects cognate to the Scheme, bringing total capital expenditure to 31st August 1966 on these projects up to $154,097,134.

Expenditure of $79,899,353 was incurred in respect of the Batang Padang and Prai Power Development, which consists of the Batang Padang Hydro-Electric Scheme (the second stage of the Cameron Highlands Hydro-Electric Scheme), Prai Thermal Power Station, and associated transmission lines. Total capital expenditure up to 31st August 1966 on the Batang Padang and Prai Power Development was $154,793,509.

Depreciation for the year, less depreciation of $1,625,070 written back on assets scrapped or sold, amounted to $17,418,925 bringing the total provision for depreciation to $125,036,017 and giving the Board's fixed assets a written-down value of $559,313,763 before deduction of the balance on consumers' contribution account.

Return on Capital

As indicated in (1) of the Board's statement of financial policy quoted on page 103, the Board expects to earn a minimum annual net revenue return of 8% on its average net fixed assets in operation during the year after meeting all operating expenses including depreciation but before meeting interest payments. The net revenue returns for 1965/66 before and after meeting interest payments were 10.5% and 4.9% respectively, calculated as follows:

	As at 31st August 1965	As at 31st August 1966
	(in $ million)	(in $ million)
Fixed assets in operation (at cost)	468.0	505.9
Less: Depreciation	107.6	125.0
Consumers' contributions	16.7	18.7
Net fixed assets in operation	343.7	362.2

A. Average net fixed assets in operation during 1965/66	$353.0 million
B. Net revenue for 1965/66 (before meeting interest payments)	$ 37.0 million
C. Net revenue for 1965/66 (after meeting interest payments)	$ 17.3 million
Percentage of B to A	10.5%
Percentage of C to A	4.9%

Loan Arrangements

The Board is empowered to borrow money and raise capital in accordance with the provisions of Sections 17 (1) and 18 of the Electricity Ordinance 1949. The loans negotiated by the Board and are currently in operation are set out in Table 4 below:

TABLE 4

Loans in Operation

Lender	Amount
	Malayan $
Government of Malaysia —5 % loan	40,000,000
6 % loan	38,000,000
5¾% loan	13,000,000
	91,000,000
International Bank for Reconstruction and Development:	
Loan 210 MA (US$28,600,000)	87,551,007
Loan 350 MA (US$51,900,000)	158,900,000
Commonwealth Development Corporation (£7,077,950)	60,668,143
Employees Provident Fund Board	10,000,000
Commonwealth Development Finance Company Limited (£500,000)	4,285,714
Overdraft facilities with Chartered Bank, Kuala Lumpur: Secured by Government guarantee	9,000,000
Overdraft facilities with Chase Manhattan Bank, K. Lumpur: Secured by Government guarantee	6,000,000
	427,404,864

Of the above amount of $427,404,864 the sum of $77,323,977 was undrawn as at 31st August 1966. Details of individual loans are given in Note 3 of Statement 3 of Appendix I.

Ordinary Stock

The amount of ordinary stock issued increased by $35,000,000 from $87,319,000 to $122,319,000. Further details of ordinary stock are given in Note 2 of Statement 3 of Appendix I.

Financing of Cameron Highlands Hydro-Electric Scheme

The first stage of the Cameron Highlands Hydro-Electric Scheme is now estimated to cost $126 million and certain projects which are cognate to the Scheme are estimated to cost $32 million, making a total of $158 million, including $12.4 million interest capitalised during the construction period. (All monetary figures in this Report refer to Malayan dollars unless otherwise stated). Of this total amount of $158 million, foreign (i.e. offshore) expenditure is estimated at $88 million, including $8.3 million capitalised interest, while local expenditure is estimated at $70 million, including $4.1 million capitalised interest. To assist in the financing of the Scheme the World Bank lent the Board US$28.6 million (approximately $86 million) in respect of the offshore expenditure on the Scheme and on the other capital projects cognate to the Scheme. These other capital projects include a fourth 25 MW generator at the Sultan Yussuf Power Station at Jor and extensions to the transmission and distribution systems which will enable or have already enabled the Board to close down ten diesel generating stations and also to bring supplies to areas without electricity. The loan originally arranged with the World Bank was for a sum of US$35.6 million but by mutual agreement this amount was reduced by US$7 million to US$28.6 million. The loan closed on 31st August 1966.

To assist in financing local expenditure on the Scheme the Commonwealth Development Finance Company Limited lent the Board £500,000 (approximately $4.3 million) and the Government lent the Board $38 million. The Government also agreed that interest accruing on its loan up to 31st December 1963 and amounting to $4.5 million would be added to the principal amount of the loan. The balance of local expenditure on the Cameron Highlands Hydro-Eletric Scheme is being financed from the Board's internal resources.

The Deputy Chairman and General Manager of the N.E.B. Yang Mulia Raja Zainal bin Raja Sulaiman (sitting at centre) putting his signature to the $13 million Woh Power Station contract of the Batang Padang Hydro Electric Scheme. On his left is the Vice President of Fuji Electric Company Ltd., Mr. K. Shimazue and on his right is the Board's Secretary, Mr. G. R. Wheeler.

The World Bank made a loan equivalent to US$37 million (M$111 million) to the N.E.B. which will assist in financing the addition to 231,400 kilowatts of generating capacity to the systems operated by the Board. Signing the loan documents in Washington were from left to right, Tan Sri Ong Yoke Lin, Malaysian Ambassador, Mr. George D. Woods, President of the World Bank, Dato Haji Osman bin Talib, Chairman N.E.B. and Raja Zainal bin Raja Sulaiman, General Manager, N.E.B.

At the end of the year $87,512,556 (including $8,571,427 interest capitalised) had been drawn on the loan from the World Bank while the Commonwealth Development Finance Company loan of £500,000 and the Government loan of $38 million had both been fully drawn.

Financing of Batang Padang and Prai Power Development

The capital cost of the Batang Padang and Prai Power Development, which comprises the second stage of the Cameron Highlands Hydro-Electric Scheme, a thermal power station at Prai, and the expansion of transmission facilities designed to interconnect all the major generating stations on the west coast of Malaya, is being met out of funds provided by the World Bank and by the Government. The total cost of these three projects originally estimated at $224.7 million ($155.7 offshore and $69.0 local) has now been revised to $243.9 million, of which $160.6 million is offshore expenditure and $83.3 million is local expenditure.

The World Bank is providing a loan of US$51.9 million ($158.9 million) to finance the foreign exchange element of the cost of these projects, including approximately US$4 million ($12 million) in respect of interest capitalised during the period of construction. The Malaysian Government has guaranteed the World Bank loan and has agreed to subscribe to the Board's ordinary stock to the extent of $66.4 million for the purpose of meeting the local currency element of the cost. At the end of the year $81,592,000 (including $4,983,833 interest capitalised) had been drawn on the World Bank loan.

Financing of South Malaya Power Development

In order to finance the South Malaya Power Development, which consists of the construction of the first stage of the Port Dickson thermal station with a capacity of 120 MW; installation of a 30 MW generating unit and, subject to the prior approval of the World Bank, a second 30 MW generating unit at the Johore Bahru thermal station; installation of 51.4 MW additional generating capacity in the power stations comprising the Batang Padang Hydro-Electric Scheme and the construction of 275 kV and 132 kV transmission lines aggregating 250 circuit miles, negotiations were concluded in July 1966 with the World Bank and the Malaysian

Government for further funds to assist in financing the offshore and local expenditure respectively on these projects. The total cost of the Development is estimated at $153.3 million, of which $111.0 million is foreign expenditure and $42.3 million is local expenditure.

Financing of Capital Expenditure during 1965/66

As indicated in Statement 14, capital expenditure during the year amounted to $114,483,219. Allowing for a decrease of $8,269,219 in working capital, the total capital requirements for the year amounted to $106,214,000. An amount of $33,402,205 or 31.4 per cent was financed from internal resources and $72,811,795 or 68.6 per cent from loans and subscriptions to ordinary stock.

It may be useful to point out that the Board has, since its formation, reinvested all its contributions to reserves in the business, thereby reducing the amounts which it has had to borrow from external sources. One of the reasons for forming the Capital Development Account was to make it perfectly clear that the sums transferred to this account are (together with the contribution to general reserve, depreciation provision and other internal resources) used to finance the Board's capital programme, i.e. they do not represent sums of money over and above that required by the Board but represent instead additional revenue which has been deliberately secured as a contribution to capital development and is available only for investment in plant and other assets.

Pensions Scheme

The Chartered Bank (Malaya) Trustee Limited is the managing trustee of the National Electricity Board Pensions Scheme 1957. The accounts of the Pensions Scheme and associated information are given in Appendix II.

Widows and Orphans Provident Fund Scheme

The National Electricity Board Widows and Orphans Provident Fund Scheme 1964 came into force on 1st July 1964 following the termination of the previous arrangements made with the Manufacturers Life Insurance Company of Canada. The Chartered Bank (Malaya) Trustee Limited was appointed as the managing trustee of the new Scheme. The accounts of the Scheme and associated information are given in Appendix III.

Audit

Messrs. Hanafiah, Raslan, Ong and Mohamed were appointed in July 1966 to undertake outstation audits. Messrs. Price Waterhouse and Company, Kuala Lumpur, were re-appointed auditors to the Board for the year ended 31st August 1966 and have conducted a continuous audit of the accounts. Messrs Price Waterhouse and Company have also audited the accounts of the Pensions Scheme and the Widows and Orphans Provident Fund Scheme. The Auditors' Report on the Accounts of the Board is at Appendix I Statement 4 and their reports on the accounts of the Pensions Scheme and the Widows and Orphans Provident Fund Scheme are at Appendix II Statement 3 and Appendix III Statement 3 respectively.

IBM 1440 Data Processing System installed in the N.E.B's. Accounts Department.

Electronic Computer

During the year the Board installed an IBM 1440 electronic computer, which is now processing stores and payroll. General appreciation lectures on the computer system and tours of the Electronic Data Processing Section were given to about 1,000 Board employees and to visitors from Government Departments and various other organisations.

Appendices

APPENDICES

APPENDIX I

STATEMENT 1

NATIONAL ELECTRICITY BOARD OF THE STATES OF MALAYA

REVENUE ACCOUNT FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965		Particulars	$	$	Cents per unit sold	Notes on the accounts	Supporting statements
Cents per unit sold	$						
9.12	97,829,831	Income from sales of electricity	110,551,216		9.00	7	5
0.24	2,588,975	Other income	2,923,291		0.24		6
9.36	100,418,806			113,474,507	9.24		
		Deduct—Operating expenses:					
3.07	30,404,378	Generation	31,324,172		2.81		9
5.16	4,277,254	Electricity purchased in bulk	5,246,102		4.69		9
3.23	34,681,632		36,570,274		2.98		
0.31	3,362,071	Transmission	3,721,812		0.30		9
1.43	15,371,507	Distribution	17,474,083		1.42		9
0.19	2,040,163	Consumers' service	2,257,276		0.18		9
0.36	3,900,386	Meter reading, billing and collection of accounts ...	4,155,932		0.34		9
0.30	3,150,202	Training and welfare ...	3,278,321		0.27		9
0.27	2,870,083	Administration	3,113,845		0.26		9
0.45	4,832,230	General expenses	5,895,933		0.48		9
6.54	70,208,274			76,467,476	6.23		
2.82	30,210,532			37,007,031	3.01		
		Deduct—Interest payable on:					
1.31	14,062,578	Loan capital ...	13,928,819		1.13	3	
0.37	3,955,402	Ordinary stock ...	4,989,923		0.41	2	
0.06	639,825	Bank overdraft ...	813,705		0.07	5	
1.74	18,657,805			19,732,447	1.61		
1.08	11,552,727			17,274,584	1.40		
		Add—Amount set aside for turnover tax no					
0.04	460,000	longer required ...		—	—		
1.12	12,012,727	Net revenue—used to finance capital requirements ...		17,274,584	1.40		
		Deduct—Contributions to reserves:					
0.99	10,612,727	Capital development account	15,974,584		1.30		
0.13	1,400,000	General reserve	1,300,000		0.10		
1.12	12,012,727			17,274,584	1.40	4	

NATIONAL ELECTRICITY BOARD
BALANCE SHEET AS AT

31st August 1965 $		$	$	Notes on the accounts	Supporting Statements
	ISSUED CAPITAL—				
87,319,000	Ordinary stock		122,319,000	2	
	LOAN CAPITAL—				
	Loans:				
38,886,057	Government of Malaysia — 5 per cent ...	38,717,232			
12,849,861	— 5¾ per cent ...	12,407,821			
41,302,306	— 6 per cent ...	40,467,181			
10,000,000	Employees Provident Fund Board—6 per cent	10,000,000			
4,285,714	Commonwealth Development Finance Company Limited 6¾ per cent	4,285,714			
78,834,632	International Bank for Reconstruction and Development — Loan 210 MA - 5¾ per cent	79,746,230			
37,877,029	— Loan 350 MA - 5½ per cent	33,067,822			
54,620,816	Commonwealth Development Corporation — 6¼ per cent	53,175,425			
278,656,415			321,867,425	3	
	RESERVES INVESTED IN THE BOARD'S UNDERTAKING—				
54,546,891	Capital development account	70,521,475			
9,800,000	General reserve	11,100,000			
64,346,891			81,621,475	4	
430,322,306			525,807,900		13
	CURRENT LIABILITIES, DEPOSITS AND PROVISIONS—				
16,953,800	Trade creditors	30,329,052		10	
2,948,055	Other creditors and accrued liabilities ...	3,694,848			
8,022,590	Accrued interest	9,289,898			
10,834,351	Consumers deposits	12,105,315			
529,725	Provision for leave pay and passages ...	483,719			
13,029,186	Bank overdraft	2,023,284		5	
52,317,707			57,926,116		
482,640,013			583,734,016		

Future capital expenditure authorised by the Board at 31st August 1966 totalled approximately $260 million, of which $101 million was under contract at that date.

The explanatory notes on the accounts in Statement 3 form an integral part of this Balance Sheet and attached Revenue Account.

The report of the Auditors appears as Statement 4.

OF THE STATES OF MALAYA
31st AUGUST 1966

APPENDIX I
STATEMENT 2

31st August 1965 $		$	$	Notes on the accounts	Supporting Statements
	FIXED ASSETS—				
572,694,782	At cost less disposals	684,849,780		6	10
	Deduct:				
107,617,092	Provision for depreciation	125,036,017			11
465,077,690		559,813,763			
	Deduct:				
16,740,436	Balance of consumers' contributions account	18,727,598			12
448,337,254			541,086,165		
	CURRENT ASSETS—				
1,564,082	Fuel at cost	2,486,367			
18,140,097	Stores at cost	22,824,077			
1,442,198	Rechargeable work in progress at cost ...	1,054,271			
2,023,316	Staff advances	2,488,902			
	Debtors:				
7,553,635	Consumers	8,430,130			
1,652,248	Rechargeable work	1,926,252			
1,185,203	Miscellaneous	1,362,204			
10,391,086		11,718,586			
	Deduct:				
470,989	Provision for doubtful debts	567,435			
9,920,097		11,151,151			
33,089,790		40,004,768			
439,150	Payments in advance	1,004,136			
	Cash in hand and at banks:				
39,666	In hand	40,875			
734,153	At banks	1,598,072			
34,302,759			42,647,851		
482,640,013			583,734,016		

DATO OSMAN
Chairman

RAJA ZAINAL BIN RAJA SULAIMAN
General Manager

A. R. SINCLAIR
Deputy General Manager (Finance)

APPENDIX I

STATEMENT 3

ACCOUNTS FOR THE YEAR ENDED 31ST AUGUST 1966

NOTES ON THE ACCOUNTS

Introduction

THESE notes supplement the figures in the Revenue Account and Balance Sheet and form an integral part thereof. The Report of the Auditors appears as Statement 4.

Note 1 — CONVERSION OF OTHER CURRENCIES INTO DOLLARS

Conversion of US dollars into sterling has been made at the rate of US$2.80 to £1 and conversion of sterling into dollars at the rate of 2s 4d to $1.

At 31st August 1966 there was a contingent liability of approximately $1,774,675 representing the excess of the Board's liability for repayment of loans in foreign currencies, other than Indian rupees, calculated at rates of exchange ruling at 31st August 1966, over the Malayan dollar equivalent of the loans included in the Board's accounts.

This contingent liability of $1,774,675 is covered by a contingent asset of $2,509,075 arising from the reduction in the Malayan dollar equivalent of loans in Indian rupees as a result of the devaluation of that currency.

Note 2 — ORDINARY STOCK

Of the amount of $122,319,000 of issued ordinary stock, $119,319,000 is held by the Government of Malaysia and $3,000,000 by the State Government of Pahang. The following ordinary stock certificates were issued to the Government of Malaysia during the year under review: -

	$
Stock issued for capital subscribed on 15th January 1966	10,000,000
Stock issued for capital subscribed on 24th March 1966	5,000,000
Stock issued for capital subscribed on 13th May 1966	10,000,000
Stock issued for capital subscribed on 28th July 1966	10,000,000
	35,000,000

Interest on the above stock is limited by Section 23 of the Electricity Ordinance 1949 to a maximum average rate of 6 per cent per annum taking one year with another. The Board paid 4 per cent interest on its ordinary stock each year up to 31st August 1962 but in consideration of Government's agreement in November 1962 to take up a further $60 million of ordinary stock the Board gave

an undertaking that it would endeavour as from 1st September 1962 to pay an average rate of interest of 5 per cent per annum taking one year with another. Interest at the rate of 5 per cent per annum has been paid for each year since 1st September 1962.

Note 3 — Loan Capital

Loans from the Government of Malaysia — The Government of Malaysia has made three separate loans to the Board. The first loan was for an amount of $40,000,000 at a rate of interest of 5 per cent per annum, repayable by equal annual instalments (principal and interest) over a period of 60 years from the date of each individual drawing. At 31st August 1966 repayments of principal amounted to $1,282,768.

A loan of $13,000,000 at the rate of interest of $5\frac{3}{4}$ per cent per annum was given to finance certain specified projects within the Board's general development programme. Interest is payable half-yearly on 1st May and 1st November. Repayment of the loan is by equal half-yearly instalments (principal and interest) over a fifteen year period. With regard to the first drawing of $7,000,000 made on 1st January 1960 the first instalment was paid on 1st May 1965 and the final instalment is due on 1st November 1979. With regard to the second and final drawing of $6,000,000 made on 15th March 1961 the first instalment was paid on 1st May 1966 and the final instalment is due on 1st November 1980. At 31st August 1966 repayments of principal amounted to $592,179.

A loan of $38,000,000 was given to assist in the financing of the Cameron Highlands Hydro-Electric Scheme. Interest at the rate of 6 per cent per annum is payable half-yearly on 1st June and 1st December but interest up to 31st December 1963 amounting to $4,465,973 was not paid in cash by the Board but added to the principal amount of the loan and treated as part thereof. Repayment of the loan (including interest capitalised) is being made by fifty equal half-yearly instalments (principal and interest) which commenced on 1st June 1964, the final instalment falling due on 1st December 1988. At 31st August 1966 repayments of principal amounted to $1,998,792.

Loans from the Employees Provident Fund Board — The Employees Provident Fund Board lent the Board $5,000,000 on 18th March 1960 and a further $5,000,000 on 1st December 1962 at a rate of interest of 6 per cent per annum. Interest is payable half-yearly on 1st March and 1st September on both of these loans. Repayment of the loans will be made by twenty equal half-yearly instalments over a ten year period, namely 1st March 1971 to 1st September 1980 in the case of the first loan and 1st March 1973 to 1st September 1982 in the case of the second loan. Both of these loans are guaranteed by the Government of Malaysia.

Loan from the Commonwealth Development Finance Company Limited — The Commonwealth Development Finance Company Limited lent the Board a sum of £500,000 ($4,285,714) towards the cost of the Cameron Highlands Hydro-Electric Scheme. Interest at the rate of $6\frac{3}{4}$ per cent per annum is payable half-yearly on 30th June and 31st December. Repayment of the loan will be made by ten annual instalments of £50,000 each, commencing on 30th June 1970, the final instalment falling due on 30th June 1979. This loan is guaranteed by the Government of Malaysia.

Loans from the International Bank for Reconstruction and Development (World Bank) — The World Bank loan No. 210 MA was originally for an amount

in various currencies equivalent to US$35,600,000 ($108,979,574) towards the cost of the Cameron Highlands Hydro-Electric Scheme, being the amount of expenditure then estimated to be incurred outside Malaysia. Following the revised estimates of the cost of the Scheme the amount of the loan was reduced by mutual agreement first to US$30,600,000 ($93,673,454) and later to US$28,600,000 ($87,551,007): it was also agreed that expenditure incurred outside Malaysia on certain capital projects cognate to the Scheme could also be financed from the loan. Interest at 5¾ per cent per annum is payable half-yearly on 15th January and 15th July together with a commitment charge of 3/8 per cent per annum (reduced from ¾ per cent per annum from 1st July 1964) on the principal amount of the loan not drawn. A sum of US$2,800,000 ($8,571,427) representing interest and commitment charges during the period of construction of the Scheme has been capitalised and treated as drawings against the principal amount of the loan. A total amount of US$28,587,439 ($87,512,556) had been drawn against the principal amount of the loan up to 31st August 1966, including the sum of US$2,800,000 ($8,571,427) charged to the Board in respect of capitalised interest and commitment charges.

Payments are made by the Bank in various currencies and the Board is required to pay interest on the amounts drawn and later make loan repayments in the currencies in which payments have been made by the Bank. The amounts drawn to 31st August 1966 were as follows:

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US$8,227,724.95	8,227,725	25,186,909
Pounds sterling	£603,234.15s 3d	1,689,057	5,170,584
Deutschemark	DM 38,485,570.94	9,527,390	29,165,475
Japanese yen	Y 398,924,327.00	1,108,125	3,392,217
Netherlands guilders	FI 1,503,542.02	404,890	1,239,458
Indian rupees	Rs. 6,853,340.63	1,439,203	4,405,723
South African rands	R 211,094.46	295,532	904,690
Austrian schillings	AS 5,241,454.38	201,594	617,126
Australian dollars	A$ 1,777,216.89	1,990,483	6,093,314
French francs	FrF 8,036,052.10	1,627,700	4,982,754
Swiss francs	SwF 8,920,677.39	2,075,740	6,354,306
		US$28,587,439	M$87,512,556

While the rate of interest on the loan is shown as 5¾ per cent per annum, the World Bank has sold participations in early maturities amounting to the equivalent of US$2,311,000 and has reduced the annual rate of interest on the appropriate part of the loan to 5 per cent in respect of US$231,000, to 5¼ per cent in respect of US$1,280,000, and to 5½ per cent in respect of US$500,000 while there is no change in the rate of interest in respect of US$250,000. The loan is repayable over a period of twenty years by half-yearly payments on 15th January and 15th July; repayments commenced on 15th January 1964. This loan is guaranteed by the Government of Malaysia. Repayments of the principal amount of the loan made to 31st August 1966 were as follows: -

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US$ 2,057,000	2,057,000	6,296,938
Pounds sterling	£100,000	280,000	857,143
Deutschemark	DM 807,894	200,000	612,245
		US$2,537,000	M$7,766,326

The second loan No. 350 MA is for an amount in various currencies equivalent to US$51,900,000 (M$158,900,000) to finance the foreign exchange element of the cost of the Batang Padang and Prai Power Development. The Loan Agreement with the World Bank was signed on 7th August 1963 and the loan became effective on 25th October 1963. As with the first loan, the Board is required to pay interest on the amounts drawn and later make loan repayments in the currencies in which payments have been made by the Bank. The amounts drawn to 31st August 1966 were as follows: -

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US$13,447,613.90	13,447,614	41,166,158
Deutschemark	DM 34,942,007.28	8,735,502	26,741,328
Indian rupees	Rs 4,225,316.18	863,637	2,643,785
Pounds sterling	£369,117.5s 8d	1,033,529	3,163,862
Belgian francs	BF 10,782,419.00	215,648	660,148
Australian dollars	A$ 555,198.50	621,822	1,903,537
Japanese yen	Y 206,180,781.00	572,724	1,753,238
Canadian dollars	C$ 718,048.04	664,195	2,033,250
Swedish kroner	Swk 83,988.90	16,235	49,700
Italian lire	IL 94,863,525.00	151,782	464,638
Iranian rials	Rls 25,050,754.90	330,703	1,012,356
		US$26,653,391	M$81,592,000

The loan is to be repaid over a period of twenty years by half-yearly payments on 1st May and 1st November commencing on 1st May 1968. Interest at $5\frac{1}{2}$ per cent per annum is payable half-yearly on 1st May and 1st November each year, together with a commitment charge of 3/8 per cent per annum (reduced from $\frac{3}{4}$ per cent per annum from 1st July 1964) on the principal amount of the loan not drawn. A sum of US$4,000,000 (M$12,000,000) was included in the loan to cover capitalisation of interest and commitment charges during the period of construction of the projects up to 1st November 1967. At 31st August 1966 a sum of US$1,628,052 (M$4,983,833) had been charged to the Board's loan account by the Bank in respect of interest and commitment charges up to 1st May 1966. Interest and commitment charges accruing from 1st May 1966 to 31st August 1966 amounting to US$482,102 (M$1,475,822) have been capitalised and treated as a drawing in

the Board's accounts, making the total amount of the loan drawn as at 31st August 1966 US$27,135,493 (M$83,067,822) i.e. US$26,653,391 drawn plus accrued interest and commitment charges of US$482,102. The Bank has sold participations in early maturities amounting to US$2,830,000 and has reduced the annual rate of interest on this part of the loan from 5½ per cent to 5¼ per cent. This loan is also guaranteed by the Government of Malaysia.

Loan from the Commonwealth Development Corporation — The three Commonwealth Development Corporation debentures amounting to £7,077,950 ($60,668,143) were redeemed on 19th January 1960 and replaced on the same date by a new loan of the same amount bearing interest at 6¼ per cent per annum. The loan is repayable by equal annual instalments (principal and interest) over 25 years commencing on 25th March 1961, the final instalment falling due on 25th March 1985. At 31st August 1966 the amount repaid was £874,150.6s 3d ($7,492,715). This loan is guaranteed by the Government of Malaysia.

Note 4 — RESERVES

The Board has only two reserves, namely a capital reserve, i.e. the Capital Development Account, and a revenue reserve, i.e. the General Reserve. The Board's policy is to make such annual contributions to General Reserve as will maintain the General Reserve at an amount approximately equal to 10 per cent of annual income from sales. The balance of net revenue available after the contribution has been made to General Reserve is then placed to Capital Development Account. The whole of the Board's net revenue is thus reinvested in the industry by being used, together with the annual depreciation provision and other internal resources, to finance a substantial part of the Board's capital expenditure.

Note 5 — BANK OVERDRAFT

The Board has two overdraft accounts, both subject to annual review, one with the Chartered Bank, Kuala Lumpur and the other with the Chase Manhattan Bank, Kuala Lumpur. The overdraft facilities with the Chartered Bank are for a maximum of $9 million secured by a Government guarantee and are in force until 31st July 1967. The overdraft facilities with the Chase Manhattan Bank are for a maximum of $6 million secured by a Government guarantee and are in force until 23rd May 1967. The rate of interest charged in respect of the overdraft facilities is the Malayan Exchange Banks Association's agreed minimum rate for clean advances, which at the end of the year under review was 7 per cent per annum.

Note 6 — LAND

Included in the fixed assets is the sum of $12,928,807 for land. This amount is made up as follows: -

Freehold land	$10,970,310
Leasehold land	$ 1,958,497

Included in the cost of freehold land is the sum of $1,034,345 in respect of land taken over from Government under the provision of Section 29 of the Electricity Ordinance for which it has still not been possible to obtain satisfactory titles. As mentioned in previous reports the Government has undertaken to assist the Board to obtain titles to this land from the State Governments concerned.

Note 7 — Income from Sales of Electricity

As in previous years the amount credited to revenue account represents charges for electricity calculated on the meter readings taken during the year to 31st August and revenue from unread consumption of electricity to 31st August 1966 has not therefore been included in the accounts.

Note 8 — Cost-of-Living Allowances on Pensions

Cost-of-living allowances paid on pensions are charged against the Board's revenues and not against the Pension Fund. The Board has a present and continuing liability for cost-of-living allowances payable on pensions which is estimated as being of the order of $1,700,000.

A provision for cost-of-living allowances payable on pensions was set up in 1962/63 and a sum of $200,000 was placed to this provision with the intention that similar annual amounts would be provided in future years. A sum of $200,000 each was placed to this provision in 1963/64 and 1964/65 and a further sum of $200,000 was placed to this provision in respect of the current year bringing the amount up to $800,000. Until the total provision is of an adequate size, cost-of-living allowances paid each year will be charged to the Board's revenue and not to the provision.

Note 9 — Contingent Liability in Respect of Malaya Borneo Building Society Limited

In accordance with an Agreement dated 28th October 1960 between the Board and the Malaya Borneo Building Society Limited, the Board has guaranteed overdraft facilities which the Chartered Bank, Kuala Lumpur, is prepared to give to the Society up to a sum not exceeding $1 million so that the Society may grant loans to Board employees to enable such employees to build or purchase dwelling houses for their own occupation. The overdraft facilities had not been used at 31st August 1966.

The Board has also given guarantees to the Malaya Borneo Building Society Limited in respect of the excess amount of any loan granted by the Society to Board employees over the maximum amount which the Society would normally advance to a borrower for the building or purchase of a dwelling house. The total amounts guaranteed on individual loans to Board employees at 31st August 1966 were $576,765.

Note 10 — Trade Creditors

The balance sheet figure for Trade Creditors includes capital expenditure of $8,756,790 in respect of the Batang Padang and Prai Power Development for which payment has since been effected by the International Bank for Reconstruction and Development under Loan 350 MA.

APPENDIX I

STATEMENT 4

ACCOUNTS FOR THE YEAR ENDED 31st AUGUST 1966

REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2)OF THE ELECTRICITY ORDINANCE 1949 TO AUDIT THE ACCOUNTS OF THE NATIONAL ELECTRICITY BOARD OF THE STATES OF MALAYA

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit. In our opinion proper books of account have been kept by the Board so far as appears from our examination of those books and proper returns adequate for the purposes of our audit have been received from district offices which were not visited by us.

We have examined the annexed Balance Sheet and Revenue Account which are in agreement with the books of account and returns. In our opinion and to the best of our information and according to the explanations given to us, the Balance Sheet, together with the Notes annexed thereto, gives a true and fair view of the state of the affairs of the Board as at 31st August 1966 and the Revenue Account gives a true and fair view of the results of its operations for the year ended on that date.

PRICE WATERHOUSE & CO.,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Kuala Lumpur.
28th February 1967.

APPENDIX I

STATEMENT 5

SALES OF ELECTRICITY FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965			Class of Consumer			
Income $	Units 000's	Cents per unit sold		Income $	Units 000's	Cents per unit sold
			DOMESTIC CONSUMERS—			
8,140,596	29,793	27.32	Lighting	8,583,382	31,507	27.24
15,576,404	133,416	11.67	Block tariff	17,913,070	151,886	11.79
23,717,000	163,209	14.53	Total	26,496,452	183,393	14.45
			COMMERCIAL CONSUMERS—			
15,407,062	65,852	23.40	Lighting	16,702,813	71,477	23.37
18,499,133	222,738	8.30	Power	21,810,093	263,682	8.27
33,906,195	288,590	11.75	Total	38,512,906	335,159	11.49
			INDUSTRIAL CONSUMERS—			
8,911,206	170,480	5.23	Dredges	8,824,808	168,847	5.23
5,420,605	110,001	4.93	Open cast mines	7,483,534	146,048	5.12
17,484,293	263,099	6.64	Others	19,907,925	306,282	6.50
31,816,104	543,580	5.85	Total	36,216,267	621,177	5.83
5,476,620	57,725	9.49	FORCES CONSUMERS ...	6,173,899	66,230	9.32
2,913,912	19,971	14.59	PUBLIC LIGHTING CONSUMERS	3,151,692	21,791	14.47
97,829,831	1,073,075	9.12	TOTAL SALES OF ELECTRICITY	110,551,216	1,227,750	9.00

STATEMENT 6

OTHER INCOME FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965 $	Particulars	$	$
	TRADING PROFITS:		
234,310	Rechargeable work	329,007	
29,206	Hire of apparatus	30,437	
263,516			359,444
	MISCELLANEOUS INCOME:		
1,366,466	Transfer from consumers' contributions account	1,641,302	
950,277	Sundry receipts	908,131	
2,316,743			2,549,433
8,716	INTEREST RECEIVABLE		14,414
2,588,975	OTHER INCOME CARRIED TO REVENUE ACCOUNT		2,923,291

APPENDIX I

STATEMENT 7

RECHARGEABLE WORK ACCOUNT FOR THE YEAR ENDED 31ST AUGUST 1966

Year ended 31st August 1965 $	Particulars	$	$	$
7,244,966	Charges for work done or supervised by the Board			6,969,242
	Deduct:			
	Direct Costs:			
2,317,393	Salaries and wages	2,396,559		
1,721,964	Materials	1,195,844		
668,820	Transport and travelling expenses	743,129		
1,913,248	Sub-contractors' charges	1,114,549		
6,621,425			5,450,081	
	Indirect Costs:			
536,843	Salaries and wages	608,056		
17,375	Repairs and maintenance	26,746		
2,434	Sundry expenses	3,657		
22,065	Depreciation of equipment	21,526		
129,595	Apportionment of general expenses	142,242		
708,312			802,227	
7,329,737			6,252,308	
	Add:			
1,123,117	Work in progress at 31st August 1965		1,442,198	
8,452,854			7,694,506	
	Deduct:			
1,442,198	Work in progress at 31st August 1966		1,054,271	
7,010,656				6,640,235
234,310	Profit transferred to Other Income			329,007

STATEMENT 8

HIRE OF APPARATUS ACCOUNT FOR THE YEAR ENDED 31ST AUGUST 1966

Year ended 31st August 1965 $	Particulars	$	$	$
776,308	Revenue from hire of apparatus			752,838
	Deduct:			
	Direct Costs:			
120,721	Salaries and wages	106,973		
267,206	Repairs and maintenance	272,469		
51,878	Transport and travelling expenses	61,549		
77,179	Installation expenses	71,360		
516,984			512,351	
	Indirect Costs:			
230,118	Depreciation of apparatus		210,050	
747,102				722,401
29,206	Profit transferred to Other Income			30,437

APPENDIX I

STATEMENT 9

OPERATING EXPENSES FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965		Particulars	$	$	Cents per unit sold
Cents per unit sold	$				
		GENERATION—			
0.45	4,433,739	Salaries and wages - operation	4,605,432		0.41
1.42	14,126,589	Fuel	14,830,873		1.33
0.08	773,105	Oil, water and engine room stores	686,423		0.06
0.04	404,574	Transport and travelling expenses	455,099		0.04
0.39	3,829,765	Repairs and maintenance	3,469,654		0.31
0.69	6,836,606	Depreciation	7,276,691		0.66
3.07	30,404,378			31,324,172	2.81
5.16	4,277,254	ELECTRICITY PURCHASED IN BULK		5,246,102	4.69
3.23	34,681,632			36,570,274	2.98
		TRANSMISSION—			
0.07	786,034	Salaries and wages - operation	844,844		0.07
0.02	240,422	Transport and travelling expenses	320,549		0.02
0.05	514,364	Repairs and maintenance	731,322		0.06
0.17	1,821,251	Depreciation	1,825,097		0.15
0.31	3,362,071			3,721,812	0.30
		DISTRIBUTION—			
0.26	2,746,975	Salaries and wages - operation	3,036,988		0.25
0.36	3,909,100	Repairs and maintenance	4,394,407		0.36
0.14	1,540,886	Transport and travelling expenses	1,750,395		0.14
0.04	408,703	Public lighting - repairs and renewals	445,734		0.03
0.63	6,765,843	Depreciation	7,846,559		0.64
1.43	15,371,507			17,474,083	1.42
		CONSUMERS' SERVICE—			
0.09	1,011,353	Salaries and wages	988,708		0.08
0.06	649,546	Connection and testing expenses	762,960		0.06
0.04	373,921	Transport and travelling expenses	498,858		0.04
—	5,343	Publicity, exhibition, etc.	6,750		—
0.19	2,040,163			2,257,276	0.18
		METER READING, BILLING AND COLLECTION OF ACCOUNTS—			
0.30	3,263,467	Salaries and wages	3,500,271		0.29
0.02	230,152	Commission for collecting electricity accounts	254,654		0.02
0.04	406,767	Transport and travelling expenses	401,007		0.03
0.36	3,900,386			4,155,932	0.34
		TRAINING AND WELFARE—			
0.02	162,350	Salaries and wages	167,755		0.01
0.03	292,946	Welfare expenses	313,802		0.03
0.01	56,724	Transport and travelling expenses	52,778		0.01
0.24	2,638,182	Training expenses	2,743,986		0.22
0.30	3,150,202			3,278,321	0.27
5.82	62,505,961	Balance carried forward		67,457,698	5.49

APPENDIX I

STATEMENT 9 *(Continued)*

OPERATING EXPENSES FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965		Particulars	$	$	Cents per unit sold
Cents per unit sold	$				
5.82	62,505,961	Balance brought forward		67,457,698	5.49
		ADMINISTRATION—			
		Salaries, wages and allowances:			
0.05	583,933	Management	593,969		0.05
0.14	1,480,359	Accounting	1,698,481		0.14
0.05	559,357	Secretarial and general	542,719		0.05
0.03	246,434	Transport and travelling expenses ...	278,676		0.02
0.27	2,870,083			3,113,845	0.26
		GENERAL EXPENSES—			
—	—	Consultants' fees and allowances	90,361		0.01
0.03	361,664	Stationery and printing	417,943		0.03
0.05	488,224	Postages, telephones and telegrams ...	536,100		0.04
0.10	1,059,103	Repairs and maintenance	1,172,549		0.10
—	35,000	Audit fees	37,118		—
0.02	217,775	Rent, rates, local taxes, etc.	254,870		0.02
0.05	565,959	Insurances	778,579		0.07
0.01	111,009	Advertising and legal expenses	120,392		0.01
—	8,494	Subscriptions and donations	16,043		—
0.02	242,140	Outfit allowances, uniforms, etc.	293,797		0.02
—	8,064	Overseas conferences	8,486		—
0.01	81,048	Miscellaneous expenses	77,848		0.01
0.06	591,832	Depreciation	621,761		0.05
0.01	90,726	Loss on exchange	52,178		—
0.02	168,927	Investigation of potential hydro-electric schemes	131,887		0.01
		Compensation payable under Board's			
0.05	579,963	Malayanication Scheme	216,700		0.02
(0.01)	(134,012)	Loss (profit) on assets dismantled	(247,263)		(0.02)
—	—	Deterioration and loss of stores	161,162		0.01
		Pre-commissioning expenses —			
—	—	Prai Power Station	89,784		0.01
		Arrears of pay to industrial and manual			
0.04	485,909	staff for period 1.1.63 to 31.8.64 ...	7,330		—
		Interim award in respect of period 1.9.65 to			
—	—	31.8.66	1,200,000		0.10
0.46	4,961,825		6,038,175		0.49
		Deduct:			
0.01	129,595	Amount apportioned to rechargeable work	142,242		0.01
0.45	4,832,230			5,895,933	0.48
6.54	70,208,274	TOTAL OPERATING EXPENSES		76,467,476	6.23

APPENDIX I

STATEMENT 10

FIXED ASSETS

A. MOVEMENTS DURING YEAR ON FIXED ASSETS (EXCLUDING CAPITAL PROJECTS IN PROGRESS)

Particulars	At 1st September 1965 $	Less Dismantled or sold during the year $	Projects completed or reclassified during the year $	At 31st August 1966 $
GENERATION—				
Land, buildings and civil works	110,109,353	—	465,122	110,574,475
Plant and machinery	103,007,000	328,140	7,980,341	110,659,201
TRANSMISSION—				
Land, buildings and civil works	2,019,717	—	64,566	2,084,283
Plant and machinery	20,200,644	—	705,660	20,906,304
Lines	32,293,635	34,204	4,097,272	36,356,703
DISTRIBUTION—				
Land, buildings and civil works	3,563,868	6,280	228,418	3,786,006
Plant and machinery	34,705,460	517,299	3,235,571	37,423,732
Mains and lines	78,765,384	297,403	9,011,558	87,479,539
Services	19,060,812	915,999	3,384,593	21,529,406
Meters	11,187,917	138,394	1,159,329	12,208,852
Public lighting	4,346,139	14,445	306,943	4,638,637
GENERAL ASSETS—				
Land, buildings and civil works	34,886,098	1,584	8,977,330	43,861,844
Plant and machinery	783,913	1,274	109,385	892,024
Furniture, fittings and office equipment ...	4,581,024	18,543	197,316	4,759,797
TRANSPORT—				
Motor vehicles	3,784,061	13,835	343,760	4,113,986
WORKSHOP—				
Land, buildings and civil works	342,291	—	—	342,291
Plant and machinery	399,856	3,250	4,013	400,619
APPARATUS FOR HIRE	3,998,240	37,571	— 71,872	3,888,797
FIXED ASSETS EMPLOYED IN EARNING REVENUE	468,035,412	2,328,221	40,199,305	505,906,496

B. MOVEMENTS DURING YEAR ON CAPITAL PROJECTS IN PROGRESS

Particulars	At 1st September 1965 $	Capital expenditure during the year $	Less Capital projects completed during the year $	At 31st August 1966 $
South Malaya Power Development ...	178,707	2,723,427	—	2,902,134
Batang Padang Hydro Electric Scheme ...	52,633,735	34,105,028	—	86,738,763
Prai Power Station	12,140,269	22,989,650	—	35,129,919
Transmission lines associated with Batang Padang and Prai Schemes	10,120,152	22,804,675	—	32,924,827
Cameron Highlands Cognate Projects ...	5,120,815	3,351,881	5,105,906	3,366,790
Transmission lines	638,459	138,894	573,553	203,800
Distribution system	10,527,681	18,230,295	14,586,733	14,171,243
Other works	13,299,552	10,139,369	19,933,113	3,505,808
	104,659,370	114,483,219	40,199,305	178,943,284
TOTAL FIXED ASSETS AT COST LESS DISPOSALS (A + B)	572,694,782	112,154,998	—	684,849,780

APPENDIX I

STATEMENT 11

PROVISION FOR DEPRECIATION

Year ended 31st August 1965 $	Particulars	$	$
96,107,214	Balance as at 1st September 1965		107,617,092
	Deduct:		
5,786,314	Depreciation provision in respect of assets dismantled or sold during the year ended 31st August 1966		1,625,070
90,320,900			105,992,022
	Add:		
	Provision for depreciation for the year ended 31st August 1966 charged to Revenue as follows:		
6,836,606	Generation	7,276,691	
1,821,251	Transmission	1,825,097	
6,765,843	Distribution	7,346,559	
591,832	Office and stores buildings	621,761	
707,419	Staff houses	727,863	
22,065	Workshops	21,526	
321,058	Transport	504,448	
230,118	Hired apparatus	210,050	
17,296,192			19,043,995
107,617,092	Balance as at 31st August 1966		125,036,017

STATEMENT 12

CONTRIBUTIONS FROM CONSUMERS TO CAPITAL WORKS

Year ended 31st August 1965 $	Particulars	$
13,690,574	Balance of contributions as at 1st September 1965	16,740,436
	Add:	
4,416,328	Contributions receivable during the year ended 31st August 1966	3,628,464
18,106,902		20,368,900
	Deduct:	
	Amount transferred to Other Income based on the estimated average	
1,366,466	lives of the assets for which the contributions were received	1,641,302
16,740,436	Balance of contributions as at 31st August 1966	18,727,598

APPENDIX I

STATEMENT 13

CAPITAL EMPLOYED — MOVEMENT DURING THE YEAR ENDED 31st AUGUST 1966

Particulars	At 31st August 1965 $	Additions during the year $	Repayments during the year $	At 31st August 1966 $
ISSUED CAPITAL—				
Ordinary stock	87,319,000	35,000,000	—	122,319,000
LOAN CAPITAL—				
Loans:				
Government of Malaysia — 5 per cent	38,886,057	—	168,825	38,717,232
— 5¾ per cent	12,849,861	—	442,040	12,407,821
— 6 per cent	41,302,306	—	835,125	40,467,181
Employees Provident Fund Board at 6 per cent	10,000,000	—	—	10,000,000
Commonwealth Development Finance Company Limited at 6¾ per cent ...	4,285,714	—	—	4,285,714
International Bank for Reconstruction and Development — Loan 210 MA at 5¾ per cent	78,834,632	3,626,904	2,715,306	79,746,230
— Loan 350 MA at 5½ per cent	37,877,029	45,190,793	—	83,067,822
Commonwealth Development Corporation at 6¼ per cent	54,620,816	—	1,445,391	53,175,425
	278,656,415	48,817,697	5,606,687	321,867,425
RESERVES INVESTED IN THE BOARD'S UNDERTAKING				
Capital development account	54,546,891	15,974,584	—	70,521,475
General reserve	9,800,000	1,300,000	—	11,100,000
	64,346,891	17,274,584	—	81,621,475
Total Issued and Loan Capital and Reserves invested in the Board's Undertaking as shown in the Balance Sheet	430,322,306	101,092,281	5,606,687	525,807,900

APPENDIX I

STATEMENT 14

FINANCING OF CAPITAL REQUIREMENTS FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965		Particulars	$	$	%
$	%				
		CAPITAL REQUIREMENTS—			
83,961,149	103.0	Capital expenditure during the year	114,483,219		107.8
2,406,293	3.0	Decrease in working capital	8,269,219		7.8
81,554,856	100.0	TOTAL CAPITAL REQUIREMENTS		106,214,000	100.0
		SOURCES OF FINANCE—			
		Internal Resources:			
17,296,192	21.2	Depreciation provision	19,043,995		17.9
12,012,727	14.7	Contributions to reserves	17,274,584		16.3
29,308,919	35.9	Retained revenue income	36,318,579		34.2
3,049,862	3.7	Consumers' contributions	1,987,162		1.9
1,343,810	1.7	Disposals of fixed assets	703,151		0.6
33,702,591	41.3		39,008,892		36.7
5,023,782	6.1	*Deduct* — Loan repayments	5,606,687		5.3
28,678,809	35.2	Total Internal Resources		33,402,205	31.4
		External Resources:			
		Borrowings:			
5,921,977	7.2	International Bank for Reconstruction and Development — Loan 210 MA	3,626,904		3.4
27,394,847	33.6	— Loan 350 MA	45,190,793		42.6
4,559,223	5.6	Increase (decrease) in Bank Overdraft	(11,005,902)		(10.4)
		Issue of ordinary stock:			
15,000,000	18.4	Government of Malaysia	35,000,000		33.0
52,876,047	64.8	Total External Resources		72,811,795	68.6
81,554,856	100.0	TOTAL SOURCES OF FINANCE		106,214,000	100.0

APPENDIX II

STATEMENT I

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME 1957
STATEMENT OF ACCOUNT FOR THE YEAR ENDED 31st AUGUST 1966

Year ended 31st August 1965 $	Particulars	$	$
12,561,477	Balance of Pension Fund as at 1st September 1965		**15,370,840**
	Add — Contributions by the Board:		
2,072,900	Contributions based on pensionable emoluments	2,264,633	
1,305	Provision for pension written back	1,013	
60,261	Profit on disposal of investments	84,042	
	Investment Income:		
429,502	Interest on Government and Municipal securities	547,021	
406,075	Dividends	438,757	
27,500	Interest on fixed deposit	30,729	
5,290	Bank interest	3,405	
3,002,833			3,369,600
15,564,310			18,740,440
112,363	*Deduct* — Pensions and retiring allowances paid	125,420	
81,107	Gratuities paid	158,114	
193,470			283,534
15,370,840	Balance of Pension Fund as at 31st August 1966		18,456,906

Notes:

1. In accordance with Section 7(1) of the National Electricity Board Pensions Scheme 1957, the National Electricity Board appointed The Chartered Bank (Malaya) Trustee Limited as trustees to administer the Pension Fund as from 1st September 1957.

2. A valuation of the Fund as at 31st August 1963 disclosed a surplus of $22,000 as at that date.

For The Chartered Bank (Malaya) Trustee Limited

A. T. HOOKER
Manager.

APPENDIX II

STATEMENT 2

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME 1957
THE BALANCE OF THE PENSION FUND AT 31st AUGUST 1966
IS REPRESENTED BY:

Year ended 31st August 1965 $	Particulars	$	$
	Investments at cost:		
1,828,574	Malaysian Government and Penang Municipal securities	2,673,584	
	Singapore Government and Municipal securities	77,962	
1,220,073	Malaysian Government securities issued in London	1,220,072	
4,434,076	British Government securities	5,014,979	
1,929,177	Other Commonwealth Government securities issued in London	1,967,459	
4,477,987	Malaysian and Singapore stocks and shares	5,711,450	
452,755	United Kingdom stocks and shares	459,443	
14,342,642	(Market value — $17,756,725)		17,124,949
	Debtors:		
203,975	National Electricity Board	221,110	
155,359	Sundry	266,162	
359,334			487,272
	Balances with The Chartered Bank on current account—		
190,775	Singapore	365,890	
	Kuala Lumpur	24,891	
190,775			390,781
500,000	Deposit with Malaya Borneo Building Society Limited	500,000	
—	Deposit with The Chartered Bank, Kuala Lumpur	100,000	
500,000			600,000
15,392,751			18,603,002
	Deduct — Creditors:		
15,649	For securities purchased	129,792	
6,262	Sundry	16,304	
21,911			146,096
15,370,840			18,456,906

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME 1957
ACCOUNTS FOR THE YEAR ENDED 31st AUGUST 1966

REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2) OF THE ELECTRICITY ORDINANCE 1949 TO AUDIT THE ACCOUNTS OF THE NATIONAL ELECTRICITY BOARD PENSIONS SCHEME 1957

We have examined the annexed statements of account with the books and vouchers maintained by the trustees in respect of the Scheme and have obtained all the information and explanations we have required. In our opinion such statements of account are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Scheme at 31st August 1966 according to the best of our information and the explanations given to us and as shown by the books of the Scheme.

PRICE WATERHOUSE & CO.,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Singapore
31st December 1966.

APPENDIX III

STATEMENT 1

NATIONAL ELECTRICITY BOARD
WIDOWS AND ORPHANS PROVIDENT FUND SCHEME 1964
STATEMENT OF ACCOUNT FOR THE YEAR ENDED 30th JUNE 1966

Year ended 30th June 1965 $	Particulars	$	$
—	Balance of Widows and Orphans Provident Fund as at 1st July 1965		1,751,634
1,132,304	Cash surrender value of group policies Nos. GE1440 and GE2510 received from The Manufacturers Life Insurance Company on dissolution of old Scheme		—
587,450	*Add* — Contributions receivable during the year ...		711,318
	Investment Income:		
	Interest—		
2,561	Malaysian Government and Municipal securities	11,270	
32,954	Other Commonwealth Government securities	54,801	
—	Bank deposit	3,701	
	Dividends—		
37,722	Malaysian and Singapore industrial stocks and shares	63,208	
73,237			132,980
—	Net profit on sale of investments		11,423
1,792,991			2,607,355
25,989	*Less* — Retirement benefits paid	59,916	
15,368	Death benefits paid	11,853	
41,357			71,769
1,751,634	Balance of the Fund at 30th June 1966		2,535,586

Note:

In accordance with Section 7(1) of the Scheme the National Electricity Board appointed The Chartered Bank (Malaya) Trustee Limited as trustees to administer the Fund as from 1st July 1964.

For The Chartered Bank (Malaya) Trustee Limited

A. T. HOOKER,
Manager.

APPENDIX III

STATEMENT 2

NATIONAL ELECTRICITY BOARD
WIDOWS AND ORPHANS PROVIDENT FUND SCHEME 1964
THE BALANCE OF THE FUND AT 30th JUNE 1966
IS REPRESENTED BY:

Year ended 30th June 1965 $	Particulars	$	$
	Investments at cost:		
95,277	Malaysian Government and Municipal securities	350,210	
840,268	Other Commonwealth Government securities ...	1,033,120	
737,080	Malaysian and Singapore industrial stocks and shares	1,026,246	
1,672,625	(Market value at 30.6.1966 — $2,418,380 30.6.1965 — $1,422,718)		2,409,576
	Debtors:		
54,991	National Electricity Board	62,592	
12,390	Comptroller of Income Tax	24,313	
67,381			86,905
	Cash at bank:		
69,674	The Chartered Bank Singapore	—	
	The Chartered Bank Kuala Lumpur:—		
1,890	Current account	22,020	
—	Deposit account	25,000	
71,564			47,020
1,811,570			2,543,501
	Deduct — Creditors:		
59,936	For securities purchased	—	
—	Retirement benefit	2,438	
—	The Chartered Bank Singapore — Overdraft ...	5,477	
59,936			7,915
1,751,634			2,535,586

APPENDIX III

STATEMENT 3

NATIONAL ELECTRICITY BOARD
WIDOWS AND ORPHANS PROVIDENT FUND SCHEME 1964
ACCOUNTS FOR THE YEAR ENDED 30th JUNE 1966

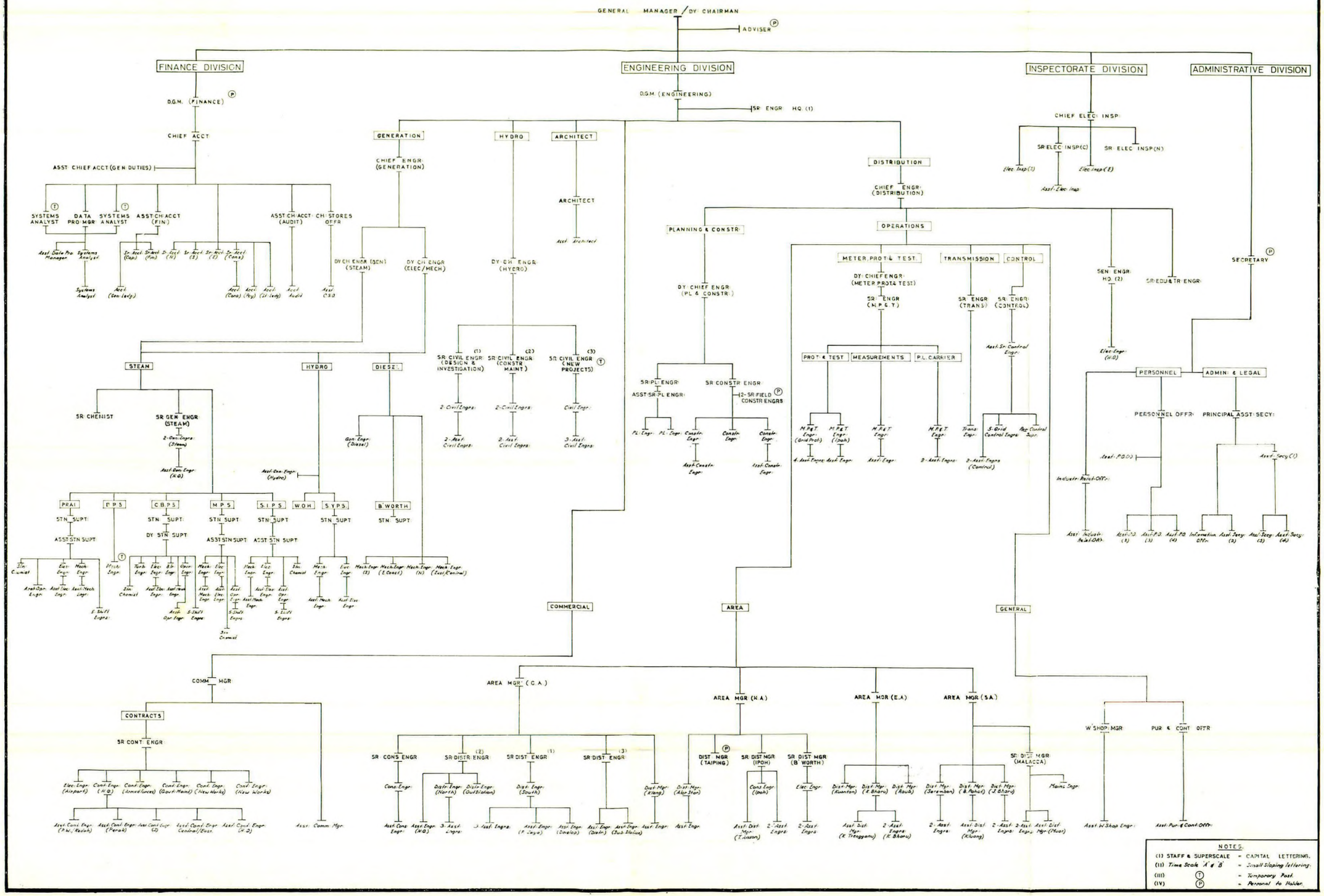
REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2) OF THE ELECTRICITY ORDINANCE 1949 TO AUDIT THE ACCOUNTS OF THE SCHEME

We have examined the annexed statements of account with the books and vouchers maintained by the trustees in respect of the Scheme and have obtained all the information and explanations we have required. In our opinion such statements of account are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Scheme at 30th June 1966 according to the best of our information and the explanations given to us and as shown by the books of the Scheme.

PRICE WATERHOUSE & *Co.*,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Singapore
15th September 1966

DIVISION 1. ESTABLISHMENT 1965/66.



APPENDIX V

LIST OF NATIONAL ELECTRICITY BOARD PUBLIC SUPPLIES GENERATING STATIONS

Name of Town or Village	State	Generating Plant Capacity kW	Motive Power
NORTHERN AREA			
Arau	Perlis	700	O.E.
Alor Star	Kedah	5,900	O.E.
Sungei Patani	Kedah	820	O.E.
Butterworth	Province Wellesley	4,270	O.E.
Taiping	Perak	5,735	O.E.
Sitiawan	Perak	1,220	O.E.
Jor (Sultan Yussuf Power Station) ...	Perak	100,000	H.E.
Habu	Pahang	5,500	H.E.
Robinson Falls	Pahang	900	H.E.
Kampong Raja	Pahang	800	H.E.
Kuala Terla	Pahang	500	H.E.
SOUTHERN AREA			
Kluang	Johore	3,864	O.E.
Batu Pahat (Standby)	Johore	908	O.E.
Muar (Standby)	Johore	390	O.E.
Segamat	Johore	1,093	O.E.
Kota Tinggi	Johore	410	O.E.
Pontian	Johore	884	O.E.
Mersing	Johore	440	O.E.
Johore Bahru (Sultan Ismail Power Station)	Johore	30,000	S.T.
Gemas	N. Sembilan	450	O.E.
Kuala Klawang	N. Sembilan	405	O.E.
Bahau (Standby)	N. Sembilan	200	O.E.
Rembau	N. Sembilan	175	O.E.
Kuala Pilah (Standby)	N. Sembilan	150	O.E.
Malacca	Malacca	40,000	S.T.
RURAL STATIONS			
Layang Layang	Johore	56	O.E.
Sri Lallang	Johore	28	O.E.
Lima Kedai	Johore	28	O.E.
Gelang Patah	Johore	28	O.E.
Pekan Nanas	Johore	56	O.E.
Cha'ah	Johore	84	O.E.
Labis	Johore	112	O.E.
Bekok	Johore	56	O.E.

LIST OF NATIONAL ELECTRICITY BOARD PUBLIC SUPPLIES GENERATING STATIONS *(Cont.)*

Name of Town or Village	State	Generating Plant Capacity kW	Motive Power
EASTERN AREA			
Raub (Operating)	Pahang	1,235	H.E.
(Standby)	Pahang	798	O.E.
Kuantan	Pahang	1,943	O.E.
Mentakab	Pahang	1,726	O.E.
Pekan	Pahang	671	O.E.
Kuala Lipis	Pahang	652	O.E.
Fraser's Hill	Pahang	355	O.E.
Bentong	Pahang	1,347	O.E.
Lemal	Kelantan	6,040	O.E.
Kota Bharu (Lundang)	Kelantan	4,230	O.E.
Kuala Krai (Standby)	Kelantan	242	O.E.
Kuala Trengganu	Trengganu	2,227	O.E.
Kemaman	Trengganu	370	O.E.
Dungun	Trengganu	630	O.E.
RURAL STATIONS			
Kuala Brang	Trengganu	28	O.E.
Sebrang Takir	Trengganu	28	O.E.
Kuala Paka	Trengganu	28	O.E.
Jerteh	Trengganu	56	O.E.
Kampong Raja	Trengganu	56	O.E.
Kuala Kemaman	Trengganu	28	O.E.
Kijal	Trengganu	28	O.E.
Rantau Panjang	Kelantan	56	O.E.
Besut Barat	Kelantan	28	O.E.
Besut Kastam	Kelantan	28	O.E.
Gambang	Pahang	56	O.E.
Jerantut	Pahang	84	O.E.
Cheroh	Pahang	28	O.E.
Sungei Ruan	Pahang	56	O.E.
Benta	Pahang	56	O.E.
CENTRAL AREA			
Connaught Bridge	Selangor	80,000	S.T.
Ulu Langat	Selangor	2,288	H.E.
Kuala Selangor (Standby)	Selangor	125	O.E.
RURAL STATIONS			
Jenjarom	Selangor	56	O.E.
Behrang Station	Perak	28	O.E.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS

HV Distribution shown in capital letters thus 'ALOR STAR'
LV Distribution shown in small type thus 'Kulim'

Locality	State	No. of substations	Transformer Capacity kVA	Supply From
NORTHERN AREA				
ALOR STAR	Kedah	1	925	Alor Star O.E.
Alor Star Town	„	23	4,875	Alor Star
Anak Bukit	„	1	100	„
Bukit Pinang	„	1	750	„
Hutan Kampong	„	1	25	„
Jitra	„	1	200	„
Kampong Langgar	„	1	50	„
Kepala Batas	„	2	350	„
Kuala Kedah	„	1	100	„
Kulim	„	6	650	Butterworth
Lunas	„	2	125	„
Padang Serai	„	2	200	„
Tanah Merah	„	1	100	Alor Star
Tanjong Pauh	„	1	100	„
Telok Chengai	„	1	100	„
Telok Jelai	„	1	200	„
Pantai Johore	„	1	100	„
Bertam Valley	Pahang	1	25	Central Network
Boh Tea Estate	„	1	200	„
Cameron Highlands	„	5	1,500	„
Federal Bungalow	„	1	100	„
Gunong Brinchang (Wireless Station)	„	1	50	„
Habu	„	1	100	„
Jor Station	„	1	100	„
Jor Workshop	„	2	300	„
Kampong Raja	„	1	50	„
Kea Farm	„	1	25	„
Kuala Terla	„	1	50	„
44th Mile	„	1	25	„
Ringlet	„	1	50	„
Robinson Falls	„	1	25	„
Rose Hill	„	1	25	„
Sg. Ular Road	„	1	200	„
Tringkap	„	1	25	„
15th Mile	Perak	1	50	„
Talam Mines	„	1	3,000	„
LANGKAP	„	1	112	PRHEP Co.
TELOK ANSON	„	1	4,500	„
Telok Anson Town	„	17	3,769	„
Hutan Melintang	„	1	50	„
Sg. Tukang Sidin	„	1	30	„
BATU GAJAH	„	4	750(a)	„
IPOH	„	5	32,475(b)	„
Ipoh Town	„	72	22,675	„

(a) Includes 1 P.R.H.E.P. 6.6 kV step-down substation of 100 kVA capacity feeding into the Batu Gajah System.
(b) Includes 4 P.R.H.E.P. 6.6 kV step-down substation of 575 kVA total capacity feeding direct into the Ipoh System.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of substations	Transformer Capacity kVA	Supply From
SITIAWAN	Perak	1	800	Sitiawan O.E.
Sitiawan Town	,,	1	200	Sitiawan
Kampong China	,,	1	25	,,
Kampong Koh	,,	1	200	,,
Kampong Koh Road	,,	1	100	,,
Lumut	,,	2	150	,,
Pasir Panjang Laut	,,	1	25	,,
Pundut Estate	,,	1	25	,,
Simpang Dua	,,	1	50	,,
Simpang Tiga	,,	1	100	,,
Suffolk Estate	,,	1	50	,,
Sungei Wangi Estate	,,	1	100	,,
TAIPING	,,	1	6,290	Taiping O.E.
Taiping Town	,,	26	5,850	Taiping
Batu Matang	,,	1	25	,,
Choong Sam Mines	,,	2	1,300	,,
Changkat Jering	,,	1	50	,,
Gunong Semanggol Quarry	,,	1	50	,,
Gunong Semanggol Waterworks	,,	1	500	,,
Jelutong	,,	1	25	,,
Kamunting Village	,,	1	100	,,
Klian Intan	,,	1	50	Rahman Hydraulic Tin
Matang	,,	1	50	Taiping
Military Sub-stations	,,	8	1,450(c)	,,
Port Weld	,,	1	100	,,
Simpang Ampat	,,	1	25	,,
Simpang Tiga	,,	1	50	,,
Simpang Village	,,	1	200	,,
Taiping Consolidated Tin	,,	1	950(d)	,,
Tropical Produce	,,	1	500	,,
TANJONG RAMBUTAN	,,	1	250(e)	PRHEP Co.
ARAU	Perlis	1	702	Arau O.E.
Arau Pumping Station	,,	1	200	Arau
Jejawi Village	,,	1	25	,,
Jelampok	,,	1	25	,,
Kangar	,,	2	500	,,
Kodiang	Kedah	1	100	,,
BUTTERWORTH	Province Wellesley	1	(3,750kW (4,000kVA	Penang S.T. Butterworth O.E. & Gasifyer
GLUGOR	,,	1	30,000kVA	Penang S.T.
Butterworth Town	,,	21	5,900	Butterworth
Ara Rendang	,,	1	50	,,
BUKIT MERTAJAM INTAKE S/S	,,	1	5,000	,,
Bukit Mertajam	,,	11	2,340	,,
Bukit Panchor	,,	1	50	,,
Bukit Panchor Govt. Qrs.	,,	1	25	,,
Bukit Tengah Gate	,,	1	200	,,
Bukit Tengah Tower	,,	1	25	,,
Bukit To' Allang	,,	1	1,500	,,

(c) The substations are military property.
(d) The transformer belongs to the Taiping Consolidated Tin Ltd.
(e) Property of P.R.H.E.P. Company.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of substations	Transformer Capacity kVA	Supply From
Coir Industries	Province Wellesley	1	50	Butterworth
Jalan Petri Intake	,,	1	300	,,
Jalan Raja Uda	,,	1	300	,,
Jawi Garden Housing Estate ...	,,	1	25	,,
Jalan Kuala Ketil	,,	1	100	,,
Kampong Guar Parahu	,,	1	50	,,
Kampong Relau	,,	1	25	,,
Kampong Setol	,,	1	50	,,
Kampong Telok	,,	1	50	,,
Kepala Batas	,,	6	1,000	,,
Lahar Ikan Mati	,,	1	50	,,
Lahar Yoi	,,	3	275	,,
Mak Mandin	,,	1	500	,,
Malaysia Weaving Factory ...	,,	1	200	,,
Menghuang Sungei Lembu ...	,,	1	25	,,
Merbau Kudong	,,	1	50	,,
Nibong Tebal	,,	5	400	,,
Oriental Estate	,,	1	100	,,
Paper Mill	,,	1	500	,,
Payar Keladi	,,	1	50	,,
Pekan Darat	,,	1	100	,,
Penaga	,,	7	375	,,
Permatang Pasir	,,	1	50	,,
Permatang Tinggi	,,	1	50	,,
Permatang To' Kandu	,,	1	50	,,
Pinang Tunggal	,,	1	750	,,
Prai	,,	8	4,370	,,
Pre-fabricated Industries ...	,,	1	100	,,
RAAF Radar Station	,,	1	100	,,
Simpang Ampat	,,	3	2,125	,,
Simpang Lima	,,	1	50	,,
Southern Iron Works	,,	1	200	,,
Steel Mill	,,	1	500	,,
Sungei Bakap	,,	3	220	,,
Sungei Dua	,,	2	100	,,
Sungei Duri	,,	1	25	,,
Sg. Juru Dam & Gates	,,	1	5	,,
Sungei Kechil	,,	3	90	,,
Sungei Kreh	,,	1	300	,,
Sungei Limau	,,	1	25	,,
Sungei Puyu	,,	1	10,050	,,
Tai San	,,	1	200	,,
Tasek	,,	1	50	,,
Tasek Glugor	,,	1	100	,,
Val D'or	,,	3	85	,,
Jalan Sekarat	Kedah	1	200	,,
Jujong	,,	1	50	,,
Kampong Permatang Pasir ...	,,	1	25	,,
Parit Buntar	Perak	7	650	,,
SUNGEI PATANI INTAKE ...	Kedah	1	5,000	,,
Sungei Patani Town	,,	10	1,875	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS *Cont.)*

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
CENTRAL AREA				
KUALA LUMPUR & DISTRICT	Selangor	8	335,000	Central Network
Kuala Lumpur Commerce & Industry	,,	187	126,285(a)	K. L. District
Kuala Lumpur Domestic ...	,,	131	43,000	,,
Kuala Lumpur Dredges & Mines	,,	89	93,060(b)	,,
Kuala Lumpur Quarries	,,	8	4,850	,,
Petaling Jaya Commerce & Industry	,,	63	43,800(c)	,,
Petaling Jaya Domestic	,,	21	8,850	,,
Ampang	,,	3	400	,,
Batu Arang Village	,,	1	200	,,
Batang Berjuntai Village ...	,,	1	100	,,
Jinjang	,,	4	1,050	,,
Kalumpang Village	,,	1	100	,,
Kampong Sungei Ramal	,,	1	50	,,
Kepong	,,	3	700	,,
Kundang Village	,,	1	50	,,
Puchong	,,	2	250	,,
Rawang	,,	4	600	,,
Serdang	,,	2	400	,,
Serendah	,,	2	150	,,
Sungei Besi	,,	1	200	,,
Sungei Buloh	,,	1	300	,,
SUNGEI BESI	,,	1	1,500	Central Network
Federation Military College ...	,,	9	2,100(d)	Sungei Besi
BANGI	,,	1	1,500	Central Network
Bangi District	,,	9	1,300	Bangi
Banting	,,	4	650	,,
Bukit Changgang	,,	1	50	,,
Kampong Olak Lempit	,,	1	25	,,
Labohan Dagang	,,	1	50	,,
KAJANG	,,	2	10,500	Central Network
Kajang Town	,,	8	4,400	Kajang
Cheras	,,	6	1,400	,,
Semenyih	,,	1	200	,,

(a) Includes 4,000 kVA transfomer capacity belonging to consumer
(b) Includes 11,160 kVA transformer capacity belonging to consumer
(c) Includes 9,600 kVA transformer capacity belonging to consumer
(d) Transformer capacity belonging to Federation Military College

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
KERLING	Selangor	1	500	Central Network
Kerling Estate	„	1	100	Kerling
Kerling Village	„	2	225	„
KLANG	„	1	20,000	Connaught Bridge S.T.
Klang & District	„	53	20,085(e)	Klang
Port Swettenham	„	21	6,470(f)	„
KUALA KUBU BAHRU ...	„	1	1,000	Central Network
Kuala Kubu Bahru Town ...	„	4	450	K. Kubu Bahru
RASA	„	1	500	Central Network
Rasa Village	„	1	200	Rasa
Batang Kali	„	2	100	„
Ulu Yam	„	2	150	„
KUANG	„	1	500	Central Network
Kuang Village	„	1	100	Kuang
SUNGEI CHOH	„	1	500	Central Network
Sungei Choh Estate	„	1	100	Sungei Choh
Sungei Choh Village	„	1	50	„
TANJONG KARANG	„	1	1,000	Central Network
Tanjong Karang Town	„	2	700	Tanjong Karang
Kuala Selangor & District ...	„	3	600	„
ULU LANGAT	„	1	500	Central Network
Ulu Langat District	„	5	250	Ulu Langat
TANJONG MALIM	Perak	1	750	Central Network
Tanjong Malim Town	„	4	600	Tanjong Malim

(e) Includes 3,600 kVA transformer belonging to consumer
(f) Includes 1,005 kVA transformer belonging to consumer

APPENDIX V *(Cont.)*

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS *(Cont.)*

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
SOUTHERN AREA				
BATU PAHAT	Johore	1	6,000	Central Network
Batu Pahat Town	,,	15	4,550	Batu Pahat
JOHORE BAHRU	,,	1	9,000	Sultan Ismail S.T.
F.E.T.C.	,,	3	1,200	,,
MOUNT AUSTIN	,,	1	200	,,
SCUDAI	,,	1	5,000	,,
TAMPOI No. 1	,,	1	3,600	,,
TAMPOI No. 2	,,	1	3,000	,,
TEBRAU TIE-IN	,,	1	3,660	,,
TEBRAU WATERWORKS ...	,,	1	7,000	,,
ULU TIRAM	,,	1	1,000	,,
ULU TIRAM VILLAGE ...	,,	1	300	,,
Johore Bahru Town	,,	45	13,570	Johore Bahru
Scudai	,,	1	50	Scudai Waterworks
Tampoi	,,	25	6,950	Tampoi No. 1
Tampoi	,,	16	5,640	Tampoi No. 2
Tebrau	,,	10	3,075	Tebrau Tie-In
KLUANG	,,	1	2,740	Kluang O.E.
Kluang Town	,,	24	8,125	Kluang
KOTA TINGGI	,,	1	410	Kota Tinggi O.E.
Kota Tinggi Town	,,	2	400	Kota Tinggi
MERSING	,,	1	200	Mersing O.E.
Mersing Town	,,	1	100	Mersing
MUAR	,,	1	6,000	Central Network
Muar Town	,,	15	3,860	Muar
Bakri New Village	,,	1	100	,,
Bukit Pasir	,,	1	100	,,
Jalan Sekolah Ismail	,,	1	100	,,
Kampong Parit Lanjut	,,	1	25	,,
Kampong Tengah Jeram ...	,,	1	30	,,
Parit Ahmad	,,	1	50	,,
Parit Bakar	,,	1	50	,,
Parit Beting	,,	1	200	,,
Parit Jawa	,,	1	200	,,
Parit Keroma	,,	1	50	,,
Parit Limbong	,,	1	50	,,
Parit Pulai	,,	1	50	,,
Parit Raja	,,	1	100	,,
Parit Sakai	,,	1	25	,,
Simpang Jeram	,,	1	100	,,
Tok Raja	,,	1	100	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
PONTIAN	Johore	1	900	Pontian O.E.
Pontian Town	„	4	600	Pontian
Pontian Besar	„	1	500	„
SEGAMAT	„	1	650	Segamat O.E.
Segamat Town	„	4	700	Segamat
Pekan Jabi	„	1	50	„
ALOR GAJAH	Malacca	1	3,000	Central Network
Alor Gajah Town	„	2	250	Alor Gajah
Gadek	„	2	225	„
Ganun	„	1	25	„
Padang Sebang	„	2	225	„
Pegoh	„	1	50	„
Tebong	„	7	1,425	„
Malacca Town	„	36	12,107	Malacca S.T.
Ayer Keroh	„	2	200	„
BONA VISTA	„	1	7,500	Central Network
Batang Tiga	„	2	400	Malacca S.T.
Batu Berendam	„	8	1,150	„
Bertam Malim	„	1	25	„
Bertam Ulu	„	1	25	„
Bukit Bahru	„	3	600	„
Bukit Bruang	„	1	25	„
Bukit Katil	„	1	25	„
Bukit Prenggi	„	1	100	„
Bukit Rambai	„	1	50	„
Bukit Sebukor	„	1	50	„
Durian Tunggal Pumphouse ...	„	1	1,000	„
Kampong Cheng	„	1	25	„
Klebang	„	3	600	„
Masjid Tanah	„	2	225	„
Paya Rumput Village	„	1	25	„
Semabok Village	„	2	150	„
Solok Paya Rumput	„	1	25	„
Sungei Udang	„	5	575	„
Tanggar Batu Village	„	2	225	„
Tanjong Kling	„	3	350	„
Terendak Camp	„	23	7,750(a)	„
Telok Mas	„	1	100	„
Umbai	„	1	25	„
MERLIMAU	„	1	1,830	Central Network
Merlimau Town	„	4	425	Merlimau
Chinchin	„	1	25	„
Jasin	„	1	300	„
Serkam Estate	„	1	200	„
Tangkak	Johore	2	400	„
Telok Rimba	„	1	100	„
GEMAS	Negeri Sembilan	1	200	Gemas O.E.
Gemas Town	„	3	400	Gemas
Tampin	„	7	1,550	Alor Gajah
RANTAU	„	1	4,830	Central Network
Bradwall Estate	„	1	100	Rantau
Bukit Palong Estate	„	1	25	„
Kampong Siliau	„	1	25	„

(a) Owned by Military.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
KUALA KLAWANG	Negeri Sembilan	1	300	Kuala Klawang O.E.
Kuala Klawang	,,	3	305	Kuala Klawang
Linsum	,,	1	50	Rantau
Lukut	,,	2	75	,,
Port Dickson	,,	26	4,090	,,
Rantau	,,	1	1,250	,,
Rantau Village	,,	1	200	,,
REMBAU	,,	1	100	Rembau O.E.
Rembau Town	,,	3	125	Rembau
Pekan Linggi	,,	1	100	Rantau
Sagga Estate	,,	1	50	,,
Sendayan Mines	,,	4	1,575	,,
Siliau Town	,,	4	1,750	,,
Tampin Linggi Estate	,,	1	200	,,
Tanah Merah Estate	,,	5	625	,,
Federal Tile Factory, Sungei Pelek	Selangor	1	300	,,
Sepang	,,	3	350	,,
Sungei Pelek	,,	1	200	,,
SEREMBAN	Negeri Sembilan	1	20,000	Central Network
Seremban Town	,,	41	12,852	Seremban
Batang Benar	,,	1	50	Bangi
Beranang Village	,,	1	150	Seremban
Bukit Bemban	,,	1	15	,,
Bukit Sepang	,,	1	50	,,
Kampong Gebok	,,	1	25	,,
Kampong Solok	,,	1	25	,,
Kombok	,,	1	50	,,
KUALA PILAH	,,	1	3,000	Central Network
KUALA PILAH	,,	1	100	Kuala Pilah O.E.
Kuala Pilah / Bahau Town ...	,,	14	2,400	Kuala Pilah
Kuala Sawah	,,	1	25	Seremban
Linggi Waterworks	,,	6	2,750	,,
Labu Village	,,	1	50	,,
Mambau	,,	1	100	,,
Mantin	,,	2	400	,,
New Labu Estate	,,	1	200	,,
Nilai	,,	1	100	Bangi
Pajam	,,	1	100	,,
Paroi Village	,,	2	225	Seremban
Pajam Home Estate	,,	1	25	,,
Rahang New Village	,,	3	500	,,
Seremban Garden Estate ...	,,	1	300	,,
Sikamat Village	,,	1	50	,,
Sin Moh Quarry	,,	1	100	,,
Sungei Kaya	,,	1	100	,,
Sungei Mahang Estate	,,	1	50	Bangi
Ulu Temiang	,,	1	50	Seremban
United Plywood Factory ...	,,	1	400	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS (*Cont.*)

Locality	State	No. of substations	Transformer Capacity kVA	Supply From
EASTERN AREA				
KOTA BHARU	Kelantan	4	6,300	Kota Bharu O.E.
Kota Bharu Town	„	20	4,150	Kota Bharu
Bachok	„	1	100	„
Batu Tiga Puloh	„	1	50	„
Bukit Abal	„	1	50	„
Bukit Tanah	„	1	50	„
Chabang Tiga Pendek	„	1	50	„
Chop Seng Hin	„	1	200	„
Jelawat	„	1	50	„
Kampong Banggol	„	1	50	„
Kampong Beranggan	„	1	25	„
Kampong Bharu	„	1	100	„
Kampong Chelah Gu	„	1	25	„
Kampong Guan Pendak ...	„	1	25	„
Kampong Guchil	„	1	50	„
Kampong Gunong	„	1	50	„
Kampong Kadok	„	1	50	„
Kampong Kemuning	„	1	50	„
Kampong Kota	„	1	50	„
Kampong Labok	„	1	50	„
Kampong Machang	„	1	100	„
Kampong Melor	„	1	50	„
Kampong Morak	„	1	25	„
Kampong Pangkal Meleret ...	„	1	50	„
Kampong Sakar	„	1	25	„
Kampong Tendong	„	1	25	„
Kampong Terbok	„	1	25	„
Kedai Mulong	„	1	50	„
Kedai Salor	„	1	50	„
Ketereh	„	1	50	„
Kok Lanas	„	1	50	„
Kumbang Krian	„	1	200	„
Lemal	„	2	3,950	Lemal O.E.
Lee Rubber Tanah Merah ...	„	1	300	Kota Bharu
Lundang	„	1	4,100	„
Palekbang	„	1	100	„
Parit China	„	1	50	„
Pasir Gajah Estate	„	1	250	„
Pasir Mas	„	4	1,150	„
Pasir Pekan	„	1	25	„
Pasir Puteh	„	1	250	„
Pasir Tumboh	„	1	50	„
Pengkalan Chepa	„	4	550	„
Pulai Chondong	„	2	600	„
Radio Malaysia	„	1	200	„
Salor	„	1	400	„
Selising	„	1	50	„
Sungei Durian	„	1	50	„
Tanah Merah	„	1	200	„
Tanjong Mas	„	1	50	„
Tepi Sungei	„	1	50	„
Tumpat	„	4	525	„
Wakaf Bahru	„	1	25	„
Wakaf Che Yeh	„	1	100	„

TRANSMISSION, IMPORT & DISTRIBUTION SUBSTATIONS *(Cont.)*

Locality	State	No. of Substations	Transformer Capacity kVA	Supply From
BENTONG	Pahang	1	500	Bentong O.E.
Bentong Town	,,	5	600	Bentong
FRASER'S HILL	,,	1	400	Fraser's Hill O.E.
Fraser's Hill Town	,,	10	437	Fraser's Hill
KUALA KRAI	Kelantan	1	300	Kota Bharu
KUALA LIPIS	Pahang	1	820	Kuala Lipis O.E.
Kuala Lipis Town	,,	11	595	Kuala Lipis
KUANTAN	,,	1	2,350	Kuantan O.E.
Kuantan Town	,,	14	3,050	Kuantan
Beserah	,,	1	100	,,
Kampong Kobat	,,	1	200	,,
Lee Rubber Works	,,	1	200	,,
PWD Quarry	,,	1	500	,,
PWD Workshop	,,	1	200	,,
Sungei Talam Estate	,,	1	25	,,
Telok Chempedak Housing Estate	,,	1	200	,,
V.H.F.	,,	1	25	,,
Water Purification Plant ...	,,	1	50	,,
MENTAKAB	,,	1	1,550	Mentakab O.E.
Mentakab Town	,,	11	1,340	Mentakab
Roundabout	,,	1	100	,,
Temerloh	,,	2	500	,,
PEKAN	,,	1	650	Pekan O.E.
Istana Abu Bakar	,,	1	300	Pekan
RAUB	,,	1	400	Raub O.E.
Raub Town	,,	5	650	Raub
SEMPAM HYDRO	,,	1	1,975	Sempam Hydro
DUNGUN	Trengganu	1	500	Dungun O.E.
Dungun Town	,,	5	650	Dungun
KUALA TRENGGANU ...	,,	2	2,000	Kuala Trengganu O.E.
Kuala Trengganu Town ...	,,	18	3,150	Kuala Trengganu
Bukit Payong Village	,,	1	50	,,
Chenering	,,	1	50	,,
Losong	,,	2	250	,,
Marang	,,	2	125	,,
Pulau Musang	,,	1	200	,,
Pulau Rusa	,,	1	100	,,

APPENDIX VI

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
		SOUTHERN AREA				
		JOHORE				
*1.	Senggarang	110 kW	O.E.	Oil	—	Lee Leong Piow
2.	Bukit Gambir	76 kW	,,	,,	—	Bukit Gambir Co.
*3.	Parit Raja	50 kW	,,	,,	—	Parit Raja Elect. Co.
4.	Kulai	381.2 kW	,,	,,	—	Eng Ann & Co.
*5.	Semerah	40 kW	,,	,,	—	Lian Kong Elect. Co.
6.	Yong Peng	440 kW	,,	,,	—	Yong Peng Elect. Co.
7.	Paloh	118 kW	,,	,,	—	Paloh Elect. Co.
8.	Senai	95 kW	,,	,,	—	Eng Ann & Co.
*9.	Bukit Kepong	3 kW	,,	,,	—	Bukit Kepong Producers Ltd.
*10.	Gricek	25 kW	,,	,,	—	Gricek Electricity Supply Co-operative Society
*11.	Benut	110.4 kW	,,	,,	—	Benut Elect. Co.
*12.	Buloh Kasap	77 kW	,,	,,	—	Buloh Kasap Elect. Co.
13.	Sungei Rengit	72 kW	,,	,,	—	Kwong Hua & Co.
14.	Ulu Tiram (Taken over by the Board on 12.7.66)	107 kW	,,	,,	—	Sharikat Hua Seng Letrik per Kongsi
*15.	Parit Sulong	31 kW	,,	,,	—	Lim Ah Chu
16.	Simpang Rengam	97.2 kW	,,	,,	—	Kueh Boon Ho
*17.	Ayer Hitam	106 kW	,,	,,	—	Goh Suan Lock
*18.	Pagoh	102.6 kW	,,	,,	—	Kueh Boon Ho
*19.	Serom	56 kW	,,	,,	—	Kelang Kuasa Api
20.	Rengit	147 kW	,,	,,	—	President, Chinese Association.
*21.	Lenga Village	44 kW	,,	,,	—	Tan Cheng Swee
*22.	Sri Gading	44 kW	,,	,,	—	Sri Gading Elect. Co.
*23.	Sedili Besar	105.2 kW	,,	,,	—	Sedili Besar Elect. Co.
*24.	Permas	19 kW	,,	,,	—	Loh Pak Yeo
*25.	Ayer Baloi	34 kW	,,	,,	—	Ayer Baloi Elect. Co.
*26.	Panchor	62.45 kW	,,	,,	—	Kueh Boon Ho
*27.	Bukit Kangkar	22 kW	,,	,,	—	Sheikh Abdullah Elect. Co.
28.	Endau Town	130.4 kW	,,	,,	—	Endau Electricity Supply Co.
*29.	Kahang New Village	75 kW	,,	,,	—	Low Tim Chui
*30.	Jemaluang New Village	66 kW	,,	,,	—	Eng Ann & Co.
*31.	Kelapa Sawit New Village	72 kW	,,	,,	—	Si Cho Cheng
*32.	See Long New Village	42.5 kW	,,	,,	—	Yap Chin San
*33.	Sri Medan	25 kW	,,	,,	—	Low Tim Chui
*34.	Tanjong Lembu	60.8 kW	,,	,,	—	Ng Chik Yew
*35.	Sanglang	20.8 kW	,,	,,	—	Tay Liat

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
		NEGERI SEMBILAN				
*36.	Batu Kikir (Taken over by the Board on 30.6.66)	10 kW	O.E.	Oil	—	Chop Sin Huat Sin
*37.	Titi (Taken over by the Board on 15.5.66)	44 kW	,,	,,	—	Titi Elec. Supply Co.
*38.	Batang Melaka	22 kW	,,	,,	—	Oh Ah Hay
*39.	Johol	22 kW	,,	,,	—	Siamley Elec. Co.
*40.	Pertang	16 kW	,,	,,	—	Pertang Elec. Co.
*41.	Pasir Panjang	54 kW	,,	,,	—	Khong Khoon Chye
*42.	Tanjong Ipoh & Simpang Sri Menanti	20 kW	,,	,,	—	Eng Hong Co.
		EASTERN AREA				
		PAHANG				
*1.	Kuala Krau	30 kW	O.E.	Oil	—	Pengerusi Majlis Tempatan.
2.	Kuala Rompin	110.4 kW	,,	,,	—	Sim Elect. Supply
		TRENGGANU				
*3.	Pekan Ayer Jerneh	12 kW	O.E.	Oil	—	Phang Yak Suan
		KELANTAN				
*4.	To'Uban, Pasir Mas	40 kW	O.E.	Oil	—	Pengerusi, Majlis Bandaran
		CENTRAL AREA				
		SELANGOR				
*1.	Sg. Ayer Tawar Sabak Bernam	40 kW(DC)	O.E.	Oil	—	Haji Jamhuri bin Haji Saad
*2.	(a)39th Mile Village, Sabak Bernam	4.5 kW	,,	,,	—	Tan Kai Seng
3.	Pulau Ketam Village	79 kW	,,	,,	—	Pulau Ketam Elec. Co.
4.	Sabak Bernam	430 kW	,,	,,	—	Tan Bros. Elec. Co
*5.	Tanjong Sepat	186 kW	,,	,,	—	Goh Eng Boy
6.	Sekinchan	178 kW	,,	,,	—	Sekinchan Elec. Supply Co.
7.	Sg. Besar Town and Bagan Fishing Village	358 kW	,,	,,	—	Min Chung Elec. Co. Ltd.
8.	Sungei Pelek	—	—	—	—	N.E.B. Sungei Pelek Elec. Co.

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.
(a) Restricted Public Licensed Installation

APPENDIX VI (*Cont.*)

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
	NORTHERN AREA					
	KEDAH					
*1.	Bedong	113 kW	O.E.	Oil	—	Beloon Elec. Co.
*2.	Merbau Pulas	12 kW	„	„	—	Lim Yew Jin
3.	Baling	166 kW	„	„	—	Sharikat Persaha-batan Berhad
*4.	Pekan Pulai	10 kW	„	„	—	Haji Ahmad bin Ismail
*5.	Alor Janggos, Alor Star	25 kW	„	„	—	Haji Sulaiman bin Haji Hassan
*6.	Kota Sarang Semut	20 kW	„	„	—	Ooi Beng Hock
7.	Selama	64 kW	„	„	—	Pengerusi, Majlis Tempatan
8.	Pekan Kuah	184 kW	„	„	—	Ho Cheow Huat
*9.	Changloon	25 kW	„	„	—	Lim Kup Jit
*10.	Pekan Tunjang	40 kW	„	„	—	Teoh Eng Thuan
*11.	Pokok Sena	65 kW	„	„	—	Pokok Sena Elec. Co.
12.	Serdang	180 kW	„	„	—	Yew Ah Kow Engr. Works
*13.	Pendang, Kota Star	113 kW	„	„	—	Quah Ah Pin
14.	Kuala Ketil (18 hours supply)	78 kW	„	„	—	Kuala Ketil Elect. Supply Co.
*15.	Sg. Yan Kechil	10 kW	„	„	—	Khor Seng Chang
16.	Gurun (20 hours supply)	153 kW	„	„	—	Beloon Elec. Co.
*17.	Kuala Nerang, Padang Terap	25 kW	„	„	—	Ahmad bin Haji Rejab
18.	Mahang	50 kW	„	„	—	Haji Mohd. Isa bin Haji Dahaman
19.	Kupang, Baling (20 hrs. supply)	65 kW	„	„	—	Haji Ahmad bin Ismail
*20.	Yen Besar	41 kW	„	„	—	Dinn's Elec. Service
*21.	Kubor Panjang Town	16 kW	„	„	—	S.A. Mohd. Hanif & Co.
*22.	Lubok Buntar Village, Bandar Bahru	44 kW	„	„	—	Setia Usaha, Sharikat Letrik, Lubok Buntar.
23.	Sungei Limau (Simpang Tiga)	34.5 kW	„	„	—	Yeoh Chean Cheng Hup Bee Sawmill.
*24.	Sungei Lallang	25 kW	„	„	—	Lim Kup Jit
*25.	Pekan, Sik	85 kW	„	„	—	Dinn's Elec. Service
*26.	Ayer Itam & Kerpang	21 kW	„	„	—	Lim Tang San
*27.	Kuala Pegang	25 kW	„	„	—	Haji Ahmad bin Ismail
*28.	(a)Bukit Junun	3 kW	„	„	—	Hock Lai Hong

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

(a) Restricted Public Licensed Installation

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
			PENANG			
29.	George Town & Penang	40,000 kW	Steam Turbine	Oil	—	City Council of George Town, Penang.
30.	Sg. Pinang	2,500 kW	Oil Engine	,,	—	-do-
31.	Ayer Hitam	800 kW	Hydro	—	—	-do-
			PERLIS			
32.	Kuala Perlis	390 kW	O.E.	Oil	—	Perlis Iceworks Ltd.
*33.	Simpang Ampat, Kangar	44 kW	,,	,,	—	Lim Sum Sun
*34.	Kuala Sanglang	32 kW	,,	,,	—	Khoo Swee Hin
			PERAK			
35.	Bagan Serai	371.6 kW	Diesel Engine	Oil	—	Kinta Elect. Dist.
36.	Selama	98.56 kW	,,	,,	—	,,
37.	Kuala Krau	199.6 kW	,,	,,	—	,,
38.	Grik	184.96 kW	,,	,,	—	,,
39.	Trong	38 kW	,,	,,	—	,,
40.	Lenggong	189.92 kW	,,	,,	—	,,
41.	Bruas	142.56 kW	,,	,,	—	,,
42.	Batu Kurau	38.56 kW	,,	,,	—	,,
43.	Ayer Kuning	38 kW	,,	,,	—	,,
*44.	Kati	16 kW	,,	,,	—	,,
45.	Sauk	38 kW	,,	,,	—	,,
*46.	Padang Grus	16 kW	,,	,,	—	,,
*47.	Kota Tampan	16 kW	,,	,,	—	,,
*48.	Selat Pagar	8 kW	,,	,,	—	,,
*49.	Ayer Kala	16 kW	,,	,,	—	,,
*50.	Kuak & Raban	22 kW	,,	,,	—	,,
51.	Lima Kati	24 kW	—	—	PRHEP	,,
52.	Lubok Merbau	24 kW	—	—	,,	,,
53.	Kg. Jelapang	16 kW	—	—	,,	,,
54.	Padang Assam	24 kW	—	—	,,	,,
55.	Kuala Dhal	24 kW	—	—	,,	,,
56.	Padang Rengas	48 kW	—	—	,,	,,
57.	Kuala Kangsar	1432 kW	—	—	,,	,,
58.	Sungei Siput	544 kW	—	—	,,	,,
59.	Rimba Panjang	80 kW	—	—	,,	,,
60.	Enggor and Kg. Enggor	128 kW	—	—	,,	,,
61.	Salak Bharu	20 kW	—	—	,,	,,
62.	Salak North	20 kW	—	—	,,	,,
63.	Kampong Jawang	20 kW	—	—	,,	,,
64.	Kampong Kota Lama Kanan	40 kW	—	—	,,	,,
65.	Kg. Saiong	40 kW	—	—	,,	,,
66.	Kg. Saiong Tengah	40 kW	—	—	,,	,,

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

APPENDIX VI (*Cont.*)

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
67.	Kg. Bendang Kering	40 kW	—	—	PRHEP	Kinta Elect. Dist
68.	Menglembu	1864 kW	—	—	,,	,,
69.	Lahat	80 kW	—	—	,,	,,
70.	Pinji Estate	80 kW	—	—	,,	,,
71.	Pengkalan Pegoh	40 kW	—	—	,,	,,
72.	Bukit Merah	120 kW	—	—	,,	,,
73.	New Pasir Puteh	80 kW	—	—	,,	,,
74.	Kg. Pasir Puteh	20 kW	—	—	,,	,,
75.	Shatin Park	40 kW	—	—	,,	,,
76.	Kuan Woh Yean	80 kW	—	—	,,	,,
77.	D.I.D. Federal Reserve	20 kW	—	—	,,	,,
78.	Jelapang	248 kW	—	—	,,	,,
79.	Chemor	216 kW	—	—	,,	,,
80.	Kuala Kuang	40 kW	—	—	,,	,,
81.	Kanthan Bharu	80 kW	—	—	,,	,,
82.	Kanthan	80 kW	—	—	,,	,,
83.	Tanah Hitam	24 kW	—	—	,,	,,
84.	Tg. Rambutan	80 kW	—	—	,,	,,
85.	Tg. Rambutan Filteration Plant	80 kW	—	—	,,	,,
86.	Tg. Rambutan Site Office	20 kW	—	—	,,	,,
87.	Tg. Rambutan PWD Quarry	80 kW	—	—	,,	,,
88.	Tg. Rambutan PWD Cantonment	150 kW	—	—	,,	,,
89.	Tambun	20 kW	—	—	,,	,,
90.	Kg. Simee	240 kW	—	—	,,	,,
91.	Tasek	2720 kW	—	—	,,	,,
92.	Kg. Tawas	80 kW	—	—	,,	,,
93.	Simpang Pulai	80 kW	—	—	,,	,,
94.	Kg. Sengat	80 kW	—	—	,,	,,
95.	Kg. Kepayang	40 kW	—	—	,,	,,
96.	Pengkalan Lama	24 kW	—	—	,,	,,
97.	Pengkalan Bharu and Sindoo	24 kW	—	—	,,	,,
98.	Kg. Ayer Mati	24 kW	—	—	,,	,,
99.	Sg. Trap & MTD	40 kW	—	—	,,	,,
100.	Kinta Kellas Estate	80 kW	—	—	,,	,,
101.	Kg. Pisang	20 kW	—	—	,,	,,
102.	Tronoh	80 kW	—	—	,,	,,
103.	Kg. Nalla	20 kW	—	—	,,	,,
104.	Kg. Bali	40 kW	—	—	,,	,,
105.	Bemban	40 kW	—	—	,,	,,
106.	Siputeh—	16 kW	—	—	,,	,,
107.	Siputeh Military Camp	20 kW	—	—	,,	,,
108.	Rayland Estate	20 kW	—	—	,,	,,
109.	Glenealy Estate	20 kW	—	—	,,	,,
110.	Parit & PWD Waterworks	240 kW	—	—	,,	,,
111.	Riverine	560 kW	—	—	,,	,,
112.	Pusing	320 kW	—	—	,,	,,

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
113.	Papan	40 kW	—	—	PRHEP	Kinta Elect. Dist.
114.	Membang Diawan	160 kW	—	—	,,	,,
115.	Tronoh Mines	20 kW	—	—	,,	,,
116.	Kampar	1284 kW	—	—	,,	,,
117.	Kuala Dipang PWD Quarry	720 kW	—	—	,,	,,
118.	Chendrong	20 kW	—	—	,,	,,
119.	Kinta Valley Estate	20 kW	—	—	,,	,,
120.	Riverview Estate	40 kW	—	—	,,	,,
121.	Sikh Temple	24 kW	—	—	,,	,,
122.	Sungei Durian	40 kW	—	—	,,	,,
123.	Tanjong Tualang	120 kW	—	—	,,	,,
124.	Ayer Papan	16 kW	—	—	,,	,,
125.	Kampong Timah	240 kW	—	—	,,	,,
126.	Malim Nawar	200 kW	—	—	,,	,,
127.	Kg. Malim Nawar	24 kW	—	—	,,	,,
128.	Kg. Tualang Sekah	24 kW	—	—	,,	,,
129.	Kuala Dipang	24 kW	—	—	,,	,,
130.	Jeram	24 kW	—	—	,,	,,
131.	Kg. Jeram	24 kW	—	—	,,	,,
132.	Kg. Gunong Panjang	24 kW	—	—	,,	,,
133.	Kg. Gunong Mesah	40 kW	—	—	,,	,,
134.	Kg. Pulai	20 kW	—	—	,,	,,
135.	Lawan Kuda	40 kW	—	—	,,	,,
136.	Gopeng	80 kW	—	—	,,	,,
137.	Kota Bharu	20 kW	—	—	,,	,,
138.	Tapah	380 kW	—	—	,,	,,
139.	Lubok Katak	24 kW	—	—	,,	,,
140.	Kampong Pahang	48 kW	—	—	,,	,,
141.	Batang Padang Hydro Elect. Scheme	176 kW	—	—	,,	,,
142.	Kg. Raya and Kuala Raya	16 kW	—	—	,,	,,
143.	Kg. Batu Dua	16 kW	—	—	,,	,,
144.	Pekan Getah	24 kW	—	—	,,	,,
145.	Tapah Road	80 kW	—	—	,,	,,
146.	Kg. Batu Tiga	20 kW	—	—	,,	,,
147.	Banir	20 kW	—	—	,,	,,
148.	Batu Tiga, Jalan Pahang	25.6 kW	—	—	,,	,,
149.	Kg. Batu Melintang	24 kW	—	—	,,	,,
150.	Temoh	120 kW	—	—	,,	,,
151.	Chenderiang	40 kW	—	—	,,	,,
152.	Trolak and Sg. Chinoh Estate	80 kW	—	—	,,	,,
153.	Trolak Estate	20 kW	—	—	,,	,,
154.	Sg. Klah Estate	20 kW	—	—	,,	,,
155.	Sungkai	80 kW	—	—	,,	,,
156.	Kampong Bikam	20 kW	—	—	,,	,,
157.	Bikam Estate	80 kW	—	—	,,	,,
158.	Pekan Pasir	40 kW	—	—	,,	,,
159.	Sungkai Estate	20 kW	—	—	,,	,,
160.	Bidor	280 kW	—	—	,,	,,

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

APPENDIX VI (*Cont.*)

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is A.C. 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner and operating Authority
161.	Eidor Railway Station	20 kW	—	—	PRHEP	Kinta Elect. Dist.
162.	Kg. Jeram Mengkuang	24 kW	—	—	„	„
163.	Kg. Coldstream	40 kW	—	—	„	„
164.	Kuala Bikam	40 kW	—	—	„	„
165.	Tanah Mas	20 kW	—	—	„	„
166.	Kg. Batu Tujoh	40 kW	—	—	„	„
167.	Kg. Bercham	80 kW	—	—	„	„
168.	Simpang Jalong	40 kW	—	—	„	„
169.	Jerlun N. Village	40 kW	—	—	„	„
170.	New Kopisan	40 kW	—	—	„	„
171.	Chenderoh	27,000 kW	HE	water	—	PRHEP
172.	Malim Nawar	94, 000 kW	S.T.	Oil and Coal	—	„
173.	Batu Gajah	24,450 kW	„	„	—	„
174.	Bagan Dato	125 kW	O.E.	Oil	—	Bagan Datoh Elect. Supply Co.
175.	Pantai Remis	210 kW	„	„	—	Kee Cheong Co.
*176.	Selekoh	44 kW	„	„	—	Tan Elect. Supply Co.
177.	Slim River	200 kW	—	Trans-formers	PRHEP	Slim River Elec. Supply Co.
*178.	Beting Luas	32.5 kW(DC)	O.E.	Oil	—	Ong Thiam Kow
*179.	Pasir Hitam	21 kW	O.E.	Oil	—	Pasir Hitam Elec. Co.
180.	Ayer Tawar (Dindings)	297.6 kW	„	„	—	Yew Ah Kow Engineering Works
181.	Slim Village	25 kW	„	„	—	Tan Boon Pin
182.	Pangkor Island	249.6 kW	„	„	—	Han Sam Elect. Light Co.
183.	Intan Village and Hitam Mine. Intan	2,000 kW	HE	Water	—	Rahman Hydraulic Tin Ltd.
184.	Titi Serong	32 kW	O.E.	Oil	—	Lee Chin Wah
185.	Kg. Jalan Bahru, Parit Buntar	54 kW	„	„	—	Lim Lean Hong
186.	Tanjong Piandang	167.6 kW	„	„	—	Tanjong Piandang Elec. Co. Ltd.
187.	Kroh New Village	150 kW	„	„	—	Syndicate Electric Perak Utara
*188.	Chui Chak New Village	22 kW	„	„	—	Wong Fook Loy
*189.	Pekan Rantau Panjang, Selama, Perak	21 kW	„	„	—	Rantau Panjang Elec. Supply Co.
*190.	Sungei Bayor	29.6 kW	„	„	—	„
191.	Gunong Semanggol	—	—	—	NEB.	Al-Ehya Public Elec. Supply

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

APPENDIX VII

COMMERCIAL STATISTICS

TABLE I

Units Generated/Purchased, Sent Out & Sold						
Year ended 31st August	Units Generated & Purchased		Units Sent Out		Units Sold	
	Millions	% increase over previous year	Millions	% increase over previous year	Millions	% increase over previous year
1962	833.9	12.6	792.4	12.5	709.1	12.1
1963	944.6	13.2	898.4	13.3	802.2	13.1
1964	1071.0	13.4	1026.6	14.3	917.3	14.3
1965	1240.0	15.8	1191.0	16.0	1071.4	16.8
1966	1417.0	14.3	1363.4	14.5	1225.9	14.4

TABLE II

Year ended 31st August	Units Sent Out (millions) & Percentage of Total									
	1962		1963		1964		1965		1966	
From Board Power Stations:		%		%		%		%		%
Steam Stations	571.3	72.1	637.6	71.0	509.3	49.6	588.1	49.4	656.8	48.2
Diesel Stations*	95.0	12.0	106.4	11.8	130.6	12.7	145.9	12.2	138.0	10.1
Hydro-Electric Stations	14.0	1.8	45.5	5.1	318.7	31.1	366.6	30.8	444.8	32.6
Sub-total	680.3	85.9	789.5	87.9	958.6	93.4	1100.6	92.4	1239.6	90.9
FROM BULK SUPPLIES:- The Perak River Hydro-Electric Power Co. Ltd.	43.7	5.5	46.6	5.2	54.2	5.3	60.9	5.1	67.6	5.0
The City of Singapore	58.3	7.3	51.6	5.7	0.3	—	—	—	—	—
The City of George Town	9.3	1.2	9.6	1.1	12.6	1.2	29.4	2.5	56.1	4.1
Other Supplies	0.8	0.1	1.1	0.1	0.9	0.1	0.1	—	0.1	—
Total	792.4	100.0	898.4	100.0	1026.6	100.0	1191.0	100.0	1363.4	100.0

*Includes Free Piston Gacifyers

TABLE III

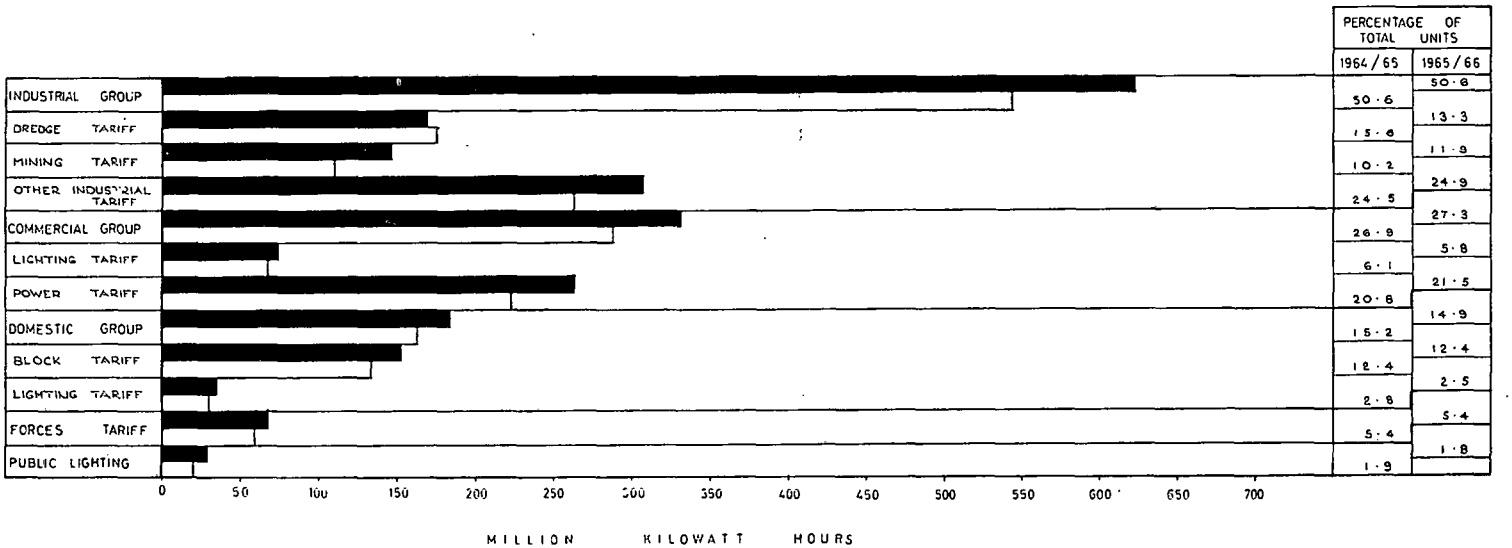
Average units Generated/Purchased Per Day during the Month of August 1966

(Thousands of Units)					
Source	1962	1963	1964	1965	1966
Generated by Thermal Stations	1,740.3	1,965.8	1,538.8	2,013.6	2,328.6
Generated by Hydro Stations	40.4	273.1	890.7	904.3	1,007.3
*Generated by Board's Diesel Stations	278.1	318.4	422.6	440.6	397.9
Purchased by the Board	331.1	172.6	210.4	250.2	367.0
Total units Generated/Purchased	2,389.9	2,729.9	3,062.5	3,608.7	4,100.8

* Includes Free Piston Gasifyers

TABLE IV

GROWTH OF SALES (UNITS) CONSUMER GROUPS 1964/65 - 1965/66



	PERCENTAGE OF TOTAL UNITS	
	1964/65	1965/66
INDUSTRIAL GROUP	50·6	50·6
DREDGE TARIFF	15·6	13·3
MINING TARIFF	10·2	11·9
OTHER INDUSTRIAL TARIFF	24·5	24·9
COMMERCIAL GROUP	26·8	27·3
LIGHTING TARIFF	6·1	5·8
POWER TARIFF	20·8	21·5
DOMESTIC GROUP	15·2	14·9
BLOCK TARIFF	12·4	12·4
LIGHTING TARIFF	2·8	2·5
FORCES TARIFF	5·4	5·4
PUBLIC LIGHTING	1·9	1·8

TABLE V

Increase In Number of Consumers

As At 31st August	Total Number connected	Increase over previous year	
		Number	Percentage
1962	213,858	16,299	7.6
1963	238,181	24,323	11.3
1964	288,199	50,018	21.0
1965	314,050	25,851	9.0
1966	338,674	24,624	7.8

TABLE VI

Appliances Hired to Consumers as at 31st August

Type of Appliance	1962	1963	1964	1965	1966
Ceiling Fans	27,000	26,648	26,298	25,531	26,355
Cookers	1,517	1,558	1,574	1,524	1,633
Motors	193	187	160	153	180
Refrigerators	10	8	9	7	6
Table Fans	119	99	67	55	61
Water Heaters	1,718	1,716	1,679	1,642	1,778

TABLE VII

Monthly output of the Board's Power Stations & Bulk Purchases 1965/66
Output in millions of units (kWH).

Type of station	1965				1966								Total
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
Bulk Purchases	8.0	9.5	8.6	10.6	10.7	10.2	11.4	11.0	11.5	10.9	11.3	11.3	125.0
Diesel*	13.0	12.8	12.9	11.0	11.2	10.7	12.4	11.8	12.7	12.3	12.6	12.3	145.7
Hydro	40.6	29.1	48.7	52.4	46.3	32.9	33.4	34.9	34.3	30.6	34.3	31.2	448.7
Steam	49.8	65.9	43.8	43.2	44.3	54.7	64.6	59.1	66.2	66.6	67.2	72.2	697.6
T o t a l	111.4	117.3	114.0	117.2	112.5	108.5	121.8	116.8	124.7	120.4	125.4	127.0	1417.0

*Includes Free Piston Gasifyers

STATISTICS OF UNITS GENERATED

STATION (1)	Maximum Demand kW (2)	Units Generated and/or Purchased (3)	Load Factor % (4)	Units used in Station (5)
CENTRAL NETWORK [1]	175,450	1,029,529,767	67.0	37,818,349
BULK SUPPLIES FROM CENTRAL NETWORK:				
Cameron Highlands (Robinson Falls)	1,290			
Jor (Talam Mines)	2,740			
Kajang	2,950			
Klang/Port Swettenham	8,300			
Kuala Kubu Bahru/Rasa	280			
Kuala Lumpur & District	104,830			
Kuala Selangor	495			
Petaling Jaya	16,800			
Tanjong Malim	260			
Malacca & District	11,599			
Tampin	1,780			
Tangkak	515			
Batu Pahat	2,250			
Muar	2,900			
Port Dickson	4,040			
Kuala Pilah/Bahau [2]	350			
Seremban & District	7,160			
		1,029,529,767	67.0	37,818,349
STEAM STATION				
Johore Bahru	19,200	114,598,650	68.1	6,989,131
BULK SUPPLIES				
Butterworth [3]	13,178	68,695,315	59.5	3,615,236
Ipoh & District	12,303	61,639,054	57.2	1,009,920
Klian Intan	15	82,439	62.7	—
Telok Anson	1,751	7,163,746	46.7	158,730
		137,581,054		4,783,886
DIESEL STATIONS				
Alor Star	4,266	18,958,671	50.7	554,867
Arau/Kangar	631	2,808,585	50.8	61,958
Bentong	720	2,696,298	42.7	68,953
Dungun	448	1,408,502	35.9	30,355
Fraser's Hill	288	935,430	37.1	54,671
Gemas	348	1,337,966	43.9	57,401
Kemaman	285	908,526	36.4	41,361
Kluang	3,920	20,778,660	60.5	281,463
Kota Bharu [4]	5,394	23,626,865	50.0	652,145
Kota Tinggi	300	1,050,754	39.9	34,065
Kuala Klawang	218	498,003	26.1	16,785
Kuala Lipis	473	1,750,885	42.3	61,251
Kuala Trengganu	1,750	6,954,943	45.4	287,338
Kuantan	1,710	7,601,603	50.8	214,326
Mentakab/Temerloh	900	3,988,727	50.6	141,689
Mersing	312	1,073,588	39.3	42,554
Pekan	580	969,637	19.1	24,193
Pontian Kechil	565	1,912,610	38.6	90,711
Raub [5]	590	2,402,201	46.5	—72,303
Rembau	152	411,151	30.7	19,657
Segamat	760	3,474,690	52.2	82,453
Sitiawan/Lumut	796	2,816,612	40.4	85,802
Taiping	5,300	26,985,221	58.1	932,891
		135,350,128		4,011,192
		1,417,059,599		53,602,558

1. Includes diesel plant units-Kuala Pilah (86,338), Bahau (66,443), diesel plant standby units Batu Pahat (16,832) Kuala Selangor (471) and Muar (4,150).
2. Kuala Pilah connected to Central Network on 19.9.65 and Bahau on 21.9.65.
3. Includes 12,054,850 units generated by Free Piston Gasifyers and 466,080 units by Butterworth diesel plant.

Units Sent Out	Units Used on works	Units unaccounted for		Total units sold	
		Units	% of Units Generated	1965/66	1964/65
(6)	(7)	(8)	(9)	(10)	(11)
991,711,418	12,242,055		8.72		
				3,399,776	3,317,412
				12,804,585	12,034,894
848,442,037	9,545,443	76,470,228		15,039,974	10,253,245
				43,493,139	31,097,012
				1,868,808	1,487,960
				601,819,939	534,269,456
				1,373,447	947,312
				81,396,931	66,522,199
				1,229,767	1,126,657
66,687,168	1,118,749	4,315,955		51,723,025	46,961,130
				7,967,988	6,613,477
				1,561,451	1,273,621
10,903,240	207,408	1,388,816		9,307,016	7,895,671
9,967,257	288,774	1,441,553		8,236,930	7,380,657
17,395,171	498,703	1,341,829		15,554,639	13,544,420
2,973,314	73,415	256,601		2,643,298	2,233,366
35,343,231	509,563	4,562,157		30,271,511	28,645,462
991,711,418	12,242,055	89,777,139	8.72	889,692,224	775,603,951
107,609,519	53,640	9,032,269	7.88	98,523,610	83,794,893
65,080,579	84,357	6,716,934	9.78	58,279,288	48,256,228
60,629,134	7,110	3,930,021	6.38	56,692,003	51,262,809
82,439	—	7,698	9.34	74,741	68,716
7,005,016	—	480,214	6.70	6,524,802	5,956,674
132,797,168	91,467	11,134,867	8.09	121,570,834	105,544,427
18,403,804	221,485	2,092,215	11.03	16,090,104	13,907,637
2,746,627	62,805	353,121	12.57	2,330,701	2,060,695
2,627,345	47,592	234,956	8.71	2,344,797	2,280,302
1,378,147	39,777	159,399	11.32	1,178,971	1,109,261
880,759	43,138	71,914	7.69	765,707	686,996
1,280,565	16,218	130,406	9.75	1,133,941	1,069,518
867,165	2,744	110,973	12.21	753,448	682,724
20,397,197	174,894	1,581,782	7.61	18,640,521	16,486,265
22,974,720	659,082	2,874,883	12.17	19,440,755	18,197,520
1,016,689	13,205	119,903	11.41	883,581	763,154
479,218	6,250	56,736	11.39	416,232	345,951
1,689,634	33,199	183,394	10.47	1,473,041	1,436,795
6,667,605	115,174	425,930	6.12	6,126,501	5,480,245
7,387,277	164,812	630,274	8.29	6,592,191	5,720,908
3,847,038	109,548	417,993	10.48	3,319,497	3,221,619
1,031,034	4,949	149,808	13.95	876,277	814,361
945,444	36,462	152,541	15.73	756,441	677,502
1,821,899	36,307	185,106	9.67	1,600,486	1,715,075
2,329,898	107,811	223,752	9.31	1,998,335	1,911,087
391,494	6,826	40,026	9.73	344,642	294,423
3,392,237	28,540	445,513	12.82	2,918,184	2,845,634
2,730,810	52,719	296,056	10.51	2,382,035	2,208,291
26,052,330	371,613	1,883,754	6.98	23,796,963	22,579,657
131,338,936	2,355,150	12,820,435	9.47	116,163,351	106,495,620
1,363,457,041	14,742,312	122,764 710	8.66	1,225,950,019	1,071,438,891

4. Includes 15,581,220 units generated by Lemal, 8,036,422 units by Lundang and 9,223 units by Kuala Krai.
5. Includes 2,301,340 units generated by Sempam Hydro Station.

*STATION	Population Estimated from 1958 Census	Number of Consumers	Domestic
CENTRAL AREA			
Kuala Lumpur and District	498,491	59,930	60,261,903
Kajang	15,367	7,349	2,018,576
Klang/Port Swettenham	108,344	13,216	6,715,250
Kuala Kubu Baharu/Tg. Malim	17,068	5,120	1,034,911
Kuala Selangor	2,862	1,039	249,887
Petaling Jaya	38,256	12,170	16,802,071
	680,888	99,324	87,082,603
NORTHERN AREA			
Talam Mines	—	—	—
Ipoh and District	184,714	24,326	16,601,623
Cameron Highlands	5,234	1,356	722,893
Sitiawan/Lumut	14,500	3,394	738,851
Taiping	80,502	12,113	4,126,350
Klian Intan	2,371	230	23,704
Butterworth	136,623	38,254	8,369,706
Arau/Kangar	9,322	2,199	544,946
Alor Star/Kepala Batas	83,461	14,367	4,220,661
Teluk Anson	48,249	6,619	1,964,085
	614,976	102,848	37,312,824
SOUTHERN AREA			
Seremban	70,831	14,202	8,083,484
Port Dickson	5,507	3,216	2,148,552
Kuala Klawang	3,748	1,224	136,776
Rembau	1,541	456	86,687
Malacca	95,406	19,200	10,092,540
Gemas	6,086	1,171	262,399
Muar	52,757	10,970	3,031,898
Segamat	23,013	2,686	686,560
Tangkak/Jasin	11,245	1,982	435,630
Batu Pahat	49,817	6,184	2,195,530
Kluang	41,031	5,335	2,613,444
Mersing	9,026	1,427	290,667
Pontian Kechil	10,544	2,162	530,873
Johore Bahru	97,143	15,172	14,076,935
Kota Tinggi	9,211	1,118	309,225
Kuala Pilah/Bahau	22,455	2,910	676,736
Tampin	7,066	2,576	1,112,317
	516,427	91,991	46,770,253
EASTERN AREA			
Kota Bharu	77,845	19,853	4,377,521
Kuala Trengganu	37,273	6,671	1,763,893
Dungun	15,583	2,002	395,320
Kuantan	29,570	4,649	1,595,308
Kemaman	13,637	1,398	259,581
Pekan	2,579	961	331,110
Raub	19,440	2,400	559,296
Bentong	23,887	2,678	612,270
Fraser's Hill	994	186	35,845
Kuala Lipis	10,927	1,433	397,393
Mentakab/Temerloh	16,348	2,280	541,982
	248,083	44,511	10,869,429
	2,060,374	338,674	182,035,109

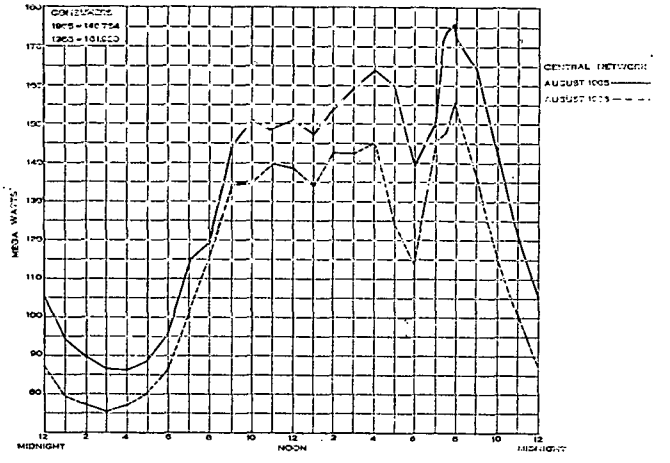
* Localities covered by the Board's stations

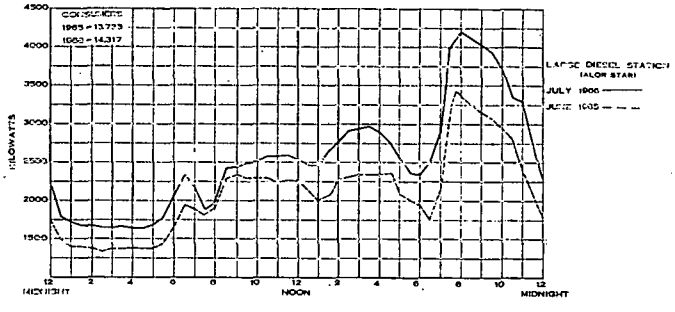
NOTE: Units sold do not include 1,799,390

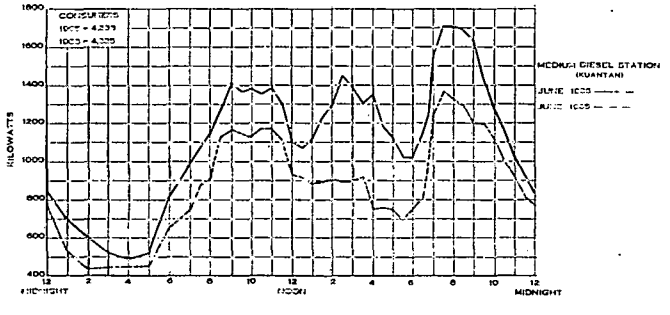
UNIT SOLD					Total	Per Head of Population
Commercial	Mining	Other Industrial	Forces	Public Lighting		
150,397,493	287,384,292	84,816,597	12,871,127	6,088,385	601,819,939	1,207
5,916,901	1,533,400	5,285,864	36,552	248,681	15,039,974	948
10,014,172	—	25,823,821	—	939,896	43,493,139	401
1,724,073	—	142,454	21,131	176,006	3,098,575	182
790,418	—	273,390	—	59,752	1,373,447	480
15,462,446	—	48,234,811	—	897,603	81,396,931	2,128
184,305,503	288,917,692	164,576,937	12,928,810	8,410,323	746,222,005	1,095
—	12,804,585	—	—	—	12,804,585	—
31,558,020	—	4,921,601	1,081,284	2,529,475	56,692,003	307
1,425,762	—	523,139	664,883	63,094	3,399,776	650
1,071,028	—	417,846	—	154,310	2,382,035	164
6,546,655	7,875,000	2,940,090	1,602,127	706,741	23,796,963	296
44,128	—	—	—	6,909	74,741	32
13,125,234	—	22,116,767	13,136,037	1,531,544	58,279,288	312
1,221,065	—	427,361	—	137,329	2,330,701	250
5,990,173	—	4,887,358	534,968	456,944	16,090,104	193
3,445,813	—	803,912	—	310,992	6,524,802	135
64,427,878	20,679,585	37,038,074	17,019,299	5,897,338	182,374,998	297
11,129,202	2,515,610	4,849,774	2,938,514	754,927	30,271,511	427
6,148,280	2,782,014	3,164,953	1,149,414	161,426	15,554,639	2,825
262,524	—	—	—	16,932	416,232	111
243,810	—	—	—	14,145	344,642	224
14,563,859	—	8,094,580	18,187,043	785,003	51,723,025	542
562,217	—	240,217	—	69,108	1,133,941	186
3,623,306	—	1,157,358	—	424,368	8,236,930	156
1,507,335	—	560,910	—	164,414	2,918,184	127
1,005,304	—	42,881	—	77,636	1,561,451	139
3,531,840	—	3,143,087	—	436,559	9,307,016	187
3,162,468	—	5,419,143	6,995,514	449,952	18,640,521	454
494,169	—	15,087	—	76,354	876,277	97
807,117	—	180,770	—	81,726	1,600,486	152
13,781,951	—	64,854,223	4,811,558	998,943	98,523,610	1,014
504,996	—	—	—	69,692	883,581	96
1,439,143	—	410,409	—	117,010	2,643,298	118
2,195,863	—	3,447,631	1,152,604	59,573	7,967,988	1,128
64,963,384	5,297,624	95,581,023	35,234,647	4,757,768	252,603,332	489
9,155,502	—	4,413,297	412,865	1,081,238	19,440,755	250
2,904,862	—	1,068,573	—	389,173	6,126,501	164
699,684	—	—	—	83,967	1,178,971	76
3,298,589	—	1,463,363	—	234,931	6,592,191	223
391,818	—	41,792	—	60,257	753,448	55
304,341	—	79,607	—	41,383	756,441	293
789,513	—	530,433	—	119,093	1,998,335	103
1,012,881	—	548,141	—	171,505	2,344,797	98
696,970	—	31,421	—	1,471	765,707	770
692,993	—	285,099	—	97,556	1,473,041	135
1,415,938	—	623,964	634,809	102,894	3,319,497	203
21,363,091	—	9,085,690	1,047,674	2,383,468	44,749,684	180
335,059,856	314,894,901	306,281,724	66,230,430	21,448,897	1,225,950,019	595

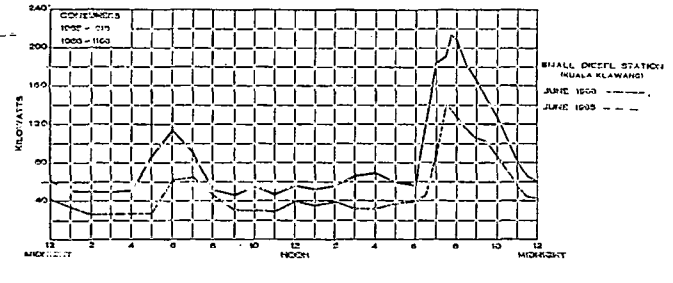
do not necessarily conform to Town Board or Municipal Areas.
sold to Rural Stations.

APPENDIX X
TYPICAL DAILY LOAD CURVES









APPENDIX XI

SUBSTATIONS OF THE NATIONAL ELECTRICITY BOARD AS AT 31ST AUGUST, 1966

Voltage of Transformer Station	Number in Commission	Total Capacity in kVA	Increase in Capacity Over Preceding Year in kVA	Under Construction or Rehabilitation	
				No.	kVA
132 kV	4	279,200	—	—	—
66 kV	14	341,000	10,500	1	20,000
33 kV	222	199,335	9,700	—	—
22 kV	15	38,662.5	2,300	2	7,500
11 kV	1,169	392,130	41,159	18	4,075
6.6 kV	261	76,140	5,050	4	1,200
5.5 kV	—	—	—	—	—
3.3 kV	8	1,350	200	—	—
			250 (D)		
2.2 kV	25	2,308.75	225	—	—
TOTAL	1,718	1,330,126.25	68,884	25	32,775

Note: (i) Step up transformers in power stations etc. are included in the category of the higher voltage.

(ii) In Power Stations all transformers of similar ratio are considered as forming one substation.

(D) Decrease.

APPENDIX XII

EXTENT OF TRANSMISSION AND DISTRIBUTION SYSTEMS OF THE NATIONAL ELECTRICITY BOARD AS AT 31ST AUGUST, 1966

Voltage of Transmission Lines	Length in Miles	Increase over Preceding Year in Miles	Decrease over Preceding Year in miles	Length under Construction in Miles
132 kV Overhead	242.95 (a)	6.15	—	158 (f)
66 kV Overhead	226.23 (b)	22.91	—	31 (e)
66 kV Underground	2.48	—	—	—
33 kV Overhead	423.74 (c)	15.10	5.03	—
33 kV Underground	39.86 (d)	—	—	—
22 kV Overhead	18.34	1.31	—	—
22 kV Underground	40.13	—	—	—
11 kV Overhead	232.99	0.29	.24	—
11 kV Underground	1,103.47	90.81	—	—
6.6 kV Overhead	18.08	—	—	—
6.6 kV Underground	219.39	10.89	0.45	—
3.3 kV Overhead	4.16	—	0.64	—
3.3 kV Underground	2.68	1.19	—	—
2.2 kV Overhead	3.79	—	—	—
2.2 kV Underground	3.98	—	—	—
TOTAL	2,582.27	148.65	6.36	189

(a) Includes 97.93 miles double circuit line
(b) Includes 41.34 miles double circuit line
(c) Includes 0.58 miles of 132 kV D/C and 5.57 miles of 132 kV single circuit line operating at 33 kV
(d) Includes 0.58 miles of 33 kV single core U/G cable and 10.98 miles of 33 kV submarine cable
(e) The 31 miles of 66 kV refers to the Batu Pahat — Kluang line
(f) 132 kV O/H line under construction in the Batang Padang Scheme are as follows:—

Double Circuit Lines with both circuits to be strung	—	64 miles
„ „ „ „ only one „ „ „ „	—	44 miles
Single Circuit Line	—	50 miles
Total:		158 miles

APPENDIX XIII

ANALYSIS OF GROSS UNITS GENERATED IN THE STATES OF MALAYA FOR PERIOD 1st SEPTEMBER, 1965 TO 31st AUGUST, 1966

Type of Prime Mover	Units Generated by Public Utilities		Units Generated by Mining Installations		Units Generated by Other Private Installations		Total Units Generated In the States	
	Millions	Percentages	Millions	Percentages	Millions	Percentages	Millions	Percentages
STEAM	1383.961	62.84	—	—	—	—	1383.961	57.22
DIESEL	150.552	6.83	85.640	85.17	115.345	100.00	351.537	14.54
HYDRO	667.960	30.33	14.916	14.83	—	—	682.876	28.24
TOTAL	2,202.473	100.00	100.556	100.00	115.345	100.00	2,418.374	100.00

UNITS GENERATED/SOLD /REVENUE-PRICE/UNIT SOLD

Authority	Year	Units Generated and/or Purchased	Units sold	$000
Federated Malay States ...	1926	6,321,508	5,279,954	998.8
- do - ...	1927	7,400,000	6,380,147	1,087.1
- do - ...	1928	17,550,067	14,155,371	1,531.4
- do - ...	1929	28,006,729	24,138,549	2,230.1
- do - ...	1930	31,760,297	26,367,689	2,494.4
- do - ...	1931	28,282,491	22,472,361	2,275.9
- do - ...	1932	24,671,710	18,770,116	1,960.8
- do - ...	1933	27,168,168	19,508,997	1,810.7
- do - ...	1934	41,091,933	31,150,958	2,208.2
- do - ...	1935	57,797,454	46,033,330	2,661.0
- do - ...	1936	83,080,165	68,982,094	3,233.6
- do - ...	1937	91,013,387	78,111,585	3,596.7
- do - ...	1938	71,495,668	60,010,165	3,242.7
- do - ...	1939	74,503,421	55,785,393	3,205.4
- do - ...	1940	121,503,012	97,887,501	4,326.2
	1941	—	—	—
	1945	—	—	—
Malayan Union and Federation of Malaya ...	1946	63,995,899	49,007,752	4,379.2
- do - ...	1947	102,533,237	80,011,234	7,478.9
- do - ...	1948	123,957,654	96,910,878	9,182.6
Central Electricity Board 1.9.49	31.8.50	175,401,436	141,363,811	13,639.5
- do - ...	1950-51	197,765,267	159,866,549	16,243.7
- do - ...	1951-52	230,744,326	183,230,475	20,195.7
- do - ...	1952-53	259,186,152	208,212,167	22,142.6
- do - ...	1953-54	297,055,212	241,076,210	24,284.5
- do - ...	1954-55	355,537,745	287,552,670	28,541.6
- do - ...	1955-56	415,829,412	340,239,096	33,069.8
- do - ...	1956-57	476,397,884	396,524,270	37,286.0
- do - ...	1957-58	548,355,934	458,506,752	42,264.2
- do - ...	1958-59	534,432,940	447,746,475	43,294.9
- do - ...	1959-60	639,502,028	544,904,857	52,134.1
- do - ...	1960-61	740,601,186	632,797,649	59,609.6
- do - ...	1961-62	833,931,372	709,052,595	66,597.4
- do - ...	1962-63	944,555,681	802,198,129	74,677.4
- do - ...	1963-64	1,070,995,640	917,271,188	83,907.0
National Electricity Board 22.6.65	1964-65	1,239,992,104	1,071,433,891	97,241.8
- do - ...	1965-66	1,417,059,599	1,225,950,019	109,906.5

NOTE: Units sold do not include 1,799,390 units sold to Rural Stations and Board's

NUMBER OF CONSUMERS, UNITS CONSUMED

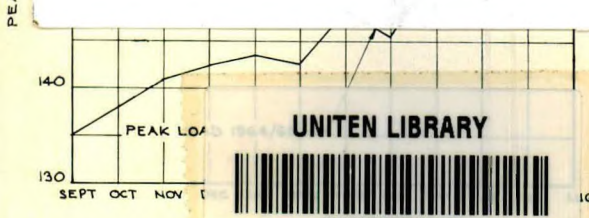
REVENUE			Number of Consumers	Units sold per Consumer	Remarks
£000	Cents per unit sold	Pence per unit sold			
116.7	18.90	5.30	5,034	1,048	
126.9	17.10	4.80	5,818	1,100	
178.7	10.80	3.15	7,503	1,888	
266.1	9.45	2.64	11,153	2,075	
291.0	9.45	2.64	13,975	1,890	
265.5	10.12	2.83	15,794	1,423	Slump years
228.8	10.45	2.93	16,576	1,133	
211.3	9.28	2.60	16,570	1,176	
257.6	7.10	1.99	17,675	1,760	
310.4	5.79	1.62	18,561	2,475	
377.3	4.69	1.31	20,237	3,440	
419.6	4.61	1.29	21,981	3,550	
378.3	5.40	1.51	23,485	2,575	
374.0	5.74	1.61	25,555	2,180	
504.7	4.43	1.24	25,836	3,780	
—	—	—	—	—	Not available
—	—	—	—	—	
510.9	8.96	2.50	41,537	1,108	9 months only
872.5	9.35	2.62	41,751	1,920	1st April to 31st
1,071.3	8.57	2.40	46,153	2,100	December 1946
1,593.0	9.65	2.70	50,006	2,827	
1,895.0	10.16	2.84	54,462	2,935	
2,356.1	11.02	3.09	59,526	3,078	
2,583.3	10.63	3.00	66,768	3,118	
2,833.2	10.07	2.82	80,355	3,000	
3,330.0	9.93	2.78	103,146	2,789	
3,858.1	9.72	2.72	120,862	2,815	
4,350.0	9.40	2.63	139,124	2,850	
4,930.8	9.22	2.58	155,691	2,945	
5,051.1	9.67	2.71	165,297	2,708	
6,082.3	9.57	2.68	180,597	3,017	
6,954.5	9.42	2.64	197,559	3,203	
7,769.7	9.39	2.63	213,858	3,316	
8,712.4	9.31	2.61	238,181	3,368	
9,789.2	9.15	2.56	288,199	3,183	
11,240.0	9.06	2.53	314,050	3,410	
12,822.4	8.97	2.51	338,674	3,620	

New Villages. Revenue does not include $644,731 received from sales to Rural Stations and New Villages.

APPENDIX XV

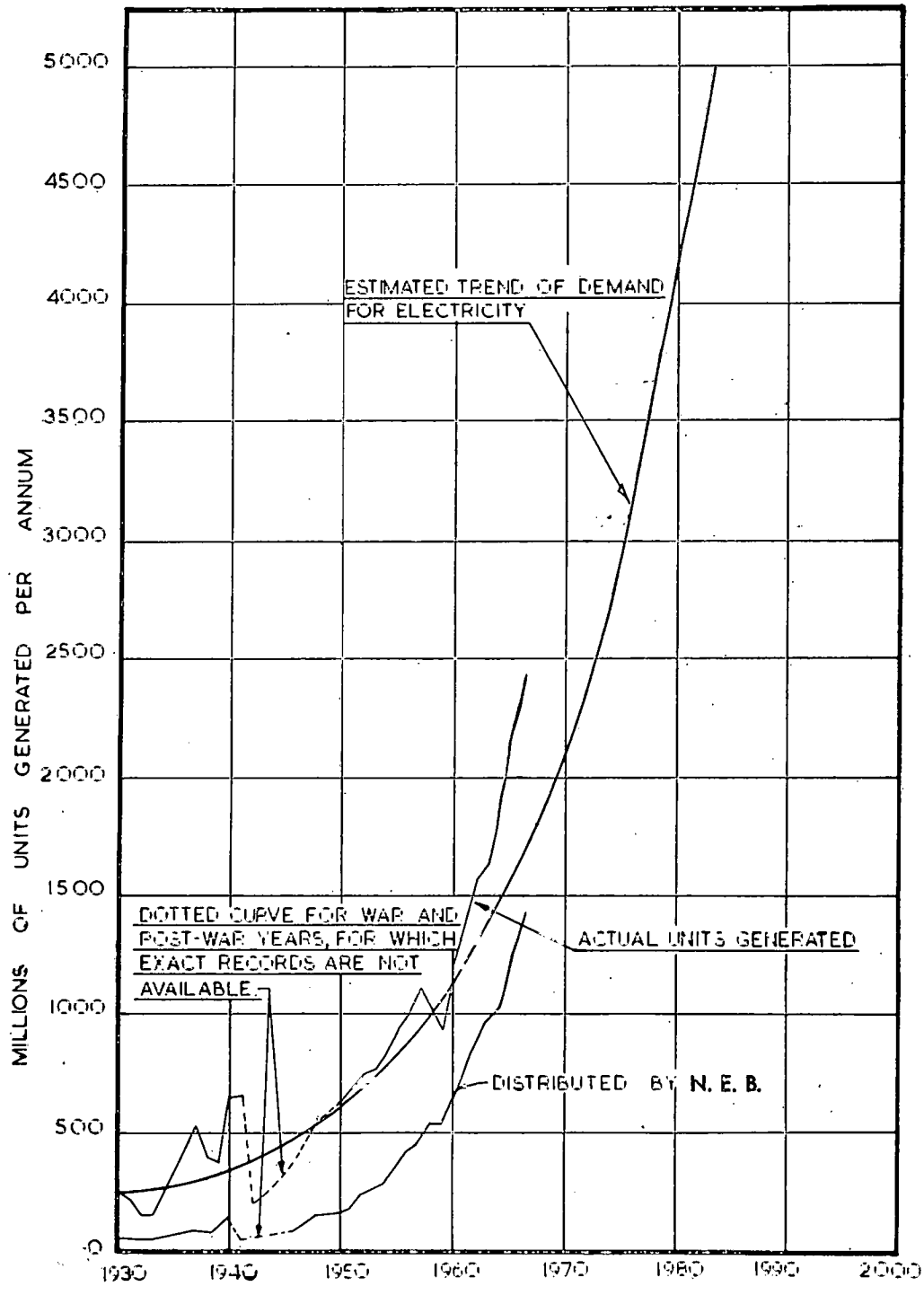
ANALYSIS OF UNITS USED FOR VARIOUS PURPOSES IN THE STATES OF MALAYA FROM 1st SEPTEMBER, 1965 to 31st AUGUST, 1966

Purpose Units Used For	From Public Utilities		From Mining Installations		From Other Private Installations		Total Units Used In The States	
	Millions	Percentages	Millions	Percentages	Millions	Percentages	Millions	Percentages
Tin Mining:- Dredging	333.420	17.40	21.571	21.45	—	—	354.991	16.66
Open Cast	488.814	25.52	18.385	18.28	—	—	507.199	23.80
Underground	—	—	24.628	24.49	—	—	24.628	1.16
Iron Mining	1.369	0.07	35.169	34.98	—	—	36.538	1.71
Gold Mining	—	—	—	—	—	—	—	—
Bauxite Mining	—	—	0.721	0.72	—	—	0.721	0.03
Cement	27.721	1.45	—	—	—	—	27.721	1.30
Industrial & Commercial	658.841	34.39	—	—	80.539	70.24	739.380	34.70
Lighting & Domestic	405.579	21.17	0.082	0.08	34.131	29.76	439.792	20.64
Total	1,915.744	100.00	100.556	100.00	114.670	100.00	2,130.970	100.00



APPENDIX XVI

GROWTH OF GENERATION OF ELECTRICITY IN THE STATE OF MALAYA, 1930 - 1966



WEST MALAYSIA

PRINCIPAL GENERATING STATIONS AND TRANSMISSION LINES 1965 - 1966

Miles 10 5 0 10 20 30 40 50 Miles

Scale 24 Miles to an Inch

THAILAND

PERLIS
ARAU
KANGAR
ALOR SETAR
KEDAH
SUNGAI PATANI
MUDA RIVER
BUTTERWORTH
SUNGAI PINANG
P. PINANG
KULIM
BT. MERTAJAM
PERAI
PROVINCE WELLESLEY
PARIT BUNTAR
Irrigation Reservoir
Chenderoh Lake
CHENDEROH
TAIPING
PERAK
IPOH
PAPAN
BATU GAJAH
MALIM NAWAR
SITIAWAN
LUMUT
TELOK ANSON
UPPER TELOM
ROBINSON FALLS
HABU
JOR
WOH
PRAH
SLIM RIVER
TANJONG MALIM
SELANGOR
TANJONG KARANG
KUALA SELANGOR
RAWANG
SEGAMBUT
ULU LANGAT
PUDU ULU
BUNGSAR
KELANG
PORT SWETTENHAM
CONNAUGHT BRIDGE
AYER HITAM
K.L. SOUTH
BANGI
SEREMBAN
PORT DICKSON
RANTAU
NEGERI SEMBILAN
BAHAU
K. PILAH
TAMPIN
ALOR GAJAH
MELAKA
MERLIMAU
MUAR
BATU PAHAT
SEMPAM
RAUB
FRASER'S HILL
BENTONG
PERTING
BENUS
MENTEKAB
TEMERLOH
PAHANG
TUMPAT
KOTA BAHARU
PASIR MAS
S. LEMAL
BACHOK
TANAH MERAH
PASIR PUTEH
MACHANG
KG. RAJA
KUALA KERAI
KELANTAN
KUALA LIPIS
TERENGGANU
KUALA TERENGGANU
DUNGUN
KEMAMAN
KUANTAN
PEKAN
Tasek Bera
P. TIOMAN
GEMAS
SEGAMAT
MERSING
KELUANG
J O H O R
KOTA TINGGI
SEKUDAI
JOHOR BAHARU
PONTIAN
SINGAPURA
PASIR PANJANG
ST. JAMES
SELAT MELAKA
LAUT CHINA

REFERENCE

	OPERATING	PLANNED OR UNDER CONSTRUCTION
GENERATING STATIONS		
Steam	●	○
Hydro	●	○
Oil Engine	●	○
TRANSMISSION LINES		
132 kV or above	———	- - -
66 kV	———	- - -
33 kV and below	———	- - -
PRINCIPAL TOWNS RECEIVING BULK SUPPLY	+	

N.E.B. AREAS: Central, Eastern, Northern, Southern

International Boundary

State Boundaries

Directorate of National Mapping Malaysia No. 104-1966

CENTRAL NETWORK

PRINCIPAL TRANSMISSION AND DISTRIBUTION LINES

MILES 4 3 2 1 0 4 8 12 16 20 MILES

APPROX · SCALE

REFERENCE

- 132/330 kV. Proposed.
- 132 kV. Existing.
- 132 kV. Under Construction.
- 132 kV. Proposed.
- 66 kV. Existing.
- 66 kV. Under Construction
- 66 kV. Proposed.
- 33 kV. Existing.
- 33 kV. Under Construction
- 33 kV. Proposed.
- 11 kV. Existing.
- 11 kV. Under Construction.

NOTE:- TOWN 11 kV. AND 6·6 kV. DISTRIBUTION SYSTEMS ARE NOT SHOWN.

K.L. TOWN 33 kV. UNDERGROUND DISTRIBUTION IS NOT SHOWN

PERAK

TO CAMERON HIGHLANDS SCHEME

TANJONG MALIM

K. KUBU BAHARU

RASA

PAHANG

TG. KARANG

BUKIT MUNCHONG

KUALA SELANGOR

BATANG BERJUNTAI

RAWANG

BENTONG HYDRO SCHEME

MALAYAN COLLIERIES

KUNDANG

KANCHING

KEPONG

S. BULOH

ULU LANGAT P.S. (Hydro)

SENTUL

SEGAMBUT

AMPANG

SELANGOR

KAPAR

BUNGSAR

PUDU ULU

SALAK SOUTH

S. BESI

ULU LANGAT VILLAGE

SUNGEI WAY

PJAYA

BATU TIGA

K. L. SOUTH

KELANG

CONNAUGHT BRIDGE P.S. (Steam)

PUCHONG

9TH. MILE CHERAS

SERDANG

PORT SWETTENHAM

KAJANG

AYER HITAM

KUALA LANGAT

BANGI

BANTING

TELOK DATOK

S. MANGGIS

PAJAM

NILAI

MANTIN

SEREMBAN

NEGERI SEMBILAN

KUALA PILAH

BAHAU

RANTAU

PORT DICKSON P.S. (Steam) PROP.

GEMAS

SEGAMAT

TAMPIN

BATANG MELAKA

ALOR GAJAH

TO KELUANG

MASJID TANAH

MELAKA

JASIN

TANGKAK

MELAKA P.S. (Steam)

MELAKA

JOHOR

MERLIMAU

MUAR

BATU PAHAT

TO KELUANG

Directorate of National Mapping Malaysia No. 104-1966