

BRITISH GUIANA

REPORT

OF A

Commission of Inquiry into
the interruption in the sup-
ply of electricity by the
Demerara Electric Company,
Limited, which commenced on
the 20th September, 1959.

COMMISSION TO ENQUIRE INTO THE INTERRUPTION IN THE SUPPLY OF ELECTRICITY BY THE DEMERARA ELECTRIC COMPANY LIMITED, WHICH COMMENCED ON THE 20TH SEPTEMBER, 1959.



R E P O R T

To HIS EXCELLENCY DENNIS MITCHELL HEDGES,
The Officer Administering the Govern-
ment, and Commander-in-Chief in and
over the Colony of British Guiana,
Vice Admiral of the same, etc., etc.

Your Excellency,

INTRODUCTION

At about 6.30 o'clock Sunday evening, 20th September, 1959, a failure occurred at the Demerara Electric Company's Power-Station at Kingston, causing a total blackout of the City. The blackout lasted for 5 minutes after which the street lights were restored. Essential services were cut off for about one hour, but the majority of consumers were without current until the 25th of September.

APPOINTMENT

2. On the 2nd October, 1959, we were appointed by Commission issued under the Commissions of Inquiry Ordinance, Chapter 59, with the following terms of reference:

- (1) To inquire into and report upon the interruption in the supply of electricity by the Demerara Electric Company, Limited, which commenced on the 20th September, 1959, with special reference to:

- (a) the extent of the interruption;
- (b) the nature and cause of the breakdown of plant that led to such interruption;
- (c) whether the interruption could reasonably have been prevented having regard to the nature and frequency of previous interruptions in the supply of electricity, and to the arrangements for providing, operating, servicing and repairing the plant and equipment (including tools and spare parts) necessary to meet the demand for electricity in relation to the Company's franchise;
- (d) whether steps could reasonably have been taken to effect an earlier resumption of the general supply of electricity.

(2) To consider and report on -

- (a) the steps that should be taken to avoid any further breakdown of plant;
- (b) the steps that should be taken to ensure the expeditious resumption of the supply of electricity in the event of any future breakdown of plant.

PROCEDURE

3. A notice was published in the Press asking for interested parties to submit their names and addresses together with brief statements of facts or matters about which they wished to testify.

4. Our inquiry was conducted throughout in public at the Legislative Council Chamber, Public Buildings. We held nine sittings.

5. Our first sitting was held on Wednesday, 16th October, 1959, and after the Secretary had read our Commission, the Chairman made the following statement:-

" This Commission was appointed by the Officer Administering the Government by virtue of Chapter 59 of the Laws of British Guiana on the 2nd October, 1959. On the 4th and 5th of October we caused the following notice to be published in all the **daily** newspapers and to be broadcast over the two Radio Stations:-

' All persons or groups of persons who can give statements of fact within their knowledge or who wish to furnish evidence leading up to or relating to the interruption of the supply of electricity by the Demerara Electric Company, Limited, which commenced on Sunday, 20th September, 1959, are invited to submit, without delay but before the 12th inst., their names and addresses together with brief statements of such facts or of the matters about which they wish to testify direct to the Chairman of the Enquiry Commission at the Public Buildings, Georgetown, and mark them "Confidential".'

2. The enquiry will be heard in public in accordance with Sec. 2(2) of the Commissions of Inquiry Ordinance, Chapter 59.

3. Evidence will be taken on oath.

4. We will allow interested parties to appear in person or by Counsel or Solicitors.

5. We will allow Counsel or Solicitors to call witnesses and to examine or cross-examine them. We do not propose to follow the strict rules of evidence but we reserve to ourselves the right to rule whether any question is relevant to our enquiry and to disallow anything we think is irrelevant. At this point may we draw attention to the two broad questions into which we are asked to enquire:-

(a) The interruption of the supply of electricity on the 20th September, 1959.

(b) The steps that should be taken to avoid further breakdown of the plant.

We will call witnesses and examine them ourselves if necessary.

" 6. At the conclusion of this statement the Secretary of the Commission will enter appearances of Counsel and Solicitors on behalf of interested parties.

7. Evidence will then be taken from the Controller of Electricity relating to the actual interruption of the service on the 20th September. This evidence will be formal.

8. The Commission will then adjourn for the purpose of giving my brother Commissioner and me an opportunity of viewing the locus.

9. The hearing will be resumed on the 21st October.

10. Thereafter we shall determine the course of the enquiry as circumstances require.

11. May we end this Statement by saying that we are anxious to conclude this enquiry with the least possible delay. We are sure that we shall get the cooperation of all those taking part. Given this, we shall be able to arrive at a finding consistent with the true facts. "

6. At the conclusion of the above statement, the following appearances were entered by Counsel:-

Mr. J.H.S. Elliott, Barrister-at-Law, with Mr. J. Edward De Freitas, Solicitor, appeared on behalf of the Demerara Electric Company, Limited.

The Honourable A.M.I. Austin, Q.C., Attorney General, with Mr. M. Shahabudeen, Acting Crown Counsel, entered appearance on behalf of the Government.

VISIT TO LOCUS

7. On Wednesday, 16th October, 1959, on the adjournment of the preliminary meeting, we visited the Company's Power-Station at Kingston, Georgetown, and were shown around the plant by officials of the Company.

EVIDENCE

8. Counsel for the Company called eight witnesses. The Attorney General called one witness. The Commission called three witnesses. / A -

A list tendered by Counsel for the Company, showing the Company's personnel concerned, normal Gauge Readings and the sequence of events on 20th September, 1959, is attached as Appendix I.

A list of the abovementioned witnesses who gave evidence is attached as Appendix II.

Eighty Exhibits were tendered; a list of these is attached as Appendix III.

EXPLANATORY NOTE

9. We have divided our report into two parts. The first part deals with the technicalities of the plant and what led up to the accident on the 20th September, 1959. We have dealt with this in some detail because we think it might be useful in future investigations about the electrical generating plant at Kingston.

10. The second part deals with the protracted negotiations which took place between Government and the Demerara Electric Company between 1954 and 1958. A great deal of evidence was led on this issue and we have thought fit to deal with it in detail also.

P A R T I

THE DEMERARA ELECTRIC COMPANY

11. The Demerara Electric Company was incorporated in June, 1899, by the Demerara Electric Company Ordinance, Chapter 239. Generally for the supply of electricity to Georgetown and its environs the Georgetown Electric Supply Ordinance, Chapter 238, was passed in October, 1926. Section 4 of the Ordinance empowers the Governor-in-Council to make an order authorising the Company to generate and supply electricity for a period of fifty years from the

date of the order, subject to conditions laid down in the section.

12. Accordingly, the Governor-in-Council on the 27th of May, 1927, made the Georgetown Electric Supply Order, Chapter 238, popularly referred to as the Company's franchise, authorising the Company to supply electricity to the franchise "area" as described in the First Schedule to the Order, for a period of fifty years, but subject nevertheless, to the conditions laid down in section 4 of the 1926 Ordinance mentioned above.

THE COMPANY'S POWER-STATION

13. The Station can be described as a Thermal Power-Station consisting of five steam turbo-alternators and ancillary equipment. A schematic diagram tendered by the Company, showing the Power-Station main units, is attached as Appendix IV. It will be observed that the Station is designed on the "unit" principle, and basically laid out for a turbine and its associated boiler to work together.

14. Boilers Nos. 1 and 2 are wood-fired boilers with a capacity each of 15,000 lbs. of steam per hour. Boiler No. 3 is oil-fired with a capacity of 20,000 lbs. of steam per hour. All three are low-pressure, of John Thompson manufacture, capable of supplying steam at a pressure of 250 p.s.i. (pounds per square inch) and temperature of 600°F.

15. Boilers Nos. 4 and 5 are oil-fired. No. 4 has a capacity of 60,000 lbs. of steam per hour, and No. 5 a capacity of 70,000 lbs. per hour. Both are high-pressure, capable of supplying steam at a pressure of 450 p.s.i. and a temperature of 750°F. No. 4 Boiler is of Foster Wheeler manufacture, while No. 5 is a John Thompson.

16. These five boilers supply a common steam header which is divided at a point by a de-pressurising and de-superheating station. Boilers 2 and 3 supply the low-pressure section of this header and furnish steam to turbines 1, 2 and 3 each of which turbine is rated at 1,666 h.p. and an electrical output of 1,250 Kw. Boilers 4 and 5 supply the high-pressure section of the header and furnish steam to turbines 4 and 5 which are rated respectively at 4,666 h.p. and 3,500 Kw. and 6,666 h.p. and 5,000 Kw. It is also possible by means of the de-pressurising and de-superheating station for these boilers to furnish steam to the low-pressure section of the header, if required. The station is however uni-directional.

17. The aggregate horse power (turbines) of the Power-Station with all units in working condition is 16,333 h.p. and the aggregate kilowatts (alternators) 12,250 Kw. This electrical output is fed into a 14-panelled truck-type switchboard consisting of 5 generator panels and 9 distribution panels with indicating, recording, regulating and distributing apparatus.

18. Each of the boilers is given an annual overhaul and the average time taken for each overhaul is one month; thus for five months in every year there are four boilers only available for service at the Power-Station. This of course does not take into account any additional "off-time" occasioned by accidents or other unpredictable circumstances. There is no reserve or stand-by boiler. It can be assumed that advantage is taken of the boiler overhaul period for carrying out any required examination and replacements to the turbines and alternators.

19. The boilers are of the water-tube type.

They consist of one or more steam drums with

one or more mud drums. The steam drum is situated at the top of the boiler, the highest point of the unit, and the mud drums are located at the bottom. The steam drums and mud drums are connected by a large number of steel tubes which should always be filled with water. Some of these steel tubes are so disposed as to form a furnace enclosure, and the entire boiler is surrounded by a casing basically of fire-bricks to contain the flames. It also contains fire-brick baffles to guide the flow of hot gases. Heat is applied to the tubes by burning a suitable fuel in the combustion chamber, either bunker fuel oil or wood.

When water is heated steam is produced. Certain of the tubes in the hotter section of the boiler, which are known as riser tubes, produce the bulk of the steam. The tubes in the other section of the boiler supply water from the steam drum to the mud drum establishing a continuous circulation.

A mud drum has two purposes. One of them is to distribute the water among the boiler tubes. The other is to act as a collection point for any sludge or mud in the boiler, through which it can be disposed of. Mud is not mud in the ordinary sense of the word. It may consist of erosion products of sludge resulting from the internal water treatment in the boiler.

Steam bubbles separate from the water in the steam drum and the steam thus produced leaves the drum and passes through what is known as the super-heater section of the boiler where it is heated above saturation temperature and increased to the desired heat value for supply to the turbines.

Boilers Nos. 4 and 5 are supplied with water by two high-pressure boiler feed pumps. One is electrically driven, and the other is steam turbine driven. Each pump is capable of supplying water to both boilers at full load. Only one pump is needed at a time, the second pump is stand-by to the first. The boiler feed pump supplies water to the cold feed header. From the cold feed header water passes through the high pressure heaters of the turbine, where it is warmed. The water then enters the boiler drum through an internal feed water distribution pipe which is perforated to distribute water uniformly down the length of the steam drum.

The drum is normally about half full of steam and half full of water; the water level is maintained in the drum and that is the level observed on the boiler water gauge glass. The water enters the boiler unit at the steam drum and joins in the general circulation of water within the boiler. Steam is produced in the steam drum and passes through the super-heater and is delivered to the turbine at the correct temperature. Steam passes right through the turbine, and the low pressure steam from which mechanical work to drive the turbine has been extracted is liquified in a condenser by the cooling effect of river water. Condensed water is known as "condensate". It is removed from the condenser by duplicate extraction pumps. In other words, there are two pumps, one of which is a stand-by for the other; the condensate is delivered through the turbine feed heating system to the boiler feed pump suction header. The amount of water delivered by the turbine and the quantity required by the boiler

may not be the same at any given time, and a surge tank is provided to cater for any differences. In other words, if the boiler requires more water than the turbine is delivering, then the balance is drawn from the surge tank, or conversely, if the turbine is delivering more water than the boiler requires surplus water is put into the surge tank. The water passes through the boiler is condensed and returns as a closed circuit and, with the exception of very minor losses which are made up, the same water circulates continuously.

PREVIOUS INTERRUPTIONS IN ELECTRICAL SERVICE

20. There is a record of interruptions dating back to 1954, but the duration of the interruptions have been comparatively short periods ranging from a few minutes to eight hours. None of these necessitated a curtailment of the power supply on a pre-arranged schedule, described as "Load-shedding".

21. On the 10th January, 1958, however, there was a tube failure in No. 5 boiler; this necessitated enforced load-shedding to the amount of 400 to 500 Kw. for three days from 11th January, during a period of two hours each day, namely, 6.15 to 8.15 p.m. On the 16th September, another tube failure occurred in No. 5 boiler; this resulted in a shed of 400 Kw. covering a period of twelve days from 17th September, during a period of two hours each day from 6.15 to 8.25 p.m. On each of these two failures the station lost 5,000 Kw. of its installed capacity or 41% of its available power owing to lack of steam.

22. We were assured that prior to the 1st June, 1959, all five boilers and all five turbines were available

(an aggregate of 12,250 Kw.). The peak load at this date varied between 8,000 and 8,500 Kw. and it is therefore evident that there was no firm capacity.

THE INTERRUPTION ON THE 20TH SEPTEMBER, 1959

23. At the time of the breakdown on the 20th September, 1959, load-shedding had been in operation, having been re-introduced from 1st June, and applied in varying degrees from 1,000 to 300 Kw. Moreover, at the request of the Company, statutory authority was given to the procedure by the Georgetown Electric Supply (Control) Ordinance 1959. On the 20th September, there was an anticipated shed of 400 Kw.

24. At this time only three turbines (Nos. 1, 2 and 5) and three boilers (Nos. 1, 3 and 4) were available - all to a maximum aggregate of 7,500 Kw. No. 2 boiler was out of service due to repairs being carried out in the furnace. No. 2 turbine was operating on steam which was being furnished by No. 3 boiler. No. 3 turbine was not available as it was undergoing a general overhaul in the course of which a defective high-pressure bearing had been discovered. No. 5 boiler was being overhauled. No. 4 turbine was not available for service as No. 4 boiler was being used to supply steam to drive No. 5 turbine. As a consequence, an aggregate of 4,750 Kw. was unavailable, that is, approximately 39% of the installed capacity of the Station. In the result there was a boiler availability to produce 6,000 Kw. and a turbine availability of 7,500 Kw.

25. On 20th September, at about 6 o'clock in the afternoon on the 3 p.m. to 11 p.m. shift the Shift Engineer was in charge of the Power-Station along with the Boiler Operator and other employees. This was just before the approach of the peak load period and commencement of the

/ load-

load-shedding programme for that night. A screeching noise was heard coming from the electrically driven high-pressure boiler feed pump which was feeding the No. 4 boiler. The Boiler Operator and others immediately set about starting the steam turbo-driven stand-by. They succeeded and both pumps were now in operation. It was observed, however, that the suction pressures of both pumps were below normal; that on the electrically driven one was about 10 p.s.i. while that on the turbo pump was zero. The normal pressure is 30 p.s.i. The delivery end pressure was also below normal, being only 100 p.s.i. instead of 600 to 650 p.s.i. Instructions were issued to open the City water suction valves. This would have the effect of putting additional water into the suction header thus making up any possible shortage. As this water is cool it would have the effect of reducing the temperature of the water in the header by which means any vaporising condition in the header would be eliminated, and the pumps would be assisted. Indeed, no sooner was the City water admitted than both suction and delivery pressures on the pumps rose back to normal and the noise ceased. The pressures of the feed pumps having returned to normal the next action was to check water level conditions in the boiler. It was not possible to see any water in the gauge glass from ground level and the Boiler Operator was sent up to the water gauge ladder to close the steam valve on the water gauge column. This done, the water rose and it was possible to see water in the glass. This result, while not indicating the actual level of the water in the steam drum, showed that water was still there, and at least as high as the bottom valve of the water gauge.

26. The steam valve was then re-opened, the pressure came back in the column (gauge glass) carrying the water

down again, whereupon the "warning whistle" blew for about three minutes. The boiler was working on two of its three burners, one burner having been cut out when it was noticed that the water was dropping in the gauge glass. The electrical load in the turbine had also been reduced. The boiler pressure at this time had dropped to about 240 p.s.i. Efforts were then directed towards restoring the supply of water to the boiler and building up the pressure to the normal working figure. An inch rise of water in the gauge glass indicated that water was being pumped back into the boiler and there was no danger of water shortage. By about 6.15 p.m. a pressure of 320 p.s.i. was obtained and shortly after 400 p.s.i. when everything seemed to be returning to normal. This was about 6.30 p.m. Some of the electrical load that had been taken off the No. 5 turbine was returned.

27. It was at this point, however, that the boiler failed and subsequent investigation showed that the cause of the failure was the bursting of one of the boiler tubes. The evidence of the Shift Engineer is as follows:

Q: Did you observe whether the pressure had changed from 320 pounds, which it had last ?

A: Yes, it had risen.

Q: Do you remember to what figure ?

A: Yes, 400 pounds.

Q: And then what did you do ?

A: After seeing the pressure was that high, I went back and told Mr. Huggins he could take back some of the load.

Q: You thought everything was coming back to normal ?

A: Yes. During that period I transferred back what I had taken off from the emergency back to No. 5.

Q: What was the next thing that happened ?

A: Well, I transferred the load, then spoke to Mr. Huggins. While speaking to Mr. Huggins we heard a loud explosion.

/ Q: About -

- Q: About what time was that ?
- A: About 6.30.
- Q: When you heard the explosion, what did you see ?
- A: All I could see was dust and smoke. You could not make out anything of the boiler.
- Q: What did you do ?
- A: I gave instructions to the turbine operator, James, to close down No. 5 turbine, and we tripped out the feeders leaving the station transformer, street lighting, and water works, and East Bank Feeder.

28. As a result of the explosion only turbines Nos. 1 and 2 at the Station were running; there was a nominal maximum output of 2,500 Kw. available, of which about 1,800 Kw. only could be made use of on the system, owing to the highly reactive load characteristic. But immediately after the breakdown, it was not found possible even to make full use of this 1,800 Kw. and only 800 Kw. could be used. This meant that about 85% of the franchise area was without electricity.

RESUMPTION OF SUPPLY

29. In a matter of minutes the situation was brought back under control. The City's Street Lighting and Pure Water Supply Services were restored within seven minutes after the explosion, and the Georgetown Public Hospital, the Prisons and Fire Station by 7.29 p.m. Services to the St. Joseph's Mercy Hospital at Kingston, the Government Wireless Station at Thomas Lands, and Radio Demerara's transmitter at Sparendaam, East Coast, Demerara, were restored by 8.21 p.m. The restoration work continued as the circumstances permitted and by 10.54 p.m. it was possible to provide a supply of 1,800 Kw. which we are told was the limit of the load which could be carried with stability on the two small turbines, Nos. 1 and 2.

30. The next afternoon, Monday 21st September, No. 3 turbine was brought back into operation for the purpose of using the alternator as a synchronous condenser so as to relieve turbines Nos. 1 and 2 of the reactive load. It thus became possible to get the full capacity of 2,500 Kw. out of the machines then available, and this supply was distributed over the franchise area until Friday 25th September, in accordance with a schedule agreed with the Controller of Electricity.

31. By this date the repairs to No. 5 boiler were completed and around 10 o'clock on Friday night it was brought back into service. As a result it became possible, from Monday 28th September, to return to what has been described as normal load-shedding in operation before the breakdown.

32. But whereas before the breakdown there was a daily shed of about 600 Kw. after the breakdown and up to the time of our inquiry, 1,100 Kw. had to be shed. The reason given for this difference was the inability to get the full output of No. 5 boiler as all the necessary adjustments had probably not been made when it was put back into service on 25th September.

CAUSE OF BREAKDOWN

33. The tube which failed was a front wall tube. The explosion left a large sharp-edged hole in it at a point immediately below the burner arch, described as a canopy of water tubes and refractory tiles. On inspection it was found that 80% of the tubes in the boiler showed actual signs of overheating either by discolouration or distortion. The corresponding left hand tube to the one that failed was swollen at the same point.

34. The first indication of trouble was the screeching noise heard coming from the electrically driven boiler feed pump, accompanied by a drop in the delivery pressure. This suggested that some defect had arisen in the pump. The turbo-driven stand-by when put into operation effected no improvement in the delivery pressure. We accept the evidence that there was no shortage of condensate either in the suction header or surge tank. The conclusion to which we are therefore drawn is that the water was vaporising in the pumps due to abnormal temperature.

35. This adverse condition was remedied by the introduction of City water into the suction header; the delivery pressure and water supply from the pump became normal and the diminishing water content in the boiler was being restored. It would seem, however, that this improvement was not effective early enough to stabilise the unfavourable water/vapour balance in the boiler which resulted in vapour pocket expansion or steam-blanketing.

P A R T I I

36. Under our terms of reference 1(c) we are asked to enquire into "Whether the interruption to the service on the 20th September could reasonably have been prevented having regard to the arrangements for providing plant and equipment necessary to meet the demand for electricity in relation to the Company's franchise." We take this to mean whether or not the Company had fulfilled its obligation under the Electric Lighting Ordinance Chapter 237; the Georgetown Electric Supply Ordinance Chapter 238; and the Demerara Electric Company's Ordinance Chapter 239, which ordinances taken together gave the Company the exclusive right to supply electrical energy to the City of Georgetown.

37. About the beginning of 1954 the total capacity of the Company's Station was 12,250 Kw., while the peak load at that time was approximately 6,600 Kw. This meant that the Station at that time had what is known as "firm capacity". This is an international term used by electricity supply undertakings and means that a station is capable of meeting its peak load with its largest unit out of commission. We were told that it was the intention of the Company in 1954 to proceed with an expansion of the Station Plant by the installation of a 10,000 Kw. unit to ensure that firm capacity would be maintained over a number of years. A document (Exhibit 23) was produced showing a forecast of capital expenditure over the years 1956/1960 amounting to \$5,012,680.

38. On the 12th May, 1954, the Company received a letter in the following terms from the Ministry of Communications and Works:

" Gentlemen,

I am directed to notify you that in accordance with the provisions of Section 4 of the Georgetown Electric Supply and Tramways Ordinance, Chapter 79, the Company is requested to comply with the following requirements of the Governor-in-Council to improve the undertaking and bring it up-to-date and put in efficient working conditions ".

39. This letter was later to become known as "The Letter of Requirements" and contained eleven items, the most important of which were Numbers (iii) (iv) and (x), which were as follows:

- (iii) all mains, distributing mains, and service lines of the undertaking in the urban area of Greater Georgetown, as defined in Part Four of the Report and Draft Scheme for Greater Georgetown Planning Area, approved by the Governor-in-Council on the 9th October, 1951, and published in the Official Gazette on the 27th October, 1951, shall be laid underground;

/ (iv) -

- (iv) all mains, distributing mains and service lines within the area (excluding the urban area of Greater Georgetown as defined in paragraph (iii) above) within 100 yards of any building shall be laid underground;
- (x) the Company shall maintain such reasonable generating capacity as the Governor-in-Council may from time to time specify.

40. Section 4 of the Georgetown Electric Supply Ordinance, Cap. 238, is in the following terms:

" On the application of the undertakers the Governor-in-Council may make an order authorising the undertakers to generate and supply electricity for a period of fifty years from the date thereof, subject to the following conditions:-

- (a) the Governor-in-Council may revoke the order at the expiration of thirty years from the date thereof if the undertakers fail to comply with the reasonable requirements of the Governor-in-Council to improve the undertaking and bring it up-to-date and to put it in efficient working condition;
- (b) notice in writing specifying those requirements shall be served upon the undertakers before the expiration of the twenty-seventh year after the date of the order, and the undertakers shall comply with the requirements before the expiration of the thirtieth year after that date. "

41. On receipt of the letter of requirements the Company instructed its associate Company, the Montreal Engineering Company, to survey the electrical distribution system in Georgetown and submit estimates for laying the electrical cables underground and on the 6th April, 1955, the Company wrote to the Ministry of Communications and Works the following letter:

" The Permanent Secretary,
Ministry of Communications and Works,
Ministerial Building,
High Street,
Georgetown.

Dear Sir,

In reply to your letter of the 12th May, 1954, I am instructed by my Directors to state that the requirements therein set out are not "reasonable requirements" within the meaning of Section 4 of the Georgetown Electric Supply and Tramways Ordinance, Chapter 79, and that consequently, the Company is not obliged to comply therewith.

Yours very truly,
THE DEMERARA ELECTRIC COMPANY, LIMITED
(Sgd.) C.A. MacIntyre
General Manager "

42. On the 29th April the Company wrote to the Ministry enclosing a copy of the estimates by the Montreal Engineering Company of the cost of laying the overhead distribution system underground. These estimates were as follows:

Scheme "A"	Directly Buried Cable	\$12,500,000
Scheme "B"	Cable in Conduit	\$17,800,000

43. We have set these matters out in detail because we are of opinion that the letter of requirements started the dispute between Government and the Company which has continued until the present time.

44. There can be no possible doubt that Government was entitled under the ordinance to issue the letter of requirements at the time it did; indeed there was a duty upon it to do so, otherwise it would have lost the right to exercise its option. There was also no doubt that the Company could have been compelled to carry out the requirements subject to the overriding consideration that they were reasonable. Failure to do so would have meant revocation of the Company's franchise.

45. The position had now been reached that the Company had rejected the letter of requirements as unreasonable,

/ while -

while Government were saying that the mere delivery of the letter was not sufficient cause for the Company stopping its programme of expansion of the Plant. The opposing points of view were clearly brought out during the cross-examination by the Attorney General of Mr. H.L. Talbot, a Director of the Company, and we make no excuses for quoting it here in extenso:-

Q: Mr. Talbot, this letter of requirements is almost the basis of the Company's claim that they were unable to put in sufficient generating capacity to meet the increasing demands. Now, that letter of requirements was served on the 12th of May, 1954, and a letter from the Company, dated the 6th April, 1955, was sent to the Government saying that the Company considered that the requirements were not reasonable. It seems to me that if the requirements were not reasonable they were invalid and therefore of no effect; and that if that were the case, of course, the Company would not be bound by them and so they would have no fear. What would you say to that line of argument ?

A: There were two parties to that agreement. We were only one of them, and unless the other party agreed it seems to me that that would not be the correct argument.

Q: Did you do anything about it; because you see there is a provision under the franchise that where there is any dispute on any matter relating to the Company's undertakings, it is fair to say it shall be resolved by arbitration. My question is, and you may say that you do not know of it, did your Company ever contemplate seeking an arbitration award to determine the reasonableness or unreasonableness of the letter of requirements ?

A: No. I came back here every few months to try to get it resolved. I made 18 trips to this Colony between June 1954 and the present time always with one object of trying to get this problem resolved, an indication of the endeavour on the part of the Company to get a solution to this.

Q: I suggest that if the Company did not think that the requirements were reasonable, they had nothing to fear. If they did have their doubts about the letter there was the possibility of settling the issue by arbitration,

/ but -

but we have heard that that did not occur. But what I now want to ask you is this: Whether you thought that the letter of requirements froze the franchise and that the Company was not liable to discharge its obligation, at any rate, as far as installing new plant capacity, until the letter was out of the way ?

A: We took the attitude based on our information that the Government wanted that letter of requirements to be unreasonable to the extent that we cannot comply with it, so that at the end of the period they could take us over because they were playing around with hydro-electric power.

Q: This is a startling pronouncement and it amounts to no less than a charge that the Government was trying to blackmail the Company.

A: No, not blackmail, but just holding us in a 'straight jacket'.

Q: Now, I put it to you that Government could not possibly move to revoke the licence once the letter of requirements had been challenged by the Company as unreasonable.

A: Is that a statement or are you asking a question ?

Q: I am just saying whether the Company considered that view that once the letter of requirements had been challenged Government would not be in the position to revoke the franchise, at least until the arbitration award had decided that they were reasonable ?

A: I am not a lawyer and I cannot answer that.

Q: But I still put it to you that there was no justification for holding up the installation of plant because the letter of requirements had been put in. There was nothing under the franchise which said that it should suspend the obligation of the Company ?

A: If you are going to be taken over on a specific date you are not going to go ahead and put additional investment in.

Q: But if you had gone ahead in putting in increased generating capacity at considerable cost and you were taken over or bought out the new equipment on which you had expended certain amounts of money would be included in the sale, so that you would not be the loser in either way.

/ A: It -

A: It might have been, but we had no assurance it would. It is very hard to raise money under those conditions.

Q: But you see, under the franchise, Government is not responsible for raising money for the D.E.C. plant to increase its capacity. That is their business.

A: Do you mean after the Government has taken us over ?

Q: It is the Company's business to find increased capacity.

A: And we did that until May, 1957.

Q: There was no question, up to the time of the letter of requirements, as to any difficulty of raising funds for this new plant ?

A: The Company was quite sound, solid and liquid.

Q: And do you mean to say as the Company would have stood to lose a dollar if it had invested in a new plant in the event of a take-over or revocation, there was justification in saying you could not raise the money ?

A: Yes. We put in new plant in 1954 and the next plant would probably have gone in, or was due to go in, about the time the property was to be taken over. If we had purchased it, we had no assurance that Government would say they did not want it and we might have invested in a plant that might or might not have been put in at the time of the take over.

Q: But the contemplated basis of take-over was all the plant that was there ?

A: Yes.

Q: Do you suppose that the Government would, in the circumstances have rejected the transaction when plant had already been ordered ? Do you think any Government with any sense of propriety would have gone to such lengths.

A: I cannot tell what the Government might do.

Q: I suggest to you that in those circumstances the Government would not have dreamt of rejecting the plant. Do you disagree ?

A: Yes.

46. It appears from this passage in the evidence that the Company had come to the conclusion that Government was trying to impose impossible conditions which would result eventually in revocation of the franchise and the purchase of the undertaking by Government, while Government's explanation was that the letter of requirements was a formal notice under Section 4 of the Ordinance, the rejection of which would not in any way endanger the Company's franchise.

47. At this point we asked some questions ourselves about the origin of the proposal to put the distribution system underground and about the probable cost. We were told that it originated from one Mr. P.L. Skey who in 1954 was the Engineer-in-Chief of the Post Office Telecommunications Department. Mr. Skey has since left the country and was not available to give evidence but we accepted the statement given by Mr. J.A.E. Young, the Permanent Secretary to the Ministry of Communications and Works, that Mr. Skey was of opinion that overhead electric cables constituted a serious fire hazard. On the question of cost we could not accept, without reserve, the figures given by the Montreal Engineering Company, although it was clear to us that the estimates had been made with great thoroughness and care and obviously at no small cost. On this point Mr. Young informed us that Mr. Skey had estimated the cost of the work at \$5,000,000 or approximately 1/3 of the estimate made by the Montreal Engineering Company.

48. Several discussions took place subsequently between Government and the Company, some recorded and some not, but on the 6th July, 1956, a meeting took place between a Sub-Committee appointed by the Governor-in-Council and representatives of the Company, at which the letter of requirements was fully discussed.

The following extract from the note of the meeting (Exhibit 49) shows how it ended.

"The members of the Sub-Committee and Government's technical advisers considered, and still consider, that the proposals set out are all reasonable and are the absolute minimum to which Government should agree in the circumstances. The Company's representatives stated that they were not prepared to modify any of their counter proposals. Consequently, complete deadlock arose as to the negotiations with regard to the letter of requirements."

49. It is only fair to say that at this meeting the Government's representatives withdrew the demand that the overhead distribution system should be put underground in one operation and made the suggestion that the Company should do the work in stages, spending \$50,000 per year on a plan, to be agreed with Government. The Company made a counter proposal that they should only be required to spend \$25,000 per year on this work.

50. This was the position in July, 1956, when the Station was already beginning to lose firm capacity.

51. At this point the negotiations continued with two objects in view and it has been anything but easy to separate them into two distinct channels. In the first place it appears that Government had always intended to purchase the undertaking provided it could find the money and an Ordinance, the Electricity Ordinance, 1957, was actually passed in 1957, for the purpose of putting this into effect. Secondly, there were times when there were doubts about Government's ability to raise the necessary capital and on these occasions the negotiations centered round the possibility of the Company proceeding with its programme of expansion and Government granting it a new franchise.

52. Dealing first with the question of purchase we were referred during the hearing to what was called the "Simple Contract". This was a series of letters and notes
/of -

of meetings, which taken together, might be legally regarded as a firm offer and acceptance, although the final terms would be embodied in a formal document duly signed and sealed.

53. This simple contract seems to have crystallized in a letter from Government to the Company dated 23rd May, 1957, in the following terms:

<p>"CJ In replying quote Date hereof and No. CW.253 IV C</p>	<p>Ministry of Communications & Works, P.O. Box 487, British Guiana. 23rd May, 1957.</p>
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Sir,

I have the honour to refer to previous correspondence and discussions on the subject of your franchise, and in particular to your letters of the 15th December, 1956, the 23rd January, 1957, and the enclosure to that letter.

2. I have to inform you that the Government has decided to accept the offer made by your Company to sell its undertaking upon like terms to those applicable if the Government were to effect the purchase under the terms of, and in the circumstances envisaged by, your Company's franchise.

I have the honour to be,
Sir,
Your obedient servant,

(Sgd.) W.O.R. Kendall,
Member for Communications
and Works.

The General Manager,
The Demerara Electric Company,
Main Street,
Georgetown. "

54. This letter was followed by another one of the same date which indicated that Government was willing to negotiate a formal contract.

"CW 253 IV C

Ministry of Communications
& Works,
P.O. Box 487,
British Guiana.
23rd May, 1957.

Sir,

WITHOUT PREJUDICE

I have the honour to refer to my letter of even date informing you of the acceptance by the Government of the offer made by your Company to sell its undertaking.

2. I have to inform you that, without prejudice to such acceptance, the Government would be willing to negotiate a more formal contract of sale to be executed by deed if your Company would wish to do so. In view of the fact that it will take some time for the purchase price to be determined, it would appear to be desirable to come to some firm understanding about the future commitments of your Company prior to the completion of the sale, and also such matters as the taking over of staff, etc. These and other relevant matters could conveniently be dealt with in such a deed of contract.

3. In any event, it seems that it would be desirable for the Attorney General to consult with your lawyers so that the contract can be executed in a smooth manner to the advantage of the parties.

I have the honour to be,
Sir,
Your obedient servant,
(Sgd.) W.O.R. Kendall,
Member for Communications
and Works.

The General Manager
The Demerara Electric Company,
Main Street
Georgetown. "

55. It will be noted that this second letter was written "Without Prejudice" and was not therefore binding on Government. The most important part however were the words "it would appear to be desirable to come to some firm understanding about the future commitments of your Company." It was argued by Counsel for the Company that these words meant that the Company should call a halt to its expansion programme, pending the completion of the formal contract. This argument has some force when it is

/ considered -

considered in the light of the draft agreement which was delivered to the Company 5th July, 1957, and which contained the following clause:

" The Company shall not, after the date of this Agreement, enter into any contracts for the purchase of any lands, buildings, works, materials (other than consumable materials or stores) or plant for the purpose of the said undertaking without the prior approval in writing of the Government. "

56. The Attorney General, however, on behalf of Government maintained that the simple contract and the draft agreement were things outside the franchise and that all the proposals and counter proposals made by the parties did not relieve the Company from its liability to supply the franchise area with an adequate supply of electrical energy.

57. From the ensuing correspondence it appears that the draft agreement, with certain amendments, was sent back to Government on the 2nd of August, 1957, and returned to the Company on the 23rd September, 1957, with Government's views on the amendments.

58. And so the process went on until the 23rd January, 1958, when the Company sent the following letter to the Permanent Secretary to the Ministry of Communications and Works:

" 23 January, 1958.

The Permanent Secretary,
Ministry of Communications & Works,
Ministerial Building,
High Street,
Georgetown.

Dear Sir,

We have to acknowledge your letter of September 23rd, 1957, together with a draft of an Agreement of Sale, all of which have been given very careful consideration.

Since the receipt of that communication, representatives of this Company have held conferences with the Hon. Attorney General and the Hon. Financial Secretary, with the object of reaching agreement on the few details still in dispute.

/ We -

" We are pleased to advise that considerable progress has been made and it would seem that all that remains is for the Agreement of Sale to be set up in final form and for the necessary funds to be made available so that Government can take over and operate the property.

As Government has repeatedly stated that a simple contract exists between the parties for this sale, the Company is now waiting on Government to conclude these final arrangements.

Government will realise that the Company has been placed in the position of being unable to raise capital, or to plan for any major expansion, since the 'Requirements' were served on it in May, 1954. Also that during the negotiations with Government towards the sale of the Company, it has been the wish of Government that no major capital additions should be undertaken by the Company.

The stage has now been reached where the existing plant cannot take on any additional load during the evening peak load hours without seriously jeopardising the service to existing consumers. It appears, therefore that the Company has no alternative but to notify the various authorities concerned on this condition.

Having all this in mind, Government will appreciate that considerable urgency exists to complete the sale, as the demands of existing consumers for electric service continue to grow and it will take a long time to obtain and place in service the necessary new plant after the sale has been concluded.

Yours very truly,
THE DEMERARA ELECTRIC COMPANY, LIMITED
(Sgd.) C.A. MacIntyre
General Manager. "

59. From this letter it would appear that negotiations had reached a stage when everything was ready for the take-over by Government, provided funds were available. During the early months of 1958, both parties were acutely aware of the perilous state into which the plant at the station was drifting and suggestions were made by the Company with a view to the possible rationing of electricity.

60. In July, 1958, the prospects of the Government purchasing the undertaking received a fatal knock in a letter written by Sir Patrick Renison, then Governor of

British Guiana, to Mr. Raymer, a Montreal Director of the Company, which contained the following paragraph:

" I am sorry to have to tell you that for the present we can see no prospect of obtaining sufficient funds for the purchase of the Demerara Electric Company. We must therefore seek your cooperation that the Company should continue to supply current for Georgetown and as required for the proposed extension to the rural areas on the Coastlands. "

61. It is clear from this part of the evidence that Government intended to take over the undertaking and was proceeding with the negotiations in the hope that the money would be available to do so. It does not seem that any responsibility can be attached to anyone because these hopes did not materialize.

62. The question of the purchase of the undertaking was at times overshadowed by two other proposals: the possibility of the development of hydro-electric power and the establishment of a nuclear power station. A great deal of evidence was led about both these projects but as it all led back to the same point, namely the acquisition of the necessary capital to put them into effect, we do not think it necessary to deal with them in any detail in this report, except to say that these proposals stiffened the Company's opposition to further capital expenditure.

63. The stage had now been reached when the Company was being asked to reconsider its programme of expansion so that the station could be brought back to and could maintain firm capacity for several years to come. On the 23rd July, 1958, the Company submitted a Memorandum setting out the terms and conditions on which it would be prepared to proceed with this expansion. This Memorandum is of such importance that we feel justified in setting it out here in full:

" MEMORANDUM RE: THE DEMERARA ELECTRIC COMPANY LIMITED

" To enable the Company to operate satisfactorily and attract necessary capital the following points should be covered:

1. The Indenture made between the Company and the Mayor and Town Council of Georgetown, dated November 26, 1930, should be cancelled, particularly the limitation on net rates for alternating current power to be used for industrial purposes contained in Clause 7. This can possibly be done by Indenture of Cancellation between the parties to the original indenture or by Ordinance as Cameron & Shepherd advise.
2. The Electricity Ordinance 1957, which by Section 15 empowers the Corporation thereby created to expropriate electricity undertakings and by Section 28 repealed both the Georgetown Electric Supply Ordinance and the Demerara Electric Company Ordinance should itself be repealed or at least those sections and such other sections as Cameron and Shepherd consider affect the Company's business should be repealed.
3. The Georgetown Electric Supply Ordinance should be amended so as to provide that with the concurrence of the Company an amending Order may be issued providing, amongst other things:
 - (a) that the Georgetown Electric Supply Order, 1927, shall continue in force until exercise by the Governor-in-Council of a right of purchase;
 - (b) that such right of purchase shall be exercisable by the Governor-in-Council at any time on one year's notice and that upon expiry of such notice the Company shall be required to sell and the Governor-in-Council shall be required to purchase and pay for in cash the property, assets and undertaking of the Company used or useful in connection with the generation or supply of electricity under the said Order at the fair value thereof as agreed upon between the Company and the appropriate government official or failing agreement as determined by arbitration, together with a premium on such fair value of $\frac{1}{2}$ of 1% for each full year from the expiry of such notice to May 27, 1977, the present date on which the Order expires;
 - (c) that the rates or prices to be charged to consumers for the supply of electricity under the Order may be increased

beyond the limits set out in the Third Schedule to such rates or prices as from time to time agreed upon between the Company and the appropriate Government official or failing agreement, as determined by arbitration, as being sufficient to provide the Company with a fair return on the fair value of the property, assets and undertaking of the Company used or useful in rendering the service.

- (d) that the "fair value" of the property, assets and undertaking be defined either in the Ordinance or in the Order as meaning as regards physical assets other than land, the amount it would cost to reconstruct the same on the date of determination less observed depreciation, and as regards land and investments, the market value thereof at the date of determination plus reasonable allowances for working capital and going value, but without any addition in respect of compulsory sale or of goodwill or of any profits which may be or might have been made from the undertaking and that the "fair return" be defined as the amount (not less than $8\frac{1}{2}\%$) computed after all operating expenses and taxes of all kinds (including taxes on income) and proper allowance for depreciation which the Company is entitled to earn annually on the fair value of its property, assets and undertakings used or useful in supplying electricity, in order to attract investment capital within and without the Colony;
- (e) that **the provisions** of Section 27 of the Electric Lighting Ordinance shall, mutatis mutandis, apply to such arbitration;
- (f) that by Ordinance or appropriate regulations the Company and its officers, servants, and agents be relieved from any penalties or liability for failure to supply electricity for the next four years through lack of generating capacity and that the Governor-in-Council with the concurrence of the Company be empowered to put in force such scheme or schemes for rationing electricity during peak load periods until in his opinion the Company has sufficient reserve capacity to carry safely the load requirements of consumers and that the Company and its officers, servants and agents be relieved from any penalties or liability incurred by reason of complying with any such scheme or schemes.
4. That the Demerara Electric Company Ordinance be amended as follows:
- (a) to provide that the share capital of the Company shall be increased from \$425,000 to \$2,550,000 divided into 25,500 shares of \$100 each with power to increase the share capital by ordinary resolution and

to add provisions from the English Companies Act, 1948, authorising the Company by ordinary resolution to consolidate or sub-divide share capital and cancel unsubscribed share capital and by special resolution to issue redeemable preference shares and reduce share capital or any capital redemption reserve fund in any manner and with, and subject to, any incident authorised and consent required, by law, and adding definitions or extraordinary and special resolutions taken from the English Companies Act, 1948;

(b) to repeal the proviso to subsection (2) of Section 19 of the Demerara Electric Company Ordinance which limits the amount of bonds or debentures to the share capital and to provide that bonds or debentures may from time to time be issued by the Company without any such limitation.

5. Since the By-Laws which were made and approved in 1899 are now out of date they should be replaced by By-Laws framed as far as possible on Table A of the English Companies Act, 1948.

6. The Government to agree to sell the Company such further land as may be required for expansion of generating facilities. "

64. After the delivery of this Memorandum the Company actually instructed its Solicitors to draft the new Ordinances and these were delivered to Government under cover of a letter dated 18th September, 1958, in which it was stated that in view of the urgency of the matter the new Ordinances should be passed and put into force not later than the 11th October, 1958, or in other words, in twenty-one days. The reason for this urgency was that the Company had obtained an option on a 10,000 Kw. generating set for delivery in twelve months, and this option would expire on the 15th October, 1958.

65. To those who know the ways of Governments when dealing with new legislation this was speed indeed and at a meeting held between the parties on the 24th September, 1958, the Attorney General not unnaturally said that the Government could not be rushed into agreeing to the Company's proposals by a fixed date: the proposals would have to be examined very carefully before they could be approved.

As an alternative Government offered to guarantee the Company against any liability they might incur in ordering the new generator unit. It did not come out in evidence what form this guarantee would take. In any case the Company's representative quoting instructions from Montreal said:

" It is not a question of their guaranteeing any commitments on our part or putting up any money. It is a question of their placing us in a position where we feel sufficiently confident to obligate the Company to the extent of a large indebtedness. Unless the Company receives these assurances in the form of a complete legislation as submitted, we simply will not place any order for anything. "

66. Another point of disagreement was the Company's demand in Clause 3(d) of the Memorandum that a fair return on its capital should be defined as "the amount (not less than 8 $\frac{1}{2}$ %) computed after all operating expenses and taxes of all kinds (including taxes on income) and proper allowance for depreciation which the Company is entitled to earn annually on the fair value of its property, assets and undertakings used or useful in supplying electricity, in order to attract investment capital within and without the Colony." The Permanent Secretary to the Ministry of Communications and Works said in evidence that "the rock on which these discussions foundered was the Company's insistence on a guaranteed profit of 8 $\frac{1}{2}$ %".

67. This was the last meeting of which there is any record in the evidence and it ended like many others in complete deadlock.

68. We have set out as fully as possible what appears to us to be the main issues in this contentious matter between May, 1954, and September, 1958, but there were two side issues which we will deal with briefly.

Diesel Plant

69. In October, 1957, Government's electrical consultants, Messrs. Preece, Cardew and Rider, wrote to the Crown Agents for Oversea Governments and Administrations a letter of which the following is an extract:

" We have reached the conclusion that two 2,500 Kw. diesel generating sets and two 10,000 Kw. turbo alternator sets with associated boiler plant etc. will have to be installed as an interim measure to meet the combined requirements of the Georgetown Undertaking and the Rural Electrification Scheme until such time as either the hydro-electric plant or further steam plant, whichever may be found the better alternative, can be designed, installed and commissioned. A full report indicating the basis on which this conclusion has been reached and estimates of the costs is being prepared and will be submitted shortly together with our comments on the Demba Hydro-Electric Report. In the meantime we have prepared the enclosed drawing No. 13058 showing our proposals for developing the Georgetown Power Station site to implement the interim measures referred to above."

70. The electrical supply situation was still deteriorating and Government, presumably in an effort to retrieve it to some extent, ordered one of the 2,500 Kw. Diesel generating sets mentioned in this letter. One year would elapse before the unit could be installed. There was nothing in the evidence to show that the Company had been consulted about the purchase of this unit which was to cost \$773,500. Mr. Young in his evidence however said this:

" Government invited the Company to take over the Diesel which was on order but the Company declined to do so." "The Company suggested that Government should operate the set, installing it somewhere on the East Bank and sell current to the Company in bulk."

71. Mr. Talbot when it was put to him why the Company refused to accept the Diesel unit at the Company's plant said:

" We would not want to have vibrating machinery near our high speed turbines. "

72. About this time the Company had received information that a 12,500 Kw. turbo-generating set could be obtained on twelve months' delivery, and on that information being conveyed to Government, the order for the diesel set was cancelled.

73. There was a good deal of evidence about the advisability or otherwise of installing a Diesel plant in or around Georgetown. Our own expert witness said it would be undesirable to install this type of plant near high speed turbines unless it was placed on special foundations. We were rather surprised therefore that Government's consultants should recommend the installation of two heavy Diesel units at the Company's plant when the senior partner of the firm, Mr. C.H. Pickworth, had stated at one meeting, and this was not contradicted, that:

" he agreed that on general principle he detested diesels, and that the justification for the installation of a plant of this nature in this case would only be on the assumption that the plant would eventually be operated merely as standby to hydro-electric power. He fully agreed that if the plant was to continue as a main source of energy, steam turbines were the proper answer. "

The Company's Finances

74. Some evidence was given about the Company's finances. The annual profits rose from \$484,333 in 1954 to \$654,516 in 1958, which is a natural consequence of the plant being more or less wholly revenue earning. This is a common factor in all electricity supply undertakings. Whenever a generating plant is of firm capacity or more the profits will be comparatively low, but when the demand for power pushes the peak load towards the station capacity, the profits will gradually rise.

75. The annual profits quoted to us represent an average dividend of 10% on the original capital of \$425,000.

This would not be considered a good investment if the profits were calculated on the capital employed at the present time or even on the book value of the capital assets which now stand at approximately \$5 million. It has however to be remembered that substantial sums were put aside each year to what was called a "retirement reserve appropriation" amounting to approximately 15% of the current capital value. This reserve was created for the purpose of purchasing and installing new plant and equipment as and when it was required. The expenditure out of the reserve Capital Account over the ten years 1946/1956 amounted to \$2,732,496 (Exhibit 23). In 1957 when negotiations were proceeding about the sale of the undertaking to Government the Company paid out to its shareholders accrued surpluses to the amount of \$950,000, for the obvious reason that its retention by the Company would have complicated the take-over proceedings.

C O N C L U S I O N S

76. The Attorney General in his final submissions to us said that we were not sitting to have either the Government or the Company on trial. The issue was whether the position arising out of the interruption on the 20th of September could have been saved by the installation of more plant, and how much more plant. If the Attorney General meant that it was not part of our duty to apportion blame we unreservedly agree but we cannot subscribe to the statement that the only issue is whether or not there was sufficient plant at the station on the 20th September, 1959. That is not an issue at all. It is self-evident. What we consider the issue to be is -- Why was there insufficient plant at the station on that date. From the mass of

/ evidence -

evidence led, which had no logical sequence, we have endeavoured to extract sufficient facts to give a connected narrative of the events from 1954 to the end of 1958, and from our interpretation of these facts we have formed certain conclusions. These we set out below. They are not intended to constitute a judgment for or against one party or the other. Those who have the time and the inclination to read our report objectively will be able to form their own conclusions.

Cause of Breakdown

77. (a) We have come to the conclusion that at some time immediately before the explosion there had been a derangement of the relative water/vapour balance in the circulatory system of the boiler induced, no doubt, by a momentary low-level water condition in the steam drum. This produced vapour pockets in the riser tubes terminating in vapour pocket expansion or steam-blanketing which finally ruptured the tube at its weakest section. In our opinion this accident was caused by a shortage of water in No. 4 boiler, probably caused by its being overloaded. The overloading we think was a result of No. 4 boiler being required to supply steam to No. 5 turbine which is rated at more than the boiler is specified to supply.

(b) We are satisfied that the acceleration of the overhaul work already in progress on the No. 5 boiler was the only course which could have been adopted in order to restore the general supply. It is fortunate that the overhaul work had already progressed to such a stage that only five days were required for its completion. We consider that this work was carried out expeditiously by all the men engaged on it.

State of Plant

78. The plant is maintained in reasonably good operating condition. There is an adequate stock of spares for immediate requirements, both for the turbo-electric and steam plant. It is quite impracticable to carry complete sets of spare tubes for each boiler, having regard to the number involved and the problem of providing adequate storage to protect them from the corrosive effect of the atmosphere.

Steps to be taken to avoid future breakdowns

79. The most serious deficiency at this station is the lack of steam-raising plant. The turbo-electric section would always have been able to take the load had there been an adequate supply of steam power. If the peak load rises a continuation of load-shedding is inevitable and the complete failure of one of the larger boilers might be followed by another black-out. If these calamities are to be avoided plans must be made immediately for the installation of an additional boiler of 70,000 lbs. capacity per hour. We were told that it might be impracticable to link such a boiler into the existing plant but we think the matter is so important as to warrant special investigation by a competent planning engineer. The only alternative is the installation of a new boiler complete with a 5,000 Kw. turbo-electric unit.

The Offer to Purchase

80. On the 12th May, 1954, Government sent its now famous letter of requirements to the Company. In the light of later events it is clear that Government in May, 1954, had decided to purchase the undertaking as and when it could find the money but was relying on the Company to maintain an adequate supply of electricity for the needs

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of the community until the purchase had been completed. We do not think Government had any ulterior motive in adopting this course. What went wrong was that it pitched its requirements too high. It is difficult for us to understand how any official could have advised his Minister to make the demand under item (iii) of that letter which would have involved the Company in additional capital expenditure of approximately three times the capital value of the entire undertaking, expenditure which would not produce one more unit of electricity. The result of the receipt of that letter was to create in the minds of the Directors of the Company a suspicion about Government's intentions. From that moment onwards the negotiations were bedevilled on the one hand by the Directors of the Company being determined to safeguard their investment and the interests of their shareholders, and on the other hand by Government being equally determined to safeguard the interests of the consumers and preserve its right to purchase the undertaking.

81. Government in an effort to ensure that the Company would continue its normal programme of expansion carried on all its negotiations on the understanding that they were something apart from the franchise and this is indeed explicitly stated in the letter from the Minister of Communications and Works dated 23rd May, 1957, when he said "the offer to sell would be upon like terms and circumstances envisaged by the Company's franchise." Although representatives of the Government may not have realised it at the time, it was this determination to keep negotiations outside the franchise that created what later became known as the "Simple Contract". In other words, we are of opinion that Government thought it could carry the negotiations to a point, short of finality, and in the absence of any binding agreement, the Company would still

be required to carry on its obligations under the Georgetown Electricity Supply Order.

82. As we have said the delivery of the letter of requirements caused the Company to adopt the attitude that they would not install any new plant until they received certain specific guarantees. We think the Company made a mistake in taking up this stand. While we concede that the Directors had a duty to protect the interests of their shareholders, they also had a duty to provide the people of Georgetown with an adequate supply of electricity. The General Manager of the Company in reply to questions from us said that had there been one extra boiler ready for operation on the 20th September there would not have been any interruption to the service on that date. It is reasonable to infer from this that had the Company started to plan for the installation of one 5,000 Kw. set in 1954 there would have been firm capacity at the station to-day. In point of fact at the time of the interruption the station was only 1,700 Kw. below firm capacity. It has not been clear to us why the Company has always been thinking in terms of 10,000 or 12,000 Kw. generating sets unless, as was stated in evidence, larger sets are more economical to run than small ones. In any event the reasons why the Company did not proceed with the expansion of the plant are stated quite clearly in the evidence of Mr. Talbot which is set out in full earlier in this report. We were greatly impressed by the way Mr. Talbot gave his evidence. It was concise, clear and given with conviction. We think however that he committed an error of judgment when he thought the Government would not relieve the Company of any contractual obligations it might enter into prior to the take-over of the undertaking. This would have been a moral breach of the arbitration provisions contained in Section 27 of the

Electric Lighting Ordinance and would as the Attorney General implied have caused irreparable damage to Government's credit. We think that this fear was ill-founded and that the Company should have proceeded with its normal expansion programme and relied on its remedies under the arbitration clause in the event of a take-over of the undertaking by Government.

The Proposed New Franchise

83. When it was apparent in July, 1958, that there was no immediate prospect of Government purchasing the undertaking an opportunity arose of coming to agreement on the basis of a revised franchise. The Company's approach to these fresh negotiations was not very conciliatory. The demand for the passage into legislation of two Ordinances and two Orders in Council in twenty-one days and a guaranteed 8 $\frac{1}{2}$ % tax-free profit got the negotiations off to a bad start. Nevertheless it should have been possible to reconcile these differences if the shadow of the nuclear power plant had not appeared about the end of the year 1958. Government should have realised that talk about the installation of advanced scientific methods of generating electricity was bound to alarm the Directors of the Company and instil in them a fear that the existing plant would become redundant and consequently suffer a serious depreciation in value. It would have been much better for everyone concerned if Government at this stage had concentrated on devising some modified form of franchise based on an expansion of the existing plant, sufficient, and no more, to take care of the consumer's normal requirements for the next five years. It now appears that a turbo-generator with a capacity of 5,000 Kw. would have been sufficient to meet these requirements and we do not think

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there would have been any difficulty in raising the capital necessary to purchase and install a unit of that size.

84. We said at the end of the hearing that we were in the peculiar position as Commissioners of having to conduct an enquiry into a matter which was still the subject of negotiation between the parties. It is for this reason that we have refrained from making specific recommendations. We have however incorporated in our Conclusions suggestions as to the steps which might be taken to bring the present plant back to firm capacity.

85. We should like to mention the following persons who rendered great assistance to us during the enquiry:-

1. Our Secretary, Mr. R.E.O. Moriah, attached to the Ministry of Labour, Health & Housing, who excelled in making arrangements for the conduct of the enquiry.
2. Messrs. L.G. Rohlehr, H.A. Grimshaw and W.E. Archer, Official Reporters to the Legislative Council, who dealt with the technical terms of the evidence with considerable skill.
3. Mrs. Sylvia McCown and Mrs. Estelle Pollard who typed the draft report.

We are,

Your Excellency,

Your Obedient Servants,

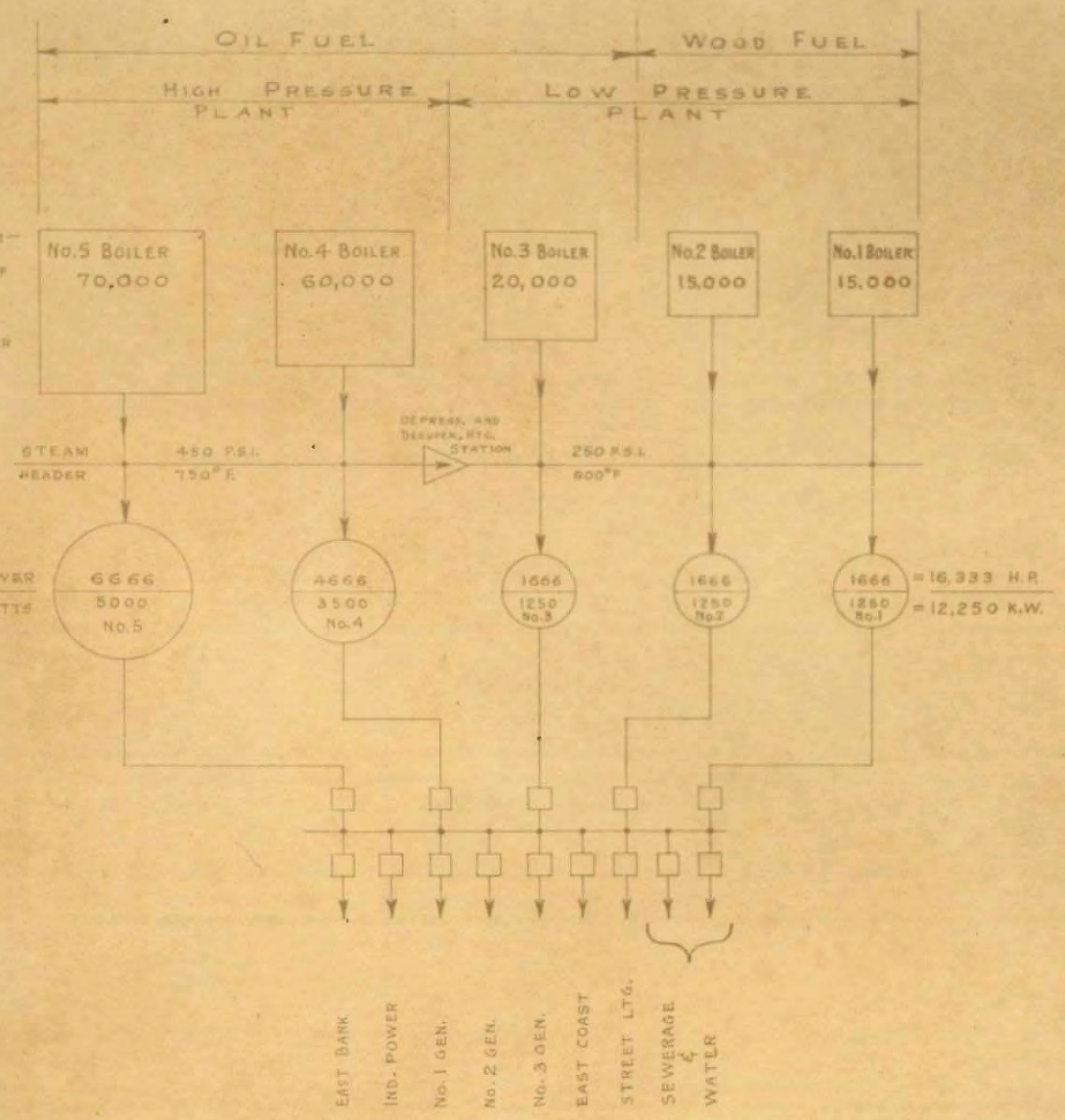
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M.C.R. RATING OF:-
BOILERS { POUNDS OF STEAM PER HOUR

TURBINES:- HORSEPOWER
GENERATORS:- KILOWATTS

APPENDIX IV.

DISTRIBUTION FEEDERS



DEMERARA ELECTRIC CO. LTD.
POWER STATION MAIN UNITS.
Scale: None. Oct. 15. 1958
Drawn E. Gomez. Checked P. A.
Approved
No. 1102