CO-OPERATIVE REPUBLIC OF GUYANA

REPORT FOR THE YEAR 1979

By

M. VEECOCK

CHIEF HYDROPOWER ENGINEER

HYDROPOWER DIVISION

MINISTRY OF ENERGY AND NATURAL RESOURCES

GEORGETOWN

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A C K N O W L E D G E M E N T

I would like to express my sincere gratitude and thanks to all members of staff of the Hydropower Division who assisted in compiling, typing, printing and binding of this report.

(M. VEECOCK)
CHIEF HYDROPOWER ENGINEER.

CONTENTS

INTRODUCTION:

During the year (1979), the Hydropower Division was involved in and/or initiated many more hydropower studies in order that vital decisions concerning the country's energy crisis could be properly assessed.

Despite severe constraints of:-

a) Staff (this is our main problem since to date we have not been able to attract technical personnel).

b) Interior transport (lack of air-craft support to service survey's crews and land transport for inspection and reconnaissance).

the Division in my estimation performed creditably.

.....2/

2. Kabalebo Hydro-Electric Project (Suriname)

Early in February, 1979, the division submitted a paper to Foreign Affairs concerning the present situation on the Kabalebo Hydro-Electric Project in Suriname and the possible effects of this project on the quality of life of the Guyanese along the banks of the Courantyne River. As a result of this paper, the Government of Guyana appointed a technical team to look into this project and nominated the Chief Hydropower Engineer to be a part of the Technical team.

To date the Division is still actively involved in these discussions and has been given valuable guidance to the technical team.

.....3/

3. Consolidation of Tumatumari Dam:

During 1979, the Guyana National Service took the initiative to secure a proper labour force to maintain the Tumatumari Hydrostation and dam. A bulldozer was used to stockpile boulders and a front-end loader transported them to the dam, where they were dumped in the major gaps of the dam.

Excellent working conditions existed for almost 180 days, however it was only during the first dry season that maintenance of the dam took place. During January - March, 1125 tons of boulders were dumped to consolidate the dam; while only 300 tons were dumped during the remaining months; this was due, mainly to the fact that the workforce was depleted and no senior officer was stationed at the site to supervise the maintenance works; moreover most of the lifting machines and equipment were inoperable.

It appears that the enthusiasm and interest displayed by GNS personnel attached to the dam maintenance unit during the first quarter of the year disappeared or ceased to exist.

This apparently has resulted from the disintegration of the former workforce. For instance, the former workforce consisted of experienced operators, servicemen, mechanics, construction men and a blaster. At present none of these men are on the job and only a few pioneers and trainee operators are on the site.

.....4/

January, 1979 — Excellent weather conditions.

Work Done

1) 60 pieces of crib logs were cut and 250 BM of lumber sawn.

2) Trestle was re-enforced and 400 tons of boulders dumped in major gaps.

3) Wooden cribs covering an area of about 180 sq. ft were constructed and placed behind the major gap to effect the proposed 1 to 7 slope.

4) Rock fragments of boulders weighing between 5 and 30 lbs. were placed in cribs to an average depth of 4 feet.

February, 1979.

Work done.

1) 555 tons of boulders dumped in major gaps.

2) A bulldozer was used to stockpile and load the front-end loader which transported the boulders to the dam..

3) The pylon which is standing on the dam was partly re-enforced.

March, 1979

The first two weeks excellent conditions existed to carry out maintenance works on the dam. The latter two weeks heavy rainfall.

Work Done

1) 170 tons of boulders were dumped to consolidate dam.

2) 30 holes were drilled for blasting.

Comments: Most of the labour force either walked off the job or was transferred to another area.

.....5/

April, 1979

Excellent conditions existed from 15th to 30th April. However no work was done because an adequate labour force was not on site.

May, 1979

The same as in April.

June, 1979

Heavy rainfall. No work done.

Amount of boulders dumped to consolidate dam is as follows:-

Month	Amount of Boulders Dumped Tons
January	400
February	555
March	170
April	
May	
June	

Total for period:..... 1125 tons

July, 1979

During this month, no work was done on the dam, due to heavy rainfall. No preparatory work done because no senior supervising officer was on site since May, 1979. Major Cumberbatch who was in charge of the works was transferred to another section of the GNS hence maintenance of the dam ceased altogether.

.....6/

August, 1979

During the month of August, no work was carried out on the maintenance of the dam. The work force on site, which was supplied by GNS were removed. Most of the men either walked off the job or were transferred to other areas. Major Cumberbatch was sent back to the site and recruitment of a labour force was undertaken by him. On 30th August Cde. Jackson travelled to the site.

September 1979

During the month of September no maintenance of the dam was carried out. The small labour force, which was contracted by GNS carried out repairs and maintenance on the machine and equipment. No blasting and stock-piling of boulders were done.

The GNS has procured some metal rails which would be cut and welded to form cribs, these cribs will be used instead of the wooden ones. Five(5)/belts were received by GNS for the generating units and they were put to use. The leakage of the main wall continued to deteriorate.

October - November

Low water period. No maintenance of the dam was carried out. A new access/bridge across the tailrace was constructed. The front-end loader was used to haul metal rails to the riverside. The bulldozer became defected. An inspection was made by Cde. Jackson during extremely low water level in the Potaro river and it was revealed

.....7/

that the dam was badly in need of maintenance owing to the amount of displacement that occurred. This was especially so in the following areas:

i) The left end portion of the main rockfilled gap which is adjacent to the old masonry wall between the pylon and the main gap. The flow of the river is greatest at this point.

ii) The portion of the old masonry wall between the pylon and small rockfilled gap. At this point the wall resembles a shell and most of the boulders that were placed there earlier in the year have been displaced because of the absence of cribs.

December

From the 7th to 11th December, 1979 a visit was made by Cde. M. Singh (SED) and from inspection made by him it was found that:-

1) The front-end loader and bulldozer were being serviced.

2) The gate of No. 2 turbine was not closing properly.

3) No. 1 turbine was constantly in operation.

.....8/

4. Prefeasibility Study of Small Hydropower Sites located in various interior areas:

Electric power supply in various interior areas of the country are currently served by dieses-generated power. In view of this fact and taking to consideration that the power requirements of these areas are small but costly, the Division has identified several possible hydropower sites for development. Short descriptions of these sites are given below:-

4.1 Hydropower Sites in the Rupununi areas:

4.1.1 Wamukaru Power Site.

During 1978 the Division had embarked on studying two sites namely: Moco-Moco and Kuma in order to supply power to Lethem, St. Ignatius, etc.

However it was found that the two sites when grouped together were only capable of supplying approximately 240 KW of power, which is far below the estimated projected power requirements of those areas. Total estimated power for the areas equals 600 KW.

In view of the above a more favourable site was located on the Wamukaru River a tributary of the Rupununi River.

Initial studies revealed that a minimum power potential of 500 KW could be developed.

4.1.2 Level of Operation - Wamukaru Hydropower Project - 1979

During 1979 it was estimated that in order to carry out topographical and hydrological surveys of the site an amount of

.....9/

$130,00 (one hundred and thirty thousand dollars) was necessary. This amount was subsequently allocated by the Ministry.

The Surveys Division (Ministry of Works and Transport) was contacted to carry out topographical survey of the site. Mobilization and recruitment of the survey crew for the project started in May, 1979. At the end of August camp was established at Nappi Village (26 miles from Lethem) and survey work started on the proposed transmission line route. During the month of September camps were set up at Maipaima approximately five miles from Nappi Village and at Wamukaru Creek in the vicinity of the power-house. At the end of December 1979 work was carried out in relation to:-

(a) Proposed Dam Axis;

(b) Location of the power-house;

(c) Penstock and Penstock Intake;

(d) Power Canal Route.

Approximately 30% of the works was completed.

4.1.3 Constraints

(a) No direct means of Communication between Wamukaru and Georgetown.

(b) No Reliable means of Transportation between Wamukaru and Lethem.

(c) The Rugged and Treacherous Undulation of the Terrain.

.....10/

4.2 Anarika Power Site in the vicinity of Rockstone.

A meeting between the Hydropower Division and Mirev Agency early 1979 has resulted in the Division's agreement to carry out survey works at the potential power site on the Anarika River in order to supply cheap power to a developing settlement in the area for this purpose a sum of $28,000.00 (Twenty eight thousand dollars) was allocated.

4.2.1 Level of Operation of Anarika Project

Mobilization of the survey crew for the Anarika survey works started on the 18th July and the following works was completed in September, 1979.

a) Dam Axis Alignment - establishing hubs at 20 ft intervals.

b) B M levels taken.

c) Profile levels along dam axis at 200 ft intervals were established.

d) c/s levels were taken.

1) On dam axis at 200 ft intervals (both sides).

2) Across the Anarika River - 300 ft on both sides of the dam axis at 50 ft intervals.

e) Anarika River traversing - 2,500 ft on either side of the dam axis alignment.

f) Line cutting.

1) Along dam axis and its prolongation.

2) Along c/s - 30,600 ft.

3) Along c/s as in d(2) above 1,950 ft.

4) Along River Bank Traverse as in (a) above 5,000 ft.

.....11/

4.2.2 Recommendation

This project was envisaged to supply power to the proposed agricultural settlers of the Anarika basin. The total power requirements for the proposed scheme was in the vicinity of 500 KW. The results of the survey as described in 4.2.1 revealed that the height of the dam was the controlling factor in the development of this river basin. A dam height of approximately 35' - 0"would ensure that the Rockstone road would not be flooded in parts and also a reduced flooded area in the reservoir. The power out-put from such a development would be about 200 KW; i.e. much less than the proposed power requirements of the scheme.

The division recommended to the Mirev Agency that the Division felt:-

(a) it is not economical to embark on this mini hydropower project.

(b) they should purchase power from Linden and that the investment in transmission lines from Anarika to Linden would be a wise one; since

(c) the main hydropower project is expected to come on stream within a few years and since the sub-station is located at Linden, they will be able to be connected to the National Grid.

.....12/

4.3 Eclipse Falls Power Site and Reconnaissance Studies of other Sites

The Division programme of works for 1979 included, hydro power Surveys for the Eclipse Falls and Towakaima Power Sites area, however due to the fact that the Surveys' Division work force was fully occupied during the year, no survey works were carried out for Eclipse Falls and Towakaima sites hence, the sum of $90,000 which was allocated for this work was re-allocated for the purchasing of equipment for Tumatumari Hydropower Station.

5. Construction of Banki Turbine (Micro)

In June, 1979, drawings for a Banki Turbine were prepared by the staff of the Division (Drawing Section). Construction work commenced in July, however the project which was expected to be completed early August was finished during the latter part of September. The main problems were securing suitable construction material and obtaining a suitable generator in Guyana.

The generating unit with an installed capacity of 1 KW was tested in October, 1979....

6. Drawing Office Activities for year 1979.

Two of our draughtsmen Cde. Jagdeo and Cde. A. Shaw were offered appointments with the M.M.A. project. Fortunately for the division neither of them were able to take up the offer. A third draughtsman was also considering leaving.

.....13/

It must be pointed out that better offers will continue to attract the core of draughtsmen and very soon we may have to resort to training a completely new set altogether. I do hope a remedy is found very soon as I feel it will not be in the best of our interest to lose their services at this critical point in time especially now that we are contemplating Hydro-power Development.

List of Maps and Plans prepared for the year 1979 for various Projects.

Chi-Chi

(1) Drawing and tracing of location and access of Chi-Chi Scheme.

(2) Drawing and tracing of Geology of the area.

(3) Computation, drawing and tracing of Chi-Chi/Kamarang plot monthly discharge.

(4) Computation, drawing and tracing of volume area curve.

(5) Computation, drawing and tracing of curve of minimum monthly flow vs. critical monthly periods at Kamarang.

(6) Computation, drawing and tracing of mass-flow curve.

(7) Computation, drawing and tracing of storage-demand curve.

(8) Computation, drawing and tracing of Kamarang/Apaikwa, correlation plot yearly peak discharge.

(9) Computation, drawing and tracing of correlation of monthly instantaneous peak period 26.11.76 - 17.10.77 Chi-Chi vs Kamarang.

(10) Plotting and tracing of extreme probability curve.

(11) Tracing of extreme probability graph paper.

(12) Drawing and tracing of maximum recorded Kamarang Hydrograph Flood. Period 16.6.71 - 29.7.71.

.....14/

(13) Drawing and tracing of graph of surcharge storage/elevation.

(14) Drawing and tracing of design flood hydrograph-spillway design.

(15) Drawing of plan of dam and spillway.

(16) Reduction of plan of dam and spillway.

(17) Retracing of plan of dam and spillway.

(18) Drawing and tracing of plan of Chi-Chi Diversion Scheme.

Drawing and tracing of plan of Chi-Chi Diversion Hydropower Plant.

(20) Drawing and tracing of Profile of Chi-Chi Diversion Hydropower Plant.

Anarika.

(1) Drawing of graph of minimum discharge of Anarika River.

(2) Section of Anarika Dam.

(3) Plan showing the three variants of Anarika Dam at different elevation.

(4) Anarika River Profile.

(5) Layout of Anarika Hydroelectric Scheme.

(6) Tracing of Plan showing Topographic Survey of site for proposed Hydro Dam and Power Station at Anarika River on the East Bank of the Essequibo River.

(7) Tracing of Plan showing site of proposed Hydropower Installation and Topo Survey of an area called "Critical Area" adjacent to a portion of the Rockstone/Suribanna road, Anarika creek, Essequibo River.

(8) Layout of Anarika Dam.

(9) Dam quantities for Anarika.

.....15/

Corentyne:

(1) Proposed Hydroelectric Scheme on the New River, Guyana.

(2) Corentyne Diversion works.

(3) Computation of drainage area on the Guyana side of the Corentyne River.

(4) Map of part of Guyana Region.

(5) Proposed Manarowa Development.

Kabalebo Hydropower Scheme - Suriname:

1. Project Maps of Western Suriname including Kabalebo Hydroelectric Scheme.

2. Kabalebo Development.

3. Kabalebo Development showing diversion of water from tailrace channel for irrigation purposes.

Tumatumari:

1. Design of intake channel for proposed Hydropower Station at Tumatumari.

General Maps.

1. Organizational Chart for Hydropower Division.

2. Chart of Additional Requirement for Manpower 1979-81 (Revised).

3. Chart showing type of skills.

4. Layout of proposed micro-hydropower Scheme.

5. Plan and details of sawmill and shed.

6. Proposed Hydrographic studies for year 1980.

7. Work schedule for 1979 - 1981.

8. Organizational Chart for Forestry Commission.

.....16/

Banki Turbine:

1. Design of Banki Turbine.

2. Detail and assembly drawing of Banki Turbine.

Wamukaru:

1. Wamukaru Volume - area curve.

Reports:

Forty-three copies each of the 1973/74 and 1975/76 annual reports.

One copy of the Chi-Chi Diversion Scheme report.

Finance.

The Drawing Office spent $5,731.46 on Drawing Office equipment and $984.90 on Printing Materials.

Repairs:

Workmen from the Ministry of Works repaired the damaged ceiling of the eastern portion of the Drawing Office.

7. Staff.

The Division is experiencing a serious staffing problem, due to the shortages of engineers and skilled personnel. This to some extent is hampering the Division in its efforts to secure reasonable involvement in the construction of hydropower projects.

.....17/

7.1 LEAVE TAKEN BY EMPLOYEES IN THE HYDROPOWER DIVISION DURING 1979:

NO.	NAMES	VACATION	ANNUAL	SPECIAL	SICK	REMARKS
1.	E.L. Lee	56 days	18 days	-	-	Resigned April 1979.
2.	M. Veecock	139 days	3 days			4 months long leave from 9.5 - 27.8.74; 8.11- 5.12.79.
3.	G. Naraine		11 days		15 days	Dismissed 26.7.79.
4.	G. Jones		12 days	3 days	1 day	
5.	P.P. Singh		12 days		11 days	
6.	B. Nero		12 days	1½ days	10 days	
7.	E. Thompson		12 days		7 days	Resigned 18.9.79.
8.	G. Smith		20 days		5 days	Resigned 11.11.79.
9.	M. Persaud				11 days	Resigned 14.2.79.
10.	P. Syemour		14 days		3 days	
11.	H. Dass		12 days		3 days	
12.	M. Wray		12 days		15 days	
13.	D. Seemangal		4 days		5 days	Interdicted 25.7.79
14.	M. Jackson		12 days		3 days	
15.	H. Elcock		10 days		2 days	Resigned 16.3.79
16.	F. Thompson		6 days		15 days	Resigned 16.4.79
17.	L. Mentore				9 days	Released to GS. w.e.f. 1.11.79.
18.	M. Singh		12 days		3 days	
19.	J. Roberts		5 days	3½ days	9½ days	
20.	J. Shaw		12 days		11½ days	

.....18/

7.1 Continued.

NO:	NAMES	VACATION	ANNUAL	SPECIAL	SICK	REMARKS
21.	Jagdeo		12 days	3 days	21 days	
22.	S.L. Martin				8 days	
23.	J. O'Lall		12 days		5 days	
24.	S. Dublin					
25.	F. Hunte				4 days	
26.	C. Carter		14 days		12 days	
27.	M. Tim		14 days		10 days	
28.	J. Henry		13 days		15 days	
29.	L. Pollard		14 days		14 days	
30.	J. Sam		14 days		14 days	
31.	I. McClintock		14 days		8 days	

.....19/

7.2. Appointments, Transfers, Resignations, Dismissals and Redeployment for 1979.

7.2.1 Appointments:

Cde. D. Seemangal who was transferred from Geological Surveys was appointed as Driver/Mechanic with effect from 1st February, 1979.

Cde. J. Roberts, Stores Attendant, who was transferred from Forest Department was appointed to act as Stores Clerk I with effect from 15th February, 1979.

Cde. S. Dublin was appointed as a Driver with effect from 24th March, 1979.

Cde. M. Singh (Specialist Engineer Designs) was appointed to act as Chief Hydropower Engineer with effect from 9th May to August, 1979 vice the resignation of Cde. E.L. Lee, Chief Hydropower Engineer and Cde. M. Veecock's (Deputy Chief Hydropower Engineer) absence from Guyana.

Cde. F. Hunte was appointed as Labourer II with effect from 17th May, 1979.

Cde. C. Carter, transferred from Forestry Commission was appointed as Typist Clerk II with effect from 17th September, 1979.

Cde. L. Pollard, transferred from Ministry of Works was appointed as Cleaner with effect from 1st October, 1979.

Cde. J. Henry, transferred from Ministry of Works was appointed as Cleaner with effect from 1st October, 1979.

Cde. J. Sam, Transferred from Ministry of Works was appointed as Cleaner with effect from 1st October, 1979.

.....20/

7.2.1 Appointments (Cont'd)

Cde. M. Trim, transferred from Ministry of Works, was appointed as Cleaner with effect from 28th October, 1979.

Cde. I. Mc Clintock - Stores Porter transferred from Forestry Commission on 6th November, 1979 was appointed to Stores Attendant with effect from 6th November, 1979.

Cde. M. Singh (Specialist Engineer Designs) was appointed to act as Chief Hydropower Engineer with effect from 8th November to 5th December, 1979 vice Cde. M. Veecock, Chief Hydropower Engineer on Vacation leave.

Cde. J. Roberts - Stores Attendant was appointed to act as Store-Keeper II with effect from 11th November, 1979 vice Cde. Smith - Storekeeper's resignation on 11th November, 1979.

7.2.2 Transfers:

Cde. L. Mentore - Trainee Draightswoman was transferred to Guyana Geological Surveys and Mines Commission as Assistant Draughtswoman with effect from 1st November, 1979.

7.2.3 Resignations:

Cde. M. Persaud, Stores Clerk (ag) resigned with effect from 14th February, 1979.

Cde. H. Elcock, Driver, resigned with effect from 16th March, 1979.

Cde. F. Thompson, Labourer II, resigned with effect from 10th April, 1979.

Cde. E. Thompson, Accounts Clerk II, resigned with effect from 18th September, 1979.

.....21/

Cde. G. Smith, Storekeeper, resigned with effect from 11th November, 1979.

Cde. G. Naraine, Temporary Technician II was dismissed because of unauthorised absence from duty with effect from 26th July, 1979.

7.2.4 Redeployment:

During this period, there was no redeployment made in the Division.

8. Stores Report:

1. Value of Stock in Stores:

a) The value of the Stores was estimated at eighty thousand dollars ($80,000.00) in the year, 1979.

b) The value estimated on "Loan" was fourteen thousand, five hundred dollars ($14,500.00)

c) The value estimated stock to be boarded was placed at four thousand dollars ($4,000.00).

9. Visits:

The following visits were made by senior officers of the Division during 1979.

	Names	Duration	Place or Country	Remarks
a)	M. Veecock	8th - 31st July.	Japan	Group Study Course in Hydroelectric Engineering.
b)	M. Singh	24th - 27th May	Barbados	Caribbean Alternative Energy Work session.
c)	M. Singh	12th - 17th July	Suriname	Kabalebo Hydropower Scheme.

10. Financial Report for year, 1979.

During the year the Division expended totals of $100,696.40 and $80,409.05 on Capital and Current Expenditure respectively. Breakdown of Expenditure are shown on Tables 1 and 2.

CAPITAL EXPENDITURE - HYDROPOWER DIVISION, 1979

TABLE 1

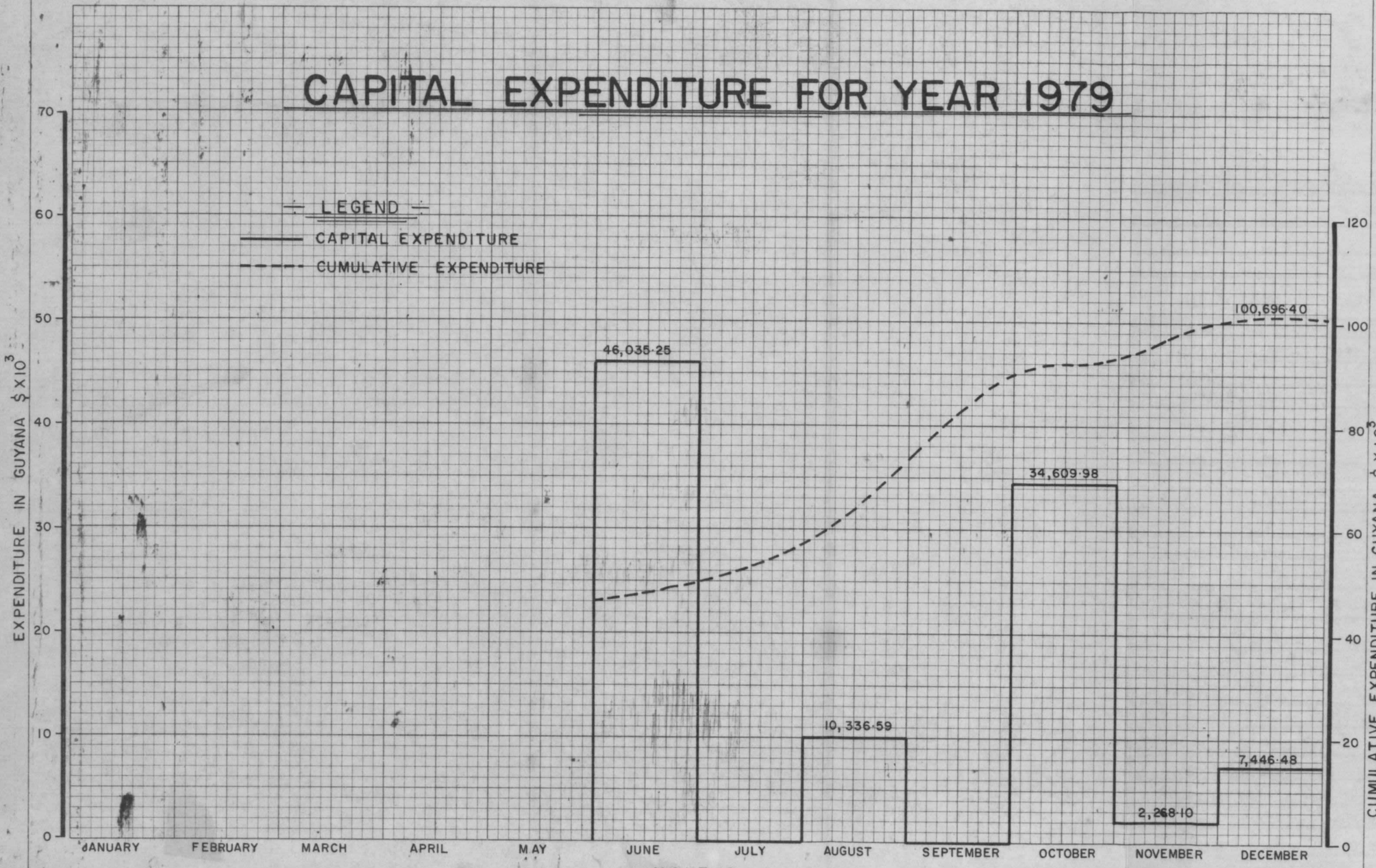
SUB-HEAD	TOTAL ALLOCATIONS FOR YEAR	TOTAL PROJECTED TO END OF DECEMBER.	TOTAL RELEASES TO END OF DECEMBER.	R / E	MONTHLY RELEASES / MONTHLY EXPENDITURE JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT.	OCT	NOV.	DEC.	TOTAL EXPENDITURE TO END OF DECEMBER.
Wamukaru (Hydro-power Surveys including gauging of the River) and field trips.	130,000.00	130,000.00	100,200.00	R	-	-	-	-	-	50000.00	-	-	20000.00	30000.00	-	-	
				E	-	-	-	-	-	31567.35	-	-	-	34609.98	1606.26	7446.48	75230.07
Anarika Hydro-power Surveys	28,000.00	28,000.00	27,800.00	R	-	-	-	-	-	18000.00	-	10000.00	-	-	-	-	
				E	-	-	-	-	-	13467.90	-	9336.59	-	-	-	-	22804.49
Construction of Banki Turbine	2,000.00	2,000.00	2,000.00	R	-	-	-	-	-	1000.00	1000.00	-	-	661.84	-	-	
				E	-	-	-	-	-	1000.00	-	1000.00	-	-	661.84	-	2661.84
Towakaima Hydro-power Surveys (including identification of other sites).	90,000.00	90,000.00	-	R	$90,000.00 was re-allocated to purchase spares for Tumatumari.												
				E													
		TOTAL	130,000.00		-	-	-	-	-	46035.25	-	10336.59	-	34609.98	2268.10	7446.48	100696.40

CURRENT EXPENDITURE - HYDROPOWER DIVISION

TABLE 2.

SUB-HEAD	TOTAL ALLOCATIONS FOR YEAR.	TOTAL PROJECTED ALLOCATION TO END OF DECEMBER.	TOTAL RELEASES TO END OF DECEMBER.	R / E	MONTHLY RELEASES / MONTHLY EXPENDITURE. JAN	FEB.	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL EXPENDITURE TO END OF DECEMBER
Transport and Travelling-2	12,000.00	12,000.00	12,000.00	R	-	500.00	1000.00	1500.00	1500.00	1500.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	
				E	210.00	373.50	260.33	486.60	288.55	612.74	266.88	964.79	657.32	683.60	1353.98	430.66	6,590.95
Miscellaneous - 3	3,000.00	3,000.00	3,000.00	R	200.00	400.00	500.00	-	-	400.00	500.00	-	200.00	500.00	300.00	-	
				E	69.50	109.34	206.88	148.73	62.62	116.50	255.77	488.73	352.55	443.00	162.79	519.27	2,935.68
Postage, Cable and Tel. - 4	100.00	100.00	100.00	R	-	-	-	-	-	50.00	-	-	-	-	50.00	-	
				E	-	-	-	-	-	19.40	-	-	-	-	6.90	6.10	32.40
Library and Publications - 6	500.00	500.00	500.00	R	-	-	-	-	-	250.00	-	-	-	-	250.00	-	
				E	-	-	-	-	-	-	-	5.40	135.00	-	-	-	140.40
Uniforms - 8	400.00	-	400.00	R	-	-	-	-	-	200.00	-	-	-	-	200.00	-	
				E	-	-	-	-	-	-	-	-	-	-	277.43	-	277.43
Maintenance & Operation of Land &Water Transp- 11	15,000.00	15,000.00	15,000.00	R	1000.00	1000.00	1000.00	1500.00	1500.00	1500.00	1000.00	1000.00	100.00	1500.00	1500.00	1500.00	
				E	177.30	344.76	505.73	289.90	1061.56	1364.11	353.78	435.43	2844.54	466.45	716.45	2975.50	11,535.51
Drawing instruments, Mat & equip - 12	6,000.00	6,000.00	6,000.00	R	-	200.00	100.00	300.00	1500.00	1100.00	1000.00	500.00	200.00	300.00	500.00	500.00	
				E	24.50	-	-	-	-	-	2171.91	-	-	93.25	-	3526.30	5815.96
Printing of Maps & Rep. - 23	1,000.00	1,000.00	1,000.00	R	-	150.00	50.00	150.00	50.00	100.00	150.00	50.00	150.00	50.00	100.00	-	
				E	-	-	96.80	-	154.43	-	-	407.67	12.00	150.00	-	164.00	984.90
Maintenance of Tumatumari Dam - 26.	50,000.00	50,000.00	50,000.00	R	-	5000.00	2500.00	17500.00	-	-	-	-	-	-	-	25000.00	
				E	-	-	4956.65	6321.19	-	10826.51	58.50	77.81	-	24.94	-	324.97	22,590.57
Maintenance of Gauges. - 28.	35,000.00	35,000.00	35,000.00	R	-	3334.00	1667.00	10000.00	-	2500.00	7500.00	-	-	-	-	-	
				E	-	-	-	9500.00	229.91	-	7500.00	5500.00	-	-	5500.00	-	28,229.91
Maintenance of Tiboku Base Camp -36.	2,000.00	2,000.00	2,000.00	R	-	334.00	167.00	-	500.00	-	-	500.00	300.00	-	200.00	-	
				E	-	60.00	60.00	120.00	-	60.00	60.00	558.86	119.48	-	180.00	57.00	1275.34
		TOTAL	125,000.00		481.30	387.60	6086.39	16868.42	1797.07	12999.26	10666.84	9438.69	4120.89	1861.24	8197.55	8003.80	80,409.05

CAPITAL EXPENDITURE FOR YEAR 1979



CURRENT EXPENDITURE FOR YEAR 1979