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PROJECT PERFORMANCE AUDIT REPORT

GHANA: SECOND VRA POWER PROJECT

(LOAN 618-GH)

November 23, 1976

Operations Evaluation Department

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Fiscal Year

Fiscal Year is Calendar Year

Monetary Equivalents (Cedi)Consumer Price Index
(1969 = 100)

1969 - 1 Cedi = US\$ 0.98	1969 = 100
1970 - 1 Cedi = US\$ 0.98	1970 = 106
1971 - 1 Cedi = US\$ 0.55	1971 = 109
1972 - 1 Cedi = US\$ 0.78	1972 = 123
1973 - 1 Cedi = US\$ 0.87	1973 = 136
1974 - 1 Cedi = US\$ 0.87	1974 = 169
1975 - 1 Cedi = US\$ 0.87	1975 = 239

Map - Ghana Volta River Authority

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PROJECT PERFORMANCE AUDIT REPORT

GHANA: SECOND VRA POWER PROJECT
(Loan 618-GH)

PREFACE

This report presents the results of a performance audit on the project supported by Loan 618-GH of 1969, the second to the Volta River Authority (VRA) in Ghana. A third loan is presently under consideration. The audit is based upon information obtained from a Project Completion Report prepared by the Western Africa Regional Office, a review of Bank files, and discussions with Bank staff, and with officials of the Borrower during a short visit to Ghana in April 1976.

The valuable assistance provided by VRA is gratefully acknowledged.

PROJECT PERFORMANCE AUDIT BASIC DATA SHEET

GHANA: SECOND VRA POWER PROJECT (LOAN 618-GH)

Amounts (in US\$ mln)

	<u>Original</u>	<u>Disbursed</u>	<u>Cancelled</u>	<u>As of 4/30/76</u>	
				<u>Repaid</u>	<u>Outstanding</u> ^{1/}
Loan 618-GH	6.0	6.0	-	-	6.7

	<u>Original Plan</u>	<u>Project Data</u>		<u>Actual or Est. Actual</u>
		<u>Revisions</u>		
Conception in Bank	--			1961
Board Approval	--			6/3/69
Loan Agreement	--			6/23/69
Effectiveness	10/1/69			10/1/69
Physical Completion:				
Akosombo	12/72			11/72
Other	4/73			12/74
% of original project actually completed:				
Akosombo	100%			100%
Other	40%			100%
Loan Closing	12/73			12/73
Total Costs (US\$ mln)	14.4			21.0
Financial Rate of Return on Incremental Investment	26%			20%

Mission Data

	<u>Month, Year</u>	<u>No. of Weeks</u>	<u>No. of Persons</u>	<u>Manweeks</u>	<u>Date of Report</u>
Identification	1961	--	--	--	--
Appraisal	2/69	<u>2</u>	2	<u>4</u>	5/69
Subtotal		<u>2</u>		<u>4</u>	
Supervision I	2/71	1	1	1	4/71
Supervision II	8/71	1-1/2	1	1-1/2	9/71
Supervision III	5/72	1-1/2	1	1-1/2	7/72
Supervision IV	12/72	1	2	2	1/73
Supervision V	6/74 ^{2/}	<u>1-1/2</u>	3	<u>4-1/2</u>	7/74
Subtotal		<u>6-1/2</u>		<u>10-1/2</u>	

^{1/}Exchange adjustment

^{2/}Includes preappraisal of the proposed third Bank financed project to VRA

PROJECT PERFORMANCE AUDIT REPORT

GHANA: SECOND VRA POWER PROJECT
(Loan 618-GH)

HIGHLIGHTS

The Bank's second loan to the Volta River Authority of Ghana was for expanding the capacity of the Akosombo hydro-electric plant, financed under the previous loan. The project was implemented successfully. It presented no unusual problems. Proposals for rationalizing the structure of the electric supply industry were considered but no action was taken.

The following points may be of particular interest:

Rationalization of the electric supply industry
(paras. 4.1, 4.3 and 4.4).

Revaluation of assets (para. 5.3).

PROJECT PERFORMANCE AUDIT REPORT

GHANA: SECOND VRA POWER PROJECT (LOAN 618-GH)

SUMMARY

(i) Loan 618-GH was the Bank Group's third loan/credit to the electric power sector in Ghana. The first loan, in an amount of US\$47.0 million equivalent (Loan 310-GH)^{1/}, was made to the Volta River Authority (VRA) in 1962 to help establish the Akosombo hydroelectric power station, and to install the first four of the intended six 147 MW generators. The first two credits, in amounts of US\$10.0 million equivalent (Credit 118-GH) and US\$7.1 million equivalent (Credit 256-GH), were made to the Electricity Corporation of Ghana (ECG) in 1968 and 1971, respectively, to assist in the financing of ECG's distribution system expansion and rehabilitation programs. A second loan, presently audited, in an amount of US\$6.0 million equivalent (Loan 618-GH), was made to VRA in 1969 mainly to assist in the installation of the fifth and sixth generators at the Akosombo power station. Three further loans/credits, one loan to VRA and one loan plus a credit to ECG (to finance one project) are presently being considered by the Bank Group, to assist with the establishment of a further hydroelectric power station for VRA, and to further expand the distribution system for ECG.

(ii) The Borrower, the Volta River Authority (VRA), was established in 1961 as an autonomous Government-owned corporation to construct, and operate the hydroelectric power station at Akosombo, which was to consist of an earth and rock-fill dam; a power house initially equipped with 4 x 147 MW generators, but with provision for two more of similar size; and a 500 mile long, 165 KV transmission line.

(iii) VRA's total expansion program for 1969-1972 had a total cost of US\$26.84 million equivalent. Loan 618-GH of July 1969 was to help finance the foreign exchange costs of a project of estimated total cost US\$14.39 million, which formed part of this expansion program. The remaining foreign exchange costs were to be provided by the Canadian International Development Agency (CIDA), the United States Agency for International Development (USAID) and VRA itself. The project consisted principally of the installation of the two remaining generators^{2/} at the Akosombo power station and transmission system expansion, mainly in the form of substations for transforming power from the transmission to the distribution systems. Because the Bank considered that VRA had a number of weaknesses in its internal organization, understaffing at the senior levels but overstaffing at the lower levels, a certain number of institutional objectives were included in the loan.

(iv) There was a delay of about 6 months in starting project implementation, due to the slow start in civil works connected with the two generating units, but work at the Akosombo power station was completed essentially on time, by the end of 1972. However, there was a delay of

^{1/} See Sector Study Report Z/19 of May 1971, part of Operations Evaluation Report Z/17 of March 10, 1972, which is an evaluation of Electric Power Sectors on a world-wide basis.

^{2/} The capacity of each unit was increased to 162 MW.

about 20 months in the completion of the transmission substations, due to the late delivery and installation of some small, but important, electrical components. The final cost of the project (US\$21.0 million) was in money terms about 64% (in real terms about 43%) higher than the appraisal estimate mainly because of increased cost of civil works. Foreign exchange and local costs were about 71% and 29% higher respectively in money terms.

(v) The main justification of the project, and, indeed, the whole of VRA's 1969-1972 expansion program, was the increase in electric power and energy required by VRA's main customer, the Volta Aluminum Company (VALCO). Although electricity sales to VRA's second main customer, the Electricity Corporation of Ghana (ECG), have not been as high as estimated at the time of appraisal, this fall has been more than compensated by increased sales to VALCO, and also to VRA's third set of customers, the mines. Furthermore, because of the large increases in fossil fuel prices, and the fact that most of the civil works for the fifth and sixth generators had already been provided (i.e. they were sunk costs), the project remains the least-cost solution for meeting that part of VRA's expansion program attributed to it at appraisal. The financial rate of return on the incremental investment for the project is now estimated to be about 20%, compared with the 26% calculated at appraisal (Annex 4).

(vi) VRA's financial performance has been reasonably close to that predicted at appraisal. However, its annual rate of return on average equity has failed to reach the 8% level stipulated in the loan agreement. In 1974 and 1975 it was actually only 6.3% and 5.6%, respectively ^{1/}. VRA has negotiated with VALCO for a tariff increase, and the agreement reached should result in a 9% annual rate of return on currently valued equity during 1976.

(vii) The possibility of a merger between ECG and VRA, the two complementary public electricity authorities in Ghana, has been the subject of discussions between the Bank and the Borrower off and on since 1964. In 1972, the Bank prepared an outline for a study to consider ways to rationalize the power sector in Ghana including the possibility of merger. The study was financed by the Canadian International Development Agency (CIDA). It was not as thorough as the Bank had hoped and it did not provide a satisfactory basis on which to proceed with a merger. The Bank decided not to press the merger issue. This continues to be its position.

(viii) The Bank made a positive contribution to the power sector of Ghana in particular, and the economy of Ghana in general, by making the loan. Besides, the advantages obtained by international competitive bidding, the Bank's presence ensured that the least-cost solution was applied to the additional requirements (mainly from VALCO) for electrical power and energy from VRA. To supplement the general shortage of professional staff, the Bank was able to assist in finding appropriate expatriate consultants. Supervision missions were adequate and fairly frequent.

^{1/} VRA's assets have not been revalued since 1971, and then only partially.

PROJECT PERFORMANCE AUDIT REPORT

GHANA: SECOND VOLTA RIVER POWER PROJECT (LOAN 618-GH)

I. Background

1.1 The Volta River Authority (VRA) was established in 1961, with the encouragement of the Bank, as an autonomous Government-owned corporation to construct, own and operate a hydroelectric power plant at Akosombo, on the Volta river. The feasibility of the Akosombo plant had been established by a preparatory commission which in 1956 had recommended its construction, basically to supply power to a proposed nearby aluminum smelting plant using the bauxite deposits of Ghana. Following a review of the proposals in the late 1950's, the plan was partially implemented. Kaiser Aluminum and Chemical Corporation of the U.S.A. sponsored the smelter and, in February 1962, the Bank made a loan for US\$47.0 million equivalent (Loan 310-GH) ^{1/} to assist in the financing of the hydroelectric plant. The establishment of VRA is thus inextricably connected with the establishment of the Volta Aluminum Company (VALCO). The contract between VRA and VALCO, signed in 1962, was for a period of 30 years (1967-1997), requiring an extremely reliable supply of electricity. Also, under the legal decree setting it up, VRA is empowered to go well beyond the boundaries of the power sector into integrated regional development, e.g. into water transportation, fisheries and even medical promotion.

1.2 VRA is governed by an eight-man board, in addition to a Chairman, appointed by the Government, the Chief Executive of VRA, the Managing Director of VALCO, the Managing Director of the main national electricity authority in Ghana (Electricity Corporation of Ghana, or ECG), and five members representing the general public. Although VALCO is the main customer of VRA, currently requiring about 315 MW out of a total maximum demand from Akosombo of about 882 MW, VRA also supplies in bulk to ECG and some local gold and diamond mines. The first development was for 588 MW (4 x 147 MW generating units) and a 300 mile long, 165 KV transmission system. The first power was commercially generated in late 1965.

1.3 In June 1969, the Bank made a second loan to VRA (presently audited) in the amount of US\$6.0 million equivalent (Loan 618-GH), to assist in the financing of an extension to Akosombo by two further generating units, and for expansion of the transmission system. The loan was fully disbursed by October 1973. A third loan is presently under consideration by the Bank for a further hydroelectric power station, about 30 Km downstream from Akosombo.

II. The Project

2.1 At the time of the appraisal, the main objective of the project was to meet the increased demand for electricity by VALCO from 1972 onwards. The total cost of VRA's development program through that period was estimated at US\$21.92 million equivalent, of which the project was to cost US\$14.39 million (foreign exchange component US\$12.19 million), at 1968 price levels.

^{1/} See sector study report Z/19 of May 1971, part of Operations Evaluation Report Z/17 of March 10, 1972, which is an evaluation of Electric Power Sectors on a world-wide basis.

2.2 The project was to consist mainly of the installation of the fifth and sixth 147 MW generating units at Akosombo (subsequently the capacity of these two units was increased to 162 MW), together with the expansion of the 165 KV transmission system, and principally the transformer stations supplying VALCO and ECG. VRA's development program, and the project, were planned and designed by the Authority's own staff assisted by the consultants Kaiser Engineers & Constructors, Inc. (KECI) from the U.S.A. The two generating units were expected to be placed in service by the end of 1972, and the substation works by mid-1973. The loan, guaranteed by the Government of Ghana, was signed in June 1969, about six months after the appraisal mission.

2.3 Several covenants were agreed upon between the Government, the Borrower and the Bank. First, VRA was to earn an annual rate of return of not less than 8% on its average equity for the fiscal year ending 1974 and thereafter. Second, a tariff study being carried out by a consulting firm during the time of negotiations would be completed by December 31, 1969. Third, electric power operations would be strictly segregated from other operations^{1/} in all their aspects (finance, engineering, economics, managerial.) Fourth, VRA (with the use of consultants) would review its own organizational structure, staffing policies, operational efficiency, and other similar managerial concerns. Except for the first, these covenants have been complied with.

III. Project Implementation

3.1 After a delayed start of about six months, the two generating units at Akosombo power station were commissioned on time at the end of 1972. However, the substation expansion part of the project had a long delay of about 20 months, mainly due to late letting of the contracts, due to government procedural delays, with which the Bank could not help.

3.2 Higher than expected costs for civil works, due to lack of local bidders and a small increase in program scope, caused the project cost to increase by about 64% in money terms, and about 43% in real terms. Foreign exchange costs increased by about 71% and local costs by about 29% both in money terms (Annex 2). This could not have been foreseen at the time of the appraisal.

3.3 There have been no major operating difficulties with the project, once it was commissioned, apart from teething troubles, which affected the two generators for a short while only.

IV. Management

4.1 In 1969, at the time of appraisal, the Bank considered that improvements could be made in VRA's organizational structure and staffing policies (especially with respect to apparent overstaffing at the lower levels). With encouragement from the Bank, a consultant from Ontario Hydro Electric

^{1/} i.e. VRA's other activities under its charter as distinct from electric power such as fisheries, water transportation, etc.

Authority of Canada was selected to carry out a study, which was completed early in 1970. The Bank did receive a copy of the report in late 1971 and considered it to be satisfactory especially with respect to its recommendations for: a) studying the possible merger of the electric power function of VRA with that of ECG (the question of such a merger had been considered by the Bank and the Borrower off and on from the time of the first VRA loan in 1964); b) training accountants in VRA and studying the use of a computer for VRA accounts, and c) attempting to overcome the problem of over-staffing. Most of these suggestions were subsequently implemented except those concerning the merger of VRA and ECG, and the reduction in VRA staff.

4.2 Bank supervision missions showed concern over VRA's surplus of clerical and general service support staff, whose numbers increased by about 64% over the period 1969 through 1973. At the same time, major vacancies existed in middle management throughout most of the period from 1967 to date.

4.3 As mentioned above, the subject of a merger between the electric power function of VRA and the Electricity Division of the Ministry of Works (the forerunner of ECG) had been discussed off and on between the Bank and the Government of Ghana since mid-1960's. The Bank was, at that time, in favor of a merger, although it could see the advantages of having a separate organization for VRA, when the latter was in its early days of operation. However, the Bank did favor the setting up of a separate ECG (as a successor to the Electricity Division of the Ministry of Works) in 1967.

4.4 In 1972, the Bank prepared an outline of a study to consider ways to rationalize the power sector. This outline as agreed to in June 1972 by the Government, VRA and ECG, was duly sent as a proposed terms of reference to the Canadian International Development Agency (CIDA) which was to provide the financing. Although the objectives of the study were clearly spelled out to CIDA, the reconnaissance study subsequently made did not fully focus on them. By the end of 1972, it became apparent to the Bank that a merger of the two utility entities - VRA which is well operated and virtually autonomous from the financial and management standpoint, and ECG which is weak financially and much more dependent on Government - might not lead to an overall strengthening of the power operation. As there was also a lack of support for a merger by the managers of both ECG and VRA, the Bank decided not to press the matter. This is still the Bank's position.

V. Financial Performance

5.1 With sales being above forecast, VRA's financial performance in the period 1969 through 1974 has been reasonably close to that forecast at appraisal (Annex 5), as shown by some key indicators given below:

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
<u>Energy Sold (GWH)</u>						
Forecast	2497	2596	2738	3079	3569	3850
Actual	2674	2806	2835	3237	3771	3989
<u>Average Revenue per KWH (Cedi)</u>						
Forecast	0.0040	0.0041	0.0043	0.0042	0.0042	0.0042
Actual	0.0040	0.0042	0.0044	0.0048	0.0047	0.0048
<u>Operating Ratio (%)</u>						
Forecast	57	53	50	49	58	49
Actual	49	53	52	50	48	52
<u>Return on Rate Base (%)</u>						
Forecast	3.2	3.8	4.5	4.8	5.8	6.7
Actual	3.8	4.0	4.1	4.6	5.1	6.0
<u>Debt/Equity Ratio</u>						
Forecast	55/45	55/45	55/45	55/45	55/45	56/44
Actual	56/46	56/46	63/73	60/40	57/43	57/43
<u>Net Income (Cedi Mill.)</u>						
Forecast	0.55	1.46	2.51	3.47	4.58	5.81
Actual	1.56	1.82	2.24	3.59	4.37	5.35
<u>Dividends Paid (Cedi Mill.)</u>						
Forecast	-	-	-	1.0	2.5	2.0
Actual	-	-	-	1.0	2.0	2.0

5.2 Revenues from electricity sales have increased on average by 13% per year during the period 1969 through 1974, in comparison with the 10% forecast at appraisal. This increase is basically due to; (a) higher than expected sales to VALCO and the mining concerns; (b) devaluation of the Cedi (in that VALCO pays VRA in US dollars) and; (c) tariff increases to ECG and the mines (but not to VALCO until 1972). However, operating expenses have also increased, practically eliminating the effect of the increase in revenues.

5.3 During the 1969-74 period, VRA adhered to most of its financial covenants, but the rate of return on average equity did not meet the requirement of 8% in FY 74. Nor did it meet the requirement of 8% in FY 75 (6.3% and 5.6% for FY 74 and FY 75, respectively). VRA's assets were last revalued in FY 71 and then only partially so, since the revaluation was only applied to assets financed from foreign currency. It has been estimated that VRA's assets may presently be undervalued by as much as 80% which would decrease the rate of return on currently valued equity to about 2 - 3% for FY 74 and FY 75. However, VALCO has recently agreed to increases in its power rate and with the tariff increases to ECG and the mines, the rate of return on VRA's currently valued equity for FY 76 is expected to be about 9%.

VI. Economic Justification

6.1 In 1968, VRA had a contractual obligation to VALCO, whereby it was required to install additional generating plants by 1972 at the latest, and preferably part of the additional plant before that date. VRA met this contractual obligation by installing the fifth and sixth 147 MW generating units at Akosombo. Only one additional generator was actually required at that time, but as there was estimated to be a cost saving of US\$0.59 million by installing two units at the same time, the decision was made to install both fifth and sixth units together.

6.2 At the time of the appraisal, the incremental financial rate of return on the investment for the project was calculated to be about 26%, using attributable revenues as the measure of benefits. The high return was due to the fact that certain facilities, common to all generating units at Akosombo, had already been installed, and were, therefore, not part of the incremental investment for the fifth and sixth units. The presently estimated incremental financial rate of return on the investment for the project is about 20% (Annex 4).

6.3 VRA's total maximum demand and electrical energy sales (Annex 3) have been higher than forecast. The maximum demand over the period 1969 to 1974 increased by an average annual 8.8%. Energy sales increased at an average annual 8.4% over the period 1969 to 1974, in comparison with the appraised estimate of 8.1% for the same period. Because so much of the civil works for the fifth and sixth units at Akosombo had already been provided along with those for the first four units and, because so much of the basic part of the transmission network had likewise been provided before the project was commenced, the project represented the least-cost solution to meeting VRA's increased requirements for maximum demand and electrical energy in the period 1969 through 1973. This was true when the appraisal was made; it would also be true if the investment were to be made today.

VII. Bank's Performance

7.1 The Bank made a positive contribution to the electric power sector of Ghana by making the second loan to VRA. Worthwhile effort by the Bank was put into ensuring that the project was the least-cost solution to meeting the increased requirements for electrical energy. Supervision missions at about one per year were adequate. Reasonably close and effective contact with the project was maintained, and when the Bank became aware of VRA's shortage of professional staff in 1971, it was quick to respond by assisting in the search for suitable expatriates to fill the gap.

VIII. Conclusions

8.1 The major objectives of this loan have been met. The additional electricity supply generated by the new units contributed to increasing the output of the VALCO aluminum smelter. It also contributed to increasing output by the mines and to a larger supply for general distribution.

8.2 The major part of VRA's expansion program (the two 162 MW generators at Akosombo) was essentially completed on time, but VRA's overall efficiency has been marred, and is still marred, by excess staffing at the lower levels and a shortage of staff at the higher levels.

8.3 The level of communication between the Bank, the Borrower and the Government, seems to have been sufficient to cover most eventualities which cropped up during project implementation.

The Volta River Authority Program and the Bank Financed Project

The Program

VRA's expansion program covering the period 1969-1972 included:

- (i) completion of the Akosombo (Volta River) power station by the addition of the fifth and sixth 162 MW generating units;
- (ii) expansion of 165 kv substations at Akosombo-Tema, and the VALCO smelter to meet increased smelter demand;
- (iii) expansion of 165 kv substation facilities at Tema, Sekondi-Takoradi, and Kumasi to serve ECG;
- (iv) construction of a 165 kv transmission line from Akosombo to the Togo border at Aflao for the export of VRA power to Togo and Dahomey;
- (v) construction of a third double circuit 165 kv transmission line Akosombo-Tema to increase system reliability;
- (vi) purchase of specialized vehicles required in connection with the transport of equipment, tools and materials for maintenance of the 165 kv transmission system;
- (vii) miscellaneous minor works for routine improvements to generating and transmission facilities, housing, district stores, etc.;
- (viii) consulting services associated with the completion of the Akosombo power station and expansion of substation facilities; and
- (ix) consulting services to review future expansion plans, to reorganize the accountancy department, and to improve operations.

The Project

The project with which the Bank loan was associated included all of the program items listed above with the exception of item (iv) construction of a 165 kv transmission line from Akosombo to the Togo border at Aflao for the export of VRA power to Togo and Dahomey and (v) construction of the third double circuit 165 kv transmission line Akosombo-Tema. These lines were not essential for the physical completion of the project financed by the Bank.

VOLTA RIVER AUTHORITY (VRA)Actual and Forecast Project Cost
(In millions of N¢)

	<u>ACTUAL</u>			<u>APPRAISAL</u>		
	<u>Foreign</u>	<u>Local</u>	<u>Total</u>	<u>Foreign</u>	<u>Local</u>	<u>Total</u>
1. 5th and 6th units at Akosombo	16.41	1.45	17.86	8.13	1.29	9.42
2. Substation Expansion	3.33	.46	3.79	2.82	.25	3.07
3. Construction & Service vehicles	.36	.33	.69	.15	-	.15
4. V.R.A. overheads & misc.	-	.66	.66	.31	.43	.74
5. Consulting Services for Akosombo and Substation	.91	-	.91	.66	.13	.79
6. Consulting Services (Future Studies)	.20	-	.20	.36	.15	.51
Total	<u>21.21</u>	<u>2.90</u>	<u>24.11</u>	<u>12.43</u>	<u>2.25</u>	<u>14.68</u>

Source: Appraisal report of May 1969 and VRA

VOLTA RIVER AUTHORITY (VRA)
Actual and Forecast Maximum Demands, Sales and Load Factors

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Forecast Maximum Demand (MW)	340	363	387	475	491	527
Percentage Increase over Previous Year	3.0	6.8	6.6	22.7	3.4	7.3
Actual Maximum Demand (MW)	359	378	380	471	520	540
Percentage Increase over Previous Year	9.1	5.3	0.5	23.9	10.4	3.8
Forecast Sales (Gwh)	2,497	2,596	2,738	3,079	3,569	3,850
Percentage Increase in Annual Forecast Sales over Previous Year	2.8	4.0	5.5	12.5	15.9	7.9
Actual Sales (Gwh)	2,674	2,806	2,835	3,237	3,771	3,989
Percentage Increase in Annual Actual Sales over Previous Year	8.1	4.9	1.0	14.2	16.5	5.8
Forecast Average Annual Load Factor (%)	83.9	81.8	80.6	74.0	83.0	83.4
Actual Average Annual Load Factor (%)	85	84.8	85.2	74.5	82.8	92.0

Source: Appraisal Report of May 1969 and VRA's Annual Reports

VOLTA RIVER AUTHORITY (VRA)

Incremental Financial Rate of Return on the Project
('000 Cedis)

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>2004 (Annually)</u>
<u>Actual Investments</u>											
Aksoombo Fifth and Sixth Units	1286	5070	7231	4274							
Transmission/Substation Expansion	277	1007	1173	505	372	372	372	372			
Consulting Services and Miscellaneous	221	410	194	195	195	195	195	195			
Sub-Total	1784	6487	8598	4974	567	567	567	567			
Operation and Maintenance	-	-	-	213	425	571	637	861	861	861	861
Total Costs	1784	6487	8598	5187	992	1138	1204	1428	861	861	861
<u>Benefits</u>											
Attributable Revenue to Fifth and Sixth Units	-	-	-	2584	4681	6025	7295	8706	8706	8706	8706
Net Benefit Stream	-1784	-6487	-8598	-2603	3689	4887	6091	7278	7845	7845	7845
Deflator	1.4	1.3	1.2	1.1	1.0						
Net Benefit Stream in 1973 Values	-2498	-8433	-10318	-2863	3689	4887	6091	7278	7845	7845	7845

INCREMENTAL FINANCIAL RATE OF RETURN = 20%

REPUBLIC OF GHANA
VOLTA RIVER AUTHORITY (VRA)
Actual and Forecast Balance Sheets 1969-1974
(in thousand ₵)

As of December 31	Forecast 1969	Actual 1969	Forecast 1970	Actual 1970	Forecast 1971	Actual 1971	Forecast 1972	Actual 1972	Forecast 1973	Actual 1973	Forecast 1974	Actual 1974
Assets												
Fixed Assets in Operation	147,722	147,238	148,522	148,512	152,443	174,716	169,956	196,461	170,806	196,794	171,706	199,575
Less Depreciation	(11,252)	(10,911)	(14,965)	(14,430)	(18,776)	(20,492)	(23,025)	(24,588)	(27,295)	(29,325)	(31,587)	(33,828)
Net Fixed Assets in Operation	136,470	136,307	133,557	134,082	133,667	154,224	146,931	171,873	143,511	167,469	140,119	165,747
Work in Progress	1,525	1,209	7,609	2,492	13,274	13,924	4,457	4,454	14,932	6,745	31,056	5,347
Total Fixed Assets	137,995	137,516	141,166	136,574	146,941	168,148	151,388	176,327	158,443	174,214	171,175	171,094
Current Assets												
Inventories	750	1,049	750	883	750	1,051	750	1,183	900	1,337	900	1,376
Accounts Receivable	2,100	2,131	2,100	2,147	2,030	2,922	2,000	3,410	1,900	3,878	1,900	3,984
Securities Banks and Cash	2,338	2,821	2,461	3,811	2,461	3,769	2,545	2,681	2,720	5,196	2,768	9,344
Total	5,188	6,001	5,311	6,841	5,241	7,742	5,295	7,274	5,520	10,411	5,568	14,704
Total Assets	143,183	143,517	146,477	143,415	152,182	175,890	156,683	183,601	163,963	184,625	176,743	185,798
Liabilities												
Equity												
Republic of Ghana Investment	58,546	58,350	58,696	58,350	58,772	59,129	58,772	59,129	58,772	59,129	58,772	59,129
Revaluation and Exchange Difference	5,738	5,502	5,738	5,606	5,738	8,650	5,738	8,259	5,738	15,871	5,738	13,568
Reserves and Surplus	550	572	908	2,311	3,422	4,729	5,888	7,296	7,972	9,657	12,778	12,885
Total	63,734	64,424	65,342	66,267	67,932	72,508	70,398	74,684	72,482	84,657	77,288	85,582
Long-Term Debt												
IBRD Loan 310	43,559	45,363	41,917	43,983	40,179	55,103	38,341	52,697	36,395	47,599	34,336	47,740
IBRD Loan 618	337	-	2,482	48	4,917	4,019	6,120	6,714	6,120	7,647	6,120	7,301
USAID	21,145	21,896	20,543	21,438	19,918	26,309	19,163	26,028	18,297	22,750	17,400	22,092
US EXIM-Bank	6,564	7,101	6,027	6,561	5,490	7,560	4,953	7,039	4,416	5,856	3,879	5,387
UK ECDC	1,316	1,953	679	1,316	42	925	51	51	-	-	-	-
Canadian Loan	650	-	3,470	1,250	6,942	3,716	7,759	9,414	7,759	1,057	7,532	10,006
Italian Loan	-	-	370	-	1,070	200	1,749	1,082	1,572	-	1,385	-
Ghana Government Loan	-	300	-	554	-	200	-	1,282	-	1,282	-	1,282
Future Expansion Loan	-	-	-	-	-	-	3,075	-	11,525	-	23,025	-
Total	73,571	76,613	75,488	75,060	78,558	97,832	81,160	103,025	86,084	95,161	93,677	93,808
Current Liabilities												
Accounts Payable and Accruals	5,878	2,291	5,647	1,935	5,692	5,134	5,125	5,497	5,397	4,656	5,778	6,314
Retention	-	188	-	153	-	445	-	394	-	151	-	94
Total	5,878	2,479	5,647	2,088	5,692	5,549	5,125	5,891	5,397	4,807	5,778	6,408
Total Liabilities	143,183	143,517	146,477	143,415	152,182	175,890	156,683	183,601	163,963	184,625	176,743	185,798
Current Assets/Current Liabilities	.9	2.4	.9	3.3	.9	1.4	1.0	1.2	1.0	2.2	1.0	2.3
Debt as % of Total Capitalization	55	56	55	56	55	63	55	60	55	57	56	57

REPUBLIC OF GHANA
VOLTA RIVER AUTHORITY (VRA)
Actual and Forecast Income Statements 1969-1974 /1
(in thousand ₵)

As of December 31	Forecast 1969	Actual 1969	Forecast 1970	Actual 1970	Forecast 1971	Actual 1971	Forecast 1972	Actual 1972	Forecast 1973	Actual 1973	Forecast 1974	Actual 1974
Energy Sold, in GWh	2,497.0	2,473.6	2,596.2	2,806.0	2,738.3	2,834.6	3,079.0	3,237.1	3,569.4	3,771.4	3,850.4	3,989
Average Revenue Per KWh (NP)	.40	.40	.41	.42	.43	.44	.42	.48	.42	.47	.42	.48
Operating Revenues	9,955	10,561	10,746	11,631	11,804	12,413	13,216	15,444	14,961	17,698	16,128	18,965
Sales of Energy	150	256	150	352	150	440	150	446	150	393	150	933
Other	10,105	10,817	10,896	11,983	11,954	12,853	13,366	15,890	15,111	18,091	16,278	19,898
Total	1,635	1,587	1,716	2,164	1,803	2,553	1,976	3,021	2,060	3,208	2,150	4,079
Operating Expenses	200	335	200	514	200	228	220	403	220	460	230	608
Generation and Transmission Expenses (including Transportation)	130	153	130	50	140	270	140	418	150	543	150	707
Akosombo Administration (Net)	3,693	3,267	3,713	3,577	3,811	3,589	4,249	4,163	4,270	4,767	4,292	4,581
Hospital and Health Administration (Net)	5,658	5,341	5,759	6,306	5,954	6,642	6,585	8,004	6,700	8,977	6,822	9,975
Depreciation	4,647	5,476	5,137	5,678	5,000	6,211	6,781	7,886	8,411	9,114	9,456	9,923
Total	3,900	3,921	3,843	3,861	3,915	3,970	4,063	4,292	4,302	4,749	4,774	4,569
Operating Income	(6)	(164)	(164)	(164)	(429)	(417)	(748)	(271)	(242)	(541)	(624)	(581)
Interest + Communication Charges	3,894	3,921	3,679	3,861	3,486	3,970	3,315	4,292	3,827	4,749	3,650	4,569
Less: Interest Charged to Plant	553	1,555	1,458	1,817	2,514	2,241	3,466	3,594	4,584	4,365	5,806	5,354
Net Income	0.9	2.4	2.3	2.8	3.8	3.2	5.0	4.9	6.4	5.5	7.8	6.3
Return on average equity %												

/1 Power Operations only.

