

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) – PART I

Report Symbol U-447

1. PROJECT TITLE <p style="text-align: center; font-size: 1.2em;">RICE MODERNIZATION</p>	2. PROJECT NUMBER <p style="text-align: center; font-size: 1.2em;">L-008/504-0044</p>	3. MISSION/AID/W OFFICE <p style="text-align: center; font-size: 1.2em;">USAID/Guyana</p>							
4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 79 - 1									
<input type="checkbox"/> REGULAR EVALUATION <input checked="" type="checkbox"/> Final SPECIAL EVALUATION									
5. KEY PROJECT IMPLEMENTATION DATES <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">A. First PRO-AG or Equipment FY <u>68</u></td> <td style="width: 33%;">B. Final Obligation Expected FY <u>68</u></td> <td style="width: 33%;">C. Final Input Delivery FY <u>78</u></td> </tr> </table>	A. First PRO-AG or Equipment FY <u>68</u>	B. Final Obligation Expected FY <u>68</u>	C. Final Input Delivery FY <u>78</u>	6. ESTIMATED PROJECT FUNDING <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">A. Total</td> <td style="width: 50%; text-align: right;">\$ <u>16,000,000</u></td> </tr> <tr> <td>B. U.S.</td> <td style="text-align: right;">\$ <u>12,000,000</u></td> </tr> </table>	A. Total	\$ <u>16,000,000</u>	B. U.S.	\$ <u>12,000,000</u>	7. PERIOD COVERED BY EVALUATION From (month/yr.) <u>Aug. 1976</u> To (month/yr.) <u>May 1978</u> Date of Evaluation Review <u>June 1978</u>
A. First PRO-AG or Equipment FY <u>68</u>	B. Final Obligation Expected FY <u>68</u>	C. Final Input Delivery FY <u>78</u>							
A. Total	\$ <u>16,000,000</u>								
B. U.S.	\$ <u>12,000,000</u>								

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
<p style="font-size: 1.2em; margin-top: 0;">NONE: Final Evaluation, Project Completed</p>		

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	_____
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<input type="checkbox"/> Other (Specify) _____
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	_____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. Continue Project Without Change

B. Change Project Design and/or Change Implementation Plan

C. Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Dan Miller, Chief Engineer
 Dwight Steen, Rural Development Officer
 Joseph Charette, Capital Development Officer

12. Mission/AID/W Office Director Approval

Signature: *Edna A. Boorady*

Typed Name: **Edna A. Boorady**

Date: **January 31 1979**

RICE MODERNIZATION
Loan No. L-008, Project No. 504-0044

I. Summary: As explained in the previous evaluation, held in July 1976, the evaluation of this project was complicated by a number of major factors, these included:

- (1) The original project design had only a limited number of progress criteria and end-of-project conditions;
- (2) the time span originally expected to complete the project, i.e., 3 years, was far exceeded;
- (3) the social and economic functions of the Government changed significantly between project design, implementation, and completion, which altered the role of the private sector in Guyana, thus changing some of the perspectives originally considered.

Notwithstanding these obstacles to a "normal" evaluation, a special evaluation of the project was conducted in May 1978, by Checchi and Company, under AID Contract AID/LA-C-1259. The intent of this in-depth evaluation was to determine if the project's economic and social objectives were met, since essentially this is the "bottom line" for AID on whether its projects both impacted on the poorest group(s) in a country, and concomitantly, contributed to development.

The findings of this special evaluation were also to serve as a basis in making a determination as to whether AID should finance a follow-on project to expand upon the activities undertaken under this activity. The summary finding of the evaluation was that the project exceeded its major socio-economic goals which were:

- (1) Continued growth rate of 7% in GDP;
- (2) increased income for rice farmers;
- (3) increase of 1% per year in export earnings attributable to rice.

Of the project's other technical objectives or sub-objectives, e.g., construction, research program, improvement of transport system, all were partially to substantially met, with one exception, the Guyana Rice Board was not able to compete effectively in the world market, as distinct from the CARICOM area markets. The project was also beset with technical and construction delays which delayed the project's completion until early CY 1978. The project's Terminal Disbursement Date (TDD) remains for legal reasons, open, and has been extended indefinitely pending the outcome of a law-suit, between a contractor and the Government of Guyana (GOG).

Despite the technical and legal difficulties associated with the project, it exceeded all of its socio-economic objectives. Accordingly, based on the findings of the special evaluation, a new follow-on loan/grant project was authorized, and a new project agreement for Rice Modernization II was signed on August 31, 1978.

The Checchi special evaluation of the Rice Modernization project is attached, and serves as the Mission and GOG's final evaluation of the project as it covers, in greater detail than usual, e.g., rate of return, the majority of factors which are considered to arrive at conclusions whether a project attained its objective. The findings of the evaluation were, following review, substantially concurred with by both USAID and the GC .

Attachment: a/s

USAID/Guyana
January 30, 1979

CHAPTER IV
EVALUATION OF THE 1967 RICE MODERNIZATION PROJECT

A. Project Achievements

At the broadest level of impact, the First Rice Modernization Project was designed to help promote a continued GDP growth rate of seven percent, increase rice farmer income, and enable the GRB to compete effectively in world markets, thus optimizing the contribution of rice to export earnings.

From a current price value of 17.1 (million G\$) in 1970, the contribution of rice to GDP rose to 58.2 (million G\$) in 1977. As measured in constant prices, the rice component of GDP expanded at an annual rate nearly double the rate of total GDP growth, as shown in Exhibit IV.A-1. This strong rate of expansion has contributed to an annual GDP growth rate of 8.05 percent, well above the project objective of seven percent.

At least three factors have supported the expansion of rice related GDP: increased paddy production, a large jump in the production of approved varieties, and the associated increase in the value of GRB rice purchases. Data regarding these factors are presented in Exhibit IV.A-1. While overall paddy production increased at the yearly rate of 6.7 percent, the production of approved varieties accelerated from a small base of 55,000 bags in 1970 to 4,066,000 bags in 1977, an annual expansion of 84.3 percent. The vastly improved production of high yield, high value approved varieties has made a major contribution to the 26.3 percent annual growth rate of the value of GRB paddy intake.

EXHIBIT IV.A-1

GROWTH IN GDP, EXPORTS, AND CONTRIBUTION OF RICE

<u>Year</u>	<u>GDP Current G\$ '000,000</u>	<u>Rice Con- tribution to GDP '000,000</u>	<u>Total Exports '000,000</u>	<u>Rice Exports '000,000</u>	<u>Paddy Production '000 140 lb. Bags</u>	<u>Approved Variety Production '000 Bags</u>	<u>Value GRB Paddy Intake G\$ '000,000</u>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1970	467.4	17.1	265.6	19.2	3,502	55	4.7
1971	498.4	14.3	287.8	20.2	2,952	110	6.1
1972	530.7	11.2	299.9	24.2	2,316	393	6.7
1973	576.4	15.7	287.0	25.0	2,399	574	5.2
1974	669.8	31.3	595.9	49.0	4,029	983	8.4
1975	1,093.3	42.2	836.9	84.8	4,510	1,934	27.6
1976	1,035.4	29.5	674.1	73.6	2,722	2,661	26.7
1977	1,011.5	58.2	n.a.	66.8	5,644	4,066	28.7
Avg. Ann % Increase: Current Units	14.86	22.23	22.21	26.32	6.71	84.31	34.28
Avg. Ann. % Increase: Constant G\$	8.05	14.98	14.25	18.82	-	-	26.31

Sources: Economic Survey of Guyana, Ministry of Economic Development; 1976 Annual Report, Bank of Guyana; Annual Statistical Abstract, Statistics Bureau; unpublished GRB data.

1/ IMF accounting prices factors used in determining constant prices. See Data Base Exhibit A.11.

The shift to approved varieties has directly affected farmer incomes. Marginal gain to the farmer from the sale of approved rather than traditional varieties has more than offset the increased marginal costs of production. With the proportion of approved varieties produced moving from only eight percent in 1970 to roughly 80 percent at the present time, the gain in real farmer income has been substantial. This improvement has been reinforced by the increase in yields attributable to the approved varieties.

An improved quality of paddy has made possible the production of better quality, higher value rice, as shown in Exhibit IV.A-2.

EXHIBIT IV.A-2

IMPROVEMENT OF EXPORT RICE GRADES OVER PROJECT PERIOD 1967-77
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Rank</u>	<u>Name of Domestic Grade</u>	<u>Corresponding Export Bulk Prices per Bag</u>	<u>Changes in Export Prices, in Constant G\$ per Bag (11 yr. Period)</u>
<u>White Rice Grades</u>			
0	Extra White A	n.a.	
1	White A	87.00	81.16 (1977)
2	White B	76.60	
3	White C	71.00	71.49 (1967)
4	White A Broken	33.27	

The price improvement of about G\$10 per bag between 1967 and 1977 (in constant G\$) is equivalent to a one-and one-third grade improvement in the quality of rice exported over the period.

Source: Guyana Rice Board, Marketing Division.

In association with other factors, this trend has had a beneficial effect on the value of rice exports. Rice export earnings have increased since 1970 at an annual rate of 18.8 percent while total export earnings rose at a yearly rate of 14.3 percent. The relatively higher growth rate of the value of rice exports is reflected in the increase in the percentage of rice in the total export mix.

In 1970, the contribution of rice to total export value stood at 7.2 percent. By 1976, that contribution had increased to 10.9 percent.

On the technical level, project objectives were oriented toward construction and preparation for operation of a series of facilities designed to benefit the Guyana rice industry. These facilities included: six paddy drying/storage centers located along the coastal rice growing belt, a milled rice storage facility in Georgetown, and a pure-line seed storage unit and a rice research station, both located in the MARDS-Burma area. In association with the building of the rice research station, an expanded program of rice research was to be implemented.

The majority of the technical objectives of the project have been accomplished. Five of the six drying/storage centers are completely constructed and operating near or in excess of design capacities. At the sixth center, Somerset-Berks, finishing work under the aegis of the GRB is continuing. Limited operations at Somerset-Berks commenced in the autumn of 1977. Physical facilities for the milled rice storage center at Georgetown have recently been completed,

although the August, 1977 fire partially damaged the facility's handling capability. Limited operation of the Georgetown rice storage silos began in the autumn of 1977, necessitated by the destruction in the same fire of the storage bonds located at the Georgetown site.

At MARDS, the seed storage unit is in full operation and being utilized to capacity. The rice research station is also operational with the exception of the drier and storage bins, which have been used in the past, but are currently under reconstruction and repair.

The strength of the rice research program promoted by the project is indicated by the introduction of a series of improved varieties specifically suited to the Guyanese environment. Varieties developed through the research program and successfully introduced include variety 'N' and the recently released Champion and Rustic. Another major accomplishment has been the development of a foundation seed program. Produced on research station acreage, the specially prepared foundation seed is utilized in the multiplication of pure-line seed on the GRB's state farms and by registered private farmers. Availability of this high quality seed has promoted the increased production of approved varieties which have played such a key role in the improvement of Guyana's rice industry.

On the organizational level, the primary project objective was the amalgamation of the Guyana Rice Marketing Board and the Guyana Rice Development Corporation. In order to support the greatly expanded operations projected for the consolidated organization, a related goal

was the training of personnel in various aspects of management, research, maintenance, and rice processing technology.

Consolidation of the two entities was achieved by the formation of a single organization now called the Guyana Rice Board. Coordination of government operations related to rice, from assisting production efforts to final marketing, has been accomplished by this amalgamation. Training of GRB personnel to handle their expanded managerial and technical responsibilities has also been carried out. Positive results of this administrative and technical training are demonstrated by the utilization of the drying/storage centers at near or above designed capacity.

As a summary measure of the project's performance, a series of rate of return analyses have been prepared. The analysis for the total project, shown in Exhibit IV.D-2, indicates a return of approximately 13.6 percent. Since the Georgetown milled rice storage facility and the Somerset-Berks drying/storage center have not been operational for a period of sufficient duration to add substantially to the stream of project benefits, the return is somewhat lower than would otherwise be expected. An approximation of the rate which would be generated if these two facilities had been producing a regular stream of benefits is given in the analysis shown in Exhibit IV.D-3. In this analysis, the Georgetown and Somerset-Berks investments have been deducted, thus giving an improved return of 17.4 percent.

If the five fully operating drying/storage centers are considered separately, as indicated in Exhibit IV.D-4, the rate of return is

reduced to 6.9 percent. This lower figure reflects the high energy costs incurred by these centers and the effect of the Guyanese administered price structure which tends to shift benefits to farmers and the distribution sector of the rice industry. Finally, an economic rate of return has been generated for the project, as shown in Exhibit IV.D-5. The rate of 18.6 percent is an overall indication of the national benefits derived from the project including the incremental gain attributable to increased exports.

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B. Rice Industry Constraints in 1967

Since the late 1940's, rice production in Guyana has exceeded local demand, creating an industry heavily dependent on export sales for the disposal of its product. Increasing export demand in the early 1960's, supported in large part by Guyana's access to the Cuban rice market, encouraged the expansion of paddy production. This expansion was accomplished by an increase in the size of the spring crop. Yields, on the other hand, remained practically stagnant as a result of structural and technological deficiencies in the industry. By the mid-1960's the need was apparent for more carefully controlled water conditions, use of improved seed varieties, and large-scale investment in machinery, fertilizers, pesticides, and other capital intensive inputs if high paddy yields were ever to be achieved.

The low level of capital investment in the industry also produced major difficulties in the processing and storage aspects of the business. Of particular importance was the lack of adequate storage facilities to properly store harvested paddy. As a result, the milling of paddy into rice as quickly as possible became the practice. Milled rice, however, deteriorates more rapidly in storage than paddy and creates a dependence on rapid marketing to obtain maximum value. Any bottleneck in the marketing system soon produced a situation in which deteriorating rice earned a progressively lower return when sold on the export market. Thus, the inadequate storage capacity helped to create a processing technique detrimental to Guyana's best interest in the international rice trade.

Furthermore, the bonds which did exist were poorly equipped to prevent after-harvest losses. Losses resulted from inadequate protection from moisture, deterioration caused by heat build-up due to lack of proper aeration, damage caused by insects and rodents, and pilferage. An additional difficulty was the lack of mechanical drying capability associated with the storage bonds. This situation meant that paddy drying was entirely dependent on sun power in a tropical environment subject to the possibility of heavy rainfall during the harvest and post-harvest periods.

Constraints and problems were also present in the milling and parboiling sectors of the industry in the mid-1960's. The prevalence of single stage mills prevented an improvement in milling yields. The common practice of utilizing drainage water in the parboiling process produced a low quality product with poor color and a strong odor. These processing constraints created limitations on Guyana's ability to produce large amounts of high quality rice for an increasingly sophisticated international market.

Indicative of Guyana's difficulty in the rice export trade was the collapse of the Cuban market in 1964. The loss of this large export outlet created a number of structural problems in the industry. Despite the decline in external demand for Guyana's rice, the Rice Marketing Board continued to pay the same high prices for rice even though the export boom had passed. These high prices maintained the impetus to high levels of production and soon resulted in a serious oversupply of finished rice. The Marketing Board was unable to sell

this surplus of inadequately stored rice and consequently suffered large financial losses.

The managements of the Rice Marketing Board and the Rice Development Corporation were also faced with other difficulties. Payrolls remained high despite the curtailment of exports. Farmers were penalized by the RMB's system of paying farmers for paddy received only after the sale of the final milled product. The RDC's operation was hampered by unstandardized grading practices and a limited amount of grade testing equipment. Lack of facilities to develop a source of pure-line foundation seed placed limitations on the ability to provide a product of uniform type and quality.

In spite of these problems, the rice industry remained one of the largest employers of labor in the Guyanese economy of the mid-1960's and an important source of foreign exchange. The need for an infusion of capital to make necessary improvements had become apparent, particularly after the loss of the Cuban market. This background forms the setting in which groundwork was laid for the first U.S.-supported Rice Modernization Project.

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C. Benefits Described

1. Non-quantifiable Benefits

Much of the available information on changes in social amenities and structure is based on brief and limited surveys for special purposes and 1970 census data. Speculative opinion on non-quantifiable changes involving the First Rice Modernization Project starting in 1970 is of course possible, but sound comparative analysis needs to wait for the 1980 census results.

2. Quantifiable Benefits

Employment

The project has added roughly a million Guyana dollars to annual direct labor payrolls and off-farm employment. Average weekly earnings from the Quarterly Statistical Digest extrapolate to G\$3,000 per year in 1977 for manufacturing labor in food and associated industries. Thus, annual employment has been raised by some 330 direct job positions. This figure does not include changes in farm and distribution sector employment.

Paddy Farmer Income

Rice farmer income has improved as a result of rapid adoption of improved high-yielding varieties for which a premium price is paid in both current and real terms. For example, production of approved varieties increased from a few thousand bags in 1970 to over four million in 1977. As a percentage of production, the improved varieties rose from near zero to 80 percent over the same period. At the same

time, the premium price paid for them rose in real terms from a base of one Guyana dollar in 1972 to 2.66 Guyana dollars in 1977. Actual income to a given farmer depends of course on the individual farm size and the production achieved, which overall has increased at a rate three times as fast as the population.

Private Miller Income

The number of operating rice mills has declined from 208 in 1967 to 141 in 1977. The attrition has taken place in inefficient single-stage mills, which declined from 135 to 61 during the same period. Conversely, multi-stage mills increased from 73 to 80. Income to the private millers who have survived the attrition has undoubtedly increased. Those who have shut down their mills have lost this portion of their former incomes. The loss was made up by concentrating on raising approved rice varieties, in other forms of employment, or was absorbed. This phenomenon is one of the inescapable costs of technological modernization.

GRB Net Surplus

The GRB net surplus is a matter of definition. Operating surpluses, that is, rice sales less cost of rice sold and all expenses, have been generated every year since 1973. Grants and aids to the rice sector have been disbursed from these surpluses and give the so-called net surplus, which is an addition or deduction to reserves for bad years.

EXHIBIT IV.C-1

GRB NET SURPLUS POSITION

<u>Year Ending 30 Sep.</u>	<u>Sales Income</u>	<u>Operating Surplus</u>	<u>Grants and Aids</u>	<u>Additions or Deductions to Reserve</u>
1973	28,909	3,811	3,334	477
1974	47,152	16,329	9,462	6,867
1975	88,934	26,897	20,305	6,592
1976	92,173	18,387	11,228	7,159
1977	89,656	12,954	14,225	(1,271)

Clearly, the GRI operates as a financially viable unit. It is the independent policy affecting Grants and Aids that determines the so-called net surplus. It is not unlike corporate policy that leads to paying dividends out of reserves.

Handling Rate Costs

The drying/storage centers in operation over the past three years, including one poor and one good crop year, have been operated at an average intake to capacity ratio of 1.44 (total throughput), the large second crop in each year gives a higher ratio exceeding a 2.0 level. Average total operating costs of the five facilities with a three-year intake record compare favorably with those in the United States. The comparative average costs are 113 US cents per bag in Guyana and 123 cents per bag in the United States.

Paddy Production, Storage, and Flows

Paddy production and annual yields have increased as better rice varieties have been introduced that respond well when second cropped in

areas with fair to good drainage and irrigation works. Average arable acres in rice cultivation as measured by the largest seasonal crop harvested have been in a flat trend since 1970. At the same time, annual yield and production data give a compounded growth rate of about seven percent over the period. In comparison, export shipments have been growing annually at the much slower rate of 1.4 percent. The slower rate reflects a rapid increase in domestic consumption, growing since 1970 at an annual rate of 9.3 percent. This consumer appreciation of rice in food budgets is a reflection of bargain prices in the local market where rice has been selling over the past four years at 37 percent below its purchase cost by the GRB.^{1/} Meanwhile, the export price to the CARICOM group has remained high and other supplier nations have been penetrating this traditional Guyanese market.

^{1/} On 1 January 1978, the subsidy on domestic rice sales was removed by the Government of Guyana. Local sales prices are now roughly equal to purchase costs.

D. Rates of Return

1. Methodology

The rate of return computation requires the following types of summarized data: capital inputs including fixed assets and working capital, recipient benefits, project revenues, and operating expenses. In the formulation shown in Exhibits IV.D-2 through IV.D-4, the basic data has been arranged as follows:

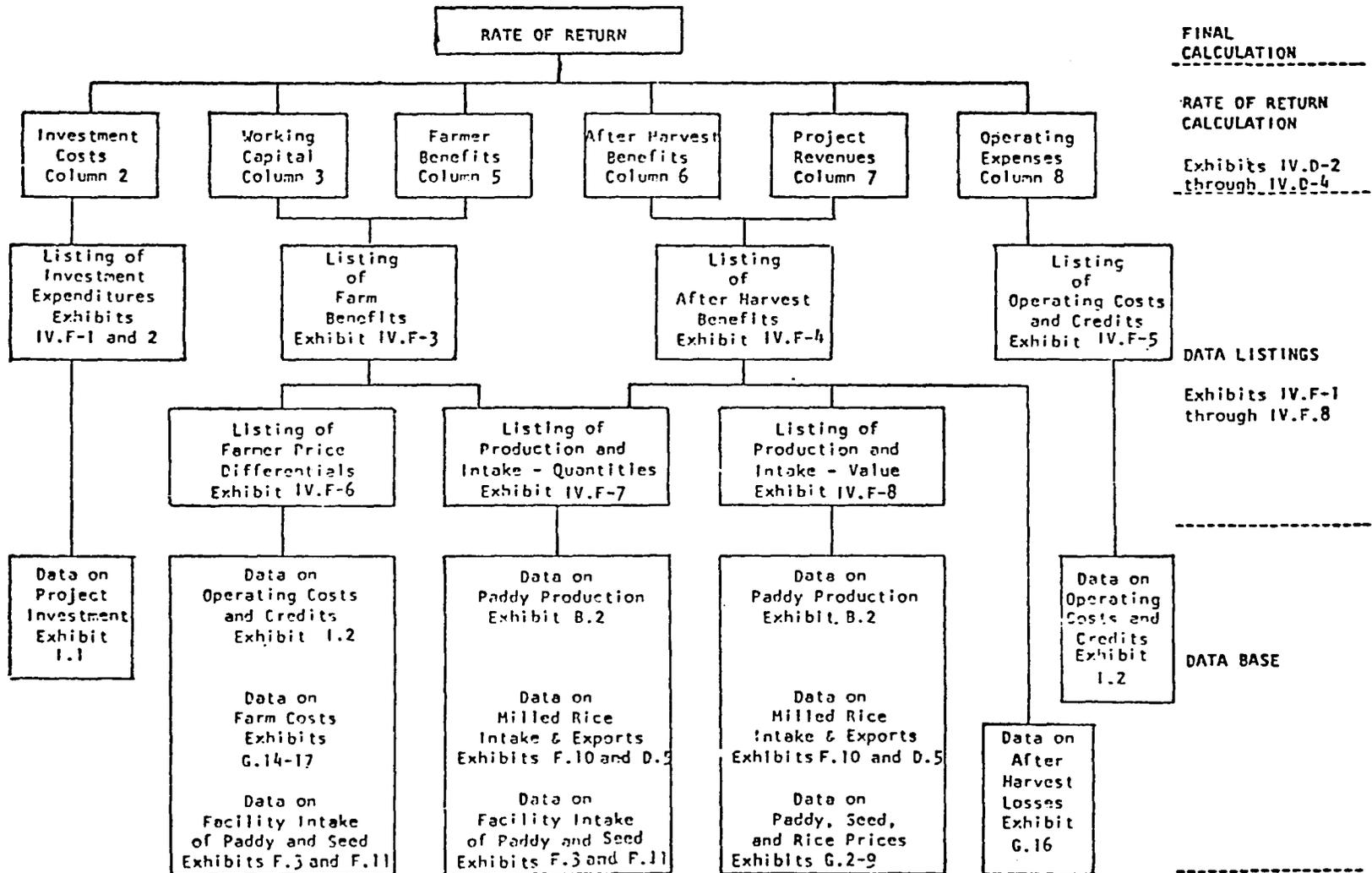
Fixed Assets + Working Capital = Total Investment
(Column 3) (4) (5)

Farmer + After Harvest + Project - Operating = Net Operating
Benefits + Benefits + Revenues - Expenses = Outputs
(Column 6) (7) (8) (9) (10)

The flow chart on the following page provides a graphic description of the derivation of the numerical information contained in these columns.

Exhibits IV.D-2 through IV.D-4 display data for the first 12 years of the life of the project through 1981. After the year 1980, capital inputs cease while operating inputs and outputs continue as listed in 1981 through the complete cycle of 30 years used to calculate the rate of return. The 30th year is shown to indicate the values obtained at the end of the 30 year cycle, while the 31st year is displayed to indicate the residual value of the project. Although the entire listing is not shown in the exhibit, data for the full period is generated and utilized to perform the machine calculated analysis.

EXHIBIT IV.D-1



IV.18

With the full set of data for total investment and net outputs generated, it is possible to calculate the rate of return by means of mini-computer programming techniques. An initial estimate of the rate of return is determined producing an associated set of present value factors which are values of total investment and net outputs. These preliminary results are then refined through machine calculation until the present values of the total investment and net outputs are equated. The final set of present value factors, the present value of the total investment, and the present value of the net outputs are shown in the three right hand columns in Exhibits IV.D-2 through IV.D-4. The final rate of return is shown above the main body of data.

Sensitivity of the costs and benefits of the project to various rates of interest is demonstrated in columns 14 through 17. A series of interest rates is shown in column 14 which are utilized to determine, again with the aid of machine calculation, the associated present value of investment (15) and outputs (17). The resultant series of benefit to cost ratios is displayed in column 16.

2. Analysis

Four rates of return analyses have been performed: for the total project, Exhibit IV.D-2; for the project without the Georgetown milled rice and Somerset-Berks facilities, Exhibit IV.D-3; for the five operating drying/storage centers only, Exhibit IV.D-4; and for the economic return to the total project, Exhibit IV.D-5. A brief explanation of format changes required for the economic rate of return analysis precedes Exhibit IV.D-5.

EXHIBIT IV.D-2

TOTAL PROJECT: 1970-77
FIRST GUYANA RICE MODERNIZATION PROJECT

(Return on Total Investment: 13.5758 Percent)

Year (1)	Period (2)	Capital Inputs (1000 US\$)			Operations (1000 G\$)			Operating Input Expenses ^{1/} (9)	Net Operating Outputs (10)	Present Value Factor (11)	Present Value	
		Fixed Assets (3)	Working Capital (4)	Total (5)	Operating Outputs						Total Capital (12)	Net Outputs (13)
					Farmer Benefits (6)	After Harvest Benefits (7)	Revenue & Credits (8)					
1970	0	2614	10	2624	10	0.	0.	0.	10	1.0009	2624	10
1971	1	6162	19	6181	0.	0.	15	14	31	.8805	5442	27
1972	2	9420	127	9547	161	0.	84	79	166	.7752	7101	129
1973	3	4356	414	4770	503	213	634	488	862	.6826	3256	588
1974	4	2407	2438	4845	2939	464	1125	730	3798	.6010	2912	2283
1975	5	3897	2537	6434	3343	2149	1771	1824	5439	.5291	3405	2678
1976	6	5680	-356	5324	2953	1941	1783	2078	4599	.4659	2480	2142
1977	7	3093	2307	5400	4650	2493	2221	2574	6790	.4102	2215	2785
1978	8	214	0.	214	4650	2493	2221	2574	6790	.3612	77	2452
1979	9	0	0.	0.	4650	2493	2221	2574	6790	.3180	0	2159
1980	10	2063 ^{2/}	0.	2063	4650	2493	2221	2574	6790	.2800	578	1901
1981	11	0.	0.	0.	4650	2493	2221	2574	6790	.2465	0.	1674
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2000	30	0. ^{3/}	0.	0.	4650	2493	2221	2574	6790	.0249	0.	168
2001	31	-5031 ^{2/}	-7496 ^{3/}	-12527	0.	0.	0.	0.	0.	.0219	-275	0.
Total		34875	0.	34875	121539	64599	58716	66989	177865		30114	30114

Interest Percent (14)	Present Value Capital (15)	Benefit /Cost Ratio (16)	Present Value Outputs (17)
5.00	36641	2.19	
10.00	32975	1.32	80097
15.00	29045	.91	43438
20.00	25708	.68	26377
			17406

IV.20

Source: As shown in Exhibit IV.D-1.

- Notes: ^{1/} Excludes depreciation, interest and taxes.
^{2/} Assumes retentions to be paid in order to more fully reflect cost of installing project facilities.
^{3/} Residual value in 31st period.

EXHIBIT IV.D-3

**LIMITED PROJECT: EXCLUDES SOMERSET/BERKS AND GEORGETOWN SITES
FIRST GUYANA RICE MODERNIZATION PROJECT**

(Return on Limited Investment: 17.401 Percent)

Year (1)	Capital Inputs (1000 G\$)				Operations (1,000 G\$)			Operating Input Expenses ^{1/} (9)	Net Operating Outputs ¹⁰ (10)	Present Value Factor (11)	Present Value	
	Calculation Period (2)	Fixed Assets (3)	Working Capital (4)	Total (5)	Farmer Benefits (6)	After Harvest Benefits (7)	Revenue & Credits (8)				Total Capital (12)	Net Output (13)
1970	0	2486	10	2496	10	0.	0.	0.	10	1.0000	2496	10
71	1	5597	19	5616	30	0.	15	14	31	.8518	4784	26
72	2	8508	127	8635	161	0.	84	79	166	.7255	6265	120
73	3	2816	414	3230	503	213	634	488	862	.6180	1996	533
74	4	1855	2438	4293	2939	464	1125	730	3798	.5264	2260	1999
75	5	1796	2537	4333	3343	2149	1771	1824	5439	.4484	1943	2439
76	6	1677	-356	1321	2953	1941	1783	2078	4599	.3819	505	1756
77	7	541	2307	2848	4650	2493	2221	2574	6790	.3253	927	2209
78	8	43	0.	43	4650	2493	2221	2574	6790	.2771	12	1882
79	9	0. ^{2/}	0.	0.	4650	2493	2221	2574	6790	.2360	0.	1603
1980	10	1577 ^{2/}	0.	1577	4650	2493	2221	2574	6790	.2010	317	1365
81	11	0.	0.	0.	4650	2493	2221	2574	6790	.1712	0.	1163
..
..
..
2000	30	0. ^{2/}	0.	0.	4650	2493	2221	2574	6790	.0095	0.	65
2001	31	-3391 ^{2/}	-7496	-10887	0.	0.	0.	0.	0.	.0081	-89	0.
Total		23505	0.	23505	121539	64599	58716	66989	177865		21414	21414

Interest Percent (14)	Present Value of Capital (15)	Benefit / Cost Ratio (16)	Present Value of Outputs (17)
5.00	26882	2.98	80097
10.00	24998	1.74	43438
15.00	22523	1.17	26377
20.00	20309	.86	17406

IV.21

Source: As shown in Exhibit IV.D-1.

- Notes: 1/ Excludes depreciation, interest, and taxes.
 2/ Assumes retentions to be paid in order to more fully reflect cost of installing project facilities.
 3/ Residual value in 31st period.

EXHIBIT IV.D-4

**FIVE DRYING/STORAGE CENTERS
FIRST GUYANA RICE MODERNIZATION PROJECT**

(Return on Five-Center Investment: 6.911 Percent)

Year (1)	Calculation Period (2)	Capital Inputs (1000 G\$)			Operations (1000 G\$)			Operating Input Expenses (9)	Net Operating Outputs (10)	Present Value Factor (11)	Present Value	
		Fixed Assets (3)	Working Capital (4)	Total (5)	Farmer Benefits (6)	After Harvest Benefits (7)	Revenue & Credits (8)				Total Capital (12)	Net Outputs (13)
1970	0	2037	0.	2037	0.	0.	0.	0.	0.	1.0000	2037	0.
71	1	5342	0	5342	0.	0.	0.	0.	0.	.9354	4997	0.
72	2	8268	0.	8268	0.	0.	0.	0.	0.	.8749	7234	0.
73	3	2269	0.	2269	0.	213	357	225	345	.8184	1857	282
74	4	852	493	1345	0.	464	737	363	838	.7655	1030	642
75	5	958	1325	2293	0.	2149	1373	1449	2073	.7160	1642	1484
76	6	565	-345	220	0.	1941	1496	1709	1728	.6697	147	1157
77	7	29	354	383	0.	2493	1766	2177	2082	.6264	240	1304
78	8	39	0.	39	0.	2493	1766	2177	2082	.5859	23	1220
79	9	0.	0.	0.	0.	2493	1766	2177	2082	.5481	0.	1141
1980	10	1577 ^{2/}	0.	1577	0.	2493	1766	2177	2082	.5126	808	1067
81	11	0.	0.	0.	0.	2493	1766	2177	2082	.4795	0.	998
.
.
.
2000	30	0.	0.	0.	0.	2493	1766	2177	2082	.1440	0.	300
2001	31	-2767 ^{3/}	-1827	-4594	0.	0.	0.	0.	0.	.1347	-619	0.
Total		19179	0.	19179	0.	64599	46347	55994	54952		19400	19400

Interest Percent (14)	Present Value of Capital (15)	Benefit /Cost Ratio (16)	Present Value of Outputs (17)
5.00	19855	1.25	24857
10.00	18457	.73	13534
15.00	16907	.49	8243
20.00	15539	.35	5449

IV.22

Source: As shown in Exhibit IV.D-1.

- Notes: 1/ Excludes depreciation, interest, and taxes.
 2/ Assumes retentions to be paid in order to more fully reflect cost of installing project facilities.
 3/ Residual value in 31st period.

3. The Economic Rate of Return

The economic rate of return computation, Exhibit IV.D-5, follows the methodology established for the preceding rate of return analyses. However, a set of data inputs is required which differs in some respects from the set used in the foregoing computations. In cases where a new data formulation has been employed, an explanation of its derivation follows:

Inputs:

- Column 3 - Total Capital Inputs: fixed assets plus working capital as shown in columns 3 and 4, Exhibit IV.D-2.
- Column 4 - Direct Labor: basic data from column 3, Exhibit IV.F-1, times the accounting price adjustment factor of -.3 (negative three-tenths).
- Column 5 - Foreign Exchange: basic data from column 4, Exhibit IV.F-1, times the appropriate accounting price factor (Data Base Exhibit A.11) minus 1.
- Column 6 - Adjusted Capital Inputs: column 3 + 4 + 5 as shown in Exhibit IV.D-5.

Outputs:

- Column 7 - Net Operating Outputs: as shown in column 10, Exhibit IV.D-2.

Column 8 - Direct Labor: basic data from column 7, Exhibit IV.F-5, times the accounting price adjustment factor .3 (three-tenths).

Column 9 - Foreign Exchange Expense: basic data from column 8, Exhibit IV.F-5, times 1 minus the accounting price factor for the year (see Data Base Exhibit A.11).

Column 10 - Project Portion Foreign Exchange Earnings: developed as shown in Exhibit IV.D-6.

With the data generated, as summarized in Exhibit IV.D-5, the computation then proceeds in the same manner as described earlier for the other rates of return.

EXHIBIT IV.D-5

ECONOMIC RATE OF RETURN
FIRST GUYANA RICE MODERNIZATION PROJECT

(Rate of Return on Investment: 18.609 Percent)

Year (1)	Calculation Period (2)	Total Capital Inputs (3)	Accounting Price Adjustments		Adjusted Capital Inputs (6)	Net Operating Outputs (7)	Accounting Price Adjustments		Project Portion of F-X Earnings (10)	Adjusted Net Oper. Outputs (11)	Present Value Factor (12)	Present Value	
			Direct Labor (.70-1.00) (4)	Foreign Exchange (r-1.00) (5)			Direct Labor (1.00-.70) (8)	Foreign-X Expense (1.00-r) (9)				Total Capital (13)	Net Outputs (14)
1970	0	2524	-237	0.	2387	10	0.	0.	0.	10	1.0000	2387	10
71	1	6181	-135	404	6450	31	2	0.	0.	33	.8431	5438	28
72	2	9547	-267	558	9838	166	13	0.	0.	179	.7108	6993	127
73	3	4770	-90	693	5373	862	64	-16	608	1518	.5993	3220	910
74	4	4845	-114	264	4995	3798	93	-27	1093	4957	.5053	2524	2505
75	5	6434	-180	334	6588	5439	167	-94	3890	9402	.4260	2806	4005
76	6	5324	-135	685	5874	4599	206	-90	3056	7771	.3591	2110	2791
77	7	5400	-121	385	5664	6790	243	-165	2251	9119	.3028	1715	2761
78	8	214	-11	26	229	6790	243	-165	2251	9119	.2553	59	2328
79	9	0. 2/	0.	0.	0.	6790	243	-165	2251	9119	.2152	0.	1953
1980	10	2063 2/	0.	526	2589	6790	243	-165	2251	9119	.1815	470	1655
81	11	0.	0.	0.	0.	6790	243	-165	2251	9119	.1530	0.	1395
.
.
2000	30	0. 2/	0.	0.	0.	6790	243	-165	2251	9119	.0071	0.	65
2001	31	-12527 2/	0.	-489	-13016	0.	0.	0.	0.	0.	.0060	-79	0.
Total		34875	-1290	3386	36971	177865	6377	-4187	62671	242726		27635	27635

Interest Percent: (15)	Present Value of Capital (16)	Benefit /Cost Ratio (17)	Present Value of Outputs (18)
5.00	38507	2.87	110545
10.00	34502	1.76	60664
20.00	26724	.93	24851
30.00	21469	.61	12992

Source: As shown in Exhibit IV.D-1 as modified in Ch. IV, section IV.D.3.

- Notes: 1/ Adjusted by accounting prices.
 2/ Assumes retentions to be paid in order to more fully reflect cost of installing project facilities.
 3/ Residual value in 31st period.

EXHIBIT IV.D-6

PROJECT PORTION OF FOREIGN EXCHANGE EARNINGS
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Year</u> <u>Ending</u> <u>30 Sep.</u>	<u>Project</u> <u>Intake</u> <u>Approved</u> <u>Varieties</u> <u>1000 Bags</u>	<u>One Grade</u> <u>Price</u> <u>Difference</u> <u>G\$</u>	<u>Benefit</u> <u>Average</u> <u>Value of</u> <u>One Grade</u> <u>1000 G\$</u>	<u>Value of</u> <u>Approved</u> <u>Varieties</u> <u>Intake</u> <u>1000 G\$</u>	<u>Benefit</u> <u>6% of</u> <u>Intake</u> <u>Value</u> <u>1000 G\$</u>	<u>Value of</u> <u>Total</u> <u>Paddy</u> <u>Intake</u> <u>1000 G\$</u>	<u>Ratio of</u> <u>Benefits</u> <u>of Total</u> <u>Value</u>	<u>GRB Killed</u> <u>Rice Intake</u> <u>1000 Bags</u>	<u>GRB Milled</u> <u>Rice Exports</u> <u>1000 Bags</u>	<u>Ratio of</u> <u>Exports</u> <u>to Intake</u>	<u>Percent of</u> <u>Benefits</u> <u>In Exports</u>	<u>F-X Value</u> <u>of Export</u> <u>Sales</u> <u>1000 G\$</u>	<u>Project</u> <u>Portion of</u> <u>F-X Earnings</u> <u>1000 G\$</u>	<u>F-X Earnings</u> <u>Adjusted</u> <u>for</u> <u>Accounting</u> <u>Prices</u> <u>1000 G\$</u>
1970	0.	n.a.	0.	0.	0.	0.	0.	n.a.	n.a.	n.a.	n.a.	0.	0.	
1971	0.	n.a.	0.	0.	0.	0.	0.	n.a.	n.a.	n.a.	n.a.	0.	0.	
1972	0.	n.a.	0.	0.	0.	0.	0.	n.a.	n.a.	n.a.	n.a.	0.	0.	
1973	187.8	.75	140.9	1208.3	72.5	5176.8	.0413	932.5	662.8	.71	2.94	25007	735	609
1974	268.1	1.125	301.6	2706.8	162.4	8356.4	.0555	1181.8	580.4	.49	2.73	19025	1338	1093
1975	861.7	1.50	1292.6	14270.2	856.2	27633.4	.0778	1322.9	913.1	.69	5.37	84838	4556	3690
1976	777.3	1.50	1166.0	12912.1	774.7	26673.3	.0728	1433.1	949.6	.66	4.82	73594	3547	3056
1977	995.9	1.50	1493.9	16664.4	999.8	28672.6	.0870	1755.5	825.9	.47	4.03	66812	2733	2251

Sources: Data Base Exhibits D.5, F.3, F.10, G.2-9, and G.16.

Note: n.a. = not applicable

E. Project Description

The 1967 project focused on two aspects of the Guyana rice industry. One, the need to improve exportable rice varieties and grades to meet the growing competition in its traditional markets by other rice producing nations. Two, the need to modernize handling and processing facilities in order to maintain paddy quality and reduce the after-harvest losses being experienced. These objectives were supported by nineteen prior technical reports covering the years 1952 to 1967 and culminating in a coastal agricultural research station study by Louisiana State University, a management study by Maynard Associates, and the Rhodes-Checchi project feasibility study.

On November 27, 1968, the Agency for International Development initiated the first rice modernization project by authorizing a Loan (no. 540-L-008) to the Government of Guyana in the amount of \$12.9 (million US). The GOG was to contribute the equivalent of \$4.6 (million US) to bring the total estimated project cost to \$17.5 (million US). The Loan and GOG expenditures on the project through March 31, 1978, are \$12.47 and 5.56 (million US) respectively.

The broad socio-economic objectives of the project were defined as: (a) to continue the growth rate of seven percent in gross domestic product, (b) to increase the income of rice farmers, (c) to enable the rice industry to compete effectively in traditional and new markets, and (d) to increase by one percent annually the export earnings attributable to rice.

- Undertakings by the terms of the Loan Agreement, as amended, included the development of:
- a. a 600-acre rice research station
 - b. a pure-line seed storage unit at MARDS
 - c. six paddy receiving, drying, storage, and loading centers with a total storage capacity of 51,200 metric tons or one-fifth of annual production
 - d. improvement of paddy transport with 50 special bulk paddy wagons
 - e. additional facilities in Georgetown for receiving and transferring milled rice with a capacity of 8,500 metric tons
 - f. upgrading of government owned milling facilities
 - g. technical assistance
 - (1) six persons to be trained in rice research techniques for six months each
 - (2) storage center construction contractor to train operating personnel for twelve months at each site
 - (3) a 24-month contract to assist Guyana Rice Board personnel in all phases of managerial and operating functions
 - h. the consolidation of the management and operations of the Guyana Rice Marketing Board and the Guyana Rice Development Corporation.

In conjunction with these specific Loan activities, the GOG undertook to increase the pace of water control and settlement improvements in the Tapakuma area west of the Essequibo River, in the Black Bush

Polder area east of the Berbice River, as well as along other sections of the coastal belt.

Conditions precedent to disbursement from the Loan were met in late 1970 and expenditures commenced at that time. The last major payout occurred in late 1977. Four engineering firms, including Nance Engineering Company, Mitchell, Weitz-Hettlesater, and Black and Veatch International, were engaged at various times to review engineering recommendations, and design and supervise the construction of the six drying/storage centers as well as the milled rice facility at Georgetown. Total costs of these engineering services rose from an original estimate of \$360,000 (US) to \$2.17 (million US) including the local currency equivalent of \$372,000 (US) (see Exhibit IV.E-1 on the following page).

On March 19, 1970, the initial turnkey construction contract was signed with Pemar International, Inc. of Florida. The contractor substantially completed work on four drying/storage centers (Anna Regina, Wakenaam, Ruimzicht, and MARDS-Burma), and purchased substantial amounts of equipment and materials for the remaining two center sites. Materials for 50 bulk paddy wagons were also supplied and training of personnel in the operation of the centers undertaken. Following the termination of Pemar's services, the Guyana Rice Board was approved by AID to proceed by force account with construction of the remaining two centers at Black Bush Polder and Somerset-Berks. The GRB was also authorized to construct a milled rice storage facility at Georgetown in place of the originally planned bulk storage units at the Anna Regina and MARDS-Burma centers. Descriptions of each of the major Project Components begin on page IV.31.

EXHIBIT IV.E-1

SUMMARY OF ESTIMATED PROJECT COSTS AND ACCRUED EXPENDITURES: 3/31/78
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Project Elements</u>	<u>First Year Operated</u>	<u>Original Estimates</u>			<u>Accrued Expenditures</u>		
		<u>Loan</u>	<u>GRB</u>	<u>Total</u>	<u>Loan</u>	<u>GRB</u>	<u>Total</u>
				(In US dollars)			
Rice Research Station	1974	565,000	470,000	1,035,000	804,857	709,860	1,514,717
Drying/Storage Centers:							
1. Anna Regina	1973	n.a.	n.a.	n.a.	1,479,930	604,656	2,084,586
2. Somerset/Berks	1977	n.a.	n.a.	n.a.	1,433,175	719,845	2,153,020
3. Wakenaam	1974	n.a.	n.a.	n.a.	832,831	363,730	1,196,561
4. Ruimzigt	1974	n.a.	n.a.	n.a.	1,388,227	458,040	1,846,267
5. HARDS-Burma	1972	n.a.	n.a.	n.a.	1,832,944	654,918	2,487,862
6. Black Bush Polder	1975	n.a.	n.a.	n.a.	799,042	670,476	1,469,518
Subtotal		9,812,000	3,018,000	12,830,000	7,766,149	3,471,665	11,237,814
Milled Rice Facilities	1978	-	450,000	450,000	1,873,367	1,139,779	3,013,146
Tech. & Mgt. Assistance	1977	550,000	144,000	694,000	169,156	40,276	209,432
Engineering Services	1977	285,000	75,000	360,000	1,801,342	371,656	2,172,998
Paddy Wagons	1976	500,000	5,000	505,000	220,007	185	220,192
Contingencies		1,188,000	438,000	1,626,000	-	-	-
Unallocated		-	-	-	797,625	-	797,625
Retentions		-	-	-	(960,210)	(59,690)	(1,019,900)
Total		12,900,000	4,600,000	17,500,000	12,472,293	5,673,731	18,146,024

Source: Data Base Exhibit I.1 and original estimates from 1968 Capital Assistance Paper.

1. Rice Research Station

Guyana rice industry studies, conducted prior to the Rice I project, clearly established the need for new, high-quality, high-yield, pure-line rice varieties. In order to develop responsive varieties under Guyana conditions, a continuing rice research program was recommended along with a Tropical Agricultural Research Station. A MARDS-Burma location, where 600 acres were available, was selected rather than trying to expand the closely confined Ministry of Agriculture station at Mon Repos. In addition to developing new varieties, the new station was expected to disseminate knowledge of improved farming practices gained while multiplying seed from the research activities. Guyana's existing extension service would then be expanded to introduce rice farmers to the better seeds and husbandry techniques.

The total Project cost of facilities at the Rice Research Station amounted to US \$1.56 (million). The annual operating expenses are averaging US \$155,400 with payrolls for staff amounting to US \$79,000.

Descriptive material related to the successful history of the new variety development program is provided in Chapter III, Section A. At present, some 75 to 80 percent of all paddy grown in Guyana is produced from the new high-yielding varieties developed at the Rice Research Station.

The benefits to farmers from the cultivation of the new varieties are very real. These benefits accrue primarily from the price differential between the new higher-yielding varieties and the traditional lower-quality varieties. This difference has been quantified in Data Base Exhibit F.3 and is summarized in Exhibit III.E-2.

In 1975, the average price differential between new and traditional paddy received at the GRB drying and storage centers stood at G\$3.60 per bag. Incremental costs of production for the new varieties have been estimated at G\$0.13 (see Data Base Exhibit G.23). Paddy grown from new variety seed taken in at the GRB facilities alone, in 1975, amounted to over 758,000 bags, producing additional income to farmers of some G\$2,380,000 (at a net rate of G\$3.14 per bag).

While costs of production since 1975 have escalated, so has the volume of paddy produced from the improved varieties. From roughly one-third of total production in 1972, the improved varieties now constitute some three-fourths of all paddy produced in Guyana. This increase has been fostered, not only by price incentives, but also by the high-yield characteristics of the new grains which, in the presence of improved husbandry and water control, have produced yield increases averaging between seven and eight percent annually since 1971.

2. Drying/Storage Centers

The six drying/storage centers that were built as part of the Rice I Project are sited four to the northwest of Georgetown and two to the southeast (see Map 8). The four westerly centers are as follows:

- Somerset/Berks -- located on the Essequibo west coast about 48 airline miles from the Georgetown rice storage terminal (see Data Base Exhibit E.16).
- Anna Regina -- located on the Essequibo coast about ten airline miles east of Somerset/Berks and 38 airline miles from Georgetown.
- Wakenaam -- situated on the west shore of Wakenaam Island in the Essequibo River estuary and about 23 airline miles from Georgetown.

- Ruimzicht -- sited in the West Demerara Region between the Essequibo and Demerara Rivers about five air line miles west of Georgetown.

The two easterly centers are:

- MARDS/Burma -- located in the eastern section of the East Demerara Region between the Mahaicony and Abary Rivers, about 40 airlines miles from the Georgetown rice storage terminal.
- Black Bush Polder -- situated in the East Berbice Region and inland to the south of the frontlands along the coast, about 80 airline miles from Georgetown.

Investment and Capacity

The investment in the above facilities, including engineering costs, is US \$8,159,145 plus Guyana dollar expenditures of G\$9,202,948 for a total in equivalent US dollars of US \$11,939,083 (see Data Base Exhibit I.1). The GRB contribution invested in the facilities thus comes to 32 percent. The storage capacity of these facilities is 52,073 metric tons of commercial paddy and 2,032 metric tons of seed, for a total of 852,000 bags of 140 lbs. each, as shown in Exhibit III.B-2. The seed storage is located at the MARDS/Burma site. The average investment cost per bag of storage capacity is US \$14.01.

The investment, capacity and unit storage costs for each of the six facilities identified above are as follows:

EXHIBIT IV.E-2

RICE I DRYING AND STORAGE FACILITIES

INVESTMENT PER UNIT OF CAPACITY

<u>Facility</u>	<u>Investment Cost US\$</u>	<u>Storage Capacity (bags)</u>	<u>Investment Cost US\$ (bag)</u>
Somerset/Berks	2,729,098	140,000	19.49
Anna Regina	2,243,857	160,000	14.02
Wakenaam	1,397,955	80,000	17.47
Ruimzicht	2,084,115	160,000	13.03
MARDS/Burma	2,664,702	192,000 ^{a/}	13.88
Black Bush Polder	<u>1,955,744</u>	<u>120,000</u>	<u>16.30</u>
TOTAL	11,939,083	852,000	14.01

Source: Data Base Exhibit i.1 and Exhibit III.B-2.

^{a/} Includes seed storage of 32,000 bags.

Anna Regina, Ruimzicht and MARDS/Burma facilities have similar investment costs per bag of storage capacity. Ruimzicht's close proximity to Georgetown appears to have effected marginally lower costs. On the other hand, the Wakenaam and Black Bush Polder facilities illustrate how quickly unit costs rise as capacity diminishes. Somerset is a special case of adverse factors: (1) the facility was not completed until late in 1977 and, consequently, suffered most from price inflation; (2) in order to economize, foundation pilings were not used and the vertical silo alignment shifted enough to require re-design and major repairs to the conveyor lines; (3) the facility was constructed under force account, a consistently high cost procedure, after the preceding building contracts with the outside contractor were terminated; and (4) four of the 32 silos were not erected even though the foundation pads had been poured.

Operating Intake and Costs

Three years of operating accounts, from 1974/75 through 1976/77 crop seasons, are summarized below. The basic data is found in Data Base Exhibit 1.2. Start-up periods are not included because they distort unit costs due to relatively small paddy intake quantities. The Somerset/Berks facility is also excluded because operations did not start until late in 1977. The other five facilities processed over three million bags (195,150 metric tons) of paddy at an operating expenditure of G\$5.3 million (US dollar equivalent at 1:2.55 = US \$2.1 million). The expenditure per bag processed is G\$1.74 (US \$0.68). The average utilization ratio over the period is 144 percent. This ratio is less favorable than it at first appears because the importance of double cropping has been increasing. As a result, full utilization of the storage capacity twice a year is practicable and when normal withdrawals during the harvest are taken into account, the utilization ratio may approach a value of 240 percent. At present the level of utilization is being held back by insufficient intake, cleaning and drying flow capacities. Improvements to increase flow rates at the various facilities are proposed in this study and are estimated to cost US \$251,000. It is further estimated that these improvements will lower total unit costs by about US 8 cents per bag annually, so that this added investment will be recovered in two-and-one-half to three years.

The year by-year overall operating results are presented on the next page for the five active facilities.

<u>Year</u>	<u>Intake</u> (bags)	<u>Utilization</u> <u>Ratio</u>	<u>US dollars</u>	
			<u>Investment</u> <u>Cost/Bag</u> (25-yr. life)	<u>Annual</u> <u>Operating</u> <u>Cost/Bag</u>
1974/75	985,159	1.38	.37	.58
1975/76	998,856	1.40	.37	.67
1976/77	1,089,027	1.53	.34	.78
AVERAGE	1,024,347	1.44	.36	.68

Comparable three-year averages for each of the five active facilities appear as follows:

<u>Facility</u> <u>Location</u>	<u>Intake</u> <u>3 yr. avg.</u> (bags)	<u>Utilization</u> <u>Ratio</u>	<u>US dollars</u>	
			<u>Investment</u> <u>Cost/Bag</u> (25-yr. life)	<u>Annual</u> <u>Operating</u> <u>Cost/Bag</u>
Anna Regina	285,324	1.69	.31	.61
Wakenaam	95,849	1.20	.58	1.08
Ruimzicht	91,957	.57	.91	1.11
MARDS/Burma	334,481	1.74	.32	.55
Black Bush Polder	210,069	1.75	.37	.64

The utilization ratio at Ruimzicht is far below that of the other facilities. The rice farmers in the Ruimzicht area have small farms but produce high quality paddy. In order to protect this quality from comingling, they initially resisted the notion of mixing their paddy with that of other farmers and have persisted in this attitude much longer than in other areas. This point of view is changing and preliminary results in 1977/78 are now much better.

<u>Year</u>	<u>Ruimzicht</u> <u>Utilization Ratio</u>
1974/75	.37
1975/76	.59
1976/77	.76
1977/78	1.09

This trend is expected to continue but is not likely to reach levels obtained in other areas where the acreage and production are greater.

U. S. Comparisons

Average investment and operating costs for comparable paddy drying/storage facilities in the Southern United States^{1/} have been adjusted to the basis of 140 lb. bags and updated for inflation and higher fuel costs. The average Guyana results have been adjusted to a 125 percent utilization ratio and operating costs to U. S. dollars at the rate of 1:2.5⁵ in order to achieve comparability.

<u>Location</u>	<u>Intake</u> (bags)	<u>Utilization</u> <u>Ratio</u>	<u>US dollars</u>	
			<u>Investment</u> <u>Cost/Bag</u> (25-yr. life)	<u>Annual</u> <u>Operating</u> <u>Cost/Bag</u>
Guyana	889,190	1.25	.41	.72
Southern United States	889,190	1.25	.32	.91

The Guyana drying/storage facilities have a not unexpected higher unit investment. Earlier planning estimates projected a 20 percent higher figure, which proved, due to contractor/construction problems, to be 28 percent on the basis of the above analysis. Operating costs, on the other hand, are lower in Guyana than in the United States due to lower wage rates even though facilities are highly overstaffed in Guyana, particularly at Wakenaam and Ruimzigt.

^{1/} "Costs of Building and Operating Rice Drying and Storage Facilities in the South," Marketing Research Report No. 1011, United States Department of Agriculture Economic Research Service, September 1973.

EXHIBIT IV.E-3

SCHEDULE OF SUBSIDIARY ACCOUNTS

PADDY DRYING/STORAGE CENTERS
(Location)

<u>Account No.</u>	<u>Class/Function</u>	<u>TOTAL</u>		<u>DETAIL</u>	
		<u>Debit</u>	<u>Credit</u>	<u>Debit</u>	<u>Credit</u>
—	Direct Labor	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Administrative Overhead	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Electricity	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Drier Fuel	—	—		
—	Drying			—	—
—	Repairs to Structures	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Repairs to Equipment	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Depreciation, Structures	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	Depreciation, Equipment	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—
—	1/			—	—
—	Other	—	—		
—	Receiving			—	—
—	Drying			—	—
—	Storage			—	—
—	Loading Out			—	—

1/ This category may, of course, be extended to suit needs as perceived by management.

Facility Management

The preceding analytical results give an indication that the GRB managers of the drying/storage facilities have performed quite well. Further, the gathering of pertinent data during the study indicates that management achieved this success in spite of inconsistent record-keeping at individual facilities and inadequate differentiation in the subsidiary accounts.

Management can benefit from a revision of the "Schedule of Subsidiary Accounts" to reflect both class and function of costs, as illustrated on the opposite page.

3. Georgetown Rice Terminal

The Georgetown rice terminal had a 1967 storage capacity of 31,340 metric tons (MT) of milled rice, divided as follows in bag bond areas:

Receiving bonds	13,180 (MT)
Export bonds	14,750 (MT)
Local sales bond	<u>3,410 (MT)</u>
TOTAL	31,340 (MT)

The Rice I Project replaced 29 percent of the receiving bond capacity with storage silos transferred from proposed storage capacity at the MARDS and Anna Regina drying/storage centers. The net effect was to reduce much needed storage capacity at these two centers by 7,500 MT of paddy. In the process, rice storage capacity at Georgetown was increased by 4,140 MT of milled rice. In addition, the receiving rate at the terminal was increased by providing for bulk delivery of milled rice as well as mechanical handling from receiving pits to bulk storage in the silos.

These improvements were completed early in 1978 at an investment cost of US \$3.3 (million). In the meantime, a fire in August 1977 burned out some 24,000 MT of the bag bond storage capacity, i.e., all of the export area and 71 percent of the original receiving area. The new Rice I receiving facilities helped to alleviate the seriousness of this loss by providing more efficient receiving capacity and mechanical delivery of bulk milled rice to the blending and bagging operations. The bagged output must presently be trucked to a nearby dock facility for actual export shipments.

The Rice II Project proposes to rebuild the bond storage areas and provide additional equipment for more efficient handling of export shipments at an overall cost of US \$2.5 million (see Chapter VII for details). However, analysis of the total transport network in Chapter VI raises long-term questions of overall benefits to be derived from major investments at this site. The technical answers are negative for such investments but larger policy considerations are deemed to be beyond the scope of this study.

4. Other Project Investments

In addition to investments in rice research, drying and storage facilities, and the Georgetown terminal described above, the Rice I Project provided funds in three other categories totalling some US\$890,000, of which an equivalent 27 percent was contributed locally. The conversion to US dollars is calculated on the basis of the prevailing exchange rates in the year the expenditures were recorded (see Data Base Exhibits A.11 and 11 through 1n).

- Transport Equipment

Transport equipment was provided in the form of paddy wagons for bulk transport (US \$356,147) and field vehicles needed for supervisory travel between facility locations (US \$ 39,067). The paddy wagons have been slow in developing their potential but now that the bulk handling facilities are in operation at the Georgetown terminal their utility will become more pronounced. The usefulness of paddy wagons for moving paddy from the fields to drying/storage centers was handicapped by the inadequate rural feeder-roads with dirt surfaces. These roads proved unsafe for bulk carriers when it rains, which occurs on 25 percent of the days during peak harvest periods.

- Office Equipment

Additional office equipment was provided by the Project at a cost of US \$ 22,000, as supplied from local funds.

- Training

Operation of the drying/storage facilities is controlled from a large electrical switchboard with lighted functional indicators. A model of the switchboard with lighted flow lines was provided as a training device for the new operating personnel. The reported training costs totalled US \$148,520. The favorable operating results, to date, are a clear indication that this training expenditure and method was effective.

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F. Data Listings

Description of the Data Listings

Information contained in the data base has been extracted and analyzed to produce a series of seven data listings. The purpose of these listings is to consolidate and arrange the basic data in such a way that it may be utilized to produce the ultimate rate of return result. Three of these data listings are used to feed information to other listings. These underlying listings are: farmer price differentials, Exhibit IV.F-6; production and intake of paddy, seed, and milled rice--by quantity, Exhibit IV.F-7; and production and intake of paddy, seed and milled rice--by value, Exhibit IV.F-8.

Other data listings are: listing of investment expenditures, Exhibits IV.F-1 and IV.F-2; listing of farm benefits, Exhibit IV.F-3; listing of after-harvest benefits, Exhibit IV.F-4; and listing of operating expenses and credits, Exhibit IV.F-5. From these data listings is extracted the information which is displayed on the rate of return analysis sheets Exhibit IV.D-5 and Exhibit IV.D-6.

EXHIBIT IV.F-1

PROJECT INVESTMENT EXPENDITURES
FIRST GUYANA RICE MODERNIZATION PROJECT

Year (1)	Total Investment In Project			Research & Seed Station			Drying/Storage Facilities			
	Total (2)	Direct Labor	Foreign Exchange	Total (5)	Direct Labor	Foreign Exchange	Total Charged (8)	Direct Labor	Foreign Exchange	
		(3)	(4)		(6)	(7)		Charged (10)	Retained (11)	
	(In thousands of Guyana dollars)									
1970	2613.8	788.2	0.	0.	0.	0.	2164.7	671.1	0.	0.
1971	6152.1	488.7	4708.3	134.8	20.2	69.8	5698.1	390.9	4437.2	495.2
1972	9420.0	904.4	6508.5	121.3	9.4	100.9	8696.0	730.6	6336.3	242.7
1973	4355.8	301.2	3355.0	495.7	145.6	0	3624.7	134.2	3191.7	1179.4
1974	2406.7	380.5	1177.6	639.2	160.1	122.7	978.6	113.4	612.9	2.2
1975	3890.7	599.1	1957.7	668.4	151.9	178.5	2509.2	355.5	1330.2	3.2
1976	5679.5	449.1	4230.8	938.8	10.3	905.6	1198.5	222.8	479.9	3.0
1977	3092.5	403.1	1791.9	345.5	16.1	294.5	752.8	159.6	237.9	(6.2)
1978	213.6	35.4	95.2	4.1	.1	3.9	108.1	19.7	44.5	0.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	2063.3 ^{1/}	0.	1920.5	0.	0.	0.	2063.3	0.	1920.5	(1920.5)

Total (12)	Georgetown Facilities		Paddy Wagons		Rice Mill Improvements			Tech. & Maint. Asst.		5-Active Storage Centers (22)
	Direct Labor (13)	Foreign Exchange (14)	Total (15)	Foreign Exchange (16)	Total (17)	Direct Labor (18)	Foreign Exchange (19)	Total (20)	Foreign Exchange (21)	
0.	0.	0.	0.	0.	377.8	117.1	0.	71.3	0.	2037.1
299.6	19.5	146.6	11.5	11.5	58.4	18.1	0.	49.7	43.2	5342.4
484.1	127.5	72.9	(1.6)	(1.6)	119.1	36.9	0.	1.1	0.	8258.4
183.6	6.6	162.4	(.8)	(.8)	47.8	14.8	0.	3.8	1.7	2263.9
425.0	107.0	79.7	362.9	362.3	0.	0.	0.	1.0	0	251.5
553.6	81.7	290.0	77.7	77.7	0.	0.	0.	81.8	81.3	257.8
3368.8	216.0	2671.9	0.	0.	0.	0.	0.	173.4	173.4	555.1
1827.1	227.4	1093.4	0.	0.	127.3	0.	127.3	38.8	38.8	27.8
101.4	16.6	47.8	0.	0.	0.	0.	0.	0.	0.	33.2
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1577.1

Source: Data Base Exhibit I.1.

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EXHIBIT IV.F-2

INVESTMENT EXPENDITURES
FIRST GUYANA RICE MODERNIZATION PROJECT
ACCOUNTING PRICES, US DOLLARS

<u>Year</u>	<u>Engi- neering</u>	<u>Research Station</u>	<u>Anna Regina</u>	<u>Somerset/ Berks</u>	<u>Wakenaam</u>	<u>Ruim- zicht</u>	<u>MARDS- Burma</u>
<u>Loan Expenditures</u>							
1970	-	-	-	-	-	-	-
1971	333,619	3,789	11,261	20,963	16,332	287,092	1,589,587
1972	360,979	50,456	1,378,996	12,714	547,300	875,942	153,671
1973	328,670	-	89,306	804,914	158,895	113,032	89,319
1974	145,979	61,340	367	-	100,332	100,379	367
1975	240,671	89,257	-	441,576	9,972	11,782	-
1976	246,878	452,787	-	95,032	-	-	-
1977	116,023	147,228	-	57,121	-	-	-
1978	28,523	-	-	855	-	-	-
<u>GRB Expenditures</u>							
1970	194,621	-	286,122	25,426	126,399	165,398	247,875
1971	9,941	22,758	126,993	76,028	11,717	75,989	253,349
1972	69,062	5,081	145,237	128,579	191,754	183,408	111,764
1973	(2,579)	183,450	17,134	21,147	32,098	32,387	40,358
1974	41,027	190,111	29,170	12,717	1,762	858	1,572
1975	20,855	164,104	-	175,489	-	-	-
1976	24,301	11,221	-	111,280	-	-	-
1977	12,290	16,805	-	151,559	-	-	-
1978	2,138	-	-	17,620	-	-	-

EXHIBIT IV.F-2 (continued)

<u>Year</u>	<u>Black Bush Polder</u>	<u>Georgetown Facility</u>	<u>Milled Rice Facility</u>	<u>Paddy Wagons</u>	<u>Tech. & Mgt. Assistance</u>	<u>Unal-located</u>	<u>Reten-tions</u>
<u>Loan Expenditures</u>							
1970	-	-	-	-	-	-	-
1971	14,706	3,278	-	-	21,597	238,250	(248,101)
1972	29,341	7,824	-	-	-	184,929	(121,330)
1973	643,495	58,848	-	-	837	123,846	(589,698)
1974	-	-	-	-	-	22,151	(1,091)
1975	39,224	68,478	-	181,171	40,630	60,804	(1,610)
1976	71,571	1,163,894	-	38,836	86,715	116,686	(1,476)
1977	705	488,681	63,665	-	19,377	48,330	3,096
1978	-	18,699	-	-	-	2,629	-
<u>GRB Expenditures</u>							
1970	3,555	-	188,419	-	35,535	-	-
1971	53,504	25,749	26,358	-	2,944	-	-
1972	209,656	162,346	49,407	-	465	-	(62,795)
1973	16,039	2,545	17,662	-	787	-	3,105
1974	62,130	109,323	-	-	350	-	-
1975	203,964	81,979	-	185	195	-	-
1976	112,848	229,381	-	-	-	-	-
1977	8,780	230,491	-	-	-	-	-
1978	-	16,119	-	-	-	-	-

Source: Data Base Exhibits A.11 (Accounting Prices) and I.1 (Capital Expenditures)

EXHIBIT IV.F-3

FARMER BENEFITS FROM GROWING APPROVED RICE VARIETIES
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Year</u>	<u>Qty. Milled Rice From Approved Varieties ,000 Bags</u>	<u>Adjusted Farm Output ,000 Bags</u>	<u>Farmer Net Price Diff. G\$</u>	<u>Farmer Benefits ,000 G\$</u>
1970	11.6	19.33	.49	9.5
71	36.2	60.33	.49	29.6
72	193.4	322.33	.50	161.2
73	301.6	502.6	1.00	502.6
74	488.5	814.17	3.36	2735.6
75	675.4	1125.67	2.97	3343.2
76	726.1	1210.17	2.44	2952.8
77	1003.6	1672.67	2.78	4650.0

Source: Data Base Exhibits F.3, F.11, and G.14 through C.17.

EXHIBIT IV.F-4

GAIN FROM REDUCTION IN AFTER-HARVEST LOSSES
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Year</u>	<u>Project Approved Quantity ,000 Bags</u>	<u>Avg. Yearly Net Price Difference G\$ per Bag</u>	<u>Total Net Price Increase ,000 G\$</u>	<u>Total Approved Value ,000 G\$</u>	<u>6% of Total Value ,000 G\$</u>	<u>Total Gain ,000 G\$</u>
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1970	0	0	0	0	0	0
71	0	0	0	0	0	0
72	0	0	0	0	0	0
73	187.8	.750	140.9	1,208	72.5	213.4
74	268.1	1.125	301.6	2,707	162.4	464.0
75	861.7	1.500	1,292.6	14,270.	856.2	2,148.8
76	777.3	1.500	1,166.0	12,912	774.7	1,940.7
77	995.9	1.500	1,493.9	16,664	999.8	2,443.7

Source: Data Base information as shown in Exhibit IV.D-1.

EXHIBIT IV.F-5

PROJECT REVENUES, CREDITS, AND EXPENSES
FIRST GUYANA RICE MODERNIZATION PROJECT

Year Ending 30 Sep. (1)	Revenues and Credits				Expenses			Drying/Storage Center Expenses	
	Project Total (2)	Storage Centers (3)	Seed (4)	G'town Storage (5)	Project Total (6)	Included Labor (7)	Foreign Exchange (8)	Total (9)	Over- head (10)
	(In thousands of Guyana dollars)								
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	15.1	0.	15.1	0.	14.3	7.9	.7	0.	0.
1972	83.8	0.	83.8	0.	79.4	43.7	3.7	0.	0.
1973	634.2	656.7	277.5	0.	487.8	212.4	77.1	224.8	85.9
1974	1124.7	737.2	387.5	0.	730.1	311.4	121.8	362.8	140.3
1975	1770.9	1372.6	398.3	0.	1824.8	557.8	551.6	1449.1	316.7
1976	1782.8	1495.8	286.0	0.	2077.9	688.0	553.8	1709.4	473.3
1977	2220.9	1765.4	455.5	0.	2573.7	808.3	767.3	2177.4	581.1
1978									
1979									
1980									

Oper- ating (11)	Drying/Storage Center Expenses*			Foreign Exchange (15)	Research & Seed Station		
	Energy (12)	Mainte- nance (13)	Labor (14)		Total Expense (16)	Included Labor (17)	Foreign Exchange (18)
0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	14.3	7.9	.7
0.	0.	0.	0.	0.	79.4	43.7	3.7
26.8	85.1	26.0	67.7	64.7	263.0	144.7	12.4
43.3	137.3	41.9	109.3	104.5	357.3	202.0	17.3
221.8	704.5	206.1	351.1	534.4	375.7	206.6	17.2
300.3	708.8	226.9	485.3	541.5	368.5	202.7	12.3
359.2	976.4	260.6	582.4	749.6	396.3	225.9	17.7

Source: Data Base Exhibit 1.2.

EXHIBIT IV.F-6

REALIZED PADDY PRICE DIFFERENCE TO FARMERS
FOR APPROVED PROJECT RICE VARIETIES
FIRST GUYANA RICE MODERNIZATION PROJECT

<u>Year</u>	<u>Farmer Price Differ- ence</u>	<u>Associated Costs (adjusted for inflation)</u>		<u>Farmer Net Price Differ- ence</u>
		<u>Farming Cost Differ- ence</u>	<u>Drying Cost</u>	
1970	.95	.0957	.3681	.49
1971	.95	.0960	.3690	.49
1972	1.01*	.1061	.4079	.50
1973	1.56*	.1153	.4434	1.00
1974	4.24*	.1295	.4980	3.61
1975	3.60*	.1300*	.5000*	2.97*
1976	3.42*	.1428	.5494	2.44
1977	3.50*	.1482	.5700	2.78
1978	3.55	.1500	.6000	2.80
1979	3.55	.1500	.6000	2.80
1980	3.55	.1500	.6000	2.80

Source: Data Base Exhibits F.3, F.11, G.14-17, and I.2.

Note: * Statistical data of operations. Other data is calculated from monetary factors or estimated.

EXHIBIT IV.F-7

PRODUCTION AND INTAKE OF PADDY, SEED, AND MILLED RICE
FIRST GUYANA RICE MODERNIZATION PROJECT

Year Ending 30 Sep. (1)	Basic Harvest Acreage (2) ,000 acres	Annual Yield per Acre (3)	Total Paddy (4)	Approved Varieties (5)	Total Paddy (6)	Approved Varieties (7)	Paddy and Seed Intake at GRB Facilities		
							Project Facilities by Varieties		
							Total (8)	Approved (9)	Other (10)
[In thousands of 140 lb. bags]									
1970	212.0	16.5	3502	55	784.9	13.1	0.	0.	0.
1971	171.7	17.2	2952	110	954.3	11.2	0.	0.	0.
1972	115.9	19.8	2316	323	973.0	83.9	0.	0.	0.
1973	147.5	16.3	2399	579	740.8	288.2	230.1	187.8	42.3
1974	187.9	21.4	4079	983	990.5	336.8	379.7	268.1	111.6
1975	181.2	24.9	4510	1234	1880.9	1062.8	1024.0	861.7	162.3
1976	117.4	23.2	2722	2651	1775.1	946.7	1037.7	777.3	260.4
1977	213.1	26.2	5644	4056	1834.7	1311.7	1177.8	995.9	181.9
1978									
1979									
1980									

IV.52

Paddy and Seed Intake at GRB Facilities			Seed Intake at GRB Facilities				GRB Milled Rice Intake			GRB Export Shipments
Other Facilities by Varieties			Project Facilities		Other Facilities		Total	Milled Rice Intake		(21)
Total (11)	Approved (12)	Other (13)	Found- ation (14)	Pure Line (15)	Found- ation (16)	Pure Line (17)	Intake (18)	Approved (19)	Other (20)	
784.9	13.1	771.8	0.	0.	n.a.	5.5	998.0	11.6	986.4	778.5
954.3	11.2	943.1	1.5	4.0	n.a.	4.5	975.8	36.2	939.6	815.7
973.0	83.9	889.1	3.6	7.5	n.a.	17.9	1006.5	193.4	813.1	855.5
510.7	100.4	410.3	11.1	27.7	0.	25.4	932.5	301.6	630.9	652.8
610.8	68.7	542.1	15.5	23.3	0.	34.6	1181.8	483.5	698.3	593.4
856.9	201.1	655.8	15.9	22.9	0.	55.6	1322.9	675.4	647.5	913.1
737.4	169.4	568.0	10.6	28.2	0.	30.4	1433.1	726.1	707.0	940.6
656.9	315.8	341.1	16.9	21.9	0.	63.4	1755.5	1003.6	751.9	825.9

Source: Data Base Exhibits B.2, D.5, F.3, F.10, and F.11.

EXHIBIT IV.F-8

VALUE OF INTAKE OF PADDY, SEED, AND MILLED RICE
FIRST GUYANA RICE MODERNIZATION PROJECT

Year Ending 30 Sep. (1)	Paddy Values Incl. Seed			Paddy Intake Values (5)	Project Facility Intake			Other Facility Intake			Project Facility Intake Seed Type		Other Facility Intake Seed Type		GRB Milled Rice Purchases		
	Total Value (2)	Varieties			Total Value (6)	Paddy Varieties		Total Value (9)	Paddy Varieties		Foun- dation (12)	Pure Line (13)	Foun- dation (14)	Pure Line (15)	Total Value (16)	Milled Rice Approved (17)	Varieties Other (18)
		Approved (3)	Other (4)			Approved (7)	Other (8)		Approved (10)	Other (11)							
1970				4725	0.	0.	0.	4725	95	4630	0.	0.	n.a.	44			16065.9
1971				6060	0.	0.	0.	6060	84	5976	26	35	n.a.	40			16532.9
1972				6705	0.	0.	0.	6705	629	6076	63	75	n.a.	179			18235.4
1973				5177	1523	1208	315	3654	645	3009	279	289	0.	265			19078.3
1974				8356	3729	2707	1022	4627	387	4241	388	290	0.	431			34863.1
1975	29678	18804	10874	27633	16497	14270	2227	11136	2489	8647	398	463	0.	1184			45223.8
1976	28182	16824	11358	26573	16560	12912	3648	10113	2403	7710	264	599	0.	646			48682.9
1977	30909	23407	7502	28673	19361	16664	2697	9312	4507	4305	423	466	0.	1347			59543.5
1978																	
1979																	
1980																	

(In thousands of Guyana dollars)

Source: Data Base Exhibits B.2, D.5, F.10, and G.2-3.