PART VI

PROJECT COST ESTIMATE AND FINANCING PLAN

PART VI
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AND FINANCING PLAN

CHAPTER 1. PROJECT COST ESTIMATE

1-1 Major Assumption on Project Cost Estimation

In addition to the conditions provided in the preceding Parts, major assumptions for estimation of the project cost are as follows;

1-1-1 Investment body and common facilities

This project which is consisting of phosphate rock concentration plant in Sierra Grande and a phosphate fertilizer plant in Bahia Blanca is assumed to be established by HIPASAM's sole investment. In this regards, commonly used facilities such as administration office and other offsite facilities in Sierra Grande and Buenos Aires are assumed to be co-used to the possible extent, and only incremental investment or supplement as required will be made under the scope of this project.

1-1-2 Facilities excluded from investment scope

Following facilities are excluded from the scope of investment for this project.

- Access road
- Electric power transmission line upto the battery limit of the plant
- Port facility including loader and unloader for the raw materials and products
- Township facilities such as church, school, parks, hospital, etc.

1-1-3 Project implementation schedule

According to the detailed project implementation schedule shown in Figure V-5 and V-6 the major key dates thereof are assumed, as follows;

Project Implementation Program	Nos. of Month	Date/Period
a. Feasibility Study	14	May '83 - Jun.'84
b. Detailed Study, Gov. Formalities for Approvals, etc, Financial Arrangement, Other Preparations	18	July. '84 - Dec.'85
c. Preparation of Bid Documents	6	July. '85 - Dec.'85
d. Bid, Evaluation of Bid, Award of Contract	12	Jan. '86 - Dec.'86
e. Construction of Plants	36	Jan. '87 - Dec.'89
f. Start of Commercial Operation		Jan. '90

1-1-4 Project scheme alternatives

Among the various project scheme alternatives as assumed in Part V, which are different kind of phosphate fertilizer project in combination with the phosphate rock concentration plant in Sierra Grande as the base project unit, following two cases are selected for further study hereunder.

Case I: Monoammonium Phosphate (MAP) Project (PC-1/PF-5)

i) Major production unit
   a. Phosphate rock cencentration
   b. Sulfuric acid
   c. Phosphoric acid
   d. Monoammonium phosphate

ii) Final product and production capacity
   Monoammonium phospase fertilizer (MAP) 80, 454 TPY

iii) Project Site
   Except phosphate rock concentration unit which is located in Sierra Grande, all units are assumed to be located at a coastal area in Bahía Blanca.

Case II: Nitrophoshate and Calium Ammonium Nitrate (NP/CAN) Project (PC-1/PF-7)

i) Major production unit

a. Phosphate rock concentration
b. Ammonia
c. Nitric acid
d. Nitrophosphate (NP)
e. Calcium ammonium nitrate (CAN)

ii) Product and production capacity

a. Nitrophoshate (NP) fertilizer 181, 863 TPY
b. Calcium ammonium nitrate (CAN) fertilizer 155, 232 TPY

iii) Project site

Except phosphate rock concentration unit which is located in Sierra Grande, all units are assumed to be located at a certain coastal area in Bahía Blanca.

1-1-5 Currency and exchange rate

All costs, prices and expenses related to this study are ultimately expressed in U.S. Dollars. For estimation of local currency cost items, the conversion from Pesos Argentinos to U.S. Dollars is made at the rate of Pesos 8.044* per one U.S. Dollar.

1-1-6 Import duty and tax incentives

Subject to the approval by the government authority, various tax incentives including exemption of import duty on imported goods will be granted to the new industrial investment when such investment is deemed to contribute to national economy. Although this project may be eligible as promoted industry it is not assured at this moment, therefore, throughout the project study hereof including project cost estimate, no investment priviledges are assumed to be granted.

Import duties on imported equipment and materials are imposed in accordance with the tariff code in force as of June 1, 1983.

* An official exchange rate on the day of May 27, 1983.

1-1-7 Price escalation factors

(1) Foreign currency costs

The foreign currency costs are assumed to be escalated in accordance with an average escalation of consumers goods in the major industrialized countries though the price level of international market is usually kept lower than the consumers goods price level which is dominated by domestic prices. Historical trend and assumed rates of escalation rates in the major countries are as shown in Table VI-1.

Table VI-1 PRICE ESCALATION IN MAJOR INDUSTRIALIZED COUNTRIES

(Unit: %)

	1) U.S.A	2) JAPAN	3) 7-INDUSTRIALIZED COUNTRIES	4) EXPORT PRICE AVERAGE
1978	7.7	3.8	6.9	5.7
1979	11.3	3.6	9.2	11.9
1980	13.5	8.0	12.1	11.9
1981	10.4	4.9	9.8	6.3
1982	6.2	2.6	6.9	3 3
1983	3.0	2.0	5.0	3.0

Note: 1) Consumers goods price
2) Consumers goods price
3) Average of U.S.A., Germany F.R., Japan, Italy, U.K., Canada, France— Consumer goods price
4) Average of all industrialized countries
Data Source : IMF
Base Currency : U.S. Dollar

PROJECTED ESCALATION RATE
(Foreign Currency Portion)

Year	Escalation Rate (%)
1983	3.0
1984	3.5
1985	3.5
1986	4.0
1987	5.0
1988 and onward	6.0

(2) Local currency costs

Local inflation, in principle, should follow international inflation trends, if local prices are assessed in terms of U.S. Dollars because such difference between local inflation and international inflation would be adjusted by devaluation or revaluation of foreign exchange rate when such unbalance is caused. Nevertheless, in the country where local escalation of goods is always higher than that of international level or where devaluation of local currency is not enforced frequently or timely (e.g. fixed rate system), project budget for local currency portion which is estimated in terms of U.S. Dollar and escalated in accordance with the international inflation rate often cause budgetary deficit because of time lugs in adjustment for equilibrium of currency values.

Therefore, in the budgeting of local currency portion in terms of U.S. Dollars, adequate adjustment or supplement in applicable escalation rate or in price contigency may be required respectively.

The above is a general view. In Argentine, however, floating rate system is adopted in principle, the average difference of consumers goods price from the level in U.S.A. is higher by 3.88 percent only (for past 20 years average).

In addition to the above considering an average annual escalation rate in U.S.A. for past twenty years of 6.25 percent, average escalation rate of local currency portion applicable for this study throughout 2009 from 1983 is assumed to be 6.5 percent. In regard to the annual escalation rate starting from 1983, escalation rates for two or three years from 1983 are assumed to be kept lower reflecting stagnant world economy, then it is assumed slowly be increased. The assumed escalation rates in terms of U.S. Dollar and applicable in this study is as follows;

PROJECTED ESCALATION RATE
(Local Currency Portion)

Year	Escalation Rate (%)
1983	3.0*
1984	4.0
1985	4.0
1986	5.0
1987	6.0
1988	7.0

* Actual Figure in U.S.A., 1983

(3) Deflator

The historical trend of the GNP deflator in the USA (IMF-1983) and the deflator projection to be applied in this study from 1984 through 2009 (for 26 years) considering the past trend records are shown as follows;

Year	GNP Deflator, %
1963/72 (Historical)	3.5 (Average)
1973	5.7
74	8.8
75	9.3
76	5.2
77	5.8
78	7.4
79	8.6
1980	9.3
81	9.4
82	6.0
83	4.1
84 (Projection)	4.0
85	4.0
86	5.0
87	5.5
88	6.0
89 and Onward	6.5

Period	Average Deflator
1964/83 (20 Years)	5.53
1969/83 (15 Years)	6.22
1974/83 (10 Years)	7.37
1984/2009 (26 Years)	6.19

1-1-8 Base date for project cost estimation

The base date for estimation of total project cost in June 1, 1983. All costs and prices obtained are once adjusted on the base date (Base Cost Estimate), then such costs and prices are escalated through each expected disbursement time using escalation rates specified in (1) and (2) of paragraph 1-1-7 above. The amount increased by escalation rates is called "price contingency".

In case the project implenmentation schedule is caused be changed, therefore, estimated project cost could be re-adjusted in the same manner.

1-1-9 Physical contingency

The physical contingency reflects expected price increases in the Base Cost Estimates, due to changes in quantities and methods of implementation judged necessary to take into account, as being caused by uncertainties related to the site conditions and other design bases, as well as the degree of precision applied in the estimation hereof. Amount of the physical contingecies estimated in this study are five percent (5%) on foreign currency portion plus import duty and ten percent (10%) on local currency portion minus import duty.

1-1-10 Type of construction contract

In order to facilitate and simplify long term project finance by foreign financing institutions on the production units and related facilities, it is assumed that the type of contract is fixed lump sum contract covering wider supply scope to the possible extent including the items as follows;

a. Process licence and know-how
b. Design and engineering service
c. Imported equipment and materials procurement, shipping, customs clearance and delivery to the site
d. Domestic equipment and materials procurement and delivery to the site
e. Temporary work, civil and building construction service, erection and installation service
f. Inspection, test run, guarantee test run, take over
g. Training, performance/workmanship guarantee

1-1-11 Stamp duty on contracting

One point two percent (1.2%) of stamp duty is assumed to be imposed on the amount of construction contract and project management advisory contract.

1-1-12 Value added tax (IVA) on supplies and services

All supplies and services including imported equipment and materials and local supplies and services are assumed to be subject to value added tax of twenty percent (20%) equally.

1-2 Base Cost Estimate

Estimation of the base costs (B.C.E.) which are required for implementation and operation of the project are made on the following items.

a. Land Acquisition and Site Preparation Cost
b. Plant Construction Cost
c. Pre-operational Expenses
d. Initial Working Capital
e. Interest During Construction

Conditions and assumptions for estimation and estimated Base Cost are as per following 1-2-1 through 1-2-5 herebelow.

1-2-1 Land acquisition and site preparation cost

The project site to construct production facilities are distributed in two sites (i.e. Sierra Grande and Bahia Blanca) in both alternative cases. Estimated land acquisition cost and site preparation cost for each alternative case are as follows:

BASE COST ESTIMATE FOR
LAND ACQUISITION AND SITE PREPARATION COST

Cost Item	Case I (PC-1/PF-5)	Case II (PC-1/PF-7)
Land Area Requirement		
Sierra Grande	40,000m^2	40,000m^2
Bahía Blanca	97,500m^2	135,000m^2
Total	137,500m^2	175,000m^2
		(Unit: USD 1,000)
Land Acquisition Cost	1,180	1,550
Site Preparation Cost	700	900
Total	1,880	2,450

1-2-2 Plant construction cost

As described in preceding paragraph 1-1-10, plant construction is assumed to be performed under the fixed lump-pum contract including site preparation work. The Basic Cost Estimate on the plant construction is as per Table V-13 and Table V-15, and its summaries are as follows:

Case I (PC-1/PF-5)

(Unit: USD 1,000)

Cost Item	PC-1	PF-5	Total	Foreign Currency	Local Currency
1. Land Acquisition Cost	200	980	1,180	-	1,180
2. Land Preparation Cost	200	500	700	-	700
3. Plant Construction Cost	24,930	36,990	61,920	25,950	35,970
4. Construction Equipment	750	950	1,700	350	1,350
5. Transportation/Handling	1,870	3,210	5,080	3,760	1,320
6. Field Indirect Cost	400	380	780	200	580
7. Engineering Fee	2,780	2,930	5,710	4,790	920
8. Project Management Fee	2,520	500	3,020	2,150	870
Total	33,650	46,440	80,090	37,200	42,890

Case II (PC-1/PF-7)

(Unit: USD 1,000)

Cost Item	PC-1	PF-5	Total	Foreign Currency	Local Currency
1. Land Acquisition Cost	200	1,350	1,550	-	1,550
2. Land Preparation Cost	200	700	900	-	900
3. Plant Construction Cost	24,930	136,230	161,160	77,510	83,650
4. Construction Equipment	750	5,150	5,900	1,400	4,500
5. Transportation/Handling	91,870	12,200	14,070	10,420	3,650
6. Field Indirect Cost	400	1,500	1,900	350	1,550
7. Engineering Fee	2,780	20,500	23,280	19,090	4,190
8. Project Management Fee	2,520	3,000	5,520	3,930	1,590
Total	33,650	180,630	214,280	112,700	101,580

1-2-3 Pre-operational expenses and start-up expenses

The pre-operational expenses include verious direct expenses required for owner's undertakings throughout the project implementation stage such as owner's personnel costs, office supplies, training expenses for operators, loss at raw materials, utilities and consumables during the test run period and institutional expenses including formalities, permits, charges, etc. In case of the investment to new project is made by owner who has existing organization, certain portions of the expenses including personnel costs could be saved. The base estimate of the pre-operational expenses are as follows:

Case I (PC-1/PF-5)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
- Personnel supplies	-	3,906	3,906
- Training expenses	498	90	588
- Test run expenses	409	121	530
- Other expenses	-	78	78
(Sub-total)	(907)	(4,195)	(5,102)
- Physical Contingency	45	419	464
Total	952	4,614	5,566

Case II (PC-1/PF-7)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
- Personnel supplies	-	3,906	3,906
- Training expenses	597	117	714
- Test run expenses	69	452	521
- Other expenses	-	78	78
(Sub-total)	(666)	(4,553)	(5,219)
- Physical Contingency	33	455	488
Total	699	5,008	5,707

1-2-4 Initial working capital

Adequate amount of initial working capital is estimated, taking into account the following items;

- Initial inventory cost for raw materials, sub-materials and consumables
- Initial inventory cost for products, by-products and intermediates
- Balance of account receivable and payable
- Adequate cash level in hand during operation period

The calculated initial working capital is shown as follows:

Case I (PC-1/PF-5)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
- Raw materials & Consumables Inventories	2,993	222	3,215
- Intermediates & Products Inventories	3,879	2,737	6,616
- A/C Receivable & (-) A/C Payable	-	506	506
Total	6,872	3,465	10,337

Case II (PC-1/PF-5)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
- Raw materials & Consumables inventories	3,674	3,526	7,200
- Intermediates & Products Inventories	10,572	15,857	26,429
- A/C Receivable & (-) A/C Payable	5,877	5,675	11,552
Total	20,123	25,058	45,181

1-2-5 Interest during construction

Interest during construction up to the completion of construction work is calculated in accordance with the financial conditions as assumed in the next chapter on the Base Cost Estimates as estimated in 1-2-1 through 1-2-4 plus price contingency (escalation) through expected disbursed time.

1-2-6 Estimated total project cost

Based on the preceding paragraphs 1-1 and 1-2, total project cost is estimated as follows:

Case I (PC-1/PF-5)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
a. Land Acquisition and Site Preparation Cost	-	2,897	2,897
b. Plant Construction Cost	44,277	77,632	121,909
c. Pre-operational Expenses	1,163	5,846	7,009
d. Initial Working Capital	3,915	6,422	10,337
e. Interest During Construction	13,493	-	13,493
Total	62,848	92,797	155,645

Case II (PC-1/PF-7)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
a. Land Acquisition and Site Preparation Cost	-	3,774	3,774
b. Plant Construction Cost	134,141	196,354	330,495
c. Pre-operational Expenses	854	6,345	7,199
d. Initial Working Capital	20,123	25,059	45,182
e. Interest During Construction	35,135	-	35,135
Total	193,287	228,498	421,785

CHAPTER 2. FINANCING PLAN

The total project cost as estimated in the paragraph 1-3 is assumed to be financed according to the following conditions.

2-1 Debt-Equity Ratio

The debt-equity ratio on total capital requirement is 70% : 30% where the capital in debt shall be financed by foreign financing institutions with long term loan.

Financing schedule for pay-in of equity capital and borrowing of long term loan are in accordance with expected capital disbursement schedule comprising thirty precent and seventy percent respectively thereof.

2-2 Financing Terms on Long Term Loan

Although the finance sources for the long term loan requirements are still indifinite it is assumed that the loan will be financed by certain international financing institutions as well as suppliers' credit in the form of project loan or in the other form of loans.

For the purpose of this study, the following financing terms commonly offered by Japanese contractors in the form of suppliers' credit with the Export and Import Bank of Japan are applied.

(1) Loan Repayment Schedule

Loan principal is to be repaid in equally divided 20 semi-annual installments of which first due comes at the end ot first operating year of the project.

(2) Grace Period

Full construction period (i.e. 3 years)

(3) Interest Rate

Nine percent (9%) per annum

2-3 Financing Terms on Short Term Loan

When annual money flow is caused being deficient during the operating period of the project, short term loan by local financiers is assumed to be made at an annual interest rate of fourteen percent (14%).

PART VII

PROJECT OPERATING PLAN

CHAPTER 1. MAJOR ASSUMPTION

CHAPTER 2. PRODUCTION, INVENTORY AND REVENUE SCHEDULE

CHAPTER 3. OPERATING COSTS

PART VII
PROJECT OPERATING PLAN

CHAPTER 1. MAJOR ASSUMPTIONS

1-1 Management and Organization

Implementation of the project and management in the production stage is, in principle, assumed to be made by HIPASAM's existing management system. However, since addtional production facilities of phosphate rock concentration plant in Sierra Grande and phosphate fertilizer plant newly constructed in Bahia Blanca will cause substantial increase in existing number of employees and different business activities, certain modification in the organization of head quarter in Buenos Aires will be required.

Incremental number of management staff and other employees required for this project is assumed as per Table V-12 and V-14.

1-2 Delivery and Payment Terms on Supplies and Products

Main raw material for the project starts from the tails of HIPASAM's existing iron ore cncentration plant, and said tails is fed directly to the phosphate rock concentration plant in Sierra Grande which is a first processing unit in this project.

Phosphate rock produced in the processing plant is delivered from Sierra Grande to the phosphate fertilizer production plant in Bahia Blanca (528 km) by the road transportation.

Both of the tails from iron concentration plant and phosphate rock are delivered without commercial value.

All of local supplies including other raw material, consumables and utilities and sales of the final products (i.e. phosphate fertilizers) are assumed to be delivered at factory gate with thirty (30) days of payment site condition.

All of imported supplies are assumed to be delivered at CIF Bahia Blanca under letter of credit at sight basis.

1-3 Operation System and Standard Operating Days

Operation of the proposed project is assumed to be made under three-shift continuous operation system. Annual operating days for design basis is 330 days per annum and maximum capacity utilization rate is limited to ninety percent (90%) or 297 days of operation.

CHAPTER 2. PRODUCTION, INVENTORY AND REVENUE SCHEDULE

2-1 Production Schedule

2-1-1 Production capacity of final product

Designed production capacity of the phosphate fertilizer plant(s) is assumed as follows,

Case I (PC-1/PF-5)

Monoammonium Phosphate(MAP);	243.8 TPD
	80,454 TPY

Case II (PC-1/PF-7)

Nitrophosphate (NP);	551.1 TPD
	181,863 TPY
Calcium Ammonium Nitrate (CAN);	470.4 TPD
	155,232 TPY

2-1-2 Capacity utilization factor

Capacity utilization of the plant is assumed as follows;

Year	Capacity Utilization, %
1990	80
1991	85
1992	90

Despite of the above capacity utilization factors as basic assumption, anticipated local market demand on the products from CaseII would be small to keep such operational rate, therefore, an alternative capacity utilization factor is assumed for CaseII (L) in accordance with the projected NP/CAN demand as shown in paragraph 3-2 of Part II for supplementary study which data is given in Chapter 3 of Part VIII in the report.

2-1-3 Production schedule

Case I (PC-1/PF-5)

Year	MAP Production, TPY
1990	64,363
1991	68,386
1992	72,409

Case II (CP-1/PF-7)

Year	NP Production, TPY	CAN Production, TPY
1990	145,490	124,186
1991	154,584	131,947
1992	163,673	139,709

2-2 Products Inventory Schedule

It is assumed that product inventory level at the end of each operating year is equivalent to average monthly production volume or one-twelfth of the annual production of each year. Inventory volume of the products are as follows;

	Case I	Case II	
Year	MAP, Ton	NP, Ton	CAN, Ton
1990	5,364	12,124	10,349
1991	5,699	12,882	10,996
1992	6,034	13,640	11,642

2-3 Sales-Term of Products

All products are assumed to be sold with following conditions.

a. Delivery Term: Ex-factory (Bahia Blanca)
b. Packaging: 50kg PP bag with PE inner sack
c. Payment Term: 30 days after delivery date

2-4 Selling Price of Products

Selling prices of the products are as follows;

	Case I	Case II	
Year	MAP, USD/Ton	NP, USD/Ton	CAN, USD/Ton
(1983)	(271.15)	(234.60)	(268.60)
1990	385.24	343.52	393.31
1995	521.38	478.47	563.61
2000	703.79	655.68	786.62

Note: Above prices include import duty (except MAP), value added tax (IVA), importers' charges, margin, interest, etc. The CAN price is based on AN price and converted according to the nitrogen content (26.0/34.5) in financial analysis.

CHAPTER 3. OPERATING COSTS

3-1 Variable Cost for Case I

Unit consumption figures of variable costs for Case I are as follows;

3-1-1 Raw material consumption

Cost Item	Consumption, TPT of MAP	Note
a. Iron Ore Tails	12.6140	Local, No-value
b. Phosphate Rock	(1.3687)	(Local)
c. Ammonia	0.1279	Imported
d. Sulfur	0.3698	Imported

Unit price of the above items are as per Table VII-1.

3-1-2 Utilities, sub-materials consumption

Cost Item	Consumption, TPT of MAP	Note
a. Natural Gas	0.7527 MMBTU-LHV	Local
b. Electric Power	643.90 kWh	Local
c. Industrial Water	8.453 Ton	Local
d. Catalyst & Chemical	USD32.4135	Imported, 1990 price
e. Packing Material	USD26.3694	Local, 1990 price

Unit price of the above items are as per Table VII-1.

3-2 Variable Costs for Case II

Unit consumption figures of variable costs for Case-II are as follows;

3-2-1 Raw material consumption

Cost Item	Consumption, TPT of NP/CAN	Note
a. Iron Ore Tails	3.0377	Local, No-value
b. Phosphate Rock	(0.3296)	(Local)
c. Natural Gas	9.9963 MMBTU-LHV	Local

3-2-2 Utilities, sub-materials consumption

Cost Item	Consumption, TPT of NP/CAN	Note
a. Electric Power	531.30 kWh	Local
b. Industrial Water	7.318 Ton	Local
c. Catalyst Chemicals	USD10.4664	Imported, 1990 Price
d. Packing Material	USD26.3694	Local, 1990 Price

Unit price of the above items are as per Table VII-1.

Table VII-1 UNIT PRICE OF MAJOR OPERATING COST

	B.C.E. (1983)	1990	1995	2000
Ammonia, USD/Ton	371	509.81	736.33	1,042.19
Sulfur, USD/Ton	221	303.52	407.44	546.79
Natural Gas, USD/MMBTU-LHV	1.1837	1.7169	2.4080	3.3773
Electric Power, USD/kWh	0.0256	0.0371	0.0520	0.0729
Industrial Water, USD/Ton	0.0500	0.0725	0.1017	0.1426
Catalyst & Chemicals				
Case I				
USD/Ton of Product	23.6007	32.4135	43.3766	58.0477
Case II				
USD/Ton of Product	7.6208	10.4664	14.0064	18.7437
Fertilizer Bag				
USD/Ton of Product	18.18	26.3695	36.9846	51.8728
Transport of Phosphate Rock				
Case I				
USD/Ton of Product	12.3184	17.8674	25.0600	35.1479
Case II				
USD/Ton of Product	2.9664	4.3027	6.0348	8.4641

Notes: 1) Import duties assumed CIF value of the imported goods are;
Ammonia: 25%
Sulfur: 10%
Catalysf & Chemical: 15%
2) Twenty percent (20%) of value added tax (IVA) is assumed to be applied to all items.

3-3 Fixed Cost

3-3-1 Labor cost (Gross direct salary)

Class of Labor	Nos of Labor		Unit Annual Salary	
	Case I	Case II	1983	1990
Director/Factory Manager	8	8	36,550	53,020
Manager/Senior Engineer	31	35	24,370	35,350
Foreman/Section Chief	59	63	4,480	6,500
Skilled Labor	131	151	3,730	5,410
Unskilled Labor	288	402	3,360	4,870
Total	517	659	-	-

Note: Above gross unit annual salary includes 26.2 persent of various allowances (i.e. bonus, family allowance, medical care, adjustments). The above gross salary is assumed to be escalated along local escalation rates illustrated in paragraph 1-1-7 (2) of Part-VI.

3-3-2 General overhead

General overhead including administrative expenses in the head office, indirect salaries, etc. is assumed to be 120 precent of gross direct salary cost.

3-3-3 Maintenance cost

Maintenance costs incurred in the usual maintenance services excluding substantial modification of the plant is assumed to be 3.5 percent of the initial constructed plant cost in the first operating year subject to further escalation by seven percent (7%) per annum after second operating year.

3-3-4 Depreciation

The constructed plant cost (Depreciable assets) is depreciated according to the following rule;

a. Mode of depreciation : straight line
b. Salvage value : zero
c. Depreciated period
- Permanent building, pipeline : 30 years
- Office building : 20 years
- Plant equipment, housing : 10 years
- Vehicles : 5 years
- Thickener : 15 years

3-3-5 Amortization

Preoperational expenses and interest during construction are amortized equally for first five years.

3-3-6 Sales expenses and revenue tax

Two percent (2%) of the total revenue is assumed to be required for sales expenses and revenue tax (1.5% on sales revenue).

3-3-7 Miscellaneous taxes and insurance premium

Equivalent to one percent (1%) of the intial constructed plant cost is assumed to be required for real estate tax, building tax and insurance premium for plant operation.

3-3-8 Value added tax (IVA)

Twenty percent (20%) of the total value added which is calculated as total sales revenue minus total expenditures to outside, all taxes and levies, depreciation and amortization is assumed to be payable to the Government as value added tax (IVA).

3-4 Others

3-4-1 Corporate income tax

Thirty three percent (33%) of the taxable income is assumed to be imposed as corporate income tax.

3-4-2 Dividend

No dividend payment is considered at this stage.

PART VIII

FINANCIAL AND ECONOMIC ANALYSES AND EVALUATION

PART VIII

FINANCIAL AND ECONOMIC ANALYSES AND EVALUATION

CHAPTER 1. FINANCIAL ANALYSES

1-1 Introduction

This project study is made based on the assumption that this project is implemented by HIPASAM with its sole investment. Financial analysis and evaluation of the project, therefore, is desirous to be made in the evaluation method of as an additional investment.

However, an essential purpose of this study is understood to establish an economically applicable technology to recover phosphate rock from tails of existing iron ore concentration plant and to select phosphate fertilizer adequate for agriculture in Argentine which can be produced from above phosphate rock as an intermediate raw material, and financial analysis made herein is to clarify financial viability of individual alternative.

This project is consisting of phosphate rock concentration plant in Sierra Grande and phosphate fertilizer plant in Bahia Blanca, and each plant can be considered as an independent profit center. In the financial analysis therefore, individual profitability and added value distribution on each profit center could be analyzed.

Nevertheless, in so far as the result of laboratory test on phosphate rock concentration, quality of an expected product from plant may not reach to the level of internationally traded phosphate rock. It is difficult to perform financial analysis on each profit center in serious meaning, because of difficulty in pricing of the phosphate rock.

In this consequence, the project scheme to be analysed and evaluated herein is consolidated scheme of the phosphate rock concentration plant in Sierra Grande and the phosphate fertilizer plant in Bahia Blanca.

1-2 Major Assumptions on Finacial Analysis

1-2-1 Economic life span of project

The economic life span of the project is assumed to be twenty (20) years provided that no substantial modification, renovation or additional investment is made on the initial facilities.

1-2-2 Base cost for financial projections

All financial projections are made in the U.S. Dollar current term basis, and such projections are made according to relevant escalation rates on the base cost date of June 1, 1983

1-2-3 Methodology of financial analysis

Financial analysis is made mainly by means of various financial and operating ratio analysis and financial internal rate of return (FIRROI) by discount cash flow method.

Two kinds of financial internal rate of return are calculated namely, current term FIRROI (C) and real term (or constant term) FIRROI (R) which is obtained as current term cash flow adjusted by deflator.

1-3 Result of Financial Analysis

Based on the assumptions as above, following financial papers are prepared as attached in Annex VIII-1.

- Production and Sales Plan
- Production Cost Statements
- Working Capital Statements
- Income Statements
- Funds Flow Statements
- Balance Sheet
- Long Term Debt Repayment Schedule

The result of financial analysis on the basis of above financial papers are as follows,

1-3-1 Internal rate of return (FIRROI)

	FIRROI, %	
Alternative Case	Before Tax	After Tax
Case I	Negative *	Negative *
Case II		
- Current Term	14.19	12.15
- Real Term	7.49	5.62

Despite of repeated trial by sensitivity analysis on Case I, no possibility was identified to turn cash flow into positive figure. No calculation result on such sensitivity analysis is attached.

* For Case I, net cash flow shows always negative figure through project life, therefore no IRR is available

1-3-2 Sensitivity analysis (on CASE II)

Variable Item,		Case II - FIRROI, % Before Tax	After Tax
- Capacity Utilization Rate			
+10%	(C)*	14.47	12.45
	(R)**	7.77	5.91
−10%	(C)	13.58	11.51
	(R)	6.91	5.01
- Product Selling Price			
+20%	(C)	18.51	15.94
	(R)	11.55	9.17
+10%	(C)	16.45	14.15
	(R)	9.61	7.49
−10%	(C)	11.62	9.82
	(R)	5.09	3.44
−20%	(C)	8.80	7.62
	(R)	2.45	1.38
- Plant Construction Cost			
−20%	(C)	17.54	15.09
	(R)	10.65	8.39
−10%	(C)	15.74	13.53
	(R)	8.95	6.92
+10%	(C)	12.79	10.87
	(R)	6.17	4.41
+20%	(C)	11.57	9.77
	(R)	5.02	3.38

The above result of sensivity analysis is graphically shown in Figure VIII-1.

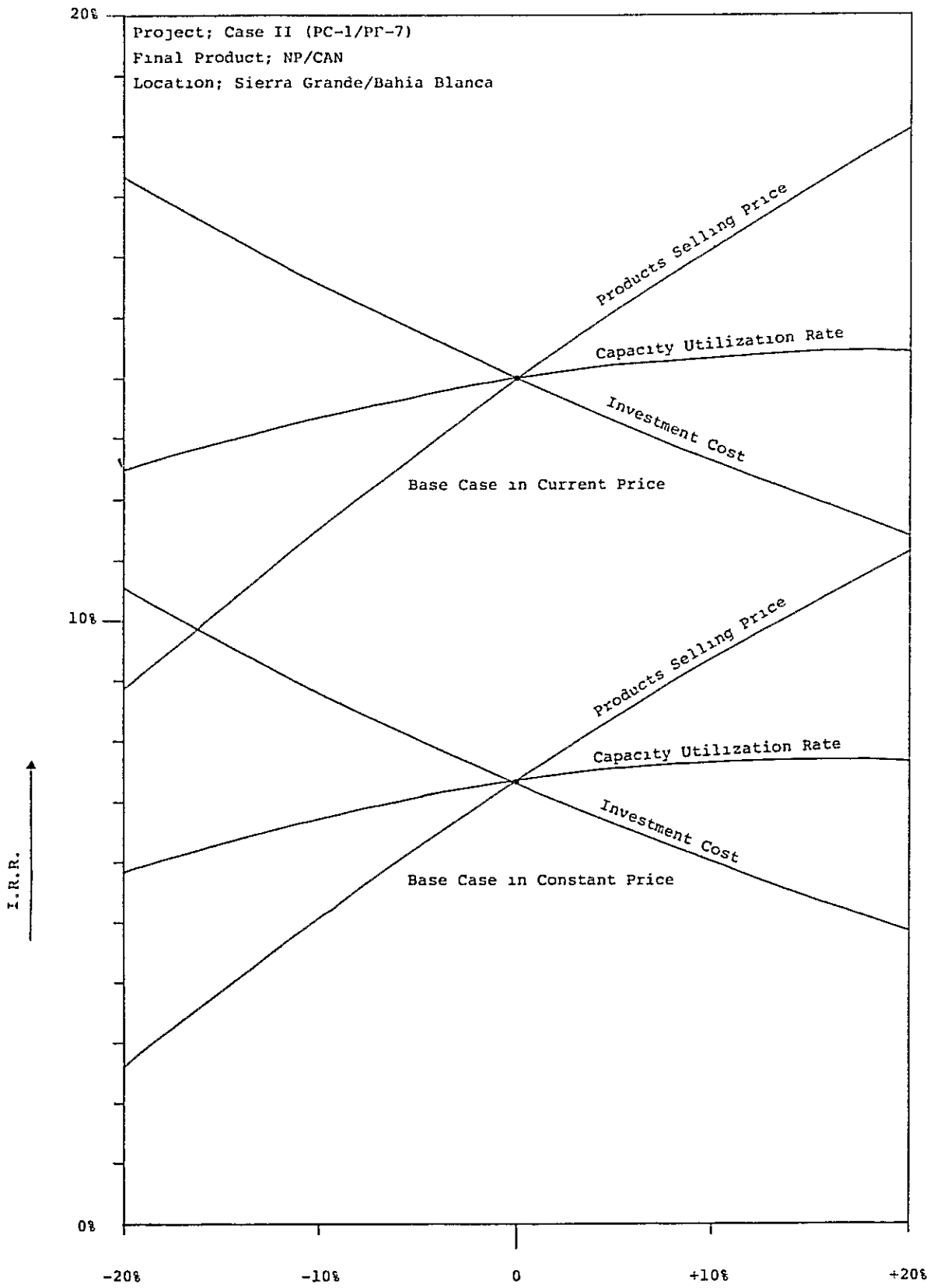
1-3-3 Financial indicators

Various financial indicators including ratio analysis are as per Annex VIII-1.

* (C) Current Term

**(R) Real (Constant) Term

Figure VIII-1, SENSITIVITY CURVE



CHAPTER 2. ECONOMIC ANALYSIS

2-1 Introduction

In as much as an essential purpose of this project is the effective utilization of national resources, this project must be ultimately proved as economically justifiable by means of economic cost and benefit analysis.

Evaluation of economic benefit is made using economic internal rate of return and enconomic net present value (ENPV).

2-2 Economic Viability of Project

2-2-1 *Major assumptions*

(1) Currency and Exchange Rate

U.S. Dollar is used for economic analysis with exchange rate of ten Pesos Argentinos per one U.S. Dollar which was prevailing by the end of May, 1983 in free exchange market thus deemed to be opportunity exchange rate.

(2) Escalation and Deflator

All economic costs and benefits are ultimately evaluated in real term, in other words, economic costs and benefit flows in current term are adjusted into real term flows by deflator.

(3) Cut Off Rate

In calculation of ecconomic net present value of economic benefit, twelve percent (12%) of cut-off rate is assumed.

(4) Economic Project Cost

Economic project cost is assumed to be the total project cost in paragraph 1-3 of Part VI deducted by all taxes and levies components (transferrable costs) therefrom, and all local costs are adjusted by the economic exchange rate. Economic project cost calculated as above are as follows;

Case I (CP-1/PF-5)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
1. Land Acquisition and Site Preparation Cost	-	2,390	2,390
2. Plant Construction Cost	44,277	52,129	96,406
3. Pre-operational Expenses	922	4,881	5,803
4. Initial Working Capital	10,719	-	10,719
5. Interest During Construction	2,741	5,330	8,071
Total	58,659	64,730	123,389

Case II (CP-1/PF-7)

(Unit: USD 1,000)

Cost Item	Foreign Currency	Local Currency	Total
1. Land Acquisition and Site Preparation Cost	-	3,114	3,114
2. Plant Construction Cost	134,141	126,005	260,146
3. Pre-operational Expenses	782	4,897	5,679
4. Initial Working Capital	27,684	-	27,684
5. Interest During Construction	14,086	20,799	34,885
Total	176,693	154,815	331,508

(5) Economic Operating Costs

Economic operating cost are assumed in principle as opportunity costs of the items.

1) Imported Materials and Goods : Net CIF Argentine port price excluding import duties and IVA (Ammonia, Sulfur, Catalyst and Chemicals).
2) Natural Gas : Since Argentine is self sufficient oil producting country, opportunity price of natural gas is assumed to be as same as fuel oil price in Argentine.
3) Electric Power : Domestic price is used as it is.
4) Industrial Water : Costs for water intake is used.

5) Other Domenstic Raw Materials and Supplies : The prices deducted by assumed taxes and levies (approx. 18%) are used.

6) Labor Cost and Overhead : Assumed personal income tax is deducted by approximate percentage for each case.

7) Maintenance Cost : Thirty percent (30%) of average taxes and duties on imported parts and materials and local labor service as well is deducted.

8) Items of transferable Costs : Corporate income tax, Value added tax (IVA), Stamp duty, Revenue tax, Real estate tax, Building tax, Import Duty

(6) Economic Benefit

Economic value of products (direct benefit of the project) are assumed as CIF Argentine Port Price (bagged, landed price) of the imported same fertilizers, as follows:

ECONOMIC PRICE OF PRODUCTS

(USD/Ton)

Product	1983	1990	1995
MAP	233.75	321.03	434.48
NP	172.50	236.91	329.98
CAN (as AN)	197.50	271.25	388.70

2-2-ㄴ Economic internal rate of return (EIRROI)

Econimic internal rate of return on total investment are as follows:

Alternative Case	Current Term, %	Real Term 1987, %
Case I	Negative *	Negative *
Case II	9.63	3.22

* For Case I, net cash flow shows always negative figure through project life, therefore no IRR is available.

2-2-3 Sensitivity analysis (on CASE II)

Case II - EIRROI, %

Variable Item	Current Term	Real Term-1987
- Capacity Utilization Rate		
+10%	9.83	3.41
-10%	9.18	2.79
- Product Selling Price		
+20%	14.85	8.11
+10%	12 42	5.83
-10%	6.25	0.07
-20%	1.71	-4.12
- Plant Construction Cost		
-20%	12.94	6.34
-10%	11.18	4.68
+10%	8.24	1.91
+20%	6.97	0.72

CHAPTER 3. GENERAL COMMENT AND SUPPLEMENTAL ANALYSIS

As result of financial and economic analysis on alternative scheme made in the former two Chapters, Case I is hardly justifiable both in financial and economic aspects. For Case II, although the result shows marginal feasibility financially and economically it is emphasized to elaborate further on the assumptions used herein.

In addition to the former two Chapters, supplemental studies with general comments are made as follows:

3-1 Profitability of Case I

As described in the begining of this Part, Case I is consisting of two profit centers i.e. PC-1 and PF-5. Providing the following conditions, Case I is splited into two projects, and financial and economic analysis are made on individual project.

a. Price of phosphate rock produced from CP-1 plant is assumed as equal to imported phosphate rock provided with certain adjustments by quality difference. Delivery condition is ex-godown of PF-5 plant site in Bahia Blanca.

b. Organization is assumed to be identical, and total labor cost is splited according to the required number of labors in each plant

c. The same operational unit costs and rates are applied.

As result of this supplemental study, however, cash flow of the both case are all nagative, and no IRR is available. Further, analysis of production cost composition are made as shown in Table VIII-1. In PC-1 Case, fixed cost components particularly labor costs and depreciation hold significant portion, and in PF-5 Case, variable cost components such as imported sulfur, imported ammonia and phosphate rock hold significant portion.

Table VIII-1 PRODUCTION COST ANALYSIS

(UNIT: USD 1,000)

	PC - 1				PF - 5				PF - 7			
	1990		1999		1990		1999		1990		1999	
PRODUCTION COST ITEM	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%
PRODUCTION VOLUME (MT/Y)	88,889	-	100,000	-	64,363	-	72,409	-	266,476	-	299,785	-
RAW MATERIALS & UTILITIES	2,356	14.25	4,633	13.49	21,138	46.37	41,401	38.49	12,205	16.18	25,959	29.61
NON-MAGNETIC TAILS	0	-	-	-	0	-	0	-	-	-	-	-
LIQUID AMMONIA (BULK)	-	-	-	-	4,197	9.21	9,058	8.42	-	-	-	-
SULFUR (BULK)	-	-	-	-	7,224	15.85	13,795	12.82	-	-	-	
PHOSPHATE ROCK OR NATURAL GAS	170	1.03	367	1.07	9,208	20.20	17,500	16.27	9,103	12.07	19,635	22.40
ELECRIC POWER	655	3.96	1,354	3.94	431	0.95	891	0.83	2,426	3.22	5,018	5.72
RAW WATER	5	0.03	10	0.03	34	0.08	71	0.07	136	0.18	282	0.32
CHEMICAL & CATALYST	1,526	9.23	2,901	8.45	45	0.10	85	0.08	540	0.72	1,026	1.17
TRANSPORTATION COST	958	5.79	1,982	5.77	0	-	0	-	0	0	0	0
FERTILIZER BAG	-	-	-	-	1,697	3.72	3,510	3.26	5,853	7.76	12,105	13.81
VARIABLE COST	3,315	20.04	6,615	19.26	22,836	50.10	44,912	41.75	18,055	23.94	38,059	43.42
DIRECT LABOR COST	1,565	9.46	2,877	8.38	2,209	4.85	4,061	3.78	2,535	3.36	4,661	5.32
OVERHEAD	1,878	11.36	3,453	10.06	2,651	5.81	4,873	4.53	3,042	4.03	5,592	6.38
MAINTENANCE	1,437	8.69	2,642	7.69	2,464	5.40	4,531	4.21	7,668	10.17	14,097	16.08
TAX & INSURANCE	459	2.78	459	1.34	770	1.69	770	0.72	2,158	2.86	2,158	2.46
DIRECT FIXED COST	5,339	32.29	9,431	27.47	8,094	17.75	14,235	13.24	15,403	20.42	26,509	30.24
CASH FACTORY COST	8,654	52.33	16,046	46.73	30,930	67.85	59,147	54.99	33,458	44.37	64,567	73.66
DEPRECIATION (EQUIPMENT)	3,490	21.10	3,490	10.16	5,985	13.13	5,985	5.56	18,622	24.69	18,622	21.24
DEPRECIATION (BUILDINGS)	205	1.24	205	0.60	352	0.77	352	0.33	1,096	1.45	1,096	1.25
AMORTIZATION (PRE-OPERAT'L EXP.)	374	2.26	0	-	957	2.10	0	-	762	1.01	0	0
AMORTIZATION (INT. DR'G CONST'N)	875	5.29	0	-	1,608	3.53	0	-	4,662	6.18	0	0
DEPRECIATION & AMORTIZATION	4,944	29.90	3,695	10.76	8,902	19.53	6,337	5.89	25,142	33.34	19,718	22.49
TOTAL FACTORY COST	13,598	82.23	19,741	57.49	39,832	87.38	65,484	60.88	58,600	77.70	84,285	96.15
UNIT FACTORY COST	(0.1530)	-	(0.1974)	-	(0.6189)	-	(0.9044)	-	(0.2199)	-	(0.2812)	-
SALES EXPENSES	142	0.86	300	0.87	455	1.00	960	0.89	942	1.25	2,148	2.45
OPERATING EXPENSES	13,740	83.09	20,041	58.36	40,286	88.38	66,444	61.77	59,542	78.95	86,433	98.60
INTEREST ON LONG-TERM DEBT	2,797	16.91	215	0.63	5,295	11.62	407	0.38	15,869	21.04	1,221	1.39
INTEREST ON SHORT-TERM DEBT	0	-	14,086	41.01	0	-	40,714	37.85	0	0	0	0
OTHER (IVA)	0	-	0	-	0	-	0	-	0	0	0	0
TOTAL PRODUCTION COST	16,537	100.00	34,341	100.0	45,582	100.00	107,565	100.00	75,411	100.00	87,654	100.0
UNIT PRODUCTION COST	(0.1860)	-	(0.3434)	-	(0.7082)	-	(1.4855)	-	(0.2830)	-	(0.2924)	

Unit production cost of either case, however, is extreamly high as shown below, and, improvement of the financial viability of the project seems to be very difficult.

Products	1990	1999
Phosphate Rock	(USD/Ton)	(USD/Ton)
A. PC-1	186.00	343.40
B. Imported	104.52	177.65
C. A/B	1.78	1.93
MAP		
A. PF-5	708.20	1,485.50
B. Imported	385.24	662.80
C. A/B	1.84	2.24

3-2 Capacity Utilization Rate of Case II

A supplementry study on marketability and demand of phoshate fertilizer product for Case II (NP/CAN) which would suffer the project feasibility is made as reference.

The demand projection of NP and CAN are given in Table II-25 and cited as follows:

Case II (PC-1, PR/PF-7, NP/CAN)

	NP	CAN
Product	(20.8 – 20.8 – 0.0)	(26.0 – 0.0 – 0.0)
Production Capacity, TPY	163,677 (90%)*	139,709 (90%)*
Sales, TPY		
- 1990	83,173 (45.7%)*	40,385 (26.0%)*
	(17,300 – 17,300 – 0.0)	(10,500 – 0.0 – 0.0)
- 1995	106,731 (58.7%)*	43,077 (27.8%)*
	(22,200 – 22,200 – 0.0)	(11,200 – 0.0 –0.0)
Growth Rate, %/year	5.1	1.3

*Capacity Utilization

The sales potential for NP is always higher than that of CAN, therefore for the objective of this study, following assumption are provided;

(1) The annual growth rate of both NP and CAN demand throughout the project life is 5.1%/year.

(2) Demand of CAN would follow to the demand of NP in production rate within the potential market demand and production capactity (90%) provided that the sales price of CAN is to be reduced by 10% from the original estimate, to attain such sales volume.

The production, sales and capacity utilization for the alternative case, Case II (L), is projected on the above assumption.

Case II (L)

	NP			CAN		
Year	Production	Sales	Capacity Utilization	Production	Sales	Capacity Utilization
1990	94,364	86,500	51.9%	80,545	73,833	51.9%
91	90,611	90,924	49.8	77,343	77,610	49.8
92	96,025	95,574	52.8	81,964	81,579	52.8
93	100,865	100,462	55.5	86,095	85,751	55.5
95	111,452	111,000	61.3	95,132	94,746	61.3
2000	143,019	142,439	74.8	122,076	121,581	78.6
05	163,677	163,677	90.0	139,709	139,709	90.0
09	163,677	163,677	90.0	139,709	139,709	90.0

Financial rate of return for Case II (L) in comparison with the original case, Case II, is as follows;

Case II		FIRROI, % Before Tax	After Tax
Case II,	(C)	14.19	12.15
	(R)	7.49	5.62
Case II (L)	(C)	9.74	8.59
	(R)	3.28	2.22

As shown above, financial rate of return is reduced for Case II (L), which production and sales projection are lower than those of Case II, according to the domestic marketability of NP and CAN in Argentine. Therefore the project for Case II (L) would be considered not feasible, too.

3-3 Tax Incentive Case on Case II

Despite of the paragraph 1-1-6 of Part VI, another alternative of "Tax Incentive Case" is studied on Case II. Particular conditions assumed on this case are as follows;

- Stamp duty is exempted from all contracts for implementation of the project.
- All import duties on imported goods including equipment and materials for construction of the plant and imported raw materials, catalysts and chemicals for operation of the plant are exempted.
- Value added tax (IVA) is fully exempted on all goods and services procured.
- Corporate income tax is exempted.
- Above tax exemptions are applicable for the period of seven (7) years after first operating year or through 1996.

Internal rate of return on the above case comparing with the original case is as follows:

		FIRROI, %	
Case II		Before Tax	After Tax
Original Case	(C)	14.19	12.15
	(R)	7.49	5.62
Tax Incentive Case	(C)	20.29	17.39
	(R)	13.22	10.54

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