

1) Profit after tax on equity

The value of profit after tax on equity shows 5, 11.6 and 27.9 percent in 5th, 10th and 15th years after commercial operation respectively; however, the values are not very high.

2) Debt service coverage ratio

The results of calculation on DSR for this project show 1.8 at the first year of commercial operation and 1.4 at the fourth year when the repayment starts. Calculated DSR values always exceed 1 throughout the project life, meaning that the financial status of the project is rather good.

3) Breakeven point

The breakeven points are 88.9 percent for the first four years, higher than the scheduled operation rate of 80 percent for the first year. For the second year, the breakeven point is about equal to the planned operation rate for the second year and lower than the operation rate for the rest of the project.

12.9 Sensitivity Analysis on FIRR

Sensitivity analyses are carried out for the following parameters.

- Construction cost
- Sales prices of production
- Operation cost
- Electricity cost
- Interest rate
- Equity
- Income tax without reinvestment

Table 12-14 Changes in Inputs

	<u>Base Case</u>	<u>+ 20</u>	<u>- 20</u>
Construction cost, x10 ³ US\$	51,921	62,805	41,537
Sales price			
PVC, US\$/t	1,100	1,320	880
Slaked lime, US\$/t	50	50	50
Operation cost, 1,000 US\$/y	15,870	19,044	12,969
Electricity cost, 1,000 US\$/y	4,880	5,856	3,094
Interest rate, %	13.5	11.0	5.0
Equity, %	40	50	20

Table 12-15 Results of Sensitivity Analysis

FIRR on I (Before tax)

	<u>Base Case</u>	<u>+ 20</u>	<u>- 20</u>	(Unit: %)
Construction cost	16.8	14.0	20.5	
Sales price	16.8	24.2	7.7	
Operation cost	16.8	11.9	21.1	
Electricity	16.8	15.3	18.1	

FIRR on I (After Tax)

	<u>Base Case</u>	<u>+ 20</u>	<u>- 20</u>	(Unit: %)
Construction cost	11.9	9.9	14.6	
Sales price	11.9	17.2	5.4	
Operation cost	11.9	8.4	15.0	
Electricity	11.9	10.9	12.9	

Table 12-15 - continued

FIRR on E (After Tax)

	<u>Base Case</u>	<u>+ 20</u>	(Unit: %) <u>- 20</u>
Construction cost	15.5	11.0	21.0
Sales price	15.5	26.2	minus
Operation cost	15.5	7.4	28.4
Electricity	15.5	13.7	17.6
Interest rate	15.5	17.2	21.4
(Condition, %/y)	(13.5)	(11.0)	(5.0)
Equity	15.5	14.5	19.1
(Condition, %)	(40)	(50)	(20)

(1) Change in construction cost

As indicated in Figures 12-1, 12-2, 12-3 and Table 12-15, the change of investment cost affects considerably the profitability of the project. When the investment cost decreases by 20 percent, the rate of FIRR on I (before tax) increases by 3.7 percent, and the rate of FIRR on E (after tax) increases by 5.5 percent.

(2) Changes in sales prices of products

The effects exerted by the changes in sales price on profitability are studied by varying the prices of products plus and minus 20 percent. As indicated by Figures 12-1, 12-2, 12-3 and Table 12-15, when the sales prices of products increase by 20 percent the rate of FIRR on I (before tax) and FIRR on E (after tax) increase by 7.4 and 10.7 percent respectively. The revenue from the sales of slaked lime accounts for only 1.6 percent of the total sales revenue; therefore, the Variations of the price of slaked lime do have little affect on the rate of FIRR.

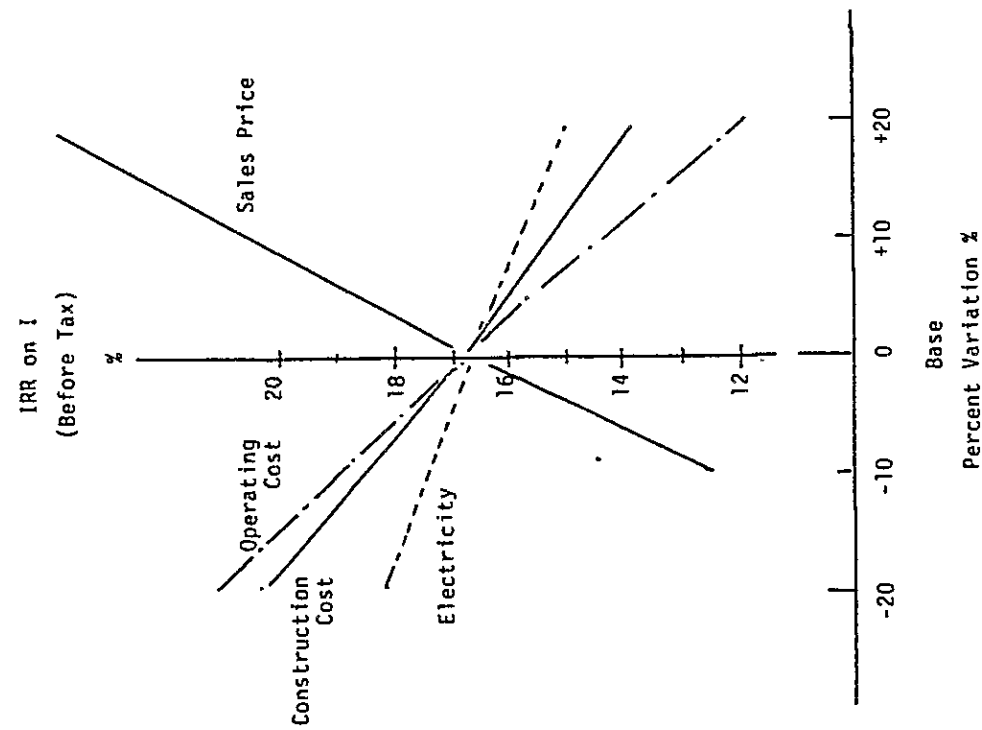


Figure 12-1 Summary of Sensitivity Analysis
(IRR on I Before Tax to Variation
of Financial Parameters)

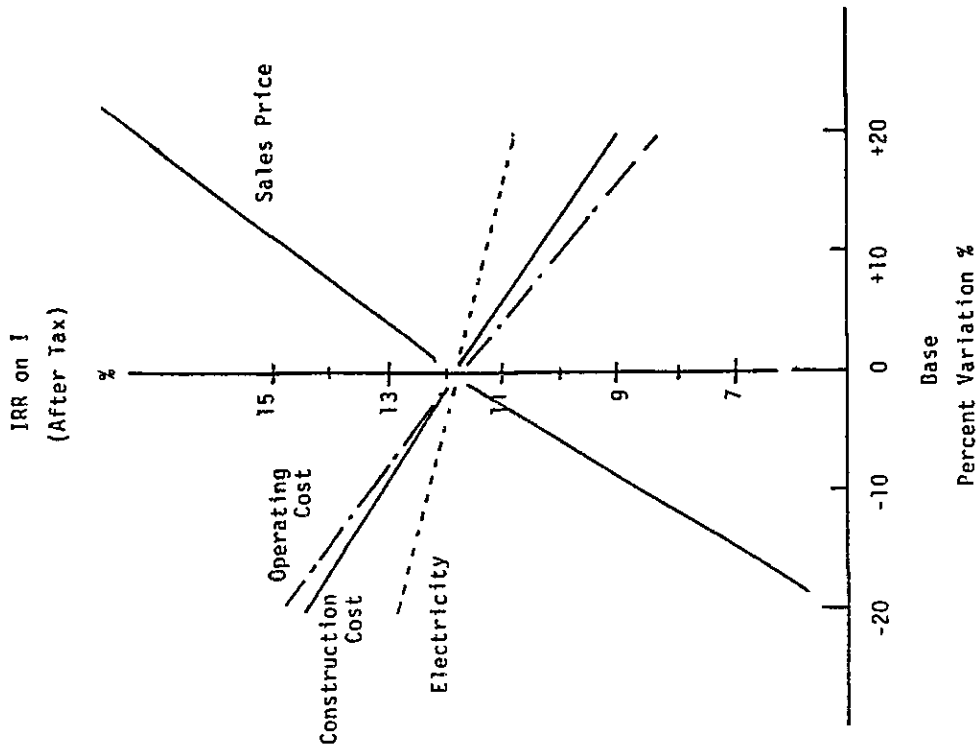


Figure 12-2 Summary of Sensitivity Analysis
(IRR on I After Tax to Variation
of Financial Parameters)

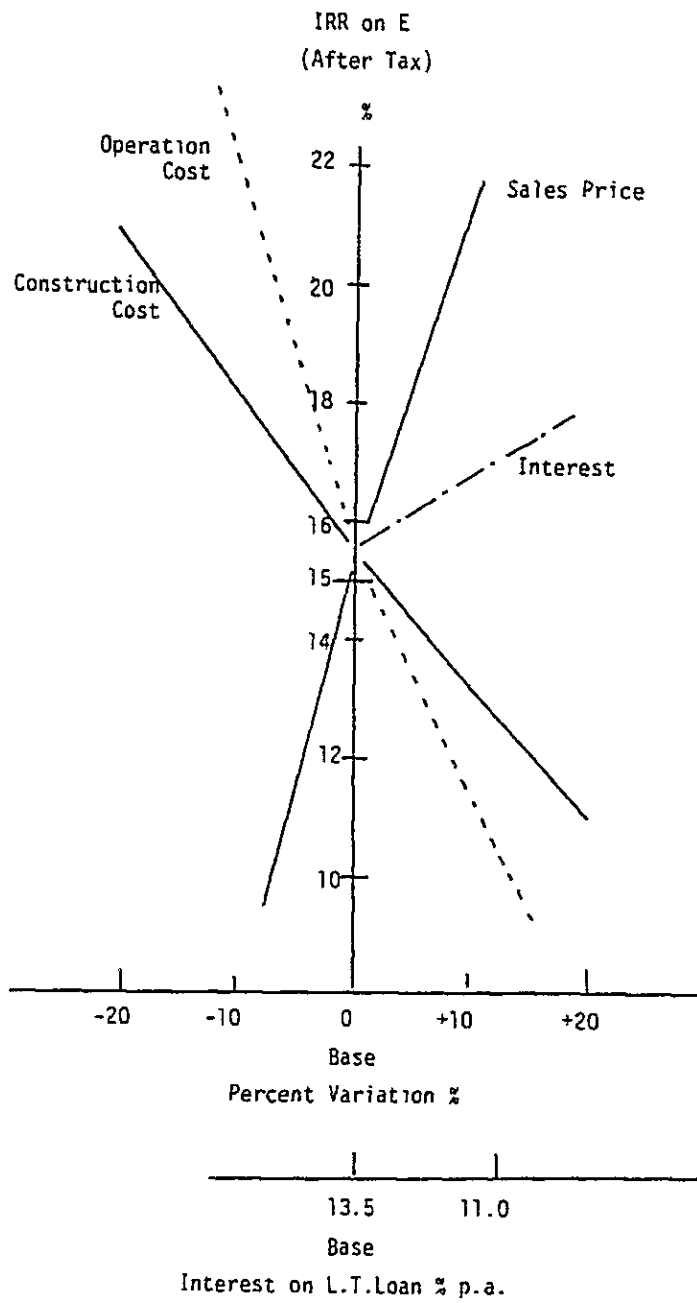


Figure 12-3 Summary of Sensitivity Analysis
(IRROE % to Variation of Financial
Parameters)

(3) Changes in operation cost

The operation cost of the project consists of the costs of raw materials, utilities, auxiliary materials, labors, overhead, maintenance, etc. The effects exerted on the profitability is studied by varying the operation cost plus and minus 20 percent. As indicated in Figures 12-1, 12-2, 12-3 and Table 12-15, the effects exerted by plus and minus 20 percent changes of operation cost on FIRR are very large.

(4) Changes of electricity cost

The Cost of electricity in the production of PVC accounts for 31 percent. The plus 20 percent change of costs of electricity shows the variation of minus 1.5 percent of FIRR on I (before tax) and of minus 1.8 percent of FIRR on E (after tax).

(5) Changes in interest

Figure 12-3 shows the effect of changes in interest on FIRR on E, together with effects of operation cost, construction cost and sales price.

The change in interest affects the rate of FIRR on E considerably. Therefore, in order to make this project better, it is important to borrow funds with a low interest rate.

(6) Changes of equity

When the equity ratio decreases from 40 percent of the Base Case to 20 percent, the rate of FIRR on E (after tax) increases by 3.6 percent.

(7) Tax (include industrial community) without reinvestment

Income taxes with and without reinvestment are shown below.

(Unit: %)

Profit Before Tax (1,000 US\$)	<u>Without Reinvestment</u>			<u>With Reinvestment</u>		
	<u>Industrial Community</u>	<u>Income Tax</u>	<u>Total</u>	<u>Industrial Community</u>	<u>Income Tax</u>	<u>Total</u>
Less than 107	27	30	48.90	27	2.19	29.19
From 107 to 1,074	27	40	56.20	27	5.84	32.84
From 1,074 to 2,148	27	50	63.50	27	10.95	37.95
More than 2,148	27	55	67.15	27	14.052	41.052

The income tax rates without the reinvestment incentives are considerably higher. The FIRR on E (after tax) without reinvestment incentives is 11.5 percent, which compares unfavorably with 15.5 percent FIRR on E for the base case.

(8) Effect of hydrogen chloride cost

Shown below are FIRR's for after and before taxes with hydrogen chloride cost.

	<u>FIRR on I</u>	<u>FIRR on E</u>
Before tax, %	14.5	15.3
After tax, %	10.3	11.9

FIRR on I after tax of 10.3 with hydrogen chloride cost is 1.6 percent smaller than the corresponding FIRR on I of 11.9 percent without hydrogen chloride cost.

12.10 Discussion

Shown below are FIRR's on I and E for six different cases.

(Unit: %)

	FIRR on I		FIRR on E	
	<u>Before tax</u>	<u>After Tax</u>	<u>Before tax</u>	<u>After tax</u>
Case 1	11.2	5.3	8.9	minus
Case 2	13.2	6.3	12.8	5.7
Case 3	13.2	6.3	12.8	6.2
Case 4	14.1	7.1	14.5	8.1
Case 5 (B)	14.1	10.3	14.7	11.5
Case 6 (A)	16.8	11.9	19.7	15.5

Case 1: Duty included, hydrogen chloride cost 101 US\$/ton, without loss carry forward, without internal tax refund, without income tax reduction for reinvestment.

Case 2: Hydrogen chloride cost Zero, all other conditions remain as Case 1.

Case 3: 5 year loss carry forward included, all other conditions remain as Case 2.

Case 4: Internal tax refund included, all other conditions remain as Case 3.

Case 5 (B): Income tax reduction by reinvestment included, all other conditions remain as Case 4.

Case 6 (A): Exemption of duty and associated expenses included, all other conditions remain as Case 5.

This table shows FIRR's on I and E in the order of increasing incentives. Without any incentive this project shows too bad a profitability as represented by Case 1. With elimination of hydrogen chloride cost the profitability shows improvement but these indices are still too low to justify this project. Zero price is based on the fact that more hydrogen chloride than required for this project is now discharged to the sea. The loss carry forward, internal tax refund, and income tax reductions are all legalized incentives and this project should enjoy such incentives.

CHAPTER 13 ECONOMIC ANALYSIS

13.1 General

Now that financial analysis has been done to evaluate the project viability, this chapter evaluates the project in terms of benefits and costs to the nation rather than to SPL. The more important items studied here are economic costs and benefits, economic internal rate of return (EIRR), tax income to the government and effects on balance of payments situation. When calculating the economic internal rate of return, national parameters are introduced to convert some of the financial values to economic values. The national parameters used are listed in Table 13-1.

Table 13-1 National Parameters

	(as of 1982)
Foreign exchange premium	$\Phi = 2.65$
Unskilled labor premium	$\lambda = 0.33$
Domestic skilled labor premium	$X = 0.69$
Social rate of discount	$i = 6.00\%$

13.2 Economic Cost and Benefit

Major items of importance that constitute the economic costs and benefits are those given in Table 13-2.

Table 13-2 Economic Cost and Benefit

Cost	Benefit
Investment cost	PVC production
Raw materials and utilities	Slaked lime production
Labor cost	Development of infrastructure
Other expenses for plant	Increased employment opportunities
Operation	Utilization of HCl now disposed of
	Foreign currency saving

13.3 Economic Benefit

(1) Direct benefit

Direct benefits of this project are the economic benefit of PVC and slaked lime. The economic benefit of products at full operation is as follows:

Table 13-3 Economic Value of Products

	<u>Unit Price (US\$)</u>	<u>Production (t/y)</u>	<u>Benefit (1,000 US\$)</u>
PVC	558*	25,000	13,950
Slaked lime	50	9,000	<u>450</u>
Total			14,400

Note: *PVC price is on CIF as of 1983

(2) Indirect benefit

1) Increase in employment opportunities

This project creates employment opportunities during both construction and operation stages. Unlike many chemical projects this project includes mining and transportation of limestone which generate the kind of employment opportunities that have not been found in many chemical industries. The direct employment opportunities for the operation are estimated at 250.

2) Ripple effects on other industries

Ripple effects on other industries include increased demand for local supplies for plant construction and operation. The demand for human resources would be the most important. Although equipment and facilities are mostly imported, there will still be demand for local supplies like cement and steel. The demand for humane resources would include, apart from those directly employed by the project, local construction and engineering companies.

This project would also provide a stable demand for anthracite. Those small-scale deposits of anthracite may be developed once dependable demand is created. This project also means effective utilization of hydroelectric power. Although electricity is not provided very cheap in Peru, the fact still remains that hydroelectric power is a natural resource Peru is generously gifted. Peru still has immense hydroelectric power to be economically developed.

3) Other indirect effects

First and foremost, a portion of hydrogen chloride now being disposed of to the sea is effectively recovered and made use of. This means better utilization of valuable natural resources on one hand. Perhaps more important is the amelioration of the pollution of the sea which could be a potential hazard to the fishing industry.

It is expected that this project will have a stabilizing effect on the domestic price of PVC. This effect cannot be quantitatively measured; however, provided that this project provide PVC at prices competitive with imported products, this will protect the domestic plastic industry from price fluctuations in the international market.

13.4 Economic Cost

Economic costs caused by this project is mentioned below:

- Initial investment
- Labor cost
- Other production expense

(1) Initial investment

Included in this category are those necessary for the development of the quarry, improvement of infrastructure at the quarry and Paramonga, purchased plant machinery, construction cost of the plants, cost of the test run, etc. These investments are converted into economic cost of investment. Table 13-4 shows the

financial capital requirement for this project and Table 13-5 indicates the economic cost for investment.

(2) Labor cost and other costs

Domestic labor costs are converted into economic labor costs in US\$ by means of labor premium factor and national parameter. Consumables and expenses necessary for the operation and maintenance of the plants are expressed in economic cost in US\$. Table 13-6 shows the financial operating costs and Table 13-7 is the economic costs for operation. The taxes, loan, interest and insurance are not included in the Cost, because such costs are transfer items in economic analysis.

13.5 Economic Internal Rate of Return (EIRR)

Major premises for EIRR calculation are the same as those described in the financial analysis.

Relevant cost and benefit are quantitatively evaluated to calculate EIRR values. Although it is desirable that the effects of saving and income distribution are studied quantitatively to evaluate the project from the socio-economic point of view, only economic analysis has been done in this study because data and resources available did not permit such study. The following tables show the Summary of economic cost and benefit.

Table 13-4 Financial Capital Requirement

	Foreign Currency Portion						Domestic Currency Portion						Total				
	-3		-2		-1		-3		-2		-1						
	Person'l	Mat'l	Person'l	Mat'l	Person'l	Mat'l	U.S.L.	S.D.L.	Mat'l	Duty	U.S.L.	S.D.L.		Mat'l	Duty		
1. Land Acquisition	-	-	-	-	-	-	-	31	62	93	0	-	0	0	0	0	
2. Land Preparation for Mining	-	-	-	-	-	-	255	270	158	-	-	10	12	7	21	6	
3. Access Road	-	-	-	30	-	7	0	0	0	0	0	-	-	-	-	-	
4. Civil & Buildings	-	-	-	1,644	-	237	-	0	-	-	-	90	108	63	1,075	155	
5. Mining Machinery	-	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-	
6. Construction Work	-	-	-	-	-	-	-	0	0	0	0	-	-	14	3	17	
7. Inland Transportation	-	-	-	1,674	-	244	-	256	332	251	0	100	120	84	1,096	161	
A. Sub-Total	-	-	-	-	-	-	97	192	290	-	-	0	0	0	0	0	
8. Land & Site Preparation	-	-	-	-	-	-	0	0	0	0	0	82	66	100	65	242	
9. Civil	0	0	0	151	-	0	0	0	0	0	0	370	97	960	725	247	
10. Buildings	0	0	0	1,633	-	451	-	0	0	0	0	-	-	-	-	65	
11. Equipment & Machinery	0	0	0	16,100	-	6,853	-	-	-	-	-	-	-	-	-	-	
12. Erection Works	-	-	-	-	-	-	0	0	0	0	0	595	481	730	8,516	3,619	
13. Inland Transportation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
B. Sub-Total	0	0	0	17,864	-	7,304	-	97	192	290	0	1,047	644	1,856	9,306	2,247	
14. Engineering & Consultants Fee	2,410	-	-	1,210	-	1,545	-	-	-	-	-	-	-	-	-	-	
15. Contingencies	0	0	0	200	678	200	678	-	-	-	-	-	-	-	-	-	
-Physical-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16. Construction Expenses	1,722	1,722	1,722	1,722	1,721	1,721	-	-	-	-	-	-	-	-	-	-	
C. Sub-Total	2,410	1,722	1,722	2,400	1,745	2,399	-	-	-	-	-	-	-	-	-	-	
TOTAL (A+B+C)	2,410	1,722	1,410	21,958	1,745	9,947	353	524	541	0	1,147	764	1,940	10,402	2,361	1,852	
17. Pre-Operating Expenses	-	-	-	-	134	144	-	-	-	-	-	-	-	-	-	-	
18. Working Capital	-	0	-	0	-	566	-	-	-	0	-	-	121	-	0	448	
19. Interest During Construction	-	-	-	459	-	3,554	-	-	-	-	-	-	-	-	-	-	
GRAND TOTAL	2,410	1,722	1,410	22,417	1,879	14,211	353	645	541	0	1,147	885	1,940	10,402	2,361	2,300	
																	5,993
																	4,456
																	75,072

Person'l: Personnel
 Mat'l : Material
 U.S.L. : Unskilled labor
 S.D.L. : Domestic skilled labor

Table 13-5 Economic Cost for Investment

	Foreign Currency Portion				Domestic Currency Portion						Total				
	-3		-2		-1		-2		-1						
	Person'l	Mat'l	Person'l	Mat'l	Person'l	Mat'l	U.S.L.	S.D.L.	Mat'l	Duty		U.S.L.	S.D.L.	Mat'l	Duty
1. Land Acquisition	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
2. Land Preparation for Mining	-	-	-	-	-	-	4	16	35	-	0	0	0	0	55
3. Access Road	-	-	-	-	-	-	28	70	60	-	-	-	-	-	158
4. Civil & Buildings	-	-	-	30	-	7	0	0	0	0	1	3	4	4	53
5. Mining Machinery	-	-	-	1,664	-	237	-	-	-	0	-	-	-	-	1,881
6. Construction Work	-	-	-	-	-	-	0	0	0	11	28	24	34	32	142
7. Inland Transportation	-	-	-	-	-	-	32	86	95	0	12	31	32	37	6
A. Sub-Total	-	-	-	1,674	-	344	-	-	-	-	-	-	-	-	4,674
8. Land & Site Preparation	-	-	-	-	-	-	12	50	109	-	0	0	0	0	171
9. Civil	-	-	-	151	-	0	0	0	0	10	17	38	52	114	412
10. Buildings	-	-	-	1,633	-	451	0	0	0	46	25	362	31	17	2,807
11. Equipment & Machinery	-	-	-	16,100	-	6,853	-	-	-	-	-	-	-	-	22,953
12. Erection Works	-	-	-	-	-	-	0	0	0	74	125	275	219	376	1,895
13. Inland Transportation	-	-	-	-	-	-	97	50	109	0	130	167	280	445	31
B. Sub-Total	-	-	-	17,884	-	7,304	-	-	-	-	-	-	-	-	28,269
14. Engineering & Consultants Fee	2,410	-	-	-	1,210	-	1,545	-	-	-	-	-	-	-	5,165
15. Contingencies -Physical-	0	0	200	678	200	678	-	-	-	-	-	-	-	-	1,756
16. Construction Expenses	-	1,722	-	1,722	-	1,721	-	-	-	-	-	-	-	-	5,165
C. Sub-Total	2,410	1,722	1,410	2,400	1,745	2,399	-	-	-	-	-	-	-	-	12,086
TOTAL (A+B+C)	2,410	1,722	1,410	21,958	1,745	9,947	44	524	204	142	198	732	294	483	42,650
17. Pre-Operating Expenses	-	-	-	-	134	144	-	32	-	-	121	-	0	116	779
18. Working Capital	-	0	-	0	-	566	-	-	-	-	-	-	-	-	1,281
19. Interest During Construction	-	-	-	0	-	0	-	-	-	-	-	0	-	-	0
GRAND TOTAL	2,410	1,722	1,410	21,958	1,879	10,657	44	168	204	142	230	732	294	599	44,710

Person'l: Personnel
 Mat'l: Material
 U.S.L.: Unskilled labor
 S.D.L.: Domestic skilled labor

Table 13-6 Financial Operating Cost of PVC

	Annual Consumption	Unit Price	Annual Cost (x 10 ³ US\$)	Unit Cost per t of PVC (US\$/t)	Foreign Currency Portion		Domestic Currency Portion				Total	
					Personnel	Material	U.S.L.	S.D.L.	Material	Duty		Total
Variable Cost												
1. Raw Material												
Coke	19,800 t	187 US\$/t	3,703	146.12	-	2,220	-	-	1,483	1,483	-	3,703
Hydrogen Chloride	15,300 t	0 US\$/t	0	0	-	-	-	0	-	-	0	0
2. Utilities												
Electricity	139.425 x 10 ³ kwh	35 US\$/10 ³ kwh	4,880	195.20	-	-	-	4,880	-	-	4,880	4,880
Steam	70,650 t	21 US\$/t	1,484	59.36	-	-	-	1,484	-	-	1,484	1,484
Cooling Water			nil		-	-	-	-	-	-	-	nil
3. Auxiliary Materials												
Sub-Total			2,051	82.04	-	1,231	-	-	820	820	-	2,051
Sub-Total			12,118	484.72	-	3,451	-	6,364	2,303	8,667	-	12,118
Fixed Cost												
4. Direct Labor			1,014	40.56	-	-	-	349	-	-	1,014	1,014
5. Plant Overhead			1,142	45.68	-	-	-	642	500	-	1,142	1,142
6. Maintenance			1,240	49.60	-	806	-	-	434	-	434	1,240
7. Insurance			327	13.08	-	-	-	-	327	-	327	327
8. Tax			24	0.96	-	-	-	-	-	24	24	24
Sub-Total			3,747	149.88	0	806	-	991	1,261	24	2,941	3,747
GRAND TOTAL			15,865	634.60	0	4,257		991	7,625	2,327	11,608	15,865

Person'l: Personnel
 Mat'l : Material
 U.S.L. : Unskilled labor
 S.D.L. : Domestic skilled labor

Table 13-7 Economic Cost for Operation

	Foreign Currency Portion		Domestic Currency Portion				Total
	Personnel	Material	U.S.L.	S.D.L.	Material	Duty	
Variable Cost							
1. Raw Material							
Coke	-	2,220	-	-	-	0	2,220
Hydrogen Chloride	-	-	-	-	0	-	0
2. Utilities							
Electricity	-	-	-	-	1,842	-	1,842
Steam	-	-	-	-	560	-	560
Cooling Water	-	-	-	-	-	-	nil
3. Auxiliary Materials							
Sub-Total	-	1,231	-	-	-	0	1,231
Sub-Total	-	3,451	-	-	2,402	0	5,853
Fixed Cost							
4. Direct Labor							
Sub-Total	-	-	83	91	-	-	174
5. Plant Overhead							
Sub-Total	-	-	-	167	189	-	356
6. Maintenance							
Sub-Total	-	806	-	-	164	-	970
7. Insurance							
Sub-Total	-	-	-	-	0	-	0
8. Tax							
Sub-Total	-	-	-	-	-	0	0
Sub-Total	0	806	83	258	353	0	1,500
GRAND TOTAL	0	4,257	83	258	2,755	0	7,353

Person'l: Personnel
 Mat'l : Material
 U.S.L. : Unskilled labor
 S.D.L. : Domestic skilled labor

Table 13-8 Economic Benefit and Cost (Base Case)

<u>Year</u>	<u>Benefit</u>	<u>Cost</u>	<u>Balance</u>
-3	-	4,548	-4,548
-2	-	24,472	-24,472
-1	-	15,690	-15,690
1	11,520	6,182	5,338
2	12,960	6,768	6,192
3	14,400	7,353	7,047
4	14,400	7,353	7,047
5	14,400	7,353	7,047
6	14,400	7,353	7,047
7	14,400	7,353	7,047
8	14,400	8,524	5,876
9	14,400	7,353	7,047
10	14,400	8,743	5,657
11	14,400	7,353	7,047
12	14,400	7,353	7,047
13	14,400	8,854	5,546
14	14,400	7,353	7,047
15	14,400	8,524	5,876
16	14,400	7,353	7,047
17	14,400	7,353	7,047
18	14,400	7,353	7,047
19	14,400	7,353	7,047
20	14,400	7,353	7,047

Table 13-9 Calculated EIRR

	(Unit: %)				
	<u>Base Case</u>	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>	<u>Case 4</u>
	12.0	17.5	5.2	9.6	15.4

- Case 1: Economic benefit +20%
- Case 2: Economic benefit -20%
- Case 3: Economic cost for investment +20%
- Case 4: Economic cost for investment -20%

Calculated rates of EIRR shown in Table 13-9 should be evaluated in comparison with opportunity cost of the capital which is the benefit the same capital could generate if used otherwise. How high EIRR should be to justify a project from economic — not financial — point of view is a question to which no clear-cut answer exists. Various international institutions are proposing cut-off rates ranging from 8 to 15 percent.

The obtained EIRR of this project is 12.0 which is within the above range. This value is not very good but still it may be regarded as being in the viable range.

13.6 Industrial Community and Tax Income

The cumulative industrial community and tax income from this project totals 54 million US\$ during the 20 years commercial operation. This tax income will greatly contribute to the national economy of Peru. Yearly tax income of the government from this project is summarized in Table 13-10.

Table 13-10 Yearly Tax Income

(Unit: 1,000 US\$)

<u>Year</u>	<u>Ind. Community & Tax Income</u>	<u>Local Tax</u>	<u>Total</u>
1	0	24	
2	0	24	
3	174	24	
4	668	24	
5	921	24	
6	1,324	24	
7	1,523	24	
8	1,722	24	
9	1,742	24	
10	1,941	24	
11	3,988	24	
12	4,187	24	
13	4,386	24	
14	4,656	24	
15	4,656	24	
16	4,478	24	
17	4,478	24	
18	4,478	24	
19	4,478	24	
20	4,478	24	
<u>Total</u>	<u>54,278</u>	<u>480</u>	<u>54,758</u>

13.7 Effects of Project on Balance of Payments

The expected effect of this project on the balance of payments of Peru is studied in this section.

The total foreign currency required by this project for production, interest and repayment to the loan, amounts to 168 million US\$ during the 23 years project period including pre-operational period.

(1) Foreign currency requirement during pre-operational period

The total foreign capital requirement is shown in Table 13-11. The foreign currency requirement during the pre-operational period is calculated to be 44 million US\$, which is assumed to be loaned by a long term loan of 11 percent per year interest.

Table 13-11 Breakdown of Foreign Currency Requirement
in Total Capital Requirement

(Unit : 1,000 US\$)

<u>Investment Cost</u>	<u>Pre-Operation Cost</u>	<u>Initial Working Capital</u>	<u>Interest</u>	<u>Total</u>
39,192	278	566	3,530	43,566

Note: The case for without duty. Foreign currency portion is all loaned by a long-term loan with interest rate of 11 percent p.a. This means that 2.5 percent of 13.5 percent per annum of financial interest rate is guarantee fee and therefore domestic.

(2) Foreign currency expenses during operational period

The expense of foreign currency during the operational period is shown in Table 13-12.

Table 13-12 Foreign Currency Requirement During Operation Period

(Unit: 1,000 US\$)

Year	Interest	Repay- ment	Operation			Total
			Coke	Auxiliary Material	Mainte- nance	
1	4,792	0	1,776	985	806	8,359
2	4,792	0	1,998	1,108	806	8,704
3	4,792	0	2,220	1,231	806	9,049
4	4,792	4,357	2,220	1,231	806	13,406
5	4,313	4,357	2,220	1,231	806	12,927
6	3,834	4,357	2,220	1,231	806	12,448
7	3,354	4,357	2,220	1,231	806	11,968
8	2,875	4,357	2,220	1,231	806	11,489
9	2,396	4,357	2,220	1,231	806	11,010
10	1,917	4,356	2,220	1,231	806	10,530
11	1,438	4,356	2,220	1,231	806	10,051
12	958	4,356	2,220	1,231	806	9,571
13	479	4,356	2,220	1,231	806	9,092
14	0	0	2,220	1,231	806	4,257
15	0	0	2,220	1,231	806	4,257
16	0	0	2,220	1,231	806	4,257
17	0	0	2,220	1,231	806	4,257
18	0	0	2,220	1,231	806	4,257
19	0	0	2,220	1,231	806	4,257
20	0	0	2,220	1,231	806	4,257
Total	40,732	43,566	43,734	24,251	16,120	168,403

13.8 Foreign currency savings

The product PVC is to be marketed solely in Peru, and no direct export of PVC is contemplated. At the present, Peru is importing PVC and will continue to import in case that this project is not realized. In addition SPL will have to import EDC if SPL does not implement this project. The following table shows the effects on foreign currency saving.

Table 13-13 Foreign Currency Saving

Year	Demand (t/y)	Existing Plant (t/y)	Balance	New Plant (t/y)	EDC Import (US\$/y)	Replacement (t/y)	Foreign Currency Saving (1,000 US\$/y)
1	21,220	7,000	14,220	25,000	2,548	14,220	7,345
2	22,890	7,000	15,890	25,000	2,548	15,890	8,867
3	24,690	7,000	17,690	25,000	2,548	17,690	9,871
4	27,000	7,000	20,000	25,000	2,548	20,000	11,160
5	29,000	7,000	22,000	25,000	2,548	22,000	12,276
6	31,000	7,000	24,000	25,000	2,548	24,000	13,392
7	34,000	7,000	27,000	25,000	2,548	25,000	13,950
8				25,000		25,000	13,950
9				25,000		25,000	13,950
10				25,000		25,000	13,950
11				25,000		25,000	13,950
12				25,000		25,000	13,950
13				25,000		25,000	13,950
14				25,000		25,000	13,950
15				25,000		25,000	13,950
16				25,000		25,000	13,950
17				25,000		25,000	13,950
18				25,000		25,000	13,950
19				25,000		25,000	13,950
20				25,000		25,000	13,950
Total					17,836		258,211

Total saving: $17,836 + 258,211 = 276,074$ thousand US\$

13.9 Balance of Payments

The implementation of this project and 20 years operation will realize 108 million US\$ of savings of foreign currency in total.

CHAPTER 14 OVERALL EVALUATION

14.1 Summary

Upon completion of the study, the project is given an overall evaluation. This project is financially viable; however, the impact of the import duty on the viability of the project is significant. Technically the processes are proven. The supply of raw materials, condition of the site, infrastructure, natural conditions, technical level of SPL, none of which would interrupt smooth implementation and operation of this project. The forecast demand of PVC supports the planned capacity. This project will have very favorable socio-economic effects. This project would not cause environmental problems. On the contrary this project would lessen the pollution of the sea by hydrogen chloride.

14.2 Technical Evaluation

This project may be considered to be technically sound. Pariahuanca will produce limestone of desired quality. Pariahuanca deposits lie along an important highway directly leading to Paramonga which facilitates transportation of limestone to the plant site. The traffic distance is about 230 kilometers which is easily covered by a fleet of trucks. Coke, the other important raw material, will be imported. Coke of uniform quality and size is available for importation. Electricity, steam and water may be made available to the project. The manufacturing processes are all commercially proven. The capacity, 25,000 tons per year, is within the economical range of the processes. The conditions of the planned plant site and surroundings are generally satisfactory. Construction of the plants is possible under the existing conditions. SPL has a strong technical background to operate all the facilities to be installed provided that technology is duly transferred. All these combined, this project may be evaluated to be technically sound.

14.3 Market Evaluation

As is elaborated in CHAPTER 4, MARKET STUDY, the domestic demand is forecast to exceed 25,000 tons per year as PVC around the year 1900. All approaches employed in this study support this view. SPL will be the only producer of PVC in

Peru. Provided SPL's PVC is competitive in price and quality with imported PVC this project can expect to fill the entire domestic market. This project is designed to be as economical as possible and at the same time to be able to produce the highest standard products.

There are virtually no domestic markets for calcium cyanamide, quick lime and slaked lime. The domestic market of carbide is also negligible. Therefore this project plans to produce only PVC. There exists possibility of using byproduct slaked lime in the Paramonga complex to a maximum of 9,000 tons per year.

Provided that SPL makes the utmost effort to reduce the cost of production and to meet the stringent quality requirement, in conclusion the marketing aspect of this project may be regarded as good enough to justify this project.

14.4 Financial Evaluation

The total capital requirement is estimated at 75,072 and 59,845 thousand US dollars respectively with import duty fully included and with import duty exempted. It should be noted that the import duty is very substantial. With import duty fully paid this project gives Internal Rate of Return of 10.3 percent after tax for standard case. Without the import duty, IRR is 11.9 percent for standard case.

The effect of interest on ROE is great. This means that a finance of very soft conditions must be used. Upon these conditions this project may be regarded as viable.

14.5 Socio-economic Evaluation

This project yields economic internal rate of 12.0 percent which is not very good but still justifies this project from national economic viewpoint. This project has a very favorable effect on the balance of payment. During the project period, the foreign currency gain totals 108 million US dollars, a contribution that should be highly valued in view of the large amount of debt from which Peru is suffering.

This project would provide incentives to the development of anthracite deposit by creating a steady demand for anthracite. Needless to say this project generates employment opportunities. Also important is the amelioration of the pollution of the sea by effectively utilizing a substantial portion of the excess hydrogen chloride now being discharged to the sea.

14.6 Overall Evaluation and Comparison with Possible Alternatives

The above discussions combine to mean that this project is technically and economically sound provided that a certain set of conditions is prepared as stated in the next chapter, RECOMMENDATION.

Regarding the comparison with other routes; production of PVC from alcohol or imported ED, this project has definite advantages. As is explained in CHAPTER 13, the continuation of the present operation, EDC route, has definite disadvantage in contribution to balance of payments. In addition, the EDC route increases the discharge of hydrogen chloride to the sea. The alcohol route is technically possible but SPL has once tried this route and abandoned it in favor of the EDC route. It is also found that supply and price of molasses, the raw material for alcohol, is not dependable under the existing circumstances, whereas this project has a dependable supply of the raw materials.

Overall, this project would have various favorable effects upon SPL as well as on the nation and may be evaluated as recommendable.

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CHAPTER 15 RECOMMENDATION

In the light of the outcomes of this feasibility study JICA presents the following recommendations:

- (1) JICA evaluates this project as worthy of realization. Therefore, JICA recommends that SPL implement this project. However, in implementing this project the following arrangements should be made.
- (2) In view of the significant impact of the import duty on the viability of the project, the exemption of import duty on the equipment has a very favorable effect and therefore should be sought.
- (3) SPL should seek finances of favorable conditions for this project. Government sponsored institutional finances are preferable in view of the facts that Peru has already been heavily in debt and that private finances with less favorable conditions are hurting the Peruvian economy.
- (4) SPL should establish firm marketing channels to PVC processors like pipe manufacturers, insulated wire manufacturers, shoes makers, floor tile manufactures, manufacturers of molded products such as toys, household utensils, office supplies, sheet makers, and wholesale dealers of plastic resins. This effort should precede the startup of this project.
- (5) In connection with the above (4), SPL should install organizations for quality control both at head office and Paramonga Plant independent of the production department. The organization for quality control at head office should collect information on the requirements of the market and have the production reflect such requirements. And the quality control team at the plant should insure that no product failing to meet market requirement will be delivered.
- (6) As is stated in CHAPTER 12, any increase in the price of electricity jeopardizes the economy of this project. SPL should do its best to negotiate preferential price of electricity in cases of future price increase.

- (7) The entire manufacturing scheme from limestone quarrying down to PVC polymerization contains various elements which are more of an art than science. Therefore SPL should employ only commercially proven processes and experienced process licensors and engineering companies.
- (8) SPL should train its engineers and operators for the startup, operation, shutdown, maintenance of the manufacturing facilities and also laboratory tests on limestone, carbide, coke, etc. Training should preferably be done in actual operating circumstances.
- (9) Before actually starting development of quarry detailed geological surveys, boring tests, estimation of reserves and the preparation of a quarry development plan should be carried out by professionals.

16 ACKNOWLEDGEMENT

To conclude this feasibility study report, we -- JICA and the study team -- wish to express heartfelt appreciation to those who have assisted in the study. First of all we thank ladies and gentlemen of SPL for the support to the activities of the study team during the field survey and the draft report presentation. We also thank Japanese Ambassador and his staff in Lima for the guidance to the study. We are indebted to the following organizations for providing us with valuable information:

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JETRO
SOCIEDAD DE INDUSTRIAS
ANCOM
Ministerio de Economia, Finansa y Comercio
Metodos de Programacion de inversiones

Computer Output
(ROE Base Case)

----- PAGE 1 ----- BREAKDOWN SUMMARY SHEET -----

*** CAPITAL INVESTMENT COST *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
CAPITAL INVESTMENT	5671.00	27799.40	26375.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PLANT INVESTMENT	5550.00	27219.00	19152.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MINING	0.00	1919.00	558.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PLANT	4132.00	21782.00	16484.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CIVIL & BUILDING	1418.00	3518.00	2190.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRE-OPERATION COST	121.00	121.00	1672.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL W/C	0.00	0.00	2840.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IDC	0.00	459.35	2711.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
CAPITAL INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00
PLANT INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00
MINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PLANT	0.00	0.00	2406.00	0.00	0.00	2597.00	0.00	0.00	0.00	0.00
CIVIL & BUILDING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRE-OPERATION COST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL W/C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT YEAR	18	19	20
CAPITAL INVESTMENT	0.00	0.00	0.00
PLANT INVESTMENT	0.00	0.00	0.00
MINING	0.00	0.00	0.00
PLANT	0.00	0.00	0.00
CIVIL & BUILDING	0.00	0.00	0.00
PRE-OPERATION COST	0.00	0.00	0.00
INITIAL W/C	0.00	0.00	0.00
IDC	0.00	0.00	0.00

*** INCREASING W/C *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
ON-STREAM FACTOR (%)	0.00	0.00	0.00	80.00	90.00	100.00	100.00	100.00	100.00	100.00
INCREASING W/C	0.00	0.00	1055.20	131.90	131.90	0.00	0.00	0.00	0.00	0.00

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
ON-STREAM FACTOR (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
INCREASING W/C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT YEAR	18	19	20
ON-STREAM FACTOR (%)	100.00	100.00	100.00
INCREASING W/C	0.00	0.00	0.00

*** DEPRECIATION/AMORTIZATION *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
DPR./AMT.	0.00	0.00	0.00	5473.18	5473.18	5473.18	5473.18	5473.18	4977.78	4977.78
DEPRECIATION	0.00	0.00	0.00	4964.73	4964.73	4964.73	4964.73	4964.73	4469.33	4469.33
MINING	0.00	0.00	0.00	495.40	495.40	495.40	495.40	495.40	0.00	0.00
PLANT	0.00	0.00	0.00	4231.80	4231.80	4231.80	4231.80	4231.80	4231.80	4231.80
CIVIL & BUILDING	0.00	0.00	0.00	237.53	237.53	237.53	237.53	237.53	237.53	237.53
AMORTIZATION	0.00	0.00	0.00	508.45	508.45	508.45	508.45	508.45	508.45	508.45
PRE-OPERATION COST	0.00	0.00	0.00	191.40	191.40	191.40	191.40	191.40	191.40	191.40
IDC	0.00	0.00	0.00	317.05	317.05	317.05	317.05	317.05	317.05	317.05

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
DPR./AMT.	4977.78	5411.98	5411.98	912.33	912.33	912.33	737.83	737.83	1172.03	1172.03
DEPRECIATION	4469.33	4903.53	4903.53	912.33	912.33	912.33	737.83	737.83	1172.03	1172.03
MINING	0.00	434.20	434.20	434.20	434.20	434.20	0.00	0.00	434.20	434.20
PLANT	4231.80	4231.80	4231.80	240.60	240.60	240.60	500.30	500.30	500.30	500.30
CIVIL & BUILDING	237.53	237.53	237.53	237.53	237.53	237.53	237.53	237.53	237.53	237.53
AMORTIZATION	508.45	508.45	508.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRE-OPERATION COST	191.40	191.40	191.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IDC	317.05	317.05	317.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT YEAR	18	19	20
DPR./AMT.	1172.03	1172.03	1172.03
DEPRECIATION	1172.03	1172.03	1172.03
MINING	434.20	434.20	434.20
PLANT	500.30	500.30	500.30
CIVIL & BUILDING	237.53	237.53	237.53
AMORTIZATION	0.00	0.00	0.00
PRE-OPERATION COST	0.00	0.00	0.00
IDC	0.00	0.00	0.00

*** ANNUAL REVENUE *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
ON-STREAM FACTOR (%)	0.00	0.00	0.00	80.00	90.00	100.00	100.00	100.00	100.00	100.00
ANNUAL REVENUE	0.00	0.00	0.00	22360.00	25155.00	27950.00	27950.00	27950.00	27950.00	27950.00
PVC	0.00	0.00	0.00	22000.00	24750.00	27500.00	27500.00	27500.00	27500.00	27500.00
CAPA. (TON/Y)	0.00	0.00	0.00	20000.00	22500.00	25000.00	25000.00	25000.00	25000.00	25000.00
UNIT PRICE(USD/TON)	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00
S LIME	0.00	0.00	0.00	360.00	405.00	450.00	450.00	450.00	450.00	450.00
CAPA. (TON/Y)	0.00	0.00	0.00	7200.00	8100.00	9000.00	9000.00	9000.00	9000.00	9000.00
UNIT PRICE(USD/TON)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
ON-STREAM FACTOR (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
ANNUAL REVENUE	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00
PVC	27500.00	27500.00	27500.00	27500.00	27500.00	27500.00	27500.00	27500.00	27500.00	27500.00
CAPA. (TON/Y)	25000.00	25000.00	25000.00	25000.00	25000.00	25000.00	25000.00	25000.00	25000.00	25000.00
UNIT PRICE(USD/TON)	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00	1100.00
S LIME	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
CAPA. (TON/Y)	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00
UNIT PRICE(USD/TON)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00

*** RAW MATERIAL COST *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
ON-STREAM FACTOR (%)	0.00	0.00	0.00	80.00	90.00	100.00	100.00	100.00	100.00	100.00
RAW MATERIAL COST	0.00	0.00	0.00	2962.40	3332.70	3703.00	3703.00	3703.00	3703.00	3703.00
COKE	0.00	0.00	0.00	2962.40	3332.70	3703.00	3703.00	3703.00	3703.00	3703.00
UNIT CONS. (USD/TON)	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
ON-STREAM FACTOR (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
RAW MATERIAL COST	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00
COKE	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00	3703.00
UNIT CONS. (USD/TON)	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12	148.12

PROJECT YEAR	18	19	20
ON-STREAM FACTOR (%)	100.00	100.00	100.00
RAW MATERIAL COST	3703.00	3703.00	3703.00
COKE	3703.00	3703.00	3703.00
UNIT CONS. (USD/TON)	148.12	148.12	148.12

*** VARIABLE OPE-COST *****

PROJECT YEAR	-1	2	3	4	5	6	7
ON-STREAM FACTOR (%)	0.00	90.00	100.00	100.00	100.00	100.00	100.00
VARIABLE OPE-COST	0.00	7573.50	8415.00	8415.00	8415.00	8415.00	8415.00
HCL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNIT CONS. (USD/TON)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AUX1	0.00	1845.90	2051.00	2051.00	2051.00	2051.00	2051.00
UNIT CONS. (USD/TON)	82.04	82.04	82.04	82.04	82.04	82.04	82.04
ELEC	0.00	4392.00	4880.00	4880.00	4880.00	4880.00	4880.00
UNIT CONS. (USD/TON)	195.20	195.20	195.20	195.20	195.20	195.20	195.20
STEAM	0.00	1335.60	1484.00	1484.00	1484.00	1484.00	1484.00
UNIT CONS. (USD/TON)	59.36	59.36	59.36	59.36	59.36	59.36	59.36

PROJECT YEAR	10	12	13	14	15	16	17
ON-STREAM FACTOR (%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00
VARIABLE OPE-COST	8415.00	8415.00	8415.00	8415.00	8415.00	8415.00	8415.00
HCL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNIT CONS. (USD/TON)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AUX1	2051.00	2051.00	2051.00	2051.00	2051.00	2051.00	2051.00
UNIT CONS. (USD/TON)	82.04	82.04	82.04	82.04	82.04	82.04	82.04
ELEC	4880.00	4880.00	4880.00	4880.00	4880.00	4880.00	4880.00
UNIT CONS. (USD/TON)	195.20	195.20	195.20	195.20	195.20	195.20	195.20
STEAM	1484.00	1484.00	1484.00	1484.00	1484.00	1484.00	1484.00
UNIT CONS. (USD/TON)	59.36	59.36	59.36	59.36	59.36	59.36	59.36

PROJECT YEAR	18	19	20
ON-STREAM FACTOR (%)	100.00	100.00	100.00
VARIABLE OPE-COST	8415.00	8415.00	8415.00
HCL	0.00	0.00	0.00
UNIT CONS. (USD/TON)	0.00	0.00	0.00
AUX1	2051.00	2051.00	2051.00
UNIT CONS. (USD/TON)	82.04	82.04	82.04
ELEC	4880.00	4880.00	4880.00
UNIT CONS. (USD/TON)	195.20	195.20	195.20
STEAM	1484.00	1484.00	1484.00
UNIT CONS. (USD/TON)	59.36	59.36	59.36

*** FIXED OPE-COST *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
FIXED OPE-COST	0.00	0.00	0.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00
LABOR COST	0.00	0.00	0.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00
PLANT OVERHEAD	0.00	0.00	0.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00
MAINTENANCE	0.00	0.00	0.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00
INSURANCE	0.00	0.00	0.00	332.00	332.00	332.00	332.00	332.00	332.00	332.00
ASSET TAX	0.00	0.00	0.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
FIXED OPE-COST	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00	3752.00
LABOR COST	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00	1014.00
PLANT OVERHEAD	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00	1142.00
MAINTENANCE	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00	1240.00
INSURANCE	332.00	332.00	332.00	332.00	332.00	332.00	332.00	332.00	332.00	332.00
ASSET TAX	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00

*** INCOME TAX *****

PROJECT YEAR	-3	-2	-1	1	2	3	4	5	6	7
NET INCOME B/TAX	0.00	0.00	0.00	1407.08	176.13	1759.33	1759.33	2244.08	3224.23	3708.98
LOSS CARRY FORWARD	0.00	0.00	0.00	0.00	-1407.08	-1230.95	0.00	0.00	0.00	0.00
TAXABLE INCOME	0.00	0.00	0.00	0.00	0.00	528.38	1759.33	2244.08	3224.23	3708.98
INCOME TAX	0.00	0.00	0.00	0.00	0.00	173.52	667.67	921.24	1323.61	1522.61
NET INCOME A/TAX	0.00	0.00	0.00	-1407.08	176.13	1585.81	1091.66	1322.84	1900.62	2186.37

PROJECT YEAR	8	9	10	11	12	13	14	15	16	17
NET INCOME B/TAX	4193.73	4244.28	4729.03	9713.42	10198.20	10682.90	11342.20	11342.20	10908.00	10908.00
LOSS CARRY FORWARD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TAXABLE INCOME	4193.73	4244.28	4729.03	9713.42	10198.20	10682.90	11342.20	11342.20	10908.00	10908.00
INCOME TAX	1721.61	1742.36	1941.36	3987.55	4186.55	4385.55	4656.19	4656.19	4477.94	4477.94
NET INCOME A/TAX	2472.12	2501.92	2787.67	5725.87	6011.62	6297.37	6685.98	6685.98	6430.03	6430.03

PROJECT YEAR

PROJECT YEAR	18	19	20
NET INCOME B/TAX	10908.00	10908.00	10908.00
LOSS CARRY FORWARD	0.00	0.00	0.00
TAXABLE INCOME	10908.00	10908.00	10908.00
INCOME TAX	4477.94	4477.94	4477.94
NET INCOME A/TAX	6430.03	6430.03	6430.03

CASII FLOW TABLE

YEAR	EQUITY : 40 %		UNIT : 1000 USD							
	A INVESTMENT	B EQUITY	C DEBT	D INCREASING W/C	E ANNUAL REVENUE	F RAW MATERIAL	G VARIABLE OPE. COST	H FIXED OPE. COST	I CASII INCOME	J DEPR. AMT.
-3	5671.00	2268.40	3402.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2	27799.40	11119.70	16679.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-1	26375.30	10550.10	15825.20	1055.20	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	131.90	22360.00	2962.40	6732.00	3752.00	8913.60	5473.18
2	0.00	0.00	0.00	131.90	25155.00	3332.70	7573.50	3752.00	10486.80	5473.18
3	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	5473.18
4	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	5473.18
5	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	5473.18
6	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	4977.78
7	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	4977.78
8	2171.00	2171.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	4977.78
9	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	5411.98
10	2406.00	2406.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	5411.98
11	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	912.33
12	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	912.33
13	2597.00	2597.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	912.33
14	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	737.83
15	2171.00	2171.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	737.83
16	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	1172.03
17	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	1172.03
18	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	1172.03
19	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	1172.03
20	0.00	0.00	0.00	0.00	27950.00	3703.00	8415.00	3752.00	12080.00	1172.03
				-1319.00						-3154.43

CASH FLOW TABLE

YEAR	EQUITY : 40 %		UNIT : 1000 USD									
	K INTEREST	L PROFIT B/TAX	M INCOME TAX	N PROFIT A/TAX	O REPAYMENT	P CASH FLOW A/TAX ROE	Q DISCOUNTED A/TAX ROE 15.54	R DISCOUNTED B/TAX ROI 19.72	S CASH FLOW A/TAX ROI	T DISCOUNTED A/TAX ROI 11.89		
-3	0.00	-5671.00	0.00	-5671.00	0.00	-2268.40	-2268.40	-2268.40	-5671.00	-5671.00		
-2	0.00	-27799.40	0.00	-27799.40	0.00	-11119.70	-9623.76	-9287.88	-27340.00	-24434.30		
-1	0.00	-26375.30	0.00	-26375.30	0.00	-10550.10	-7902.38	-7360.40	-23664.20	-18901.40		
1	4847.50	-1407.08	0.00	-1407.08	0.00	3934.20	2550.39	2292.57	7239.18	5167.63		
2	4847.50	176.13	0.00	176.13	0.00	5517.40	3095.53	2685.49	8172.45	5213.80		
3	4847.50	1759.33	173.52	1585.81	0.00	7058.99	3427.03	2940.35	9237.62	5266.99		
4	4847.50	1759.33	667.67	1091.66	3590.74	2974.10	1249.85	1236.64	9237.62	4707.20		
5	4362.75	2244.08	921.24	1322.84	3590.74	3205.28	1165.78	1170.41	9237.62	4206.91		
6	3878.00	3224.23	1323.61	1900.62	3590.74	3287.66	1034.88	1092.44	9034.25	3677.02		
7	3393.25	3708.98	1522.61	2186.37	3590.74	3573.41	973.50	1008.39	9034.25	3286.22		
8	2908.50	4193.73	1721.61	2472.12	3590.74	1688.16	398.03	563.57	6863.24	2231.18		
9	2423.75	4244.28	1742.36	2501.92	3590.74	4323.15	882.17	837.36	9212.49	2676.60		
10	1939.00	4729.03	1941.36	2787.67	3590.74	2202.91	389.04	477.87	6806.49	1767.38		
11	1454.25	9713.42	3987.55	5725.87	3590.74	3047.46	465.79	677.57	7495.45	1739.42		
12	969.50	10198.20	4186.55	6011.62	3590.74	3333.21	440.93	604.94	7495.45	1554.55		
13	484.75	10682.90	4385.55	6297.37	3590.74	1021.96	117.00	363.35	4898.45	907.96		
14	0.00	11342.20	4656.19	6685.98	0.00	7423.82	735.58	677.99	7423.82	1229.80		
15	0.00	11342.20	4656.19	6685.98	0.00	5252.82	450.45	464.52	5252.82	777.68		
16	0.00	10908.00	4477.94	6430.03	0.00	7602.06	564.20	473.00	7602.06	1005.87		
17	0.00	10908.00	4477.94	6430.03	0.00	7602.06	488.30	395.08	7602.06	898.96		
18	0.00	10908.00	4477.94	6430.03	0.00	7602.06	422.61	330.00	7602.06	803.42		
19	0.00	10908.00	4477.94	6430.03	0.00	7602.06	365.75	275.63	7602.06	718.03		
20	0.00	10008.00	4477.94	6430.03	0.00	13860.50	577.14	349.50	13860.50	1170.01		

CASH FLOW TABLE

UNIT : 1000 USD

EQUITY : 40 %

YEAR	DISCOUNTED B/TAX ROI	U 16 76
-3	-5671.00	
-2	-23415.10	
-1	-17357.40	
1	5516.56	
2	5576.37	
3	5566.09	
4	4767.02	
5	4082.66	
6	3496.55	
7	2994.59	
8	2103.76	
9	2196.49	
10	1506.49	
11	1611.10	
12	1379.81	
13	927.67	
14	1012.08	
15	711.01	
16	742.35	
17	635.77	
18	544.50	
19	466.33	
20	606.30	

----- CASII FLOW TABLE -----

YEAR (ROE) (ROI) PROJECT YEAR	EQUITY : 40 %							UNIT : 1000 USD						
	1988 -3	1989 -2	1990 -1	1991 1	1992 2	1993 3	1994 4	1995 5	1996 6	1997 7				
SOURCE OF FUNDS (ROE)	0.00	0.00	0.00	22360.00	25155.00	27950.00	27950.00	27950.00	27950.00	27950.00				
CASH INCOME	0.00	0.00	0.00	8913.60	10496.80	12080.00	12080.00	12080.00	12080.00	12080.00				
PAID-IN CAPITAL	2268.40	11119.70	10550.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
DEBT (L-T LOAN)	3402.60	16679.60	15825.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
DEBT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
TOTAL SOURCE	5671.00	27799.40	26375.30	8913.60	10496.80	12080.00	12080.00	12080.00	12080.00	12080.00				
APPLICATION OF FUNDS														
CAPITAL INVESTMENT	5671.00	27799.40	26375.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
PLANT INVESTMENT	5550.00	27219.00	19152.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
PRE-OPERATION COST	121.00	121.00	1672.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
INITIAL W/C	0.00	0.00	2840.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
IDC	0.00	459.35	2711.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
DEBT SERVICE PAYMENT	0.00	0.00	0.00	4847.50	4847.50	4847.50	8438.24	7953.49	7468.74	6983.99				
REPAYMENT (L-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	3590.74	3590.74	3590.74	3590.74				
REPAYMENT (L-T LOAN)	0.00	0.00	0.00	4847.50	4847.50	4847.50	4847.50	4362.75	3878.00	3393.25				
REPAYMENT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
INTEREST (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
INCREASING W/C	0.00	0.00	0.00	131.90	131.90	0.00	0.00	0.00	0.00	0.00				
INCOME TAX	0.00	0.00	0.00	0.00	0.00	173.52	667.67	921.24	1323.61	1522.61				
TOTAL APPLICATION	5671.00	27799.40	26375.30	4979.40	4079.40	5021.02	9105.90	8874.73	8792.35	8506.60				
CASH INCREASE	0.00	0.00	0.00	3934.20	5517.40	7058.99	2974.10	3205.28	3287.66	3573.41				
CUMULATIVE CASH INC.	0.00	0.00	0.00	3934.20	9451.61	16510.60	19484.70	22690.00	25977.60	29551.00				
W/C RETURN & SALVAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
CASH FLOW B/TAX	-2268.40	-11119.70	-10550.10	3934.20	5517.40	7232.51	3641.77	4126.52	4611.27	5096.02				
DISCOUNTED CASH FLOW	-2268.40	-9287.88	-7360.40	2292.57	2685.49	2940.35	1236.64	1170.41	1092.44	1008.39				
CASH FLOW A/TAX	-2268.40	-11119.70	-10550.10	3934.20	5517.40	7058.99	2974.10	3205.28	3287.66	3573.41				
DISCOUNTED CASH FLOW	-2268.40	-9623.76	-7902.38	2550.39	3095.53	3427.63	1249.85	1165.78	1034.88	973.50				
CASH FLOW B/TAX	-5671.00	-27340.00	-23664.20	8781.70	10364.90	12080.00	12080.00	12080.00	12080.00	12080.00				
DISCOUNTED CASH FLOW	-5671.00	-23415.10	-17357.40	5516.56	5576.37	5566.09	4767.02	4082.66	3496.55	2994.59				
CASH FLOW A/TAX	-5671.00	-27340.00	-23664.20	7239.18	8172.45	9237.62	9237.62	9237.62	9034.25	9034.25				
DISCOUNTED CASH FLOW	-5671.00	-24434.30	-18901.40	5167.63	5213.80	5266.99	4707.20	4206.91	3677.02	3286.22				

CASH FLOW TABLE

YEAR (ROE) (ROI) PROJECT YEAR	EQUITY : 40 %		UNIT : 1000 USD													
	1998 8	1999 9	2000 10	2001 11	2002 12	2003 13	2004 14	2005 15	2006 16	2007 17						
SOURCE OF FUNDS (ROE)	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00	27950.00						
CASH INCOME	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00						
PAID-IN CAPITAL	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00						
DEBT (L-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
DEBT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
TOTAL SOURCE	14251.00	12080.00	14486.00	12080.00	12080.00	14677.00	12080.00	14251.00	12080.00	12080.00						
APPLICATION OF FUNDS																
CAPITAL INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00						
PLANT INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00						
PRE-OPERATION COST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
INITIAL W/C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
DEBT SERVICE PAYMENT	6499.24	6014.49	5529.74	5044.99	4560.24	4075.49	0.00	0.00	0.00	0.00						
REPAYMENT (L-T LOAN)	3590.74	3590.74	3590.74	3590.74	3590.74	3590.74	0.00	0.00	0.00	0.00						
INTEREST (L-T LOAN)	2908.50	2423.75	1939.00	1454.25	969.50	484.75	0.00	0.00	0.00	0.00						
REPAYMENT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
INTEREST (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
INCREASING W/C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
INCOME TAX	1721.61	1742.36	1941.36	3987.55	4186.55	4385.55	4656.19	4656.19	4477.94	4477.94						
TOTAL APPLICATION	10391.80	7756.85	9877.10	9032.54	8746.79	11058.00	4656.19	6827.19	4477.94	4477.94						
CASH INCREASE	3859.16	4323.15	4608.91	3047.46	3333.21	3618.96	7423.82	7423.82	7602.06	7602.06						
CUMULATIVE CASH INC.	33410.20	37733.30	42342.30	45389.70	48722.90	52341.90	59765.70	67180.50	74791.60	82393.60						
W/C RETURN & SALVAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
CASH FLOW B/TAX	3409.77	6065.51	4144.26	7035.01	7519.76	5407.51	12080.00	9909.00	12080.00	12080.00						
DISCOUNTED CASH FLOW	563.57	837.36	477.87	677.57	604.94	363.35	677.99	464.52	473.00	395.08						
CASH FLOW A/TAX	1688.16	4323.15	2202.91	3047.46	3333.21	1021.96	7423.82	5252.82	7602.06	7602.06						
DISCOUNTED CASH FLOW	398.03	882.17	389.04	465.79	440.93	117.00	735.58	450.45	564.20	488.30						
CASH FLOW B/TAX	9909.00	12080.00	9674.00	12080.00	12080.00	9483.00	12080.00	9909.00	12080.00	12080.00						
DISCOUNTED CASH FLOW	2103.76	2196.49	1506.49	1611.10	1379.81	927.67	1012.08	711.01	742.35	635.77						
CASH FLOW A/TAX	6863.24	9212.49	6806.49	7405.45	7495.45	4898.45	7423.82	5252.82	7602.06	7602.06						
DISCOUNTED CASH FLOW	2231.18	2676.60	1767.38	1739.42	1554.55	907.96	1229.80	777.68	1005.87	898.96						

YEAR (ROE) (ROI) PROJECT YEAR	EQUITY : 40 %			
	2008 18	2009 19	2010 20	
SOURCE OF FUNDS (ROE)	27950.00	27950.00	27950.00	
CASH INCOME	12080.00	12080.00	12080.00	
PAID-IN CAPITAL	0.00	0.00	0.00	
DEBT (L-T LOAN)	0.00	0.00	0.00	
DEBT (S-T LOAN)	0.00	0.00	0.00	
TOTAL SOURCE	12080.00	12080.00	12080.00	
APPLICATION OF FUNDS				
CAPITAL INVESTMENT	0.00	0.00	0.00	
PLANT INVESTMENT	0.00	0.00	0.00	
PRE-OPERATION COST	0.00	0.00	0.00	
INITIAL W/C	0.00	0.00	0.00	
IDC	0.00	0.00	0.00	
DEBT SERVICE PAYMENT	0.00	0.00	0.00	
REPAYMENT (L-T LOAN)	0.00	0.00	0.00	
INTEREST (L-T LOAN)	0.00	0.00	0.00	
REPAYMENT (S-T LOAN)	0.00	0.00	0.00	
INTEREST (S-T LOAN)	0.00	0.00	0.00	
INCREASING W/C	0.00	0.00	0.00	
INCOME TAX	4477.94	4477.94	4477.94	
TOTAL APPLICATION	4477.94	4477.94	4477.94	
CASH INCREASE	7602.06	7602.06	7602.06	
CUMULATIVE CASH INC.	89995.70	97597.80	105200.00	
W/C RETURN & SALVAGE	0.00	0.00	6258.43	
CASH FLOW B/TAX	12080.00	12080.00	18338.40	
DISCOUNTED CASH FLOW	330.00	275.63	349.50	
CASH FLOW A/TAX	7602.06	7602.06	13860.50	
DISCOUNTED CASH FLOW	422.61	365.75	577.14	
CASH FLOW B/TAX	12080.00	12080.00	18338.40	
DISCOUNTED CASH FLOW	544.50	466.33	606.30	
CASH FLOW A/TAX	7602.06	7602.06	13860.50	
DISCOUNTED CASH FLOW	803.42	718.01	1170.01	

CASH FLOW TABLE

YEAR PROJECT YEAR	EQUITY : 40 %							UNIT : 1000 USD						
	1988 -3	1989 -2	1990 -1	1991 1	1992 2	1993 3	1994 4	1995 5	1996 6	1997 7	1998 8	1999 9		
SOURCE OF FUNDS														
CASH INCOME	0.00	0.00	0.00	8913.60	10496.80	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00		
SUBSIDY (OPERATION)	0.00	0.00	0.00	2700.00	2700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
PAID-IN CAPITAL	2268.40	15280.50	12479.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
DEBT (L-T LOAN)	3402.60	2920.80	18719.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
DEBT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
TOTAL SOURCE	5671.00	38201.40	31199.90	11613.60	3196.80	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00		
APPLICATION OF FUNDS														
CAPITAL INVESTMENT	5671.00	38201.40	31199.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
PLANT INVESTMENT	5550.00	37621.00	23134.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
PRE-OPERATION COST	121.00	121.00	1672.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
INITIAL W/C	0.00	0.00	2840.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
IDC	0.00	459.35	3553.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
DEBT SERVICE PAYMENT	0.00	0.00	0.00	6080.85	6080.85	6080.85	10585.20	9977.10	9369.01	8760.93	8760.93	8760.93		
REPAYMENT (L-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
INTEREST (L-T LOAN)	0.00	0.00	0.00	6080.85	6080.85	6080.85	4504.33	4504.33	4504.33	4504.33	4504.33	4504.33		
REPAYMENT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
INTEREST (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
INCREASING W/C	0.00	0.00	0.00	131.90	131.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
INCOME TAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
TOTAL APPLICATION	5671.00	38201.40	31199.90	6212.75	6212.75	6080.85	10585.20	9977.10	9369.01	8760.93	8760.93	8760.93		
CASH INCREASE														
CUMULATIVE CASH INC.	0.00	0.00	0.00	5400.85	6984.05	5999.15	1494.82	2102.91	2710.99	3319.07	3319.07	3319.07		
	0.00	0.00	0.00	5400.85	12364.90	18364.10	19878.90	21981.80	24692.80	28011.80	28011.80	28011.80		
W/C RETURN & SALVAGE														
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
CASH FLOW B/TAX (ROE)														
DISCOUNTED CASH FLOW	-2268.40	-15280.50	-12479.90	5400.85	6984.05	5999.15	1494.82	2102.91	2710.99	3319.07	3319.07	3319.07		
	-2268.40	-13327.10	-9493.13	3883.09	4041.12	3027.49	657.93	807.25	907.65	969.18	969.18	969.18		
CASH FLOW A/TAX (ROE)														
DISCOUNTED CASH FLOW	-2268.40	-15280.50	-12479.90	5400.85	6984.05	5999.15	1494.82	2102.91	2710.99	3319.07	3319.07	3319.07		
	-2268.40	-13700.80	-10602.90	3892.96	4513.69	3476.33	776.65	979.63	1132.34	1243.00	1243.00	1243.00		
CASH FLOW B/TAX (ROI)														
DISCOUNTED CASH FLOW	-5671.00	-37742.00	-27546.20	11481.70	13064.90	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00		
	-5671.00	-33078.40	-21236.10	7729.76	7708.78	6246.93	5475.03	4798.51	4205.58	3685.92	3685.92	3685.92		
CASH FLOW A/TAX (ROI)														
DISCOUNTED CASH FLOW	-5671.00	-37742.00	-27546.20	10552.30	11485.50	9850.71	9850.71	9850.71	9850.71	9546.35	9546.35	9546.35		
	-5671.00	-34220.10	-22727.30	7865.27	7762.02	6035.96	5472.70	4962.01	4359.97	3953.11	3953.11	3953.11		

----- CASII FLOW TABLE -----

YEAR PROJECT YEAR	UNIT : 1000 USD										
	1998 8	1999 9	2000 10	2001 11	2002 12	2003 13	2004 14	2005 15	2006 16	2007 17	
SOURCE OF FUNDS											
CASH INCOME	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	12080.00	
SUBSIDY (OPERATION)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PAID-IN CAPITAL	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00	
DEBT (L-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
DEBT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
TOTAL SOURCE	14251.00	12080.00	14486.00	12080.00	12080.00	14677.00	12080.00	14251.00	12080.00	12080.00	
APPLICATION OF FUNDS											
CAPITAL INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00	
PLANT INVESTMENT	2171.00	0.00	2406.00	0.00	0.00	2597.00	0.00	2171.00	0.00	0.00	
PRE-OPERATION COST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
INITIAL W/C	413.18	942.50	1192.13	3821.71	4071.35	4320.98	4642.24	4642.24	4464.00	4464.00	
IDC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
DEBT SERVICE PAYMENT	8152.84	7544.76	6936.67	6328.59	5720.50	5112.42	0.00	0.00	0.00	0.00	
REPAYMENT (L-T LOAN)	4504.33	4504.33	4504.33	4504.33	4504.33	4504.33	0.00	0.00	0.00	0.00	
INTEREST (L-T LOAN)	3648.51	3040.43	2432.34	1824.26	1216.17	608.09	0.00	0.00	0.00	0.00	
REPAYMENT (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
INTEREST (S-T LOAN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
INCREASING W/C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
INCOME TAX	413.18	942.50	1192.13	3821.71	4071.35	4320.98	4642.24	4642.24	4464.00	4464.00	
TOTAL APPLICATION	10737.00	8487.26	10534.80	10150.30	9791.85	12030.40	4642.24	6813.24	4464.00	4464.00	
CASH INCREASE	3513.98	3592.74	3951.20	1929.70	2288.15	2646.61	7437.76	7437.76	7616.01	7616.01	
CUMULATIVE CASII INC.	31525.80	35118.60	39069.80	40999.50	43287.60	45934.20	53372.00	60809.80	68425.80	76041.80	
W/C RETURN & SALVAGE											
CASH FLOW B/TAX (ROE)	1756.16	4535.24	2737.33	5751.41	6359.50	4370.58	12080.00	9909.00	12080.00	12080.00	
DISCOUNTED CASH FLOW	447.25	1007.36	530.28	971.75	937.13	561.72	1354.08	568.73	1030.01	898.34	
CASH FLOW A/TAX (ROE)	1342.98	3592.74	1545.20	1929.70	2288.15	49.61	7437.76	5266.76	7616.01	7616.01	
DISCOUNTED CASH FLOW	450.95	1081.67	417.12	467.06	496.56	9.65	1297.60	823.85	1068.16	957.73	
CASII FLOW B/TAX (ROI)	9909.00	12080.00	9674.00	12080.00	12080.00	9483.00	12080.00	9909.00	12080.00	12080.00	
DISCOUNTED CASH FLOW	2649.90	2831.30	1987.22	2174.83	1906.10	1311.43	1464.15	1052.61	1124.67	985.70	
CASII FLOW A/TAX (ROI)	7375.35	9724.60	7318.60	7509.40	7509.40	4912.40	7437.76	5266.76	7616.01	7616.01	
DISCOUNTED CASH FLOW	2769.11	3310.43	2258.90	2101.50	1905.39	1130.13	1551.43	996.07	1305.96	1184.09	

----- CASH FLOW TABLE -----

UNIT : 1000 USD

EQUITY : 40 %

YEAR PROJECT YEAR	2008 18	2009 19	2010 20
SOURCE OF FUNDS			
CASH INCOME	12080.00	12080.00	12080.00
SUBSIDY (OPERATION)	0.00	0.00	0.00
PAID-IN CAPITAL	0.00	0.00	0.00
DEBT (L-T LOAN)	0.00	0.00	0.00
DEBT (S-T LOAN)	0.00	0.00	0.00
TOTAL SOURCE	12080.00	12080.00	12080.00
APPLICATION OF FUNDS			
CAPITAL INVESTMENT	0.00	0.00	0.00
PLANT INVESTMENT	0.00	0.00	0.00
PRE-OPERATION COST	0.00	0.00	0.00
INITIAL W/C	4464.00	4464.00	4464.00
IDC	0.00	0.00	0.00
DEBT SERVICE PAYMENT	0.00	0.00	0.00
REPAYMENT (L-T LOAN)	0.00	0.00	0.00
INTEREST (L-T LOAN)	0.00	0.00	0.00
REPAYMENT (S-T LOAN)	0.00	0.00	0.00
INTEREST (S-T LOAN)	0.00	0.00	0.00
INCREASING W/C	0.00	0.00	0.00
INCOME TAX	4464.00	4464.00	4464.00
TOTAL APPLICATION	4464.00	4464.00	4464.00
CASH INCREASE	7616.01	7616.01	7616.01
CUMULATIVE CASH INC.	83657.80	91273.80	98889.80
W/C RETURN & SALVAGE	0.00	0.00	6598.10
CASH FLOW B/TAX (ROE)	12080.00	12080.00	18678.10
DISCOUNTED CASH FLOW	783.50	683.34	921.51
CASH FLOW A/TAX (ROE)	7616.01	7616.01	14214.10
DISCOUNTED CASH FLOW	858.72	769.94	1288.41
CASH FLOW B/TAX (ROI)	12080.00	12080.00	18678.10
DISCOUNTED CASH FLOW	863.90	757.16	1026.06
CASH FLOW A/TAX (ROI)	7616.01	7616.01	14214.10
DISCOUNTED CASH FLOW	1073.60	973.41	1647.20

SCOPE OF WORK

This scope of work was agreed between Messrs C. Orams and A. Vargas of SPL and Mr. K. Iwaguchi of JICA on February 3, 1983 as follows:

1. Review on the background of the Project
 - 1.1 To review the present situation of the PVC industry in Peru.
 - 1.2 To review the present situation of supply/demand and price movement in Peru.
 - 1.3 to review the present situation of supply/demand of substitute products of PVC.
 - 1.4 To review the correlation of the Project with Andes Group including new PVC factory plans in the region.

2. Study on the PVC market and its distribution system
 - 2.1 To investigate the potential market of PVC in Peru by sector and products.
 - 2.2 To project future demand and supply of PVC in Peru.
 - 2.3 To project future price of PVC in Peru.
 - 2.4 To assess the system and cost of marketing and distribution.

3. Study on the raw materials for the PVC production
 - 3.1 To investigate availability of limestone including mining and transportation.
 - 3.2 To analyze the components of the limestone.
 - 3.3 To investigate the supply plan of hydrochloric acid.
 - 3.4 To investigate the availability of coal including mining and transportation.
 - 3.5 To investigate the availability of other auxiliaries
 - (1) Cokes
 - (2) Electrode and etc.

- 3.6 To investigate the price of raw materials.
4. Study on the project location and site(s)
 - 4.1 To investigate the natural conditions of the site(s)
 - (1) Meteorology
 - (2) Geology and topography
 - 4.2 To investigate the socio-economic conditions
 - (1) Population, labour force and wages, etc.
 - (2) Industries
 - (3) Regional administration
 - 4.3 To investigate utilities and infrastructure such as electricity, water, transportation (road, port and railway) and communication.
 - 4.4 To select the plant site(s) based on the results of the study on the availability of raw materials, utilities, infrastructure and other factors.
5. Preparation of the basic plan and the conceptual design of the carbide/PVC plants.
 - 5.1 To conduct study on PVC products and their optimum production scale.
 - 5.2 To examine and determine the process of PVC production.
 - 5.3 To determine the design standards of the proposed plants and facilities.
 - 5.4 To prepare plant layout of the proposed plants and facilities.
 - 5.5 To prepare process flow sheet including material balance.
 - 5.6 To prepare drawings of plants and facilities.
 - 5.7 To propose transport plan of materials for plant construction.
 - 5.8 To prepare implementation program of plant construction.
 - 5.9 To prepare organization and manpower plan for plant construction and operation of the commercial basis.
 - 5.10 To propose the commercial operation program.

6. Study on environmental protection

7. Financial analysis

7.1 Capital requirements

- (1) Fixed Capital (Land cost, construction cost of plants and facilities, and pre-operation cost, etc.)
- (2) Working Capital
- (3) Expenditure Schedule

7.2 Procurement of capital.

7.3 Production cost.

7.4 Projected balance sheet.

7.5 Projected income statement.

7.6 Projected cash flow statement.

7.7 Financial internal rate of return.

7.8 Sensitivity analysis based on possible variations in:

- (1) Investment cost,
- (2) Price of raw materials,
- (3) Sales price,
- (4) Interest rate, and
- (5) Inflation rate

8. Economic and social evaluation

9. Conclusion and recommendations

MINUTES OF A MEETING BETWEEN THE PRELIMINARY
JAPANESE SURVEY TEAM AND SOCIEDAD PARAMONGA

LIMITADA

FEBRUARY 2, 1983

1. During preliminary discussions, the JICA survey team pointed out that it was crucial to the project that the silica content of the limestone used for the production of calcium carbide, should be minimum.

The information to hand on the Rupay quarry shows that the silica content of this limestone seems to be higher than that normally employed in existing plants in Japan.

S.P.L. therefore agreed to look for alternative sources of limestone with a lower silica content, in particular in the Casma area, and requested that the scope of work include the study of alternative sources.

Accordingly both parties agreed as follows:

- (1) The study of the raw material limestone will include the Rupay quarry as well as alternatives within 300 km. of Paramonga. The number of alternatives should be limited to two, these two having been previously selected by Paramonga as the most likely alternatives. Information on these two selected limestone sources will be sent to the JICA office in Lima by the end of March 1983.
- (2) The study should include the possibility that the carbide plant could be situated outside Paramonga. In this case S.P.L. will suggest possible sites following the studies

..//..



cont.

(2) carried out as per 1. (1) above.

This information should be supplied to JICA (Lima) before the end of March.

2. Both parties agreed on the importance of communication during the feasibility study and that it would be advantageous for Sociedad Paramonga Ltda. counterpart personnel to be present in Japan with a view to taking part in the discussions for the preparation of the final report.

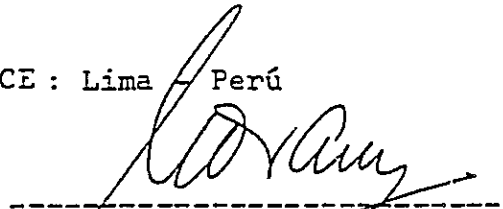
The Japanese preliminary survey team will endeavour to comply with this suggestion.

DATE: February 3rd, 1983

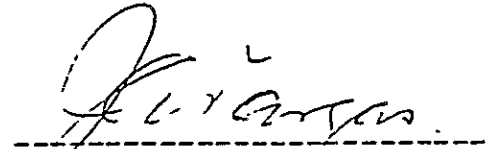
PLACE: Lima - Perú



KENJI IWAGUCHI
LEADER, PRELIMINARY SURVEY TEAM
JAPAN INTERNATIONAL COOPERATION
AGENCY



CARLOS ORAMS BASADRE
GENERAL MANAGER
SOCIEDAD PARAMONGA LTDA. S.A.



ALVARO VARGAS GUACUCANO
ENGINEERING MANAGER
SOCIEDAD PARAMONGA LTDA. S.A.



MINUTES OF DISCUSSION

THEME : PRESENTATION OF INTERIM REPORT FOR FEASIBILITY
STUDY ON ESTABLISHMENT OF CARBIDE AND PVC
PLANTS IN THE REPUBLIC OF PERU.

TIME : JULY 12, 1983

PLACE : SOCIEDAD PARAMONGA LIMITADA, LIMA

1. The study team of Japan International Cooperation Agency (JICA) presented Interim Report for Feasibility Study on Establishment of Carbide and PVC Plants in the Republic of Peru (Interim Report) to Sociedad Paramonga Limitada (SPL) on the said date at the said place.
2. SPL and the study team basically agreed on the contents of the Interim Report.
3. SPL and the study team agreed that JICA will develop the feasibility study report on the project scheme presented in Chapter 3 PROJECT SCHEME FOR FEASIBILITY STUDY and according to Chapter 5 BASIS FOR FINANCIAL AND ECONOMIC EVALUATIONS.
4. SPL shows particular concern about the impact of the price of electricity upon project viability. The study team explained that this will be part of the sensitivity analy-

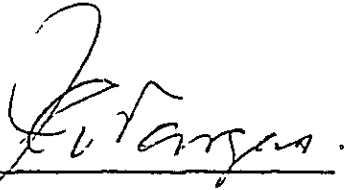
J. T.
K. T.

sis of the financial evaluation of the feasibility report.


5. SPL also shows concern about the disturbances in electric power at the electric furnace on the operation of other facilities and requested a write-up about this question to which the study team agreed.
6. In recognition of the importance of feed limestone, SPL agreed to further investigate Pariahuanca quarry and also to search for other quarries as set for in Chapter 8,
CONCLUSION.
7. In view of the presumably high transportation cost of limestone from the quarries, SPL asked the possibility of bricketing a portion of slaked lime and limestone fines to be recycled as feed. The study team agreed to examine such possibility.

DATE: JULY 13, 1983

PLACE: LIMA, PERU



ALVARO VARGAS GUACUCANO
Engineering Manager,
Sociedad Paramonga Ltda. S.A.



KOJI TANAKA
Leader of Study Team

APPENDIX 5.

Limestone cost

The cost of limestone at Paramonga Plant consists of the mining cost plus the cost of transportation from Pariahuanca to Paramonga. This is found to be 1,363 thousand US\$ per year or 23.3 US\$ per ton of limestone. The following table shows a preliminary calculation of mining and transportation costs. By way of comparison, the cost of quick lime purchased by Hornos Electricos, a Peruvian carbide manufacturer, is US\$96/ton.

Limestone Mining and Transportation Cost

Item (*)	Annual Consumption	Unit Price (US\$/*)	Annual Cost (X10 ³ US\$)
Mining			
Fuel (l)	58,000	0.201	12
Explosive (kg)	17,400	2.58	45
Electricity (X10 ³ kwh)	124	35	4
Maintenance			150
Mining Right (55 US\$/Year)			Nil
Transportation			
Fuel (l)	664,000	0.201	133
Tire (10)	32	1,033	43
Maintenance			42
Sub Total			429
Depreciation			767
Labor			167
Total			1,363

APPENDIX 6

EXAMPLE FOR CALCULATING CUSTOMS DUTIES

* CUSTOM CODE :

PRICE OF PURCHASE

	FOB		
+	FREIGHT		
+	<u>INSURANCE</u>		
	C & F	=	TAXABLE VALUE (1)

LIQUIDATION :

- (2) AD VALOREM DUTY
- (3) OVER TAX 10 % OF (1)
- (4) D.L. N°22342 1% OF (1)
- (5) INTERNAL TAX* (SALES' TAXES) 16 %
Applied on the bases of (1) + (2) + (3) + (4)
- (6) D.L. N°22448(10 % in maritime freight)
- (7) Custom Agents' commission and Expenses :
10 % of (2) + (3) + (4) + (5) + (6)

TOTAL OF LIQUIDATION

NOTE:

*The Custom Code according to the merchandise is determinant of the amount of the duties (2) and (5), as also of the payment or not of the duties (4) and (6)

INDUSTRIAL STATISTICS 1982 (PVC Plant)

OCCUPYING CLASS	<u>Number of Occupied Persons (average)</u>				<u>Remunerations (Miles of Soles)</u>	
	<u>March</u>	<u>June</u>	<u>September</u>	<u>December</u>	<u>In September</u>	<u>In the Year</u>
Permanent Employees (02 to 04)	97	97	97	96	33014	437381
Directors and Managers	2	2	2	2	1852	24537
Professionals	30	30	30	31	13097	173509
Officeholders and Others	65	65	65	63	18065	239335
Permanent Workers (11 to 18)	56	56	54	54	10661	163799
Technics	5	5	5	5	2294	35250
Workers Qualified	7	7	7	7	1972	30303
Workers No Qualified	44	44	42	42	6395	98246
Contingent' Employees						
Contingent' Workers						
TOTAL REMUNERABLE (01 + 10 + 20 + 30)	153	153	151	150	43075	601180
Personal No Remunerable						
TOTAL (40 + 50)	153	153	151	150	43075	601180

S/ 114,000 by month (Min.Salary)
(minimum) Salaries only

APPENDIX 8

UTILITY' TAXES

<u>INCOME DUTIABLE</u>		<u>RATE</u>	
	Until 150 U.I.T.	U.I.T.	30 ‰
For the Excess of	150 U.I.T. and Until 1500 U.I.T.	U.I.T.	40 ‰
For the excess of	1500 U.I.T. and Until 3000 U.I.T.	U.I.T.	50 ‰
For the excess of	3000 U.I.T.		55 ‰

U.I.T. = S/ 1'100,000

EXAMPLE

REINVESTMENT INCOME TAX CREDIT

Net Profit	100'000
Industrial Community 27 %	27'000
Income Tax 30 %	<u>21'900</u>
Profit before reinvestment	51'100 =====

A) Calculation of the maximum amount that may be reinvested

Average Income Tax Rate according to "selective index"

$$30 \% \times 1 = 30 \%$$

$$100 \% - 30 \% = 70 \%$$

$$70 \% = 51'100 \text{ maximum amount that may be reinvested, } 14.60 \%$$

$$\rightarrow S/ 100'000 = 14'600,000 \times 30 \% = 4'380,000$$

B) Calculation of the credit against the income tax because of reinvestment

Average Income Tax rate according to "selective index", according to the maximum to be reinvested

$$30 \% \times 1 \times 51'100 = 15'330$$

C) Tax Amount	21'900
Credit (Additional)	(4'380)
Credit Reinvested	<u>(15'330)</u>
Net Payable Tax	2'190 =====

GENERAL TAX TO THE SALES

EXAMPLE

NET SALE :

I) Price of Sale	<u>S/ 100</u>
II) General Tax Sales 16 % (I)	16
III) Profit Decentralization 15 % (II)	<u>(2)</u>

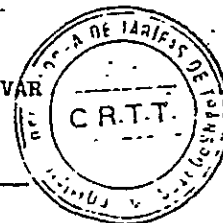
NET PAY I.G.V.

S/ 14

COMISION REGULADORA DE TARIFAS DE TRANSPORTES

... ANO BICENTENARIO DEL NACIMIENTO DEL LIBERTADOR SIMON BOLIVAR

RESOLUCION DEL CONSEJO DIRECTIVO No. 021-83-TC/CRTT/T.



Lima, 25 de Marzo de 1983.

Visto por el Consejo Directivo de la Comisión Reguladora de Tarifas de Transportes, en sesión No.12 de fecha 24 de Marzo de 1983, el estudio sobre regulación tarifaria para el Servicio Público de Transporte de Carga en Camión Regional Nacional.

CONSIDERANDO:

Que los estudios técnico-económicos practicados por el personal técnico de la Comisión revelan que los costos de operación del mencionado servicio han sufrido incrementos, por lo que resulta necesario efectuar un reajuste de los fletes vigentes conforme a los nuevos costos de operación resultantes señalados en el respectivo estudio.

Que igualmente en dichos estudios se ha determinado la necesidad de mantener los coeficientes de conversión por factores físicos aplicables por región, altura sobre el nivel del mar, gradiente y tipos de superficie de rodamiento.

Estando al merito de lo informado por la Secretaría Técnica de la Comisión;

El Consejo Directivo de la Comisión Reguladora de Tarifas de Transportes en ejercicio de las facultades que el Decreto Legislativo No.166 le confiere;

Artículo 1º.- Aprobar para el Servicio Público de Transporte de Carga en Camión Regional Nacional para la Costa y en pista asfaltada las tarifas siguientes:

De 0 hasta 500 Kms. virtuales	S/. 5,230	Por tonelada de flote base más S/. 30,020 Ton.Km.Virtual	20.24
Más de 500 Kms. virtuales	S/. 40,447	Ton.Km.Virtual	21.22

Norma

Artículo 2º.- Las tarifas para combustibles y líquidos para la Costa y en pista asfaltada serán las siguientes:

De 0 hasta 400 Kms. virtuales	S/. 4,219	Por tonelada de flete base más S/. 46,335 Ton.Km.virtual.	22.71
Más de 400 Kms.virtuales	S/. 58,316	Ton.Km.Virtual.	23.26

Liquidación

Artículo 3º.- Los coeficientes de conversión por factores físicos aplicables para este servicio serán las siguientes:

REGION	Altura	TIPO DE CARRETERA		
		Afáltada <i>HARÁ TOP</i>	Afirmada <i>UN PAVED</i>	Si afirmar o trocha <i>2A</i>
Costa:	0 a 1,000 m.s.n.m.	1.00	1.58	2.15
Intermedia y Solva:	1,000 á 2,500 m.s.n.m. Gradiente 3-5%	1.20	2.10	2.90
Sierra:	2,500 á más m.s.n.m. Gradiente 5-7%	1.40	2.80	3.90

Artículo 4º.- Para los otros tipos de servicio de carga que no estén comprendidos en la presente Resolución ni en las Resoluciones Nos.019 y 020-83-TC/CRTT/T, las tarifas serán incrementadas en 25.6% con relación a las tarifas vigentes al 31 de Diciembre de 1982.

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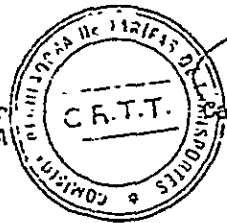
Artículo 5º.- Los módulos de 0 hasta 500 Kms. virtuales se aplicarán a los viajes desde el inicio hasta el fin del recorrido comprendido entre los límites mencionados. Los módulos de "más de 400 y 500 Kms. virtuales" se aplicarán a los viajes que excedan de estas distancias.

Artículo 6º.- Las prescutes tarifas no incluyen los costos de carga, descarga, seguro de la carga, carta fianza, retención de pagos, diferencia de balanza y otros que son por parte del usuario.

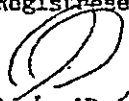
Artículo 7º.- La C.R.T.T. fijará y publicará las tarifas de carga resultantes de la aplicación de los módulos Ton./Km. que motivan la presente Resolución para los lugares comprendidos en las rutas del Sistema Nacional de Carreteras, las que serán de exclusiva aplicación para este servicio.

Artículo 8º.- Las tarifas que se autorizan por la presente Resolución serán puestas en vigencia al día de su publicación en el Diario Oficial "EL PERUANO".


Lic. Eduardo Zúñiga Tafur
JEFE DE SECRETARIA TECNICA



Regístrese y Comuníquese.


Cap. Navío AP (r) Germán González U.
VICE-PRESIDENTE DEL CONSEJO DIRECTIVO.

APPENDIX 12

SPL's Answers to JICA's Question

1. Common Section
2. Information of SPL Plant Site
3. Design Conditions
4. Information on the SPL Existing
PVC Plant
5. Limestone Mining Survey Procedure
6. Calcium Carbide
7. Availability and Prices of
Materials and Equipment
8. Import of Equipment and Materials
9. Supply and Demand
10. Financial, Economic &
Social Information and Data

1.1.2 DISASTERS

1) EARTHQUAKE

a) GENERAL DESCRIPTION

Paramonga is located at an earthquake area.

About description, we think it is not necessary, because it is similar to Japan areas.

b) MAX. AMPLITUD

Using the modified Mercalli intensity or international MKS scale for factory design use 8.0 equivalent to Richter 6.

c) REMARKABLE DISASTERS

Last earthquake happened in Paramonga destroyed the lineation of Paper Mill Cylinder, PVC Piping was broken, Brick walls fell down, etc. but we did not have injured people.

2) THUNDER

Never happens along Peruvian coast (nor in Paramonga)

3) STORM AND FLOOD

Never happens in Paramonga.

1.2 GEOLOGY AND TOPOGRAPHY

1.2.1 GEOLOGY

Paramonga area, million years ago was the bed of a river.

1- GEOLOGICAL MAP

Mr. Figueroa will give you a clear and technical explanation about Paramonga area.

1.2.2 TOPOGRAPHY

1- TOPOGRAPHICAL MAP (with counterline).

Mr. Araki has received two drawings, one of them showing the place for the new plant including counterline and the other showing Paramonga Plants and Town which are there nowadays.

2- LOCATION

a) CITY (TOWN) NAME

Name is Paramonga

b) DISTANCE TO THE NEAREST BIG CITY

Lima is 200 Kms from Paramonga.

Barranca is another city near Paramonga - not a big one.

Population is about 60,000 people but has all the necessary services like Lima but in minimum capacity. It is located to 10 Kms from Paramonga.

1.3 INFRASTRUCTURE CONDITIONS

1.3.1 UTILITY SUPPLY

1- ELECTRICITY

There is enough electric power to 2 Km from PVC Plant.

2- WATER

There is river water piping with capacity over 6,000 GPM available.

1.3.2 COMMUNICATION FACILITY

There are telephoneline, radio and telex

between Paramonga and Lima.

1.3.3 TRANSPORTATION

1- TRAFFIC FACILITY

Along the coast of Peru exists the Panamerican Highway. For emergency it is possible to use air transportation. There is an airport in front of Paramonga only for small airplanes.

2- ROAD

Highway (Panamericana) for buses, trucks and automobiles.

3- PORT

The port of Callao is close to Lima and 200 Kms from Paramonga.

Chimbote is located north of Paramonga-220 Kms.

4- DISTANCE FROM THE SITE TO THE NEAREST CITY (NAME)

AND THE NEAREST PORT: (KM), (HRS)

Paramonga nearest city is Barranca to 10 Kms (South).

Callao nearest port Paramonga to 200 Kms (South).

1.4 SOCIO-ECONOMIC CONDITIONS OF THE REGION

Paramonga is an industrial district. Actually exist Paper & Pulp, Caustic & Chlorine, PVC & Alcohol Plant owned by Sociedad Paramonga Ltd. S.A. Another is the Sugar Plant owned by Cooperativa Agro-Industrial Paramonga Ltda. #37.

1- POPULATION

Is about 30,000 people.

2- LABOR FORCE

We assume 20% of the population

3- INDUSTRIES

Paper, PVC, Chlorine, Alcohol, Sugar, etc.

4- REGIONAL ADMINISTRATION

Suprefecto is the Political Authority

Major is City Authority.

1.5 EXPANSION AND MODIFICATION PROGRAMS OF SPL
PARAMONGA FACTORY

PVC Plant Expansion study by JICA.

2.0 INFORMATION OF SPL PLANT SITE

2.1 SPACE

Available area to PVC plant expansion
existing to north of actual plant.

2.2 GROUND CONDITIONS (SLOPE)

Practically flat is the area available to
the expansion plant.

2.3 SOIL BEARINGS STRENGTH

Average is 1 Kg/cm^2 . Anyway will be necessary
analysis at the moment to install heavy building
or foundations for machinery.

2.4 SURROUNDING CONDITIONS

All area is flat.

3.0 DESIGN CONDITIONS

3.1 NATURAL CONDITIONS

1. TEMPERATURE

See Section 1.1.1.1

Barometric Pressure 760 mm Hg

2. RAIN FALL

Maximum 10 mm/Hr

3. WIND VELOCITY AND DIRECTION

20 Km/Hr Max. - South to North

4. EARTHQUAKE FACTOR

8.0 Mercalli modified intensity or

International MKS scale. (Richter Scale 6.0)

5. RELATIVE HUMIDITY

Maximum 95%

Minimum 70%

3.2 UTILITY CONDITIONS

1) WATER

- WATER RIVER ANALYSIS

Pressure 2 Kg/cm² gage

Temperature Ambient (22°C)

p. H.	7.4
Total hardness (as CaCO ₃)	195 PPM
Ca Hardness (as CaCO ₃)	155 PPM
Mg Hardness (as CaCO ₃)	40 PPM
M Alkalinity (as CaCO ₃)	65 PPM
SO ₄	112.8 PPM
Chlorides (as CL ⁻)	47.9 PPM
Total solid	438 PPM
Turbidity	50 degree max.
KMn O ₄ Consumption	10 PPM Max.
Si O ₂	10 PPM
Si O ₂ Colloidal	Trace

- WELL WATER ANALYSIS

Not available at this time.

Average Total Hardness 820 PPM
(at May 1983)

- POTABLE WATER

Chlorides	0.250 grm/lt
SO ₄	0.255 grm/lt
M _g	0.125 grm/lt
Total solid	1.05 grm/lt
pH	7.3

- DEMINERALIZED WATER

It is necessary to build a new plant.

- INDUSTRIAL SERVICE WATER (PROCESS WATER)

Will be necessary to install a new cooling tower.

c. PRICES

River Water	- \$0.097/1000 m ³
Well Water plus River Water	- 0.22/m ³
Potable Water	- 0.019/m ³
Demineralized Water	-

d. COOLING TOWER TO BE RECYCLED

Cooling tower is recycled in the plant of Paramonga.

e. FOULING FACTOR OF COOLING TOWER

- M² Hr°C/Kcal. 0.0002

CAPACITY OF EXISTING COOLING TOWER

- 2,500 GPM Max.

2) STEAM

a) PRESSURE

450 PSI (31.6 Kg/cm²) gage

b) PRICE

US\$ 20.81 metric tons (May 83)

c) QUANTITY

There is enough

3) NITROGEN GAS

It does not exist any plant.

4) COMPRESSED AIR

It is necessary to get a new compressor

5) INSTRUMENT AIR

It is necessary to get a new compressor

6) ELECTRIC POWER

a) SUPPLY (TRANSMISSION) VOLTAGE

The main line gets 138,000 volts from hydraulic power Cahua and 220,000 volts from Mantaro Hydraulic Power Plant.

b) CYCLE

Tri-phase

c) CAPACITY OF EXISTING SUBSTATION

There is enough capacity

d) DISTANCE FROM SUPPLY POINT TO SUBSTATION
IN PLANT SITE

Kmts

e) FLUCTUATION IN VOLTAGE AND FREQUENCY

Frequency fluctuation happens few times a year. Occasionally there are voltage problems.

f) SUPPLY FAILURE (FREQUENCY, TOTAL PER YEAR)

Almost zero, without stop advertisement.

g) EXISTING EMERGENCY POWER SUPPLY UNIT

Exist two main lines - From Cahua and Mantaro with enough capacity.

h) PRICE (Cahua) - See Hidrandina Invoice
(Mantaro) - See Electroperu Invoice

3.4 DESIGN STANDARD/CODE/SPECIFICATION

1. CODES AND STANDARDS

a) UNFIRED PRESSURE VESSELS-ASME SECT.VIII

DIV.I & DIV.2, 1979

JIS B8243, 1977

b) WELDED STORAGE TANKS

(General) - API 620 5th Edition, July 1979

- API 650, 6th " , Dec. 1978

(Spherical Tanks) - ASME Sect.VIII Div.I & Div.2

JIS B 8243

(Space, Dike, Hydrant) - Fire Service Law of Japan 1972

- High Pressure Gas Control Law
(Japan) 1973

- Japan L.P. Gas Plant Assoc.
Code 1967

c) SHELL & TUBE HEAT EXCHANGER - TEMA Class "C", 6th Edition 1978.

d) FIRE HEATER (For Tube) - API RP 530, 1958

e) ROTATING MACHINES - Manufacturer's Standard

f) THREADS (Except to Instrumentation)

- Pipe Threads NPT

- Bolts & Nuts for UNC & 8 UN

Pipe Flange (1 inch & over)

- Other Service UNC

g) PIPING

(for Design) - ANSI B 31.3, B 31.5.

(for Special - Manufacturer's STD.

i) SINGLE LINE DIAGRAM FOR EXISTING SYSTEM
(From transmission line)

We are including Diagram N°E-01.

7) BRINE

There is not refrigeration plant.

3.3 CONDITIONS OF FEEDSTOCK
(Quality, quantity & Price)

a - LIMESTONE

Raw material conditions feedstock will be cleared when location is defined.

b - REDUCTANTS

Coke carbon is imported.

c - CHLORINE LIQUID (or HCl) GAS

Analysis: HCl Gas

Purity	99.999%
--------	---------

Water	10 PPM
-------	--------

By stripping

d - FUEL OIL-BUNKER N°6 - PRICE US\$ 0.738/Gl.

Analysis:Flash Point °F	226 Avg
-------------------------	---------

Gravity Deg. API	16.9 "
------------------	--------

Say BdT Viscosity,Sec. (at 50°C)	180 "
-------------------------------------	-------

Sulphur Total	0.5 "
---------------	-------

BTU/LB	18555 "
--------	---------

Water & Sediment % by volume	0.10 "
---------------------------------	--------

- h) ELECTRICAL
 - NEMA
 - JIS, JEC, JEM
 - Manufacturer's STD
- i) INSTRUMENTATION
 - NEMA
 - JIS, JEC, JEM
 - Manufacturer's STD
- j) FIRE FIGHTING & PROTECTION
 - (for System) - NFPA
 - (for Hand) - JFSL
- k) CIVIL

-The design of reinforced concrete construction shall be in accordance with ACI-318-63.

-The design of structural steel (light gauge steel, tubular steel and steel) construction shall be in accordance with AISC (ASTM A 36).

-The design of building foundation, structure and various civil foundations shall be in accordance with CRSI Code.

-Design loading concerning external force such as wind and earthquake load shall be in accordance with Peruvian Regulations (Resolución Ministerial N°159-77-VC-1100) of April 5, 1983.

2. MEASUREMENT SYSTEM AND WORDING

a) MEASUREMENT SYSTEM

Metric system and the Celsius system will be applied as the measurement system in all respects, except that nominal sizes

of piping components shall be in accordance with the English System (inches).

b) WORDING

English shall be used as wording for communications, documentation, etc.

c) CODING SYSTEM

The Deka's coding system will be adopted for all engineering and documentation.

3. VOLTAGE SYSTEM ELECTRIC POWER

Selection of voltage system will be in accordance with technology of the plant.

We suggest:

H. T. Motors (above 151 KW)	A.C. 4000 V - 3 Phase
L. T. Motors (below 150 KW)	A.C. 440 V - 3 Phase
Lighting	A.C. 220 V - 1 Phase
Emergency Lighting	D.C. 100 V A.C. 220 V - 1 Phase
Motor Control	A.C. 220 V
Instrument	A.C. 100 V D.C. 24 V

3.5 ENVIRONMENT PROTECTION

Our recommendation regarding pollution control is to use the Japan regulations.

3.6 OTHERS

1) DEGREE OF AUTOMATION & MECHANIZATION

Instruments for operation control must be electronic. Pneumatic-electric used in some areas dependable of requirements.

2) REQUIREMENTS FOR PLANT LAYOUT
(Relation with existing plants)

A new plant will be installed close to the existing PVC plant, but all services will be separate except water for fire fighting system which could be enlarged.

3) FUTURE EXPANSION PLANT

After factibility studies be finished by JICA.

4) PHILOSOPHY FOR STAND-BY MACHINERY, SPARE PARTS AND MAINTENANCE AND OPERATING SUPPLIES.

Normally heat exchanger, pumps and every minor equipment must have stand-by parts. Supplier will recommend all necessary spare parts for maintenance during the first year of plant operation. Chemical additives, coke or any material which is necessary for one year operation must be imported before the plant start-up.

4.0 INFORMATION ON THE SPL EXISTING PVC PLANT

4.1 PLANT CAPACITY

Capacity PVC Plant is 7,000 MT/Year

1. PROCESS PLANT

a) Electrolysis

Chlorine Plant by De-Nora technology

Capacity 40,000 MT/Year

b) HCL Plant

Capacity 1,400 Lbs/Hr. Actual HCl stripping

c) VCM BY SCIENTIFIC DESIGN

Capacity 7,260 ton/Year

d) PVC BY PFAULDER

Capacity 7,000 MT/Year

2. OFF-SITE CAPACITY

a) WAREHOUSE

Capacity 1,500 Tons PVC (2 Warehouses)

b) EFFLUENT TREATMENT FACILITY

There is not any.

c) WORKSHOP

Exists a small workshop to make normal maintenance. When large works are necessary we send them to workshops in Lima.

d) UTILITY FACILITY

There is a cooling tower with 2,500 GPM capacity.

e) LABORATORY

There is an Analytical Laboratory for all products of the actual PVC Plant. We recommend to review its capacity for the new plant.

4.2 RAW MATERIAL & PRODUCT

1) PRICE & SPECIFICATIONS OF RAW MATERIAL

a) NaCl

Price: Salinas US\$ 1.89 MT

Paramonga 3.96 MT

b) EDC

Import Price US\$ 300/MT (CIF PGA)

ANALYSIS:

EDC	98.47 Wt % min (dry base)
Chloroethane	Trace (dry base)
1.2 Dichloro-ethylene	0.02 Wt % max (dry base)
Chloroform	0.37 Wt % max (dry base)
Carbotetrachloride	0.13 Wt % max (dry base)
Trichloroethylene	Trace (dry base)
Trichloroethane	0.85 Wt % max (dry base)
Tetrachloroethylene	Trace (dry base)
Tetrachloroethane	0.15 Wt % max (dry base)
Acid	0.0030% Wt % max (dry base)
Iron	None
Water	0.0050 Wt % max(dry base)

c) CL_2 SPECIFICATION

Pressure 2.5 Kg/cm²

Temperature 30°C

Cost Price (By Mr. R. Echeandia)

HCl 33% Concentration-Cost Price (By Mr. Echeandia)

d) CHEMICALS

Vinyl Acetate US\$ 0.35/Kg

Lauroyl Peroxide 3.64/Kg

Perkadox Y-16 9.35/Kg

MOK - 17 6.17/Kg

Methocel 3.45/Kg

2) CONSUMPTION DATA OF RAW MATERIALS
AND UTILITIES.

1.9 DCE Raw /MT PVC

1.8 DCE Pure /MT PVC

1.1 MVC /MT PVC

1000 KW/MT PVC ELECTRICITY

14.6×10^6 BTU/MT PVC STEAM

(5.511 MT Steam) MT PVC at

1204 BTU/LB.

3) PRODUCT

a) GRADE & APPLICATION

HOMOPOLYMER

K - 55 Bottles, liquid recipients

K - 60 Pipe Connections

K - 65 Piping

K - 70 Hoses, plastified articles

COPOLYMER

K - 1450 Records, Plastic floor

b) PRODUCT MIX

K - 57 Bottles

K - 67 Plastified articles, piping,
 electric cable covers.

4.3 PERSONNEL REQUIREMENT BY SECTION

E D C 3 men/shift

V C M 2 men/shift

P V C 3 men/shift

Lab. 2 men/shift

PLANT SUPERVISOR

1 Chemical Engineer

2 Foremen

4.4 MAIN EQUIPMENT OF PVC PLANT

a) REACTOR Glass Lined

Capacity 3,900 Gls. each

Number 3

- b) SLURRY TANK Glass Lined
Capacity 8 Tons
Number 3 (1 Discharge- 2 Slurry)
- c) VCM STRIPPER
Capacity Design 18 Tons
Actual Production 22 Tons
- d) DECANTER - BIRD CENTRIFUGAL HORIZONTAL
Capacity 1 Ton/Hr
Product Outlet 18-20% Water
- e) DRYER
Capacity 1 Ton/Hr
Rotary Cylinder Type
Final Product 0.5% Water
- f) PRODUCT SILO
There is not any.
- g) PACKER - BY AIR HANDLE
Capacity 15 Ton-1 Shift

ITEMS 5 AND 6 BY MR. J. BARROW AND FIGUEROA

7.0 AVAILABILITY OF MATERIALS AND EQUIPMENT, PRICES

-MATERIALS	(US\$ 1 = S/ 1,550) June 1983	
Sand	\$ 3.23/m ³	
Aggregates	5.81/m ³	
Portland Cement	3.55/Bag (42.5 Kgs)	
Ready-mixed Concrete	48.95/m ³	175 Kg/cm ²
	51.05/m ³	210 Kg/cm ²
	58.10/m ³	280 Kg/cm ²
Concrete Pump Rental	4.70/m ³	
Section (Shape) Steel	1.40/Kg	avg.
Steel Plate	0.82/Kg	"
Stainless Steel Plate	Imported	
Gas Pipe	Imported	
Solid Drawn Steel Pipe	Imported	
Gun Metal Valves	Imported	
Cast Steel Valves	Imported	
Stainless Steel Valves	Imported	
Electric Cables TW Type-18 AWG	\$0.11/m-	AWG \$0.86/m
Indolene Type (Outdoor use) 14 AWG	\$0.24/m-	AWG \$4.64/m
PVC Cover Cable - 16 AWG	\$0.15/m -	500 MCM \$42.98/m
Conduits	Imported	
Refractories	Imported	
Carbon Block/Paste	Imported	
Clay	Imported	
Graphite Powder	Imported	
Machine Oils	Imported	

-EQUIPMENT

VESSEL, TANK, ETC.

1. Max. Pressure and Size

Open Tank at the time 200,000 barrel capacity

PRESSURE VESSELS

500 PSI or more, depend of design

There is no problem with any size.

2. Max. Size of Multitube Heat Exchanger

There is no problem with any size.

3. Max. Size of Plate Heat Exchanger

Imported

4. Fabrication of Stainless Steel Material

Any size and pressure tanks and vessels

are fabricated in Peru. Material is

imported.

5. Glass Lining Vessel

Imported

6. Hard Rubber Lining Vessels

Peruvian companies make this type of work

including Paramonga.

7. Towers made of Carbon

Imported.

-MACHINES

1) TRANSFORMERS

Up to 50 MVA (Up to 220 KV)

2) ACETYLENE ROOTS - BLOWERS

Imported

- 3) VCM COMPRESSOR
Imported
- 4) HCL PUMP
Imported
- 5) VCM GEARED PUMP
Imported
- 6) CONVEYOR
Up to 6'0" wide, any length
- 7) CRUSHERS
Imported
- 8) BAG FILTER
Imported

-ELECTRICAL

- 1) MOTOR
Max.size open type Motor
Up to 200 HP - 600 Volts - 3 ph.- 60 Cycles
PRESSURE & EXPLOSION-PROOF MOTOR
Imported
- 2) SWITCHES
PRESSURE-PROOF TYPE (no fuse breaker)
Imported

-INSTRUMENTS

- 1) UTILIZATION OF PROCESS CONTROL COMPUTER
There are no computer instruments in Paramonga
- 2) ANALOGOUS INSTRUMENTS
Paramonga use electronic instruments in
some Plants.

8.0 IMPORTATION OF EQUIPMENT & MATERIALS

8.1 REGULATIONS (RESTRICTIONS) AND DUTIES ON
IMPORTS OF EQUIPMENT AND MATERIALS.

There are no restrictions to import machinery
to build new plants.

TAXES ON IMPORTATIONS APPROX.

JICA have received the "Manual del Importador"
from Camara de Comercio de Lima.

8.2 PORT FACILITIES

a) Max. allowable weight per one package

There is no problem.

b) Longest size per one package

There is no problem.

8.3 IN-LAND TRANSPORTATION

Up to 100 Tons

Field Survey ScheduleTEAM ACTIVITIES

Brief records of activities conducted by the study team is as follows:

<u>Date</u>	<u>Place</u>	<u>Visit to</u>
June 3, Fri	Arrive at Lima	(KO/JW)
June 4, Sat	Lima	
June 5, Sun	Lima	
June 6, Mon	Lima	JICA, Embassy of Japan, SPL (KO/JW)
June 7, Tue	Lima	INGEMMET (KO/JW)
June 8, Wed	Lima	CEMENT LIMA, MITSUI MINING AND SMELTING (KO/JW)
June 9, Thu	Lima/Paramonga	ENCI (JW), Paramonga (KO)
June 10, Fri	Lima/Yautan	COFIDE (JW), Yautan quarry (KO)
June 11, Sat	Lima/Chulin	Chulin (KO)
June 12, Sun	Lima/Paramonga	Rupay (KO)
June 13, Mon	Lima/Paramonga	PVC market survey (JW)
June 14, Tue	Lima/Huaraz	ENCI, PRIDI (JW), Norca quarry, Tarica quarry (KO)
June 15, Wed	Lima/Paramonga	Pariahuanca deposits (KO)
June 16, Thu	Lima	PROCARBON (JW)
June 17, Fri	Lima	Plastics market survey in Andean countries (JW) Arrive at Lima (KT/RA/MA)

<u>Date</u>	<u>Place</u>	<u>Visit to</u>
June 18, Sat	Lima	(Internal meeting)
June 19, Sun	Lima	(Internal meeting)
June 20, Mon	Lima	JICA, Embassy of Japan, SPL (KT/KO/RA/MA/JW)
June 21, Tue	Lima	SPL (KT/KO/RA/MA/JW)
June 22, Wed	Lima	SPL (KT/KO/RA/MA/JW)
June 23, Thu	Lima/Paramonga	ELECTROPERU, HIDRANDINA (KT/RA), MEFC (KT/RA/MA), Paramonga (KO)
June 24, Fri	Lima/Paramonga	CAF (KT/MA), Min.Agricultura, SIDERPERU (JW), Tumac Calcite deposits (KO), Arrive at Lima (SK/ TA)
June 25, Sat	Lima/Paramonga	(Internal meeting)
June 26, Sun	Lima/Paramonga	(Internal meeting)
June 27, Mon	Lima/Paramonga	MITI (KT/MA/JW), FUJITA GUMI (KT/RA), COSAPI (RA), Min.Agricultura (JW)
June 28, Tue	Lima/Huaraz	HORNOS ELECTRICOS (KT/RA/ SK), COFIDE (MA), Pariahuanca & Maroara deposits (KO)
June 29, Wed	Lima/Paramonga/ Huaraz	Move to Paramonga (KT/RA/ SK/TA/MA), Pariahuanca & Maroara deposits (KO)

<u>Date</u>	<u>Place</u>	<u>Visit to</u>
June 30, Thu	Lima/Paramonga	Paramonga factory (KT/KO/RA/SK/TA/MA)
July 1, Fri	Lima/Paramonga	CORPORACION DE INDUSTRIAS PLASTICAS, PLASTICOS FORT, COPSA, INDECO PERUANA (JW), Paramonga factory (KT/RA/SK/TA/MA)
July 2, Sat	Lima/Paramonga	Chimbote port (KT/KO/RA/SK/TA/MA)
July 3, Sun	Lima/Paramonga	(Internal meeting)
July 4, Mon	Paramonga	Move to Paramonga (JW), Discussion about the survey.
July 5, Tue	Lima/Paramonga	Review & discussion of the survey, Carbide Plant in Chimbote (KO), Move to Lima (KT/RA/SK/TA/MA/JW)
July 6, Wed	Lima	IBRO INTERNACIONAL (KT/JW), Move to Lima (KO)
July 7, Thu	Lima/Oroya	Mr. Nozaki (Consultant of electricity), HIDRANDINA (RA/MA), PISOPAK DEL PERU, FABRICA DE CALZADO (JW) JETRO (KT/JW), Oroya quarry (KO)

<u>Date</u>	<u>Place</u>	<u>Visit to</u>
July 8, Fri	Lima	HORNOS ELECTRICOS (SK/JW), MPI (MA), FUJITA (RA), SOCIEDAD DE INDUSTRIAS (JW), Oroya quarry (KO)
July 9, Sat	Lima	(Prepare interim report)
July 10, Sun	Lima	(Prepare interim report)
July 11, Mon	Lima	ANCOM (JW) (Prepare interim report)
July 12, Tue	Lima	SPL (presentation of in- terim report)
July 13, Wed	Lima	SPL (signing of interim report)
July 14, Thu	Leave Lima	

Note: Abbreviations of the study team names:

KT : Koji TANAKA
 KO : Ken ONO
 RA : Ryusuke ARAKI
 SK : Sotoyuki KIRITANI
 TA : Toshio ASANO
 MA : Masaaki AWAMOTO
 JW : Jun-ichi WATANABE

Works done by the study team during the field survey period may be summarized as follows:

- 1) Discuss with SPL and other sources of information to obtain information and data on local situations and conditions as in-

puts to the feasibility study,

- 2) Investigate candidate limestone deposits and identify the most promising limestone quarry for the project,
- 3) Visit the existing PVC and related plants to obtain technical and economic data for technical and economical studies,
- 4) Establish the most adequate project scheme from the viewpoints of market, technical and economical aspects,
- 5) Collect data and information required for establishment and confirmation of conditions and premises for the financial and economic evaluation

1. ECONOMIC ANALYSIS

National parameters to adjust the market price of the specific resources are to be determined taking accounts of the opinions of officials.

as of 1982

1) Foreign exchange premium	$\bar{\phi} = 2.65$
2) Unskilled labour premium	$\lambda = 0.33$
3) Domestic skilled labour premium	$\chi = 0.69$
4) Marginal rate of return on investment	$q =$
5) Marginal rate of savings	$s =$
6) Social rate of discount	$i =$
7) Shadow price of investment	$p^{inv} = 3.15$
8) Marginal propensities to save:	
a) Government	$S_G =$
b) Private sector	$S_P =$
c) Unskilled and semi-skilled labour	$S_L =$
9) Marginal propensity to respnd in Paramonga	$\gamma = 4.325$ ^{3 values}
10) Proportion of foreign personnel salary spent in Paramonga	$\bar{o} =$
11) Weights on objectives:	
a) Aggregate-consumption	$\theta^c =$
b) Redistribution to Paramonga	$\theta^{RS} =$

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 E RECURSOS HUMANOS

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