

Chapter 14 Financial Analysis

Chapter 14. Financial Analysis

14.1 Method of Analysis

The financial analysis for the Stage II Project was made by the methods stated hereunder.

(1) Repayment Schedule

Conditions of fund raising have been set up in both foreign and domestic currency portions for a total of four (4) cases comprised of the Principal Case and three (3) other cases to work out the repayment schedule. Uniform payment of interest and principal after a lapse of a grace period was adopted for repayment of loan proceeds.

(2) Profit and Loss Statement

Calculations were made on sales income of electricity and the operating expense of operation and maintenance, administration, fuel and depreciation thereby obtaining the profit. Thus the amount of the net profit was obtained by deduction of the financial expense from the profit incurred each year.

(3) Cash Flow

Cash flow sheets were prepared in order to know moving and balance of funds.

(4) Cost of Salable Energy Price to Obtain Financial Equalizing Discount Rate of 15%

Calculations were made to find a cost of salable energy price to ensure a financial equalizing discount rate of 15%, which is the same as the social discount rate determined in the Philippines, to equalize the cumulative present value of the benefit gained from sales of energy with that of the cost incurred from operation and maintenance of the power plant throughout its service life.

14.2 Conditions of Financial Analysis

(1) Loan Conditions

The loan conditions used in the financial analysis are as given hereunder.

- Principal Case (International Financing Agency A)

Loan in Foreign Currency

Interest Rate : 6.33% per annum
Commitment Charge: 0.75% per annum
Loan Term : 20 years (from loan agreement date)
Grace Period : 7 years
Repayment Period : 13 years

- Reference Case 1 (Bilateral Official Financing Agency)

Loan in Foreign Currency

Interest Rate : 2.70% per annum
Service Fee : 0.1% of total loan amount
Loan Term : 30 years (from loan agreement date)
Grace Period : 10 years
Repayment Period : 20 years

- Reference Case 2 (International Financing Agency B)

Loan in Foreign Currency

Interest Rate : 7.75% per annum
Commitment Charge: 0.75% per annum
Loan Term : 20 years (from loan agreement date)
Grace Period : 7 years
Repayment Period : 13 years

- Reference Case 3 (Export-Import Bank)

Loan in Foreign Currency

Interest Rate : 7.3% per annum
Commitment Charge: 0.5% per annum
Loan Term : 14 years (from loan agreement date)
Grace Period : 7 years
Repayment Period : 7 years

In working out funding programs in the local currency portion, an interest rate of 20% per annum was applied commonly to local funds in the four (4) cases. The loans in the local currency portion are to be repaid in 10 years from the start of commercial operation of the power plant. Other than the above, the exchange rate is to be US\$1.00 = P22.50.

(2) Generation of Operating Income and Operating Expenses

The commissioning of Unit 3 and Unit 4 of the Stage II Project is to be materialized in January and July 1990, respectively. It is, however, assumed that the operating income and operating cost are to be generated in 1998 and subsequent years in this financial analysis. Related costs effective as of January 1990 were used for the analysis.

(3) Salable Energy Price of Operating Income

An average billing rate of P1.1678/kWh applied to the Luzon Grid as a whole as of January 1990 was used, which was suggested by NAPOCOR.

(4) Fuel Cost

According to data provided by NAPOCOR, the price of coal at land amounts to US\$54.58/tonnage on the condition of 11,160 (BTU/LB.) = 6,200 Kcal/kg. Based on the figure stated herein, the fuel cost is calculated to be 0.0197 (\$/kWh).

(5) Operation and Maintenance and Administration Cost

By reference to data furnished by NAPOCOR, a figure of US\$2.406 Million per year was used as Operation and Maintenance (OM) including expenditure to cope with deterioration of the equipment and appropriate expenses for its repair, etc. and Administration Cost in this study. The OM Cost on a yearly basis represents 1.2% of the construction cost amounting to US\$141.50 Million used in Chapter 13 whereas the Administration

Cost per year accounts for 0.5% of such construction cost. Thus, an amount of US\$2.406 Million per year was summed up as the OM and Administration Costs.

(6) Depreciation

The yearly amount of depreciation was calculated according to a straight line method on assumption that the service life of the pumped storage plant is 50 years with a residual value of zero. The depreciation components are the construction cost with interest during construction and financial expenses; commitment charges or service fee.

(7) Operating Income (Revenue from Sales of Electricity)

The billing rate of electricity effective as of January 1990 is Pl.1678/kWh (= US\$0.0519/kWh). It is assumed that 438.4 GWh of electricity is to be salable per year on assumption that the station service ratio is 6%, transmission loss rate 2%. The unit price of electricity per kWh is multiplied by energy generation of each year. In this way the revenue from sales of energy amounted to US\$22.752 Millions (= US\$0.0519 x 438.4 GWh).

14.3 Repayment Schedule, Profit and Loss, and Cash Flow

The calculation results of the repayment schedule, profit and loss, and cash flow for each of the four (4) cases are as shown in the following tables.

Principal Case (In case of International Financing Agency A)

Table 14-1 Repayment Schedule

Table 14-2 Profit and Loss Statement

Table 14-3 Cash Flow Sheet

Reference Case 1 (In case of Bilateral Official Financing Agency)

Table 14-4 Repayment Schedule

Table 14-5 Profit and Loss Statement

Table 14-6 Cash Flow Sheet

Reference Case 2 (In case of International Financing Agency B)

Table 14-7 Repayment Schedule

Table 14-8 Profit and Loss Statement

Table 14-9 Cash Flow Sheet

Reference Case 3 (In case of Exim Bank)

Table 14-10 Repayment Schedule

Table 14-11 Profit and Loss Statement

Table 14-12 Cash Flow Sheet

Table 14-1 Repayment Schedule (Principal Case)

Interest Rate 0.0633 L.C. 0.20
 Repayment Period 13 10
 Grace Period 7 7
 Capital Recovery Factor 0.115147 0.238522

(US\$M)

No.	Year	Construction Cost		Repayment of F.C. Portion				Repayment of L.C. Portion				
		F.C.	L.C.	Interest	Commitment Charge	Principal	Interest & Principal	Outstanding Balance	Interest	Principal	Interest & Principal	Outstanding Balance
1	1991	0.572	0	0.018	0.360				0			
2	1992	0.572	0	0.054	0.717				0			
3	1993	9.380	3.583	0.369	0.712				0.358			
4	1994	13.973	10.860	1.108	0.642				1.803			
5	1995	26.744	12.643	2.397	0.537				4.153			
6	1996	31.398	14.156	4.237	0.337				6.833			
7	1997	13.485	4.643	3.042	0.051			96.125	4.589			45.886
1	1998			6.085		4.984	11.069	91.141	9.177	1.768	10.945	44.118
2	1999			5.769		5.299	11.069	85.842	8.824	2.121	10.945	41.997
3	2000			5.434		5.635	11.069	80.207	8.399	2.545	10.945	39.452
4	2001			5.077		5.991	11.069	74.215	7.890	3.054	10.945	36.397
5	2002			4.698		6.371	11.069	67.845	7.279	3.665	10.945	32.732
6	2003			4.295		6.774	11.069	61.071	6.546	4.398	10.945	28.333
7	2004			3.866		7.203	11.069	53.868	5.667	5.278	10.945	23.055
8	2005			3.410		7.659	11.069	46.209	4.611	6.334	10.945	16.721
9	2006			2.925		8.144	11.069	38.066	3.344	7.601	10.945	9.121
10	2007			2.410		8.659	11.069	29.407	1.824	9.121	10.945	0.000
11	2008			1.861		9.207	11.069	20.200				
12	2009			1.279		9.790	11.069	10.410				
13	2010			0.659		10.410	11.069	0.000				
14	2011											
15	2012											
16	2013											
17	2014											
18	2015											
19	2016											
20	2017											
21	2018											
22	2019											
23	2020											
Total		96.125	45.886	47.766	3.356	96.125	143.891	658.479	63.562	45.886	109.448	271.926

Table 14-2 Profit and Loss Statement (Principal Case)

(US\$ M)

No.	Year	Operating Income	Operating Expense			Profit	Interest during Construction	Financial Expense Commitment Charge	Interest	Net Profit
			OM & AD	Fuel	Depreciation					
1	1991						0.018	0.360		
2	1992						0.054	0.717		
3	1993						0.728	0.712		
4	1994						2.911	0.642		
5	1995						6.550	0.537		
6	1996						11.070	0.337		
7	1997						7.631	0.051		
1	1998	22.752	2.406	13.152	3.487	19.044			15.262	-11.554
2	1999	22.752	2.406	13.152	3.487	19.044			14.593	-10.885
3	2000	22.752	2.406	13.152	3.487	19.044			13.833	-10.126
4	2001	22.752	2.406	13.152	3.487	19.044			12.967	-9.260
5	2002	22.752	2.406	13.152	3.487	19.044			11.977	-8.270
6	2003	22.752	2.406	13.152	3.487	19.044			10.861	-7.133
7	2004	22.752	2.406	13.152	3.487	19.044			9.532	-5.825
8	2005	22.752	2.406	13.152	3.487	19.044			8.021	-4.313
9	2006	22.752	2.406	13.152	3.487	19.044			6.269	-2.562
10	2007	22.752	2.406	13.152	3.487	19.044			4.234	-0.526
11	2008	22.752	2.406	13.152	3.487	19.044			1.866	1.861
12	2009	22.752	2.406	13.152	3.487	19.044			1.279	2.429
13	2010	22.752	2.406	13.152	3.487	19.044			0.659	3.049
14	2011	22.752	2.406	13.152	3.487	19.044				3.707
15	2012	22.752	2.406	13.152	3.487	19.044				3.707
16	2013	22.752	2.406	13.152	3.487	19.044				3.707
17	2014	22.752	2.406	13.152	3.487	19.044				3.707
18	2015	22.752	2.406	13.152	3.487	19.044				3.707
19	2016	22.752	2.406	13.152	3.487	19.044				3.707
20	2017	22.752	2.406	13.152	3.487	19.044				3.707
21	2018	22.752	2.406	13.152	3.487	19.044				3.707
22	2019	22.752	2.406	13.152	3.487	19.044				3.707
23	2020	22.752	2.406	13.152	3.487	19.044				3.707
24	2021	22.752	2.406	13.152	3.487	19.044				3.707
25	2022	22.752	2.406	13.152	3.487	19.044				3.707
26	2023	22.752	2.406	13.152	3.487	19.044				3.707
27	2024	22.752	2.406	13.152	3.487	19.044				3.707
28	2025	22.752	2.406	13.152	3.487	19.044				3.707
29	2026	22.752	2.406	13.152	3.487	19.044				3.707
30	2027	22.752	2.406	13.152	3.487	19.044				3.707
31	2028	22.752	2.406	13.152	3.487	19.044				3.707
32	2029	22.752	2.406	13.152	3.487	19.044				3.707
33	2030	22.752	2.406	13.152	3.487	19.044				3.707
34	2031	22.752	2.406	13.152	3.487	19.044				3.707
35	2032	22.752	2.406	13.152	3.487	19.044				3.707
36	2033	22.752	2.406	13.152	3.487	19.044				3.707
37	2034	22.752	2.406	13.152	3.487	19.044				3.707
38	2035	22.752	2.406	13.152	3.487	19.044				3.707
39	2036	22.752	2.406	13.152	3.487	19.044				3.707
40	2037	22.752	2.406	13.152	3.487	19.044				3.707
41	2038	22.752	2.406	13.152	3.487	19.044				3.707
42	2039	22.752	2.406	13.152	3.487	19.044				3.707
43	2040	22.752	2.406	13.152	3.487	19.044				3.707
44	2041	22.752	2.406	13.152	3.487	19.044				3.707
45	2042	22.752	2.406	13.152	3.487	19.044				3.707
46	2043	22.752	2.406	13.152	3.487	19.044				3.707
47	2044	22.752	2.406	13.152	3.487	19.044				3.707
48	2045	22.752	2.406	13.152	3.487	19.044				3.707
49	2046	22.752	2.406	13.152	3.487	19.044				3.707
50	2047	22.752	2.406	13.152	3.487	19.044				3.707
Total		1137.577	120.278	657.596	174.329	952.203	28.962	3.356	111.329	74.045

Table 14-3 Cash Flow Sheet (Principal Case)

No.	Year	Cash Inflow			Cash Outflow			Balance		
		Construction Cost	Net Profit	Depreciation	Total	Construction Cost	Principal	Total	Yearly	Cumulative
1	1991	0.572	-0.379		0.193	0.572	0.572	0.572	-0.379	-0.379
2	1992	0.572	-0.771		-0.199	0.572	0.572	0.572	-0.771	-1.150
3	1993	12.964	-1.440		11.524	12.964	12.964	12.964	-1.440	-2.590
4	1994	24.833	-3.553		21.280	24.833	24.833	24.833	-3.553	-6.143
5	1995	39.387	-7.087		32.300	39.387	39.387	39.387	-7.087	-13.230
6	1996	45.554	-11.407		34.148	45.554	45.554	45.554	-11.407	-24.637
7	1997	18.128	-7.682		10.447	18.128	18.128	18.128	-7.682	-32.318
1	1998		-11.554	3.487	-8.068		6.752	6.752	-14.819	-47.138
2	1999		-10.885	3.487	-7.399		7.421	7.421	-14.819	-61.957
3	2000		-10.126	3.487	-6.639		8.180	8.180	-14.819	-76.776
4	2001		-9.260	3.487	-5.773		9.046	9.046	-14.819	-91.596
5	2002		-8.270	3.487	-4.783		10.036	10.036	-14.819	-106.415
6	2003		-7.133	3.487	-3.647		11.172	11.172	-16.819	-121.234
7	2004		-5.825	3.487	-2.338		12.481	12.481	-16.819	-136.054
8	2005		-4.313	3.487	-0.827		13.993	13.993	-16.819	-150.873
9	2006		-2.562	3.487	0.925		15.744	15.744	-16.819	-165.692
10	2007		-0.526	3.487	2.960		17.780	17.780	-16.819	-180.511
11	2008		1.846	3.487	5.331		9.207	9.207	-3.875	-184.386
12	2009		2.429	3.487	5.915		9.790	9.790	-3.875	-188.260
13	2010		3.049	3.487	6.535		10.410	10.410	-3.875	-192.135
14	2011		3.707	3.487	7.194				7.194	-184.941
15	2012		3.707	3.487	7.194				7.194	-177.747
16	2013		3.707	3.487	7.194				7.194	-170.553
17	2014		3.707	3.487	7.194				7.194	-163.359
18	2015		3.707	3.487	7.194				7.194	-156.165
19	2016		3.707	3.487	7.194				7.194	-148.971
20	2017		3.707	3.487	7.194				7.194	-141.777
21	2018		3.707	3.487	7.194				7.194	-134.582
22	2019		3.707	3.487	7.194				7.194	-127.388
23	2020		3.707	3.487	7.194				7.194	-120.194
24	2021		3.707	3.487	7.194				7.194	-113.000
25	2022		3.707	3.487	7.194				7.194	-105.806
26	2023		3.707	3.487	7.194				7.194	-98.612
27	2024		3.707	3.487	7.194				7.194	-91.418
28	2025		3.707	3.487	7.194				7.194	-84.224
29	2026		3.707	3.487	7.194				7.194	-77.030
30	2027		3.707	3.487	7.194				7.194	-69.836
31	2028		3.707	3.487	7.194				7.194	-62.642
32	2029		3.707	3.487	7.194				7.194	-55.448
33	2030		3.707	3.487	7.194				7.194	-48.254
34	2031		3.707	3.487	7.194				7.194	-41.060
35	2032		3.707	3.487	7.194				7.194	-33.866
36	2033		3.707	3.487	7.194				7.194	-26.672
37	2034		3.707	3.487	7.194				7.194	-19.478
38	2035		3.707	3.487	7.194				7.194	-12.283
39	2036		3.707	3.487	7.194				7.194	-5.089
40	2037		3.707	3.487	7.194				7.194	2.105
41	2038		3.707	3.487	7.194				7.194	9.299
42	2039		3.707	3.487	7.194				7.194	16.493
43	2040		3.707	3.487	7.194				7.194	23.687
44	2041		3.707	3.487	7.194				7.194	30.881
45	2042		3.707	3.487	7.194				7.194	38.075
46	2043		3.707	3.487	7.194				7.194	45.269
47	2044		3.707	3.487	7.194				7.194	52.463
48	2045		3.707	3.487	7.194				7.194	59.657
49	2046		3.707	3.487	7.194				7.194	66.851
50	2047		3.707	3.487	7.194				7.194	74.045
Total			41.727	174.329	358.067	142.011	142.011	284.021	74.045	74.045

(US\$ M)

Table 14-4 Repayment Schedule (Red. Case 1)

Interest Rate 0.027 F.C. L.C.
 Repayment Period 20 0.2
 Grace Period 10 10
 Capital Recovery Factor 0.065365 0.238522

No. Year	Construction Cost			Repayment of F.C. Portion				Repayment of L.C. Portion				(US\$M)
	F.C.	L.C.	Total	Interest	Service Fee	Principal	Interest & Principal	Outstanding Balance	Interest	Principal	Interest & Principal	
1 1991	0.572	0	0.572	0.008	0.096				0			
2 1992	0.572	0	0.572	0.023					0			
3 1993	9.380	3.583	12.964	0.158					0.358			
4 1994	13.973	10.860	24.833	0.473					1.803			
5 1995	26.744	12.643	39.387	1.022					4.153			
6 1996	31.398	14.156	45.554	1.807					6.833			
7 1997	13.485	4.643	18.128	1.298				96.125	4.589			45.886
1 1998				2.595			2.595	96.125	9.177	1.768	10.945	44.118
2 1999				2.595			2.595	96.125	8.824	2.121	10.945	41.997
3 2000				2.595			2.595	96.125	8.399	2.545	10.945	39.452
4 2001				2.595			2.595	92.437	7.890	3.054	10.945	36.397
5 2002				2.496		3.688	3.688	88.650	7.279	3.665	10.945	32.732
6 2003				2.394		3.787	3.787	84.760	6.546	4.398	10.945	28.333
7 2004				2.289		3.890	3.890	80.765	5.667	5.278	10.945	23.055
8 2005				2.181		3.995	3.995	76.663	4.611	6.334	10.945	16.721
9 2006				2.070		4.213	4.213	72.449	3.344	7.601	10.945	9.121
10 2007				1.956		4.327	4.327	68.122	1.824	9.121	10.945	0.000
11 2008				1.839		4.444	4.444	63.678				
12 2009				1.719		4.564	4.564	59.114				
13 2010				1.596		4.687	4.687	54.427				
14 2011				1.470		4.814	4.814	49.614				
15 2012				1.340		4.944	4.944	44.670				
16 2013				1.206		5.077	5.077	39.593				
17 2014				1.069		5.214	5.214	34.379				
18 2015				0.928		5.355	5.355	29.023				
19 2016				0.784		5.500	5.500	23.524				
20 2017				0.635		5.648	5.648	17.876				
21 2018				0.483		5.801	5.801	12.075				
22 2019				0.326		5.957	5.957	6.118				
23 2020				0.165		6.118	6.283	0.000				
Total	96.125	45.886	142.011	37.926	0.096	96.125	133.451	1286.312	63.562	45.886	109.448	271.926

Table 14-5 Profit and Loss Statement (Ref. Case 1)

(US\$ M)

No.	Year	Operating Income	Operating Expense				Profit	Financial Expense			Net Profit	
			OM & AD	Fuel	Depreciation	Total		Interest during Construction	Service Fee	Interest		
1	1991											
2	1992											
3	1993											
4	1994											
5	1995											
6	1996											
7	1997											
1	1998	22.752	2.406	13.152	3.293	18.850	3.901	0.008		11.773	-7.871	
2	1999	22.752	2.406	13.152	3.293	18.850	3.901	0.023	0.096	11.419	-7.518	
3	2000	22.752	2.406	13.152	3.293	18.850	3.901	0.516		10.995	-7.093	
4	2001	22.752	2.406	13.152	3.293	18.850	3.901	2.275		10.486	-6.584	
5	2002	22.752	2.406	13.152	3.293	18.850	3.901	5.175		9.775	-5.874	
6	2003	22.752	2.406	13.152	3.293	18.850	3.901	8.640		8.940	-5.038	
7	2004	22.752	2.406	13.152	3.293	18.850	3.901	3.386		7.955	-4.054	
8	2005	22.752	2.406	13.152	3.293	18.850	3.901			6.792	-2.890	
9	2006	22.752	2.406	13.152	3.293	18.850	3.901			5.414	-1.513	
10	2007	22.752	2.406	13.152	3.293	18.850	3.901			3.780	0.121	
11	2008	22.752	2.406	13.152	3.293	18.850	3.901			1.899	2.062	
12	2009	22.752	2.406	13.152	3.293	18.850	3.901			1.719	2.182	
13	2010	22.752	2.406	13.152	3.293	18.850	3.901			1.596	2.305	
14	2011	22.752	2.406	13.152	3.293	18.850	3.901			1.470	2.432	
15	2012	22.752	2.406	13.152	3.293	18.850	3.901			1.340	2.562	
16	2013	22.752	2.406	13.152	3.293	18.850	3.901			1.206	2.695	
17	2014	22.752	2.406	13.152	3.293	18.850	3.901			1.069	2.832	
18	2015	22.752	2.406	13.152	3.293	18.850	3.901			0.928	2.973	
19	2016	22.752	2.406	13.152	3.293	18.850	3.901			0.784	3.118	
20	2017	22.752	2.406	13.152	3.293	18.850	3.901			0.635	3.266	
21	2018	22.752	2.406	13.152	3.293	18.850	3.901			0.483	3.419	
22	2019	22.752	2.406	13.152	3.293	18.850	3.901			0.326	3.575	
23	2020	22.752	2.406	13.152	3.293	18.850	3.901			0.165	3.736	
24	2021	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
25	2022	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
26	2023	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
27	2024	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
28	2025	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
29	2026	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
30	2027	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
31	2028	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
32	2029	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
33	2030	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
34	2031	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
35	2032	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
36	2033	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
37	2034	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
38	2035	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
39	2036	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
40	2037	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
41	2038	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
42	2039	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
43	2040	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
44	2041	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
45	2042	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
46	2043	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
47	2044	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
48	2045	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
49	2046	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
50	2047	22.752	2.406	13.152	3.293	18.850	3.901				3.901	
Total		1137.577	130.278	657.596	164.631	942.505	195.072	22.524	0.096	100.888	94.184	

Table 14-6 Cash Flow Sheet (Ref. Case 1)

(US\$ M)

No.	Year	Cash Inflow			Cash Outflow			Balance		
		Construction Cost	Net Profit	Depreciation	Total	Construction Cost	Principal	Total	Yearly	Cumulative
1	1991	0.572	-0.104		0.468	0.572	0.572	0.572	-0.104	-0.104
2	1992	0.572	-0.023		0.549	0.572	0.572	0.572	-0.023	-0.127
3	1993	12.964	-0.516		12.448	12.964	12.964	12.964	-0.516	-0.643
4	1994	24.833	-2.275		22.558	24.833	24.833	24.833	-2.275	-2.918
5	1995	39.387	-5.175		34.212	39.387	39.387	39.387	-5.175	-8.094
6	1996	45.554	-8.640		36.914	45.554	45.554	45.554	-8.640	-16.734
7	1997	18.128	-5.886		12.242	18.128	18.128	18.128	-5.886	-22.620
1	1998		-7.871	3.293	-4.578			1.768	-6.346	-28.967
2	1999		-7.518	3.293	-4.225			2.121	-6.346	-35.313
3	2000		-7.093	3.293	-3.801			2.545	-6.346	-41.659
4	2001		-6.584	3.293	-3.292			6.742	-10.034	-51.693
5	2002		-5.874	3.293	-2.581			7.453	-10.034	-61.727
6	2003		-5.038	3.293	-1.746			8.288	-10.034	-71.761
7	2004		-4.054	3.293	-0.761			9.273	-10.034	-81.795
8	2005		-2.890	3.293	0.402			10.436	-10.034	-91.829
9	2006		-1.513	3.293	1.780			11.814	-10.034	-101.863
10	2007		0.121	3.293	3.414			13.448	-10.034	-111.897
11	2008		2.062	3.293	5.355			4.444	0.911	-110.986
12	2009		2.182	3.293	5.475			4.564	0.911	-110.075
13	2010		2.305	3.293	5.598			4.687	0.911	-109.164
14	2011		2.432	3.293	5.725			4.814	0.911	-108.253
15	2012		2.562	3.293	5.854			4.944	0.911	-107.342
16	2013		2.695	3.293	5.988			5.077	0.911	-106.432
17	2014		2.832	3.293	6.125			5.214	0.911	-105.521
18	2015		2.973	3.293	6.266			5.355	0.911	-104.610
19	2016		3.118	3.293	6.410			5.500	0.911	-103.699
20	2017		3.266	3.293	6.559			5.648	0.911	-102.788
21	2018		3.419	3.293	6.711			5.801	0.911	-101.877
22	2019		3.575	3.293	6.868			5.957	0.911	-100.967
23	2020		3.736	3.293	7.029			6.118	0.911	-100.056
24	2021		3.901	3.293	7.194				7.194	-92.862
25	2022		3.901	3.293	7.194				7.194	-85.668
26	2023		3.901	3.293	7.194				7.194	-78.474
27	2024		3.901	3.293	7.194				7.194	-71.279
28	2025		3.901	3.293	7.194				7.194	-64.085
29	2026		3.901	3.293	7.194				7.194	-56.891
30	2027		3.901	3.293	7.194				7.194	-49.697
31	2028		3.901	3.293	7.194				7.194	-42.503
32	2029		3.901	3.293	7.194				7.194	-35.309
33	2030		3.901	3.293	7.194				7.194	-28.115
34	2031		3.901	3.293	7.194				7.194	-20.921
35	2032		3.901	3.293	7.194				7.194	-13.727
36	2033		3.901	3.293	7.194				7.194	-6.533
37	2034		3.901	3.293	7.194				7.194	0.661
38	2035		3.901	3.293	7.194				7.194	7.855
39	2036		3.901	3.293	7.194				7.194	15.049
40	2037		3.901	3.293	7.194				7.194	22.243
41	2038		3.901	3.293	7.194				7.194	29.437
42	2039		3.901	3.293	7.194				7.194	36.631
43	2040		3.901	3.293	7.194				7.194	43.826
44	2041		3.901	3.293	7.194				7.194	51.020
45	2042		3.901	3.293	7.194				7.194	58.214
46	2043		3.901	3.293	7.194				7.194	65.408
47	2044		3.901	3.293	7.194				7.194	72.602
48	2045		3.901	3.293	7.194				7.194	79.796
49	2046		3.901	3.293	7.194				7.194	86.990
50	2047		3.901	3.293	7.194				7.194	94.184
Total			71.564	164.631	378.205	142.011	286.021	94.184		

Table 14-7 Repayment Schedule (Ref. Case 2)

Interest Rate 0.0775 L.C. 0.2
 Repayment Period 13 10
 Grace Period 7 7
 Capital Recovery Factor 0.124787 0.238522

No. Year	Construction Cost		Repayment of F.C. Portion				Repayment of L.C. Portion				(US\$M)
	F.C.	L.C.	Interest	Commitment Charge	Principal	Interest & Principal	Outstanding Balance	Interest	Principal	Interest & Principal	
1 1991	0.572	0	0.022	0.360				0			
2 1992	0.572	0	0.066	0.717				0			
3 1993	9.380	3.583	0.452	0.712				0.358			
4 1994	13.973	10.860	1.357	0.642				1.803			
5 1995	26.744	12.643	2.935	0.537				4.153			
6 1996	31.398	14.156	5.188	0.337				6.833			
7 1997	13.485	4.643	3.725	0.051				4.589			
											45.886
1 1998			7.450		4.546	11.995	91.579	9.177	1.768	10.945	44.118
2 1999			7.097		4.898	11.995	86.682	8.824	2.121	10.945	41.997
3 2000			6.718		5.277	11.995	81.404	8.399	2.545	10.945	39.452
4 2001			6.309		5.686	11.995	75.718	7.890	3.054	10.945	36.397
5 2002			5.868		6.127	11.995	69.591	7.279	3.665	10.945	32.732
6 2003			5.393		6.602	11.995	62.989	6.546	4.398	10.945	28.333
7 2004			4.882		7.114	11.995	55.875	5.667	5.278	10.945	23.055
8 2005			4.330		7.665	11.995	48.211	4.611	6.334	10.945	16.721
9 2006			3.736		8.259	11.995	39.952	3.344	7.601	10.945	9.121
10 2007			3.096		8.899	11.995	31.053	1.824	9.121	10.945	0.000
11 2008			2.407		9.589	11.995	21.464				
12 2009			1.663		10.332	11.995	11.132				
13 2010			0.863		11.132	11.995	0.000				
14 2011											
15 2012											
16 2013											
17 2014											
18 2015											
19 2016											
20 2017											
21 2018											
22 2019											
23 2020											
Total	96.125	45.886	59.813	3.356	96.125	155.937	675.650	63.562	45.886	109.448	271.926

Table 14-8 Profit and Loss Statement (Ref. Case 2)

(US\$ M)

No.	Year	Operating Income	Operating Expense			Total	Profit	Financial Expense		Net Profit	
			OM & AD	Fuel	Depreciation			Interest during Construction	Commitment Charge		Interest
1	1991										
2	1992	22,752	2,406	13,152	3,537	19,094	3,657	0.022	0.360	16,827	
3	1993	22,752	2,406	13,152	3,537	19,094	3,657	0.066	0.717	15,921	
4	1994	22,752	2,406	13,152	3,537	19,094	3,657	0.810	0.712	15,117	
5	1995	22,752	2,406	13,152	3,537	19,094	3,657	3.160	0.642	14,199	
6	1996	22,752	2,406	13,152	3,537	19,094	3,657	7.088	0.537	13,148	
7	1997	22,752	2,406	13,152	3,537	19,094	3,657	12.021	0.337	11,940	
								8.313	0.051	10,548	
1	1998	22,752	2,406	13,152	3,537	19,094	3,657			8,941	
2	1999	22,752	2,406	13,152	3,537	19,094	3,657			7,081	
3	2000	22,752	2,406	13,152	3,537	19,094	3,657			4,920	
4	2001	22,752	2,406	13,152	3,537	19,094	3,657			1,251	
5	2002	22,752	2,406	13,152	3,537	19,094	3,657			1,994	
6	2003	22,752	2,406	13,152	3,537	19,094	3,657			2,794	
7	2004	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
8	2005	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
9	2006	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
10	2007	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
11	2008	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
12	2009	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
13	2010	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
14	2011	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
15	2012	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
16	2013	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
17	2014	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
18	2015	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
19	2016	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
20	2017	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
21	2018	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
22	2019	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
23	2020	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
24	2021	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
25	2022	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
26	2023	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
27	2024	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
28	2025	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
29	2026	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
30	2027	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
31	2028	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
32	2029	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
33	2030	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
34	2031	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
35	2032	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
36	2033	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
37	2034	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
38	2035	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
39	2036	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
40	2037	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
41	2038	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
42	2039	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
43	2040	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
44	2041	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
45	2042	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
46	2043	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
47	2044	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
48	2045	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
49	2046	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
50	2047	22,752	2,406	13,152	3,537	19,094	3,657			3,657	
Total		1137,577	120,278	657,596	176,848	954,722	182,835	31,481	3,356	123,375	59,481

Table 14-9 Cash Flow Sheet (Ref. Case 2)

No.	Year	Cash Inflow			Cash Outflow			Balance		
		Construction Cost	Net Profit	Depreciation	Total	Construction Cost	Principal	Total	Yearly	Cumulative
1	1991	0.572	-0.383		0.189	0.572	0.572	0.572	-0.383	-0.383
2	1992	0.572	-0.783		-0.211	0.572	0.572	0.572	-0.783	-1.166
3	1993	12.964	-1.523		11.441	12.964	12.964	12.964	-1.523	-2.689
4	1994	24.833	-3.802		21.032	24.833	24.833	24.833	-3.802	-6.490
5	1995	39.387	-7.625		31.762	39.387	39.387	39.387	-7.625	-14.115
6	1996	45.554	-12.137		33.417	45.554	45.554	45.554	-12.137	-26.473
7	1997	18.128	-8.384		9.744	18.128	18.128	18.128	-8.384	-34.837
1	1998		-12.970	3.537	-9.433		6.313	6.313	-15.746	-50.583
2	1999		-12.264	3.537	-8.727		7.019	7.019	-15.746	-66.329
3	2000		-11.460	3.537	-7.923		7.823	7.823	-15.746	-82.075
4	2001		-10.542	3.537	-7.005		8.741	8.741	-15.746	-97.821
5	2002		-9.490	3.537	-5.953		9.792	9.792	-15.746	-113.567
6	2003		-8.283	3.537	-4.746		11.000	11.000	-15.746	-129.313
7	2004		-6.891	3.537	-3.354		12.392	12.392	-15.746	-145.058
8	2005		-5.284	3.537	-1.747		13.999	13.999	-15.746	-160.804
9	2006		-3.423	3.537	0.113		15.859	15.859	-15.746	-176.550
10	2007		-1.263	3.537	2.274		18.020	18.020	-15.746	-192.296
11	2008		1.251	3.537	4.787		9.589	9.589	-4.801	-197.097
12	2009		1.994	3.537	5.531		4.801	4.801	-4.801	-201.898
13	2010		2.794	3.537	6.331		4.801	4.801	-4.801	-206.700
14	2011		3.657	3.537	7.194		7.194	7.194	7.194	-199.506
15	2012		3.657	3.537	7.194		7.194	7.194	7.194	-192.311
16	2013		3.657	3.537	7.194		7.194	7.194	7.194	-185.117
17	2014		3.657	3.537	7.194		7.194	7.194	7.194	-177.923
18	2015		3.657	3.537	7.194		7.194	7.194	7.194	-170.729
19	2016		3.657	3.537	7.194		7.194	7.194	7.194	-163.535
20	2017		3.657	3.537	7.194		7.194	7.194	7.194	-156.341
21	2018		3.657	3.537	7.194		7.194	7.194	7.194	-149.147
22	2019		3.657	3.537	7.194		7.194	7.194	7.194	-141.953
23	2020		3.657	3.537	7.194		7.194	7.194	7.194	-134.759
24	2021		3.657	3.537	7.194		7.194	7.194	7.194	-127.565
25	2022		3.657	3.537	7.194		7.194	7.194	7.194	-120.371
26	2023		3.657	3.537	7.194		7.194	7.194	7.194	-113.177
27	2024		3.657	3.537	7.194		7.194	7.194	7.194	-105.983
28	2025		3.657	3.537	7.194		7.194	7.194	7.194	-98.789
29	2026		3.657	3.537	7.194		7.194	7.194	7.194	-91.595
30	2027		3.657	3.537	7.194		7.194	7.194	7.194	-84.401
31	2028		3.657	3.537	7.194		7.194	7.194	7.194	-77.207
32	2029		3.657	3.537	7.194		7.194	7.194	7.194	-70.012
33	2030		3.657	3.537	7.194		7.194	7.194	7.194	-62.818
34	2031		3.657	3.537	7.194		7.194	7.194	7.194	-55.624
35	2032		3.657	3.537	7.194		7.194	7.194	7.194	-48.430
36	2033		3.657	3.537	7.194		7.194	7.194	7.194	-41.236
37	2034		3.657	3.537	7.194		7.194	7.194	7.194	-34.042
38	2035		3.657	3.537	7.194		7.194	7.194	7.194	-26.848
39	2036		3.657	3.537	7.194		7.194	7.194	7.194	-19.654
40	2037		3.657	3.537	7.194		7.194	7.194	7.194	-12.460
41	2038		3.657	3.537	7.194		7.194	7.194	7.194	-5.266
42	2039		3.657	3.537	7.194		7.194	7.194	7.194	1.928
43	2040		3.657	3.537	7.194		7.194	7.194	7.194	9.122
44	2041		3.657	3.537	7.194		7.194	7.194	7.194	16.316
45	2042		3.657	3.537	7.194		7.194	7.194	7.194	23.510
46	2043		3.657	3.537	7.194		7.194	7.194	7.194	30.704
47	2044		3.657	3.537	7.194		7.194	7.194	7.194	37.898
48	2045		3.657	3.537	7.194		7.194	7.194	7.194	45.093
49	2046		3.657	3.537	7.194		7.194	7.194	7.194	52.287
50	2047		3.657	3.537	7.194		7.194	7.194	7.194	59.481
Total			24.644	176.848	343.502	142.011	284.021	59.481		

Table 14-10 Repayment Schedule (Ref. Case 3)

Interest Rate 0.073 F.C. L.C.
 Repayment Period 7 10
 Grace Period 7
 Capital Recovery Factor 0.187498 0.238522

No.	Year	Construction Cost			Repayment of F.C. Portion				Repayment of L.C. Portion						
		F.C.	L.C.	Total	Interest	Commitment Charge	Principal	Interest & Outstanding Balance	Interest	Principal	Interest & Outstanding Balance	Outstanding Balance			
1	1991	0.572	0	0.572	0.021	0.240					0				
2	1992	0.572	0	0.572	0.063	0.478					0				
3	1993	9.380	3.583	12.964	0.426	0.475					0.358				
4	1994	13.973	10.860	24.833	1.111	0.428					1.803				
5	1995	26.744	12.643	39.387	1.963	0.358					4.153				
6	1996	31.398	14.156	45.554	3.619	0.224					6.833				
7	1997	13.485	4.643	18.128	2.875	0.034					4.589				45.886
1	1998				7.017	11.006	18.023	85.119	9.177	1.768	10.945	109.448	44.118		
2	1999				6.214	11.810	18.023	73.309	8.824	2.121	10.945	109.448	41.997		
3	2000				5.352	12.672	18.023	60.637	8.399	2.545	10.945	109.448	39.452		
4	2001				4.427	13.597	18.023	47.041	7.890	3.054	10.945	109.448	36.397		
5	2002				3.434	14.589	18.023	32.451	7.279	3.665	10.945	109.448	32.732		
6	2003				2.369	15.654	18.023	16.797	6.546	4.398	10.945	109.448	28.333		
7	2004				1.226	16.797	18.023	0.000	5.667	5.278	10.945	109.448	23.055		
8	2005								4.611	6.334	10.945	109.448	16.721		
9	2006								3.344	7.601	10.945	109.448	9.121		
10	2007								1.824	9.121	10.945	109.448	0.000		
11	2008														
12	2009														
13	2010														
14	2011														
15	2012														
16	2013														
17	2014														
18	2015														
19	2016														
20	2017														
21	2018														
22	2019														
23	2020														
Total		96.125	45.886	142.011	30.038	2.237	126.163	315.355	63.562	45.886	109.448	271.926			

Table 14-11 Profit and Loss Statement (Ref. Case 3)

(US\$ M)

No.	Year	Operating Income	Operating Expense				Total	Profit	Financial Expense		Net Profit
			OH & AD	Fuel	Depreciation	Interest during Construction			Commitment Charge	Interest	
1	1991										
2	1992	22.752	2.406	13.152	3.441	18.999	3.753			16.194	-12.441
3	1993	22.752	2.406	13.152	3.441	18.999	3.753			15.037	-11.284
4	1994	22.752	2.406	13.152	3.441	18.999	3.753			13.751	-9.998
5	1995	22.752	2.406	13.152	3.441	18.999	3.753			12.317	-8.564
6	1996	22.752	2.406	13.152	3.441	18.999	3.753			10.713	-6.961
7	1997	22.752	2.406	13.152	3.441	18.999	3.753			8.915	-5.162
8	2005	22.752	2.406	13.152	3.441	18.999	3.753			6.893	-3.140
9	2006	22.752	2.406	13.152	3.441	18.999	3.753			4.611	-0.858
10	2007	22.752	2.406	13.152	3.441	18.999	3.753			3.344	0.409
11	2008	22.752	2.406	13.152	3.441	18.999	3.753			1.929	1.929
12	2009	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
13	2010	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
14	2011	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
15	2012	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
16	2013	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
17	2014	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
18	2015	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
19	2016	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
20	2017	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
21	2018	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
22	2019	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
23	2020	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
24	2021	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
25	2022	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
26	2023	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
27	2024	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
28	2025	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
29	2026	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
30	2027	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
31	2028	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
32	2029	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
33	2030	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
34	2031	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
35	2032	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
36	2033	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
37	2034	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
38	2035	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
39	2036	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
40	2037	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
41	2038	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
42	2039	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
43	2040	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
44	2041	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
45	2042	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
46	2043	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
47	2044	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
48	2045	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
49	2046	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
50	2047	22.752	2.406	13.152	3.441	18.999	3.753			3.753	3.753
Total		1137.577	120.278	657.596	172.060	949.935	187.643	27.812	2.237	93.600	94.042

Table 14-12 Cash Flow Sheet (Ref. Case 3)

No.	Year	Cash Inflow			Cash Outflow			Balance		
		Construction Cost	Net Profit	Depreciation	Total	Construction Cost	Principal	Total	Yearly	Cumulative
1	1991	0.572	-0.261		0.311	0.572		0.572	-0.261	-0.261
2	1992	0.572	-0.540		0.032	0.572		0.572	-0.540	-0.802
3	1993	12.964	-1.259		11.704	12.964		12.964	-1.259	-2.061
4	1994	24.833	-3.341		21.492	24.833		24.833	-3.341	-5.402
5	1995	39.387	-6.474		32.913	39.387		39.387	-6.474	-11.876
6	1996	45.554	-10.676		34.878	45.554		45.554	-10.676	-22.553
7	1997	18.128	-7.497		10.631	18.128		18.128	-11.263	-30.050
1	1998		-12.441	3.441	-9.000		12.774	12.774	-21.774	-51.824
2	1999		-11.284	3.441	-7.843		13.931	13.931	-21.774	-73.598
3	2000		-9.998	3.441	-6.557		15.217	15.217	-21.774	-95.372
4	2001		-8.564	3.441	-5.123		16.651	16.651	-21.774	-117.146
5	2002		-6.961	3.441	-3.520		18.255	18.255	-21.774	-138.920
6	2003		-5.162	3.441	-1.721		20.053	20.053	-21.774	-160.694
7	2004		-3.140	3.441	0.301		22.075	22.075	-21.774	-182.468
8	2005		-0.858	3.441	2.583		6.334	6.334	-3.751	-186.219
9	2006		0.409	3.441	3.850		7.601	7.601	-3.751	-189.969
10	2007		1.929	3.441	5.370		9.121	9.121	-3.751	-193.720
11	2008		3.753	3.441	7.194				7.194	-186.526
12	2009		3.753	3.441	7.194				7.194	-179.332
13	2010		3.753	3.441	7.194				7.194	-172.138
14	2011		3.753	3.441	7.194				7.194	-164.944
15	2012		3.753	3.441	7.194				7.194	-157.750
16	2013		3.753	3.441	7.194				7.194	-150.556
17	2014		3.753	3.441	7.194				7.194	-143.362
18	2015		3.753	3.441	7.194				7.194	-136.168
19	2016		3.753	3.441	7.194				7.194	-128.974
20	2017		3.753	3.441	7.194				7.194	-121.779
21	2018		3.753	3.441	7.194				7.194	-114.585
22	2019		3.753	3.441	7.194				7.194	-107.391
23	2020		3.753	3.441	7.194				7.194	-100.197
24	2021		3.753	3.441	7.194				7.194	-93.003
25	2022		3.753	3.441	7.194				7.194	-85.809
26	2023		3.753	3.441	7.194				7.194	-78.615
27	2024		3.753	3.441	7.194				7.194	-71.421
28	2025		3.753	3.441	7.194				7.194	-64.227
29	2026		3.753	3.441	7.194				7.194	-57.033
30	2027		3.753	3.441	7.194				7.194	-49.839
31	2028		3.753	3.441	7.194				7.194	-42.645
32	2029		3.753	3.441	7.194				7.194	-35.451
33	2030		3.753	3.441	7.194				7.194	-28.257
34	2031		3.753	3.441	7.194				7.194	-21.063
35	2032		3.753	3.441	7.194				7.194	-13.869
36	2033		3.753	3.441	7.194				7.194	-6.674
37	2034		3.753	3.441	7.194				7.194	0.520
38	2035		3.753	3.441	7.194				7.194	7.714
39	2036		3.753	3.441	7.194				7.194	14.908
40	2037		3.753	3.441	7.194				7.194	22.102
41	2038		3.753	3.441	7.194				7.194	29.296
42	2039		3.753	3.441	7.194				7.194	36.490
43	2040		3.753	3.441	7.194				7.194	43.684
44	2041		3.753	3.441	7.194				7.194	50.878
45	2042		3.753	3.441	7.194				7.194	58.072
46	2043		3.753	3.441	7.194				7.194	65.266
47	2044		3.753	3.441	7.194				7.194	72.460
48	2045		3.753	3.441	7.194				7.194	79.654
49	2046		3.753	3.441	7.194				7.194	86.848
50	2047		3.753	3.441	7.194				7.194	94.042
Total			63.993	172.060	378.064	142.011	284.021	94.042		

14.3.1 Cash Flow and Balance of Inflow and Outflow

- Principal Case

As for the yearly balance of inflow and outflow, this Case shows deficits consecutively for 13 years from the commencement year of operation (1998), going into the black in the 14th year. As far as the cumulative balance is concerned, the Case provided figures in the red for 39 years from the 1st operation year, turning into the black in the 40th year. It gains a total sum of US\$74.045 Million in the black for 50 years.

- Reference Case 1

As for the yearly balance of inflow and outflow, red figures continue for 9 years from the commencement year of operation (1998), going into the black in the 10th year. As for the cumulative balance, red figures continue consecutively for 36 years. A total sum of US\$94.184 Millions in the black in the accumulated balance is gained for 50 years.

- Reference Case 2

As for the yearly balance of inflow and outflow, red figures continue consecutively for 13 years from the commencement year of operation (1998), turning into the black in the 14th year. The cumulative balance goes into the black in the 42nd year, gaining a total sum of US\$59.481 Millions for 50 years.

- Reference Case 3

As for the yearly balance of inflow and outflow, red figures continue for 8 years, turning into the black in the 9th year. The cumulative balance turns into the black in the 37th year, showing a total sum of US\$94.062 Millions in the black for 50 years.

14.3.2 Rate of Return of the Stage II Project

The ratios between fixed assets in operation and operating income (Profit) are as shown in the following table.

Table 14-13 Rate of Return

(%)

Period Item	10 Yrs Average	20 Yrs Average	30 Yrs Average	40 Yrs Average	50 Yrs Average
Principal Case	2.363	2.658	3.038	3.545	4.253
Reference Case 1	2.604	2.962	3.385	3.950	4.740
Reference Case 2	2.298	2.585	2.954	3.447	4.136
Reference Case 3	2.423	2.726	3.116	3.635	4.362

As seen from the above table, Reference Case 1 is the most profitable. After Reference Case 1, priority could be given to the order of Reference Case 3, Principal Case, and Reference Case 2. Refer to Tables 14-14, 14-15, 14-16 and 14-17 for details.

Table 14-14 Rate of Return (Principal Case)

No.	Year	Average Net Fixed Assets in Operation					Profit		Rate of Return (%)
		Beginning Balance	Depreciation	Ending Balance	Average Yearly	Accumulative Average	Yearly	Accumulative Profit	
1	1998	174.329	3.487	170.842	172.586	172.586	3.707	3.707	
2	1999	170.842	3.487	167.356	169.099	341.685	3.707	7.415	
3	2000	167.356	3.487	163.869	165.613	507.298	3.707	11.122	
4	2001	163.869	3.487	160.383	162.126	669.424	3.707	14.830	
5	2002	160.383	3.487	156.896	158.639	828.063	3.707	18.537	
6	2003	156.896	3.487	153.410	155.153	983.216	3.707	22.245	
7	2004	153.410	3.487	149.923	151.666	1134.882	3.707	25.952	
8	2005	149.923	3.487	146.436	148.180	1283.062	3.707	29.660	
9	2006	146.436	3.487	142.950	144.693	1427.755	3.707	33.367	
10	2007	142.950	3.487	139.463	141.207	1568.962	3.707	37.075	2.363
11	2008	139.463	3.487	135.977	137.720	1706.682	3.707	40.782	
12	2009	135.977	3.487	132.490	134.233	1840.915	3.707	44.490	
13	2010	132.490	3.487	129.004	130.747	1971.662	3.707	48.197	
14	2011	129.004	3.487	125.517	127.260	2098.922	3.707	51.905	
15	2012	125.517	3.487	122.030	123.774	2222.696	3.707	55.612	
16	2013	122.030	3.487	118.544	120.287	2342.983	3.707	59.320	
17	2014	118.544	3.487	115.057	116.800	2459.783	3.707	63.027	
18	2015	115.057	3.487	111.571	113.314	2573.097	3.707	66.735	
19	2016	111.571	3.487	108.084	109.827	2682.924	3.707	70.442	
20	2017	108.084	3.487	104.597	106.341	2789.265	3.707	74.150	2.658
21	2018	104.597	3.487	101.111	102.854	2892.119	3.707	77.857	
22	2019	101.111	3.487	97.624	99.368	2991.487	3.707	81.565	
23	2020	97.624	3.487	94.138	95.881	3087.368	3.707	85.272	
24	2021	94.138	3.487	90.651	92.394	3179.762	3.707	88.980	
25	2022	90.651	3.487	87.165	88.908	3268.670	3.707	92.687	
26	2023	87.165	3.487	83.678	85.421	3354.091	3.707	96.394	
27	2024	83.678	3.487	80.191	81.935	3436.026	3.707	100.102	
28	2025	80.191	3.487	76.705	78.448	3514.474	3.707	103.809	
29	2026	76.705	3.487	73.218	74.962	3589.436	3.707	107.517	
30	2027	73.218	3.487	69.732	71.475	3660.911	3.707	111.224	3.038
31	2028	69.732	3.487	66.245	67.988	3728.899	3.707	114.932	
32	2029	66.245	3.487	62.758	64.502	3793.401	3.707	118.639	
33	2030	62.758	3.487	59.272	61.015	3854.416	3.707	122.347	
34	2031	59.272	3.487	55.785	57.529	3911.944	3.707	126.054	
35	2032	55.785	3.487	52.299	54.042	3965.986	3.707	129.762	
36	2033	52.299	3.487	48.812	50.555	4016.542	3.707	133.469	
37	2034	48.812	3.487	45.326	47.069	4063.611	3.707	137.177	
38	2035	45.326	3.487	41.839	43.582	4107.193	3.707	140.884	
39	2036	41.839	3.487	38.352	40.096	4147.289	3.707	144.592	
40	2037	38.352	3.487	34.866	36.609	4183.898	3.707	148.299	3.545
41	2038	34.866	3.487	31.379	33.123	4217.020	3.707	152.007	
42	2039	31.379	3.487	27.893	29.636	4246.656	3.707	155.714	
43	2040	27.893	3.487	24.406	26.149	4272.806	3.707	159.422	
44	2041	24.406	3.487	20.919	22.663	4295.468	3.707	163.129	
45	2042	20.919	3.487	17.433	19.176	4314.645	3.707	166.837	
46	2043	17.433	3.487	13.946	15.690	4330.334	3.707	170.544	
47	2044	13.946	3.487	10.460	12.203	4342.537	3.707	174.252	
48	2045	10.460	3.487	6.973	8.716	4351.254	3.707	177.959	
49	2046	6.973	3.487	3.487	5.230	4356.484	3.707	181.667	
50	2047	3.487	3.487	0.000	1.743	4358.227	3.707	185.374	4.253
Total		4445.391	174.329	4271.062	4358.227		185.374		

Table 14-15 Rate of Return (Principal Case)

No.	Year	Average Net Fixed Assets in Operation					Profit		Rate of Return (%)
		Beginning Balance	Depreciation	Ending Balance	Average Yearly	Accumulative Average	Yearly	Accumulative Profit	
1	1998	164.631	3.293	161.338	162.985	162.985	3.901	3.901	
2	1999	161.338	3.293	158.046	159.692	322.677	3.901	7.803	
3	2000	158.046	3.293	154.753	156.400	479.076	3.901	11.704	
4	2001	154.753	3.293	151.461	153.107	632.183	3.901	15.606	
5	2002	151.461	3.293	148.168	149.814	781.998	3.901	19.507	
6	2003	148.168	3.293	144.875	146.522	928.519	3.901	23.409	
7	2004	144.875	3.293	141.583	143.229	1071.748	3.901	27.310	
8	2005	141.583	3.293	138.290	139.936	1211.685	3.901	31.212	
9	2006	138.290	3.293	134.997	136.644	1348.329	3.901	35.113	
10	2007	134.997	3.293	131.705	133.351	1481.680	3.901	39.014	2.604
11	2008	131.705	3.293	128.412	130.059	1611.738	3.901	42.916	
12	2009	128.412	3.293	125.120	126.766	1738.504	3.901	46.817	
13	2010	125.120	3.293	121.827	123.473	1861.978	3.901	50.719	
14	2011	121.827	3.293	118.534	120.181	1982.158	3.901	54.620	
15	2012	118.534	3.293	115.242	116.888	2099.046	3.901	58.522	
16	2013	115.242	3.293	111.949	113.595	2212.642	3.901	62.423	
17	2014	111.949	3.293	108.657	110.303	2322.945	3.901	66.324	
18	2015	108.657	3.293	105.364	107.010	2429.955	3.901	70.226	
19	2016	105.364	3.293	102.071	103.718	2533.672	3.901	74.127	
20	2017	102.071	3.293	98.779	100.425	2634.097	3.901	78.029	2.962
21	2018	98.779	3.293	95.486	97.132	2731.230	3.901	81.930	
22	2019	95.486	3.293	92.193	93.840	2825.069	3.901	85.832	
23	2020	92.193	3.293	88.901	90.547	2915.617	3.901	89.733	
24	2021	88.901	3.293	85.608	87.254	3002.871	3.901	93.635	
25	2022	85.608	3.293	82.316	83.962	3086.833	3.901	97.536	
26	2023	82.316	3.293	79.023	80.669	3167.502	3.901	101.437	
27	2024	79.023	3.293	75.730	77.377	3244.879	3.901	105.339	
28	2025	75.730	3.293	72.438	74.084	3318.963	3.901	109.240	
29	2026	72.438	3.293	69.145	70.791	3389.754	3.901	113.142	
30	2027	69.145	3.293	65.852	67.499	3457.253	3.901	117.043	3.385
31	2028	65.852	3.293	62.560	64.206	3521.459	3.901	120.945	
32	2029	62.560	3.293	59.267	60.914	3582.372	3.901	124.846	
33	2030	59.267	3.293	55.975	57.621	3639.993	3.901	128.748	
34	2031	55.975	3.293	52.682	54.328	3694.322	3.901	132.649	
35	2032	52.682	3.293	49.389	51.036	3745.357	3.901	136.550	
36	2033	49.389	3.293	46.097	47.743	3793.100	3.901	140.452	
37	2034	46.097	3.293	42.804	44.450	3837.551	3.901	144.353	
38	2035	42.804	3.293	39.511	41.158	3878.708	3.901	148.255	
39	2036	39.511	3.293	36.219	37.865	3916.574	3.901	152.156	
40	2037	36.219	3.293	32.926	34.573	3951.146	3.901	156.058	3.950
41	2038	32.926	3.293	29.634	31.280	3982.426	3.901	159.959	
42	2039	29.634	3.293	26.341	27.987	4010.413	3.901	163.860	
43	2040	26.341	3.293	23.048	24.695	4035.108	3.901	167.762	
44	2041	23.048	3.293	19.756	21.402	4056.510	3.901	171.663	
45	2042	19.756	3.293	16.463	18.109	4074.619	3.901	175.565	
46	2043	16.463	3.293	13.170	14.817	4089.436	3.901	179.466	
47	2044	13.170	3.293	9.878	11.524	4100.960	3.901	183.368	
48	2045	9.878	3.293	6.585	8.232	4109.192	3.901	187.269	
49	2046	6.585	3.293	3.293	4.939	4114.131	3.901	191.171	
50	2047	3.293	3.293	0.000	1.646	4115.777	3.901	195.072	4.740
Total		4198.092	164.631	4033.461	4115.777		195.072		

Table 14-16 Rate of Return (Principal Case 2)

No.	Year	Average Net Fixed Assets in Operation					Profit		Rate of Return (%)
		Beginning Balance	Depre- ciation	Ending Balance	Average Yearly	Accumulative Average	Yearly	Accumulative Profit	
1	1998	176.848	3.537	173.311	175.079	175.079	3.657	3.657	
2	1999	173.311	3.537	169.774	171.542	346.621	3.657	7.314	
3	2000	169.774	3.537	166.237	168.005	514.627	3.657	10.971	
4	2001	166.237	3.537	162.700	164.468	679.095	3.657	14.628	
5	2002	162.700	3.537	159.163	160.931	840.026	3.657	18.286	
6	2003	159.163	3.537	155.626	157.394	997.421	3.657	21.943	
7	2004	155.626	3.537	152.089	153.857	1151.278	3.657	25.600	
8	2005	152.089	3.537	148.552	150.320	1301.598	3.657	29.257	
9	2006	148.552	3.537	145.015	146.784	1448.382	3.657	32.914	
10	2007	145.015	3.537	141.478	143.247	1591.629	3.657	36.571	2.298
11	2008	141.478	3.537	137.941	139.710	1731.338	3.657	40.228	
12	2009	137.941	3.537	134.404	136.173	1867.511	3.657	43.885	
13	2010	134.404	3.537	130.867	132.636	2000.146	3.657	47.542	
14	2011	130.867	3.537	127.330	129.099	2129.245	3.657	51.200	
15	2012	127.330	3.537	123.793	125.562	2254.807	3.657	54.857	
16	2013	123.793	3.537	120.256	122.025	2376.832	3.657	58.514	
17	2014	120.256	3.537	116.719	118.488	2495.320	3.657	62.171	
18	2015	116.719	3.537	113.182	114.951	2610.271	3.657	65.828	
19	2016	113.182	3.537	109.646	111.414	2721.685	3.657	69.485	
20	2017	109.646	3.537	106.109	107.877	2829.562	3.657	73.142	2.585
21	2018	106.109	3.537	102.572	104.340	2933.902	3.657	76.799	
22	2019	102.572	3.537	99.035	100.803	3034.705	3.657	80.456	
23	2020	99.035	3.537	95.498	97.266	3131.971	3.657	84.114	
24	2021	95.498	3.537	91.961	93.729	3225.700	3.657	87.771	
25	2022	91.961	3.537	88.424	90.192	3315.893	3.657	91.428	
26	2023	88.424	3.537	84.887	86.655	3402.548	3.657	95.085	
27	2024	84.887	3.537	81.350	83.118	3485.666	3.657	98.742	
28	2025	81.350	3.537	77.813	79.581	3565.248	3.657	102.399	
29	2026	77.813	3.537	74.276	76.044	3641.292	3.657	106.056	
30	2027	74.276	3.537	70.739	72.508	3713.800	3.657	109.713	2.954
31	2028	70.739	3.537	67.202	68.971	3782.770	3.657	113.370	
32	2029	67.202	3.537	63.665	65.434	3848.204	3.657	117.028	
33	2030	63.665	3.537	60.128	61.897	3910.101	3.657	120.685	
34	2031	60.128	3.537	56.591	58.360	3968.460	3.657	124.342	
35	2032	56.591	3.537	53.054	54.823	4023.283	3.657	127.999	
36	2033	53.054	3.537	49.517	51.286	4074.569	3.657	131.656	
37	2034	49.517	3.537	45.980	47.749	4122.318	3.657	135.313	
38	2035	45.980	3.537	42.443	44.212	4166.530	3.657	138.970	
39	2036	42.443	3.537	38.906	40.675	4207.205	3.657	142.627	
40	2037	38.906	3.537	35.370	37.138	4244.343	3.657	146.284	3.447
41	2038	35.370	3.537	31.833	33.601	4277.944	3.657	149.941	
42	2039	31.833	3.537	28.296	30.064	4308.008	3.657	153.599	
43	2040	28.296	3.537	24.759	26.527	4334.535	3.657	157.256	
44	2041	24.759	3.537	21.222	22.990	4357.525	3.657	160.913	
45	2042	21.222	3.537	17.685	19.453	4376.978	3.657	164.570	
46	2043	17.685	3.537	14.148	15.916	4392.895	3.657	168.227	
47	2044	14.148	3.537	10.611	12.379	4405.274	3.657	171.884	
48	2045	10.611	3.537	7.074	8.842	4414.116	3.657	175.541	
49	2046	7.074	3.537	3.537	5.305	4419.422	3.657	179.198	
50	2047	3.537	3.537	0.000	1.768	4421.190	3.657	182.855	4.136
Total		4509.614	176.848	4332.766	4421.190		182.855		

Table 14-17 Rate of Return (Reference Case 3)

No.	Year	Average Net Fixed Assets in Operation					Profit		Rate of Return (%)
		Beginning Balance	Depreciation	Ending Balance	Average Yearly	Accumulative Average	Yearly	Accumulative Profit	
1	1998	172.060	3.441	168.619	170.340	170.340	3.753	3.753	
2	1999	168.619	3.441	165.178	166.899	337.238	3.753	7.506	
3	2000	165.178	3.441	161.737	163.457	500.696	3.753	11.259	
4	2001	161.737	3.441	158.296	160.016	660.712	3.753	15.011	
5	2002	158.296	3.441	154.854	156.575	817.287	3.753	18.764	
6	2003	154.854	3.441	151.413	153.134	970.421	3.753	22.517	
7	2004	151.413	3.441	147.972	149.693	1120.113	3.753	26.270	
8	2005	147.972	3.441	144.531	146.251	1266.365	3.753	30.023	
9	2006	144.531	3.441	141.090	142.810	1409.175	3.753	33.776	
10	2007	141.090	3.441	137.648	139.369	1548.544	3.753	37.529	2.423
11	2008	137.648	3.441	134.207	135.928	1684.472	3.753	41.281	
12	2009	134.207	3.441	130.766	132.487	1816.958	3.753	45.034	
13	2010	130.766	3.441	127.325	129.045	1946.004	3.753	48.787	
14	2011	127.325	3.441	123.884	125.604	2071.608	3.753	52.540	
15	2012	123.884	3.441	120.442	122.163	2193.771	3.753	56.293	
16	2013	120.442	3.441	117.001	118.722	2312.492	3.753	60.046	
17	2014	117.001	3.441	113.560	115.280	2427.773	3.753	63.799	
18	2015	113.560	3.441	110.119	111.839	2539.612	3.753	67.551	
19	2016	110.119	3.441	106.677	108.398	2648.010	3.753	71.304	
20	2017	106.677	3.441	103.236	104.957	2752.967	3.753	75.057	2.726
21	2018	103.236	3.441	99.795	101.516	2854.483	3.753	78.810	
22	2019	99.795	3.441	96.354	98.074	2952.557	3.753	82.563	
23	2020	96.354	3.441	92.913	94.633	3047.190	3.753	86.316	
24	2021	92.913	3.441	89.471	91.192	3138.382	3.753	90.068	
25	2022	89.471	3.441	86.030	87.751	3226.133	3.753	93.821	
26	2023	86.030	3.441	82.589	84.310	3310.443	3.753	97.574	
27	2024	82.589	3.441	79.148	80.868	3391.311	3.753	101.327	
28	2025	79.148	3.441	75.707	77.427	3468.738	3.753	105.080	
29	2026	75.707	3.441	72.265	73.986	3542.724	3.753	108.833	
30	2027	72.265	3.441	68.824	70.545	3613.269	3.753	112.586	3.116
31	2028	68.824	3.441	65.383	67.104	3680.373	3.753	116.338	
32	2029	65.383	3.441	61.942	63.662	3744.035	3.753	120.091	
33	2030	61.942	3.441	58.501	60.221	3804.256	3.753	123.844	
34	2031	58.501	3.441	55.059	56.780	3861.036	3.753	127.597	
35	2032	55.059	3.441	51.618	53.339	3914.375	3.753	131.350	
36	2033	51.618	3.441	48.177	49.898	3964.272	3.753	135.103	
37	2034	48.177	3.441	44.736	46.456	4010.729	3.753	138.856	
38	2035	44.736	3.441	41.295	43.015	4053.744	3.753	142.608	
39	2036	41.295	3.441	37.853	39.574	4093.318	3.753	146.361	
40	2037	37.853	3.441	34.412	36.133	4129.451	3.753	150.114	3.635
41	2038	34.412	3.441	30.971	32.691	4162.142	3.753	153.867	
42	2039	30.971	3.441	27.530	29.250	4191.392	3.753	157.620	
43	2040	27.530	3.441	24.088	25.809	4217.201	3.753	161.373	
44	2041	24.088	3.441	20.647	22.368	4239.569	3.753	165.126	
45	2042	20.647	3.441	17.206	18.927	4258.496	3.753	168.878	
46	2043	17.206	3.441	13.765	15.485	4273.981	3.753	172.631	
47	2044	13.765	3.441	10.324	12.044	4286.025	3.753	176.384	
48	2045	10.324	3.441	6.882	8.603	4294.629	3.753	180.137	
49	2046	6.882	3.441	3.441	5.162	4299.790	3.753	183.890	
50	2047	3.441	3.441	0.000	1.721	4301.511	3.753	187.643	4.362
Total		4387.541	172.060	4215.481	4301.510		187.643		

14.4 Unit Price of Electricity to Obtain an FIRR of 15%

In the Study the income and cost of each year is assumed to be constant for 50 years from the commencement of operation of the Stage II Project. The figures of the construction cost, OM cost and fuel cost were converted into the cumulative present values thereof at the beginning of the year of 1991 when work for the Stage II Project is expected to commence. As a result, the cumulative present value of "Cost" amounted to US\$114.70 Millions. The unit price of electricity per kWh in case of 450 GWh available at the generation end amounted to P2.13584 as given in Table 14-18 so that the cumulative present value of "Benefit" can be equalized with that of "Cost".

Table 14-18 Unit Price of Electricity Viewed from FIRR

P2.13584/kWh

(US\$M)

No.	Year	Operating Income	Cost			Present value Dis. rate: 15%	
			Con. Cost	O/M & Fuel	Total	Benefit	Cost
1	1991		0.57		0.57		0.53
2	1992		0.57		0.57		0.46
3	1993		12.91		12.91		9.10
4	1994		24.75		24.75		15.18
5	1995		39.12		39.12		20.86
6	1996		45.45		45.45		21.07
7	1997		18.13		18.13		7.57
1	1998	42.72		14.87	14.87		
2	1999	42.72		14.87	14.87		
3	2000	42.72		14.87	14.87		
4	2001	42.72		14.87	14.87		
5	2002	42.72		14.87	14.87		
6	2003	42.72		14.87	14.87		
7	2004	42.72		14.87	14.87		
8	2005	42.72		14.87	14.87		
9	2006	42.72		14.87	14.87		
10	2007	42.72		14.87	14.87	*114.70	*39.93
.		
.		
.		
49	2046	42.72		14.87	14.87		
50	2047	42.72		14.87	14.87		
Total		2,135.84	141.50	743.50	885.00	114.70	114.70
Benefit-Cost						0	

* Since the amount of the operating income and the cost are assumed to be constant consecutively during the entire service life of 50 years from the commencement year of operation, the "Cumulative Present Value Conversion Factor" obtained from the following equation was multiplied by each amount of the "Operating Income" and "Cost" covering the 50 years.

$$\frac{(1 + r)^{50} - 1}{r(1 + r)^{50}} \times \frac{1}{(1 + r)^{6.5}}$$

r = discount rate

B/C and B-C in reference cases are described below.

In case of P2.10 $B/C = 0.98$

$B-C = -1.92$ US\$M

In case of P2.20 $B/C = 1.03$

$B-C = +3.45$ US\$M

Appendix

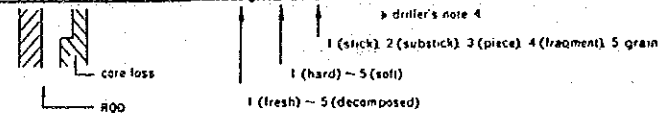
Appendix 1 Geologic Log of Drill Hole

GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT HOLE No. ST2-1 (SHEET 1 OF 4)

LOCATION _____ DEPTH OF HOLE 70.35 m COMMENCED 4-04-90
 ELEVATION _____ m DEPTH OF OVERBURDEN _____ m COMPLETED 5-05-90
 COORDINATE _____ LENGTH OF ROCK DRILLING _____ m DRILLED BY NAPOCOR
 ANGLE FROM HORIZONTAL 45 ° TOTAL LENGTH OF CORE _____ m LOGGED BY P.E. PANTA
 BEARING OF ANGLE HOLE S50 E CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE	WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH	ELEVATION	
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	LUGEON							
0			0-100%										0	40	0m	
1				HQ						Fill materials consisting of subrounded, fragmental sizes of basalt clasts/gravel to boulder embedded in a highly plastic clay.						
2				HQ												
3				HQ												
4				HQ					3.99							
5				HQ							Brownish return water.					
6				HQ					6.43							
7				HQ					7.18							
8				HQ												
9				HQ												
10				HQ					7.63							
11				HQ												
12				HQ					11.13							
13				HQ						Fine silty clay; highly plastic. Sludge samples recovered at 7.63-11.13 m.						
14				HQ					12.63							
15				HQ												
16				HQ						yellowish brown, fine grained, highly weathered and fragmental.						
17				HQ					4 4 5 14.13							
18				HQ												
19				HQ					4 3 4 15.58							
20				HQ						medium grained clasts and medium grained. Highly fractured.						
21				HQ					4 3 4 16.78							
22				HQ												
23				HQ					4 3 4 18.08							
24				HQ						Brownish to grayish return water.						
25				HQ					4 3 4 19.53							



GEOLOGIC LOG OF DRILL HOLE

Kabayaan Stage 2 PROJECT HOLE No. ST2-1 (SHEET 2 OF 4)

LOCATION _____ DEPTH OF HOLE 70.35 m COMMENCED 4-04-90

ELEVATION _____ m DEPTH OF OVERBURDEN _____ m COMPLETED 5-05-90

COORDINATE _____ LENGTH OF ROCK DRILLING _____ m DRILLED BY NAPOCOR

ANGLE FROM HORIZONTAL 45° TOTAL LENGTH OF CORE _____ m LOGGED BY P. E. PAÑA

BEARING OF ANGLE HOLE S50°E CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE			DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING		WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER	DEPTH		
2.0m			0-100%									0	43	
1	Fill materials	S.S.	100%	↑	Brownish	4	3	5	21.13				1	
2						5	4	5	21.83				2	
3						4	3	5	23.33				3	
4	Volcanic Breccia	Δ	100%	↑	Brownish to grayish return water.	4	3	3	24.18	Volcanic Breccia, grayish, medium grained clasts and coarse sandy tuff matrix.				4
5						3	3	3	26.38					5
6						3	3	3	28.65					6
7						3	3	3	27.35					7
8						3	3	3	28.65					8
9	Volcanic Breccia	Δ	100%	↑	grayish	2	2	3	32.40	N.Q. coring bit				9
10						2	2	2	35.45					10
11						1	2	2	38.50					11
12														12
13														13

driller's note 4

1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 grain

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

core loss

RQD

GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT

HOLE No. ST2-1 (SHEET 3 OF 4)

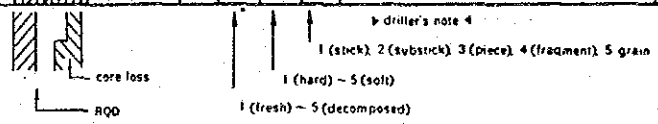
LOCATION _____	DEPTH OF HOLE <u>70.35</u> m	COMMENCED <u>4-04-90</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN _____ m	COMPLETED <u>5-05-90</u>
COORDINATE _____	LENGTH OF ROCK DRILLING _____ m	DRILLED BY <u>NAPOCOR</u>
ANGLE FROM HORIZONTAL <u>45°</u>	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>P. E. PANA</u>
BEARING OF ANGLE HOLE <u>S50E</u>	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE			DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	WATER PRESSURE TEST		LEAKAGE OF DRILLING WATER				
0			0-100%								LUGEON			0	
1		Δ													1
2		Δ				1	2	2		41.55					2
3		Δ								Volcanic Breccia; grayish, medium grained clasts and coarse grained sandy-tuff matrix.					3
4		Δ				2	2	3		Brownish to grayish return water.					4
5		Δ													5
6		Δ								Face flow was observed at 47.65 m depth, discharge of					6
7		Δ				3	2	3		47.65 0.14 lit/sec.					7
8		Δ													8
9		Δ													9
10		Δ													10
11		Δ													11
12		Δ													12
13		Δ													13
14		Δ													14
15		Δ													15
16		Δ													16
17		Δ													17
18		Δ													18
19		Δ													19
20		Δ													20
21		Δ													21
22		Δ													22
23		Δ													23
24		Δ													24
25		Δ													25
26		Δ													26
27		Δ													27
28		Δ													28
29		Δ													29
30		Δ													30
31		Δ													31
32		Δ													32
33		Δ													33
34		Δ													34
35		Δ													35
36		Δ													36
37		Δ													37
38		Δ													38
39		Δ													39
40		Δ													40

Volcanic Breccia

No casing bit

grayish



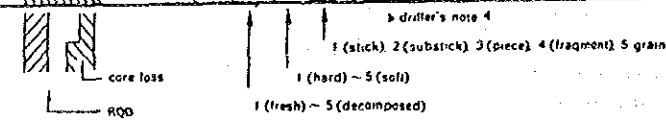
GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT

HOLE No. *ST2-1* (SHEET 4 OF 4)

LOCATION _____	DEPTH OF HOLE <u>70.35</u> m	COMMENCED <u>4-04-90</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN _____ m	COMPLETED <u>5-05-90</u>
COORDINATE _____	LENGTH OF ROCK DRILLING _____ m	DRILLED BY <u>NAPOCOR</u>
ANGLE FROM HORIZONTAL <u>45°</u>	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>P.E. PATA</u>
BEARING OF ANGLE HOLE <u>S50E</u>	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE			DEPTH	ELEVATION		
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	WATER PRESSURE TEST		LEAKAGE OF DRILLING WATER						
0m			0 → 100										0	40	0m		
1	Volcanic Breccia	Δ								2 2 4	Volcanic Breccia; grayish, very well cemented, medium grained clasts, and coarse sandy tuff matrix.				1		
2		Δ Δ								2 2 3						2	
3												2 2 3					3
4		Δ										2 2 3					4
5																	5
6		Δ Δ										2 2 2					6
7															7		
8	Δ														8		
9	Δ Δ									2 2 2					9		
0	Δ									2 2 2					0		
1															1		
2															2		
3															3		
4															4		
5															5		
6															6		
7															7		
8															8		
9															9		
0															0		



GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT **HOLE No. ST2-2 (SHEET 1 OF 3)**

LOCATION _____ DEPTH OF HOLE _____ m COMMENCED 3-5-90

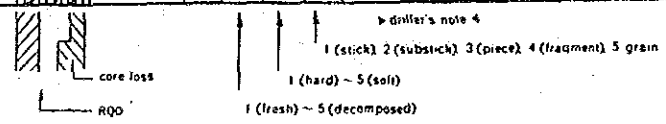
ELEVATION _____ m DEPTH OF OVERBURDEN _____ m COMPLETED 4-7-90

COORDINATE _____ LENGTH OF ROCK DRILLING _____ m DRILLED BY NAFOLOR

ANGLE FROM HORIZONTAL 90° TOTAL LENGTH OF CORE _____ m LOGGED BY PE. PANA

BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE				DEPTH	ELEVATION	
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	WATER PRESSURE TEST		LEAKAGE OF DRILLING WATER			DEPTH			ELEVATION
0m			0-100%								LUGEON				0		
1	Sand gravel									Concrete with mixture of sand and gravel						1	
2																2	
3										3.35 Volcanic Breccia; medium grained clasts and medium						3	
4										4.85 to coarse grained sandy tuff matrix.						4	
5																5	
6										6.60 Brownish gray return water						6	
7																7	
8										8.35						8	
9										9.40						9	
10																10	
11	Volcanic Breccia									11.40						11	
12										12.40						12	
13																13	
14										14.45						14	
15																15	
16										15.63 Encountered free flowing at 15.63 - 17.00 m depth, discharge = 1.3 lit/min.						16	
17										17.45						17	
18																18	
19																19	
20																20	



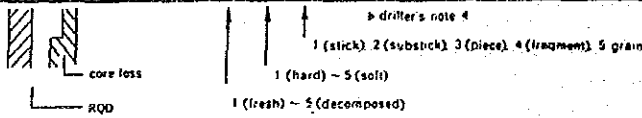
GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT

HOLE No. *ST2-2* (SHEET 2 OF 3)

LOCATION _____	DEPTH OF HOLE _____ m	COMMENCED <u>3-5-90</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN _____ m	COMPLETED <u>4-7-90</u>
COORDINATE _____	LENGTH OF ROCK DRILLING _____ m	DRILLED BY <u>NAPOCOR</u>
ANGLE FROM HORIZONTAL <u>90°</u>	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>P.E. PAÑA</u>
BEARING OF ANGLE HOLE _____	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE			DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	WATER PRESSURE TEST		LEAKAGE OF DRILLING WATER				
2.0m			0-100%												
1	Volcanic Breccia	Δ Δ			grayish	1	3	2	20.45	Volcanic Breccia; very well cemented, medium grained clasts and coarse grained sandy tuff matrix. Grayish return water					
2		Δ													
3		Δ Δ					1	3	2	23.45					
4	Volcanic Breccia	Δ Δ			"										
5		Δ													
6		Δ Δ					2	3	2	26.45					
7	Volcanic Breccia	Δ			"										
8		Δ Δ													
9		Δ Δ					3	3	2	29.45					
10	Lapilli Tuff	Δ			brownish orange					Lapilli Tuff; brownish orange, well cemented. Brownish to grayish return water.					
11		Δ Δ													
12		Δ					1	2	2	32.50					
13	Lapilli Tuff	Δ Δ			"										
14		Δ													
15		Δ Δ					3	3	3	35.55					
16	Lapilli Tuff	Δ			"										
17		Δ Δ													
18		Δ					3	3	4	38.60					
19	Lapilli Tuff	Δ			grayish										
20		Δ Δ													



GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT HOLE No. SP2-2 (SHEET 3 OF 3)

LOCATION _____ DEPTH OF HOLE _____ m COMMENCED 3-5-90

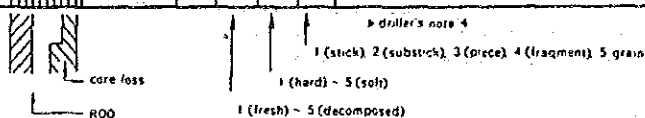
ELEVATION _____ m DEPTH OF OVERBURDEN _____ m COMPLETED 4-7-90

COORDINATE _____ LENGTH OF ROCK DRILLING _____ m DRILLED BY NAPOCOR

ANGLE FROM HORIZONTAL 90° TOTAL LENGTH OF CORE _____ m LOGGED BY P.E. PAÑA

BEARING OF ANGLE HOLE _____ CORE RECOVERY _____ %

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF CITING CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE		DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING		WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER		
0			0-100%										
1		Δ			grayish	2	3	2	41.65				
2		Δ							Volcanic Breccia; grayish very well cemented, medium grained clasts and coarse grained sandy tuff.				
3		Δ			"								
4		Δ											
5		Δ				2	3	3		44.70			
6		Δ			"								
7		Δ							47.75				
8		Δ				2	3	3					
9		Δ			"								
10		Δ											
11		Δ				2	2	2	End of Hole at 50.50 m.				



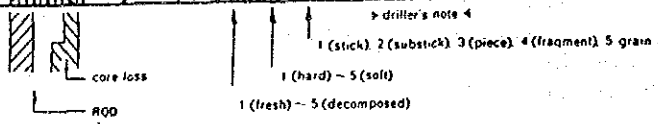
GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT

HOLE No. *ST2-3* (SHEET 1 OF 2)

LOCATION _____	DEPTH OF HOLE <u>30.20</u> m	COMMENCED <u>4-19-90</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN _____ m	COMPLETED <u>5-03-90</u>
COORDINATE _____	LENGTH OF ROCK DRILLING _____ m	DRILLED BY <u>NAPOCOR</u>
ANGLE FROM HORIZONTAL <u>90°</u>	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>P. E. PANA</u>
BEARING OF ANGLE HOLE _____	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE				DESCRIPTION	WATER TABLE		DEPTH	ELEVATION		
					COLOR	WEATHERING	HARDNESS	CORE CUTTING		WATER PRESSURE TEST	LEAKAGE OF DRILLING WATER				
0m			0 → 100								0	0m			
1	Basalt	NW casing bit			reddish gray to dark gray	3	3	5	Basalt; reddish gray to gray and porphyritic. Noted to fracturing with the core axis.	3.00					
2															
3															
4															
5															
6															
7															
8															
9	Tuff	NW casing bit			reddish orange	3	3	3	Tuff; baked, reddish orange	10.65					
10															
11	Volcanic Breccia	NW casing bit			reddish gray to grayish	3	3	3	Volcanic Breccia; medium to coarse clasts of porphyritic basalt and coarse grained sandy tuff matrix.	11.15					
12															
13															
14															
15															
16															
17															
18	Volcanic Breccia	NW casing bit			reddish gray to grayish	3	3	3	Bronnish to grayish return water.	17.25					
19															
20															



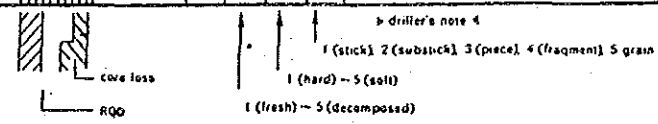
GEOLOGIC LOG OF DRILL HOLE

Kalayaan Stage 2 PROJECT

HOLE No. *ST2-3* (SHEET 2 OF 2)

LOCATION _____	DEPTH OF HOLE <u>30.20</u> m	COMMENCED <u>4-19-90</u>
ELEVATION _____ m	DEPTH OF OVERBURDEN _____ m	COMPLETED <u>5-03-90</u>
COORDINATE _____	LENGTH OF ROCK DRILLING _____ m	DRILLED BY <u>NAPOSOR</u>
ANGLE FROM HORIZONTAL <u>90</u> °	TOTAL LENGTH OF CORE _____ m	LOGGED BY <u>P. E. PAÑA</u>
BEARING OF ANGLE HOLE _____	CORE RECOVERY _____ %	

DEPTH	ROCK NAME	LOG	CORE RECOVERY	CEMENTATION KIND OF BIT CASING	OBSERVATION OF CORE					DESCRIPTION	WATER TABLE				DEPTH	ELEVATION
					COLOR	WEATHERING	HARDNESS	CORE CUTTING	WATER PRESSURE TEST		LEAKAGE OF DRILLING WATER					
0			0-100								LUGEON				0	43
1	Volcanic Breccia	Δ								20.30m					1	
2		Δ Δ								Volcanic Breccia; medium grained clast and coarse sandy tuff matrix.					2	
3		Δ				3	3	4		23.35					3	
4										Brownish to grayish return water.					4	
5		Δ Δ													5	
6															6	
7		Δ								26.40					7	
8		Δ Δ													8	
9															9	
10		Δ								29.45					10	
30									30.20					30		
1									End of Hole					1		
2														2		
3														3		
4														4		
5														5		
6														6		
7														7		
8														8		
9														9		
0														0		



Appendix 2 Results of Blasting Test

[The page contains extremely faint and illegible text, likely bleed-through from the reverse side of the paper. The text is too light to transcribe accurately.]

MEASURING RESULTS OF BLASTING TESTS

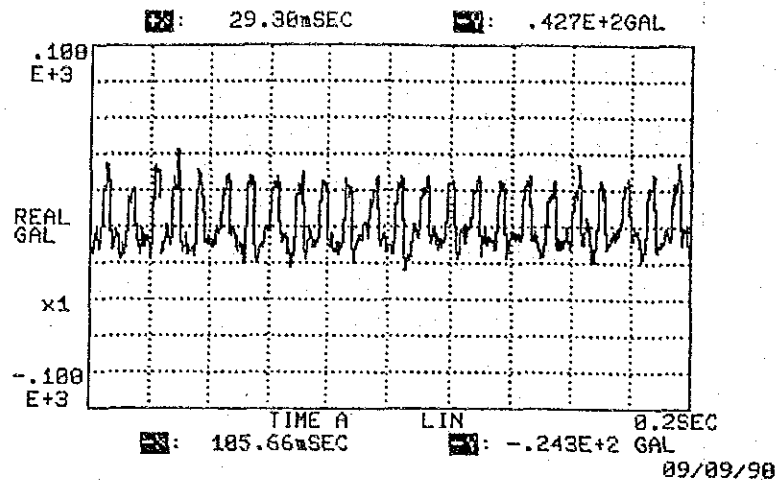
Case-No.	Weight (g)	Drill Depth (m)	Dis. (m)	Meas. Point No.	Acceleration(α) (gal=cm/s ²)	Frequencies(f) (Hertz)	Velocity ($V=\alpha/2\pi f$) (kine=cm/s)	K
Case-A (Explosive)	750	1.30		54 No. 1-H	43	120	0.06	201.5
				54 No. 1-V	22	120	0.03	103.1
				67 No. 2-H	32	120	0.04	230.8
				63 No. 3-H	35	120	0.05	223.2
				63 No. 3-V	15	120	0.02	95.7
Case-B (Explosive)	1,200	1.30		56 No. 1-H	220	120	0.29	810.3
				56 No. 1-V	49	120	0.06	180.5
				69 No. 2-H	52	120	0.07	290.8
				64 No. 3-H	55	120	0.07	264.6
				64 No. 3-V	55	120	0.07	264.6
Case-E (Explosive)	1,800	1.30		34 No. 1-H	59	120	0.08	61.1
				34 No. 1-V	209	120	0.28	216.6
				48 No. 2-H	205	120	0.27	423.3
				46 No. 3-H	220	120	0.29	417.2
				46 No. 3-V	272	120	0.36	515.9
Case-F (Explosive)	2,100	1.50		43 No. 1-H	70	80	0.14	157.0
				43 No. 1-V	67	25	0.43	480.9
				56 No. 2-H	80	25	0.51	973.9
				53 No. 3-H	251	110	0.36	622.1
				53 No. 3-V	164	80	0.33	558.9
Case-I (Calmmite)	25,560	1.50			More effectively			
Case-J (Calmmite)	64,440	1.50			Effectively			

Generating	No. 1-H	43	60	0.11
	No. 1-V	40	60	0.11
	No. 2-H	36	30	0.19
	No. 3-H	33	105	0.05
	No. 3-V	61	105	0.09

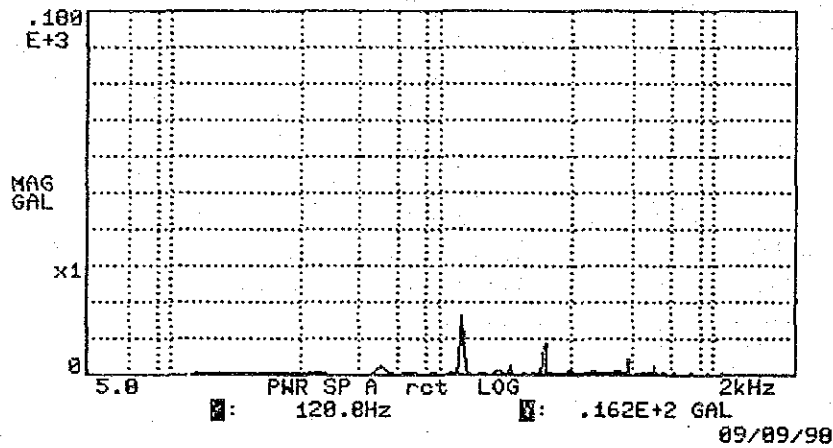
Non Generating	No. 1-H	7	120	0.01
	No. 1-V	21	120	0.03
	No. 2-H	21	120	0.03
	No. 3-H	22	120	0.03
	No. 3-V	23	120	0.03

Measuring point No.1 ; Power house's wall -H ; Horizontal component
 No.2 ; Switch control box -V ; Vertical component
 No.3 ; Generator room

KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1H

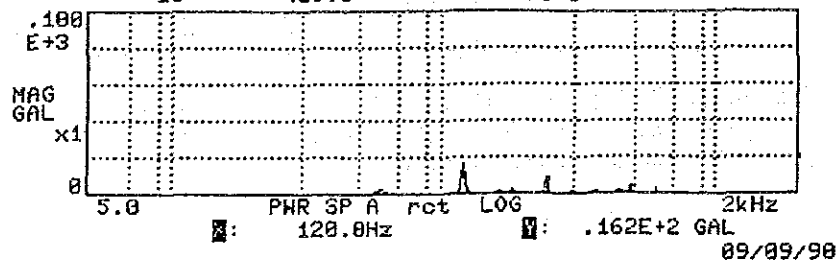


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1H

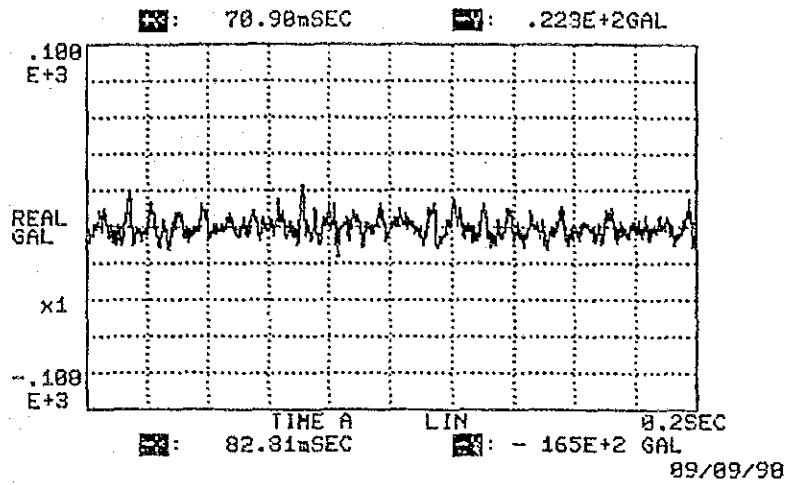


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1H

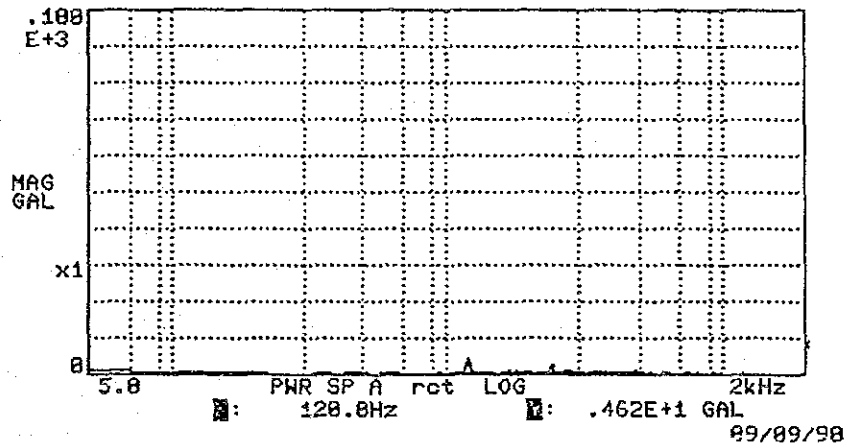
PWR SPECTRUM	ChA	
1	120.0Hz	.162E+2 GAL
2	240.0	.872E+1
3	480.0	.414E+1
4	60.0	.279E+1
5	180.0	.280E+1
6	600.0	.270E+1
7	360.0	.150E+1
8	165.0	.116E+1
9	295.0	.119E+1
10	435.0	.940E+0



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1V

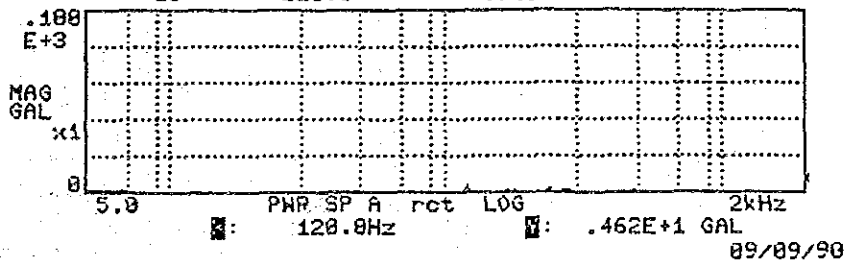


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1V

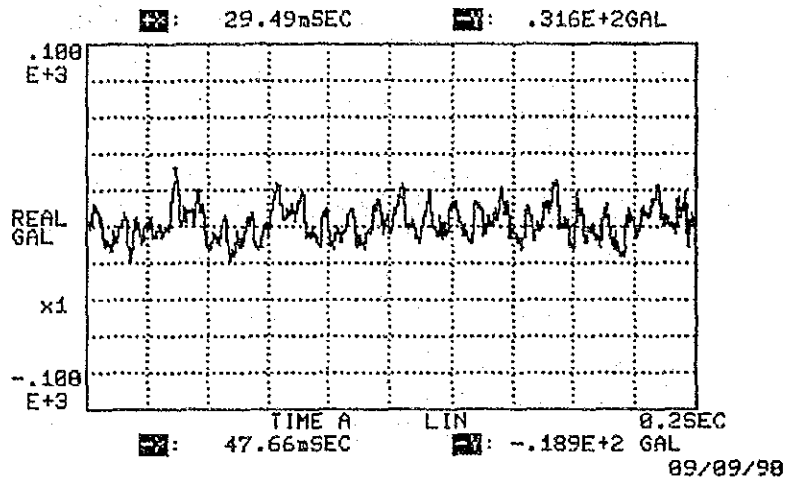


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-1V

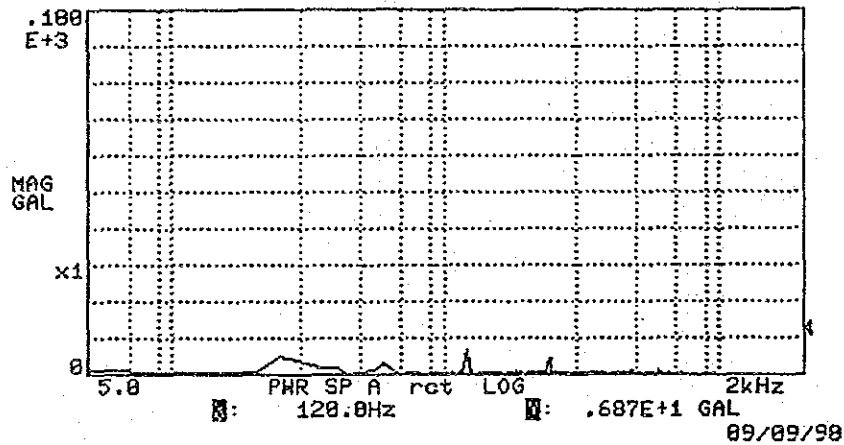
PHR SPECTRUM	Cha	
1	120.0Hz	.462E+1 GAL
2	240.0	.263E+1
3	265.0	.127E+1
4	480.0	.130E+1
5	170.0	.101E+1
6	180.0	.974E+0
7	205.0	.103E+1
8	60.0	.786E+0
9	160.0	.696E+0
10	220.0	.716E+0



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-2H

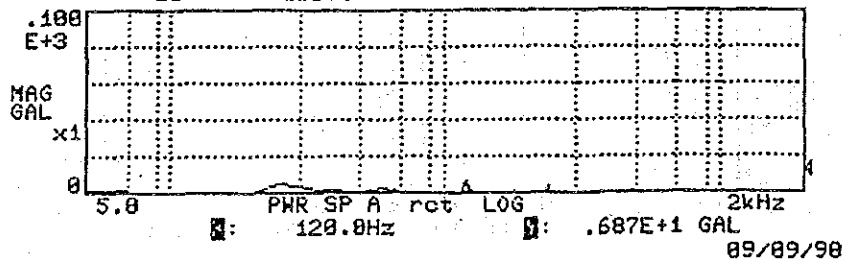


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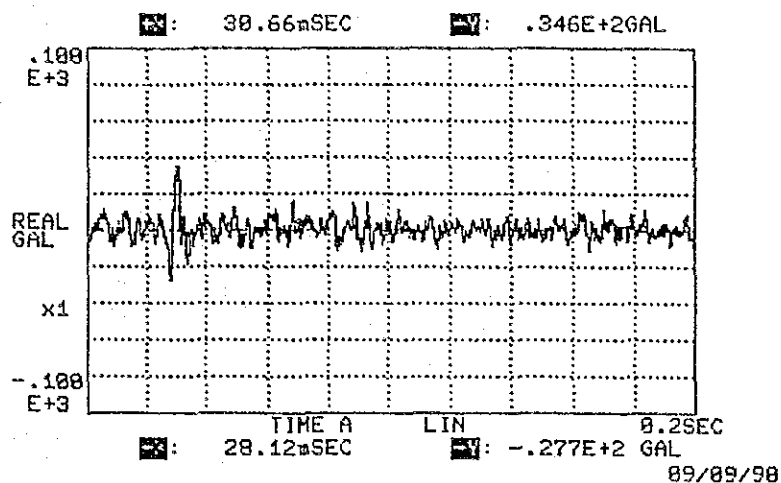


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-2H

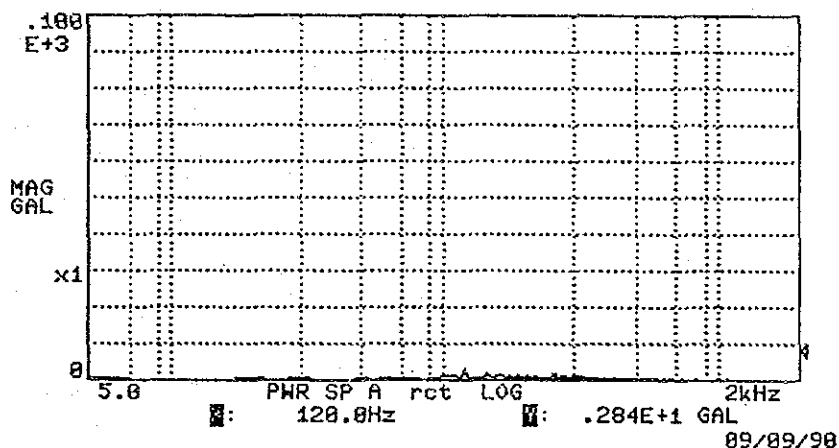
PWR SPECTRUM	ChA	
1	120.0Hz	.687E+1 GAL
2	25.0	.490E+1
3	240.0	.453E+1
4	60.0	.316E+1
5	480.0	.151E+1
6	180.0	.104E+1
7	600.0	.103E+1
8	15.0	.748E+0
9	80.0	.639E+0
10	180.0	.803E+0



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3H

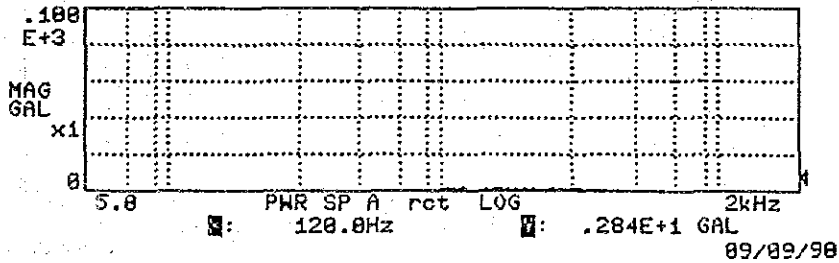


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3H

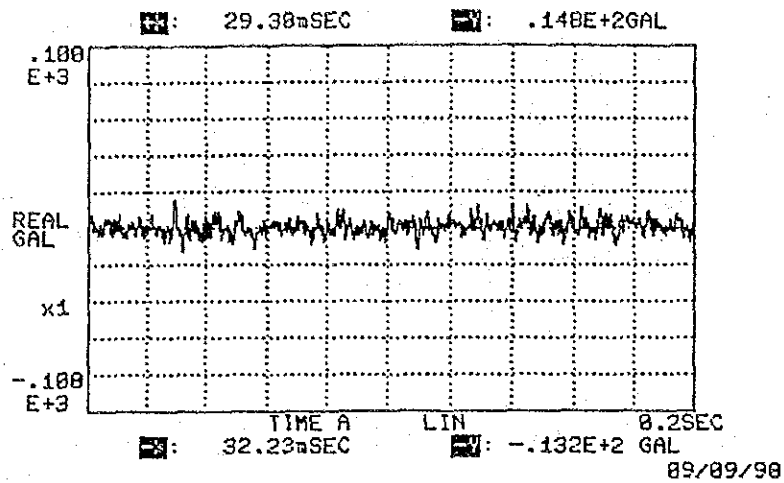


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3H

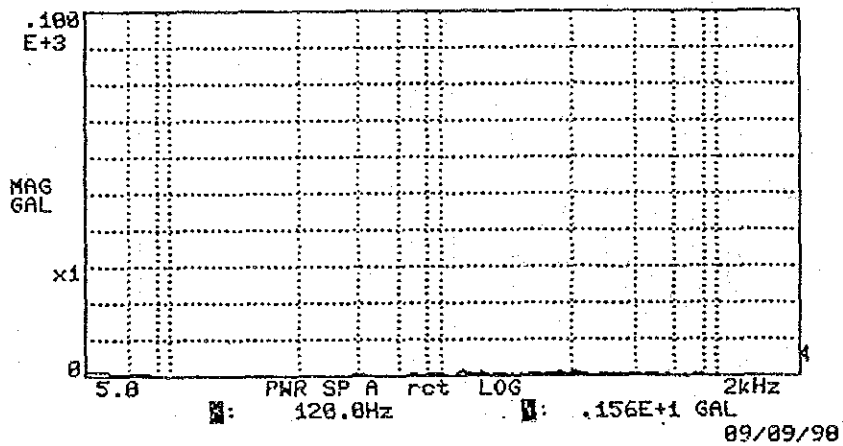
PWR SPECTRUM	ChA	
1	120.0Hz	.284E+1 GAL
2	145.0	.168E+1
3	160.0	.163E+1
4	255.0	.166E+1
5	110.0	.129E+1
6	205.0	.133E+1
7	215.0	.139E+1
8	175.0	.121E+1
9	190.0	.102E+1
10	275.0	.968E+0



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3V

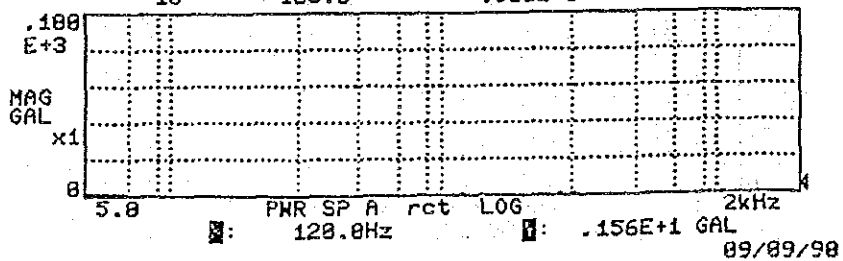


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3V

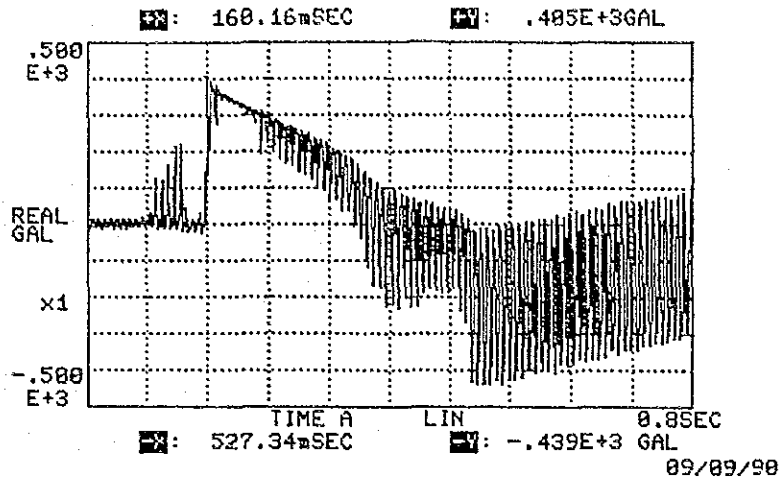


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-A NO.-3V

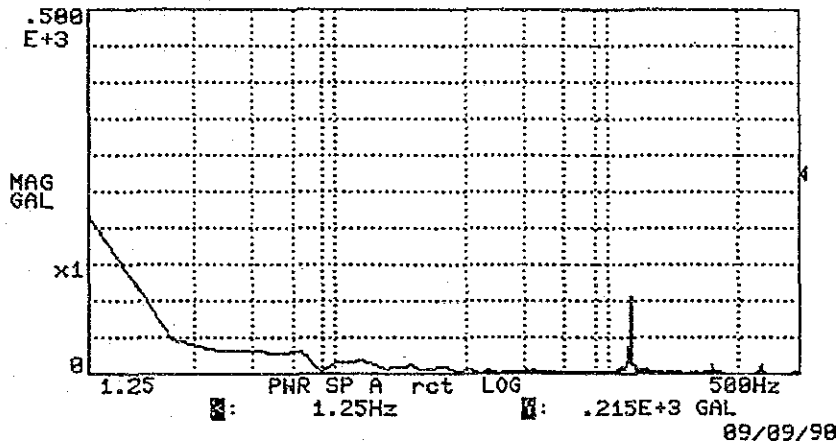
PWR SPECTRUM	ChA	
1	120.0Hz	.156E+1 GAL
2	140.0	.109E+1
3	270.0	.979E+0
4	305.0	.186E+1
5	50.0	.747E+0
6	100.0	.691E+0
7	130.0	.660E+0
8	160.0	.700E+0
9	170.0	.653E+0
10	180.0	.931E+0



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1H

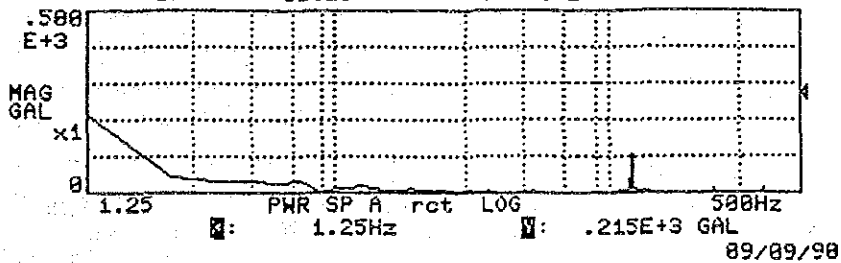


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1H

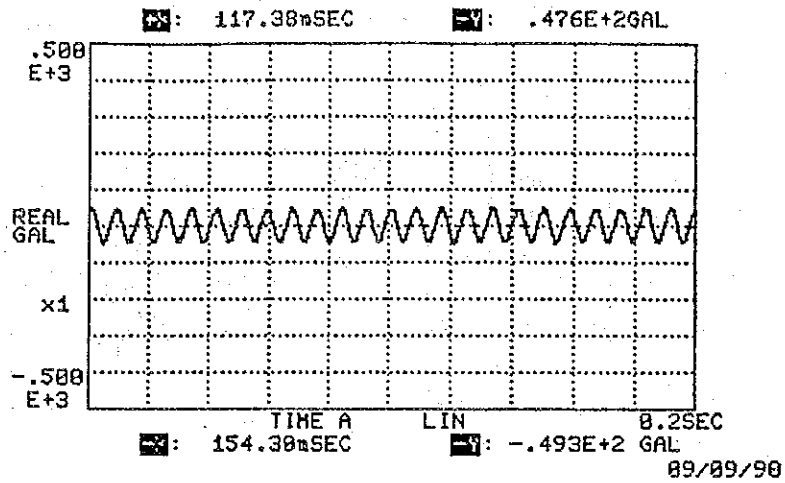


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1H

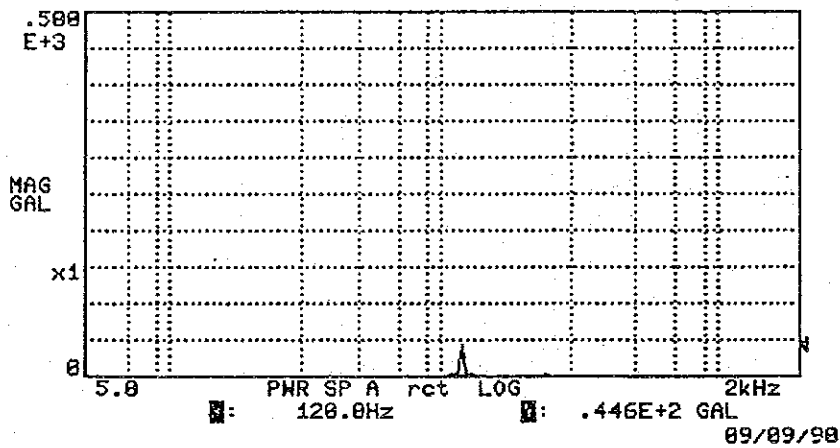
PHR SPECTRUM	ChA	
1	120.00Hz	.185E+3 GAL
2	7.50	.299E+2
3	12.50	.280E+2
4	18.75	.139E+2
5	240.00	.141E+2
6	362.50	.113E+2
7	112.50	.104E+2
8	25.00	.840E+1
9	360.00	.934E+1
10	31.25	.494E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1V

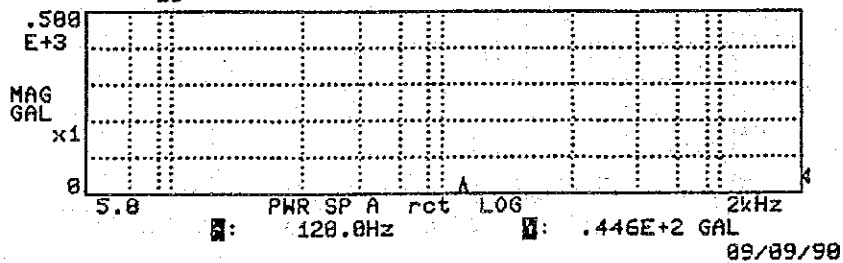


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1V

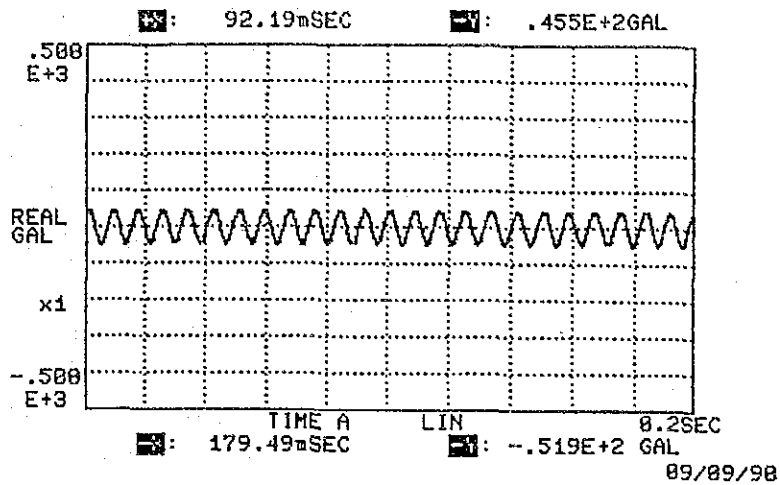


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-1V

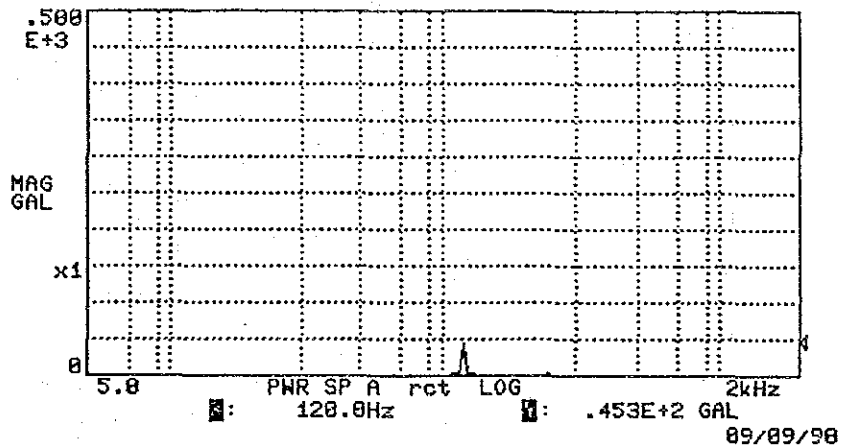
PWR SPECTRUM	ChA	
1	120.0Hz	.446E+2 GAL
2	240.0	.229E+1
3		
4		
5		
6		
7		
8		
9		
10		



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-2H

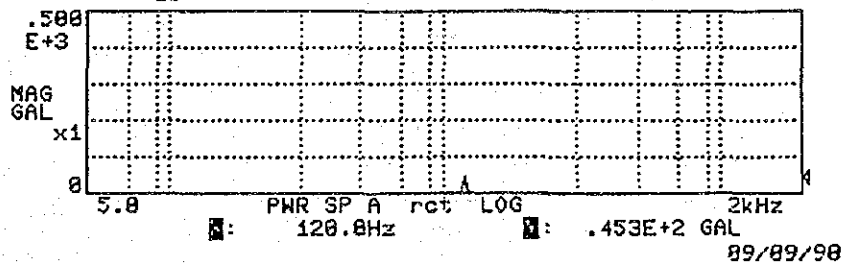


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-2H

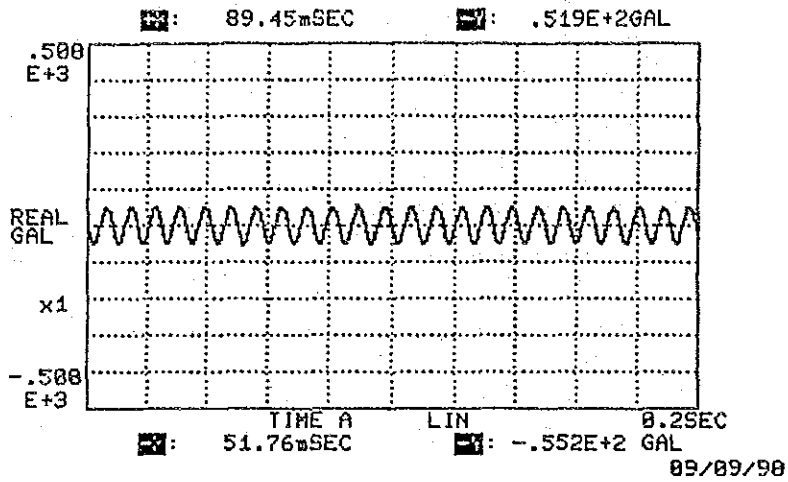


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-2H

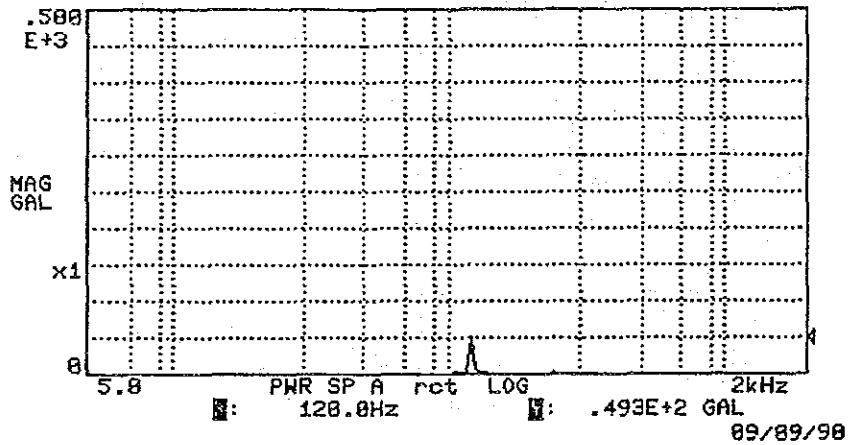
PWR SPECTRUM		
ChA		
1	120.0Hz	.453E+2 GAL
2	240.0	.218E+1
3		
4		
5		
6		
7		
8		
9		
10		



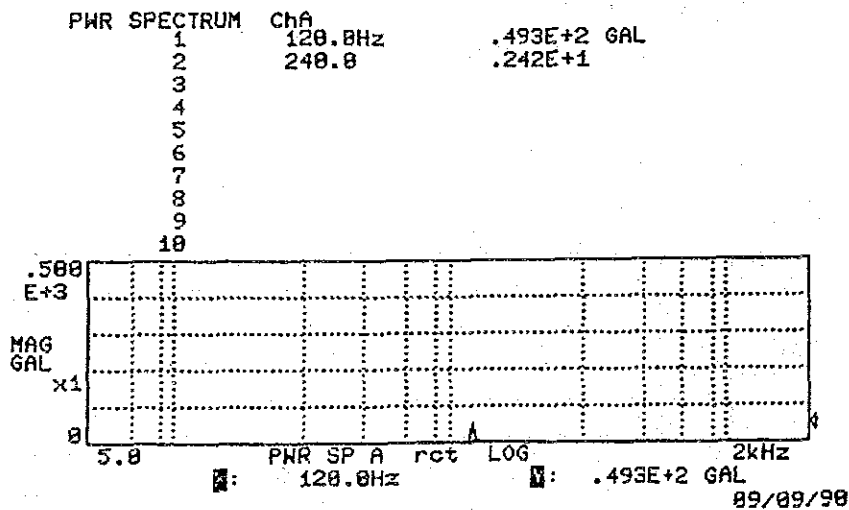
KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3H



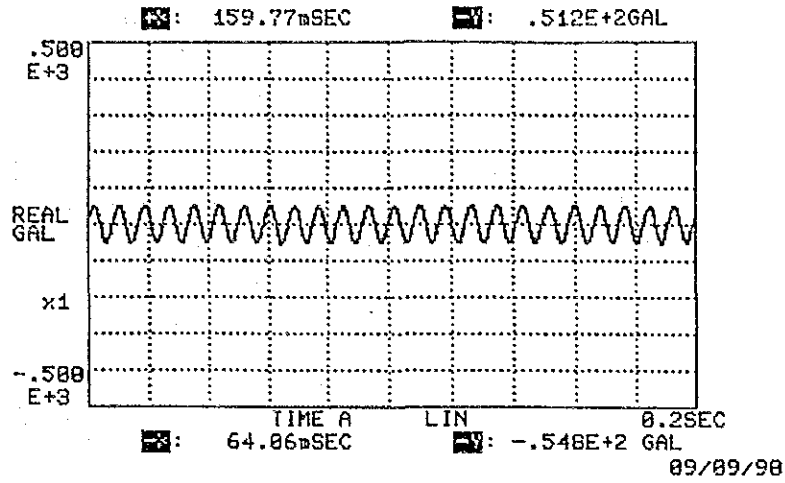
KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3H



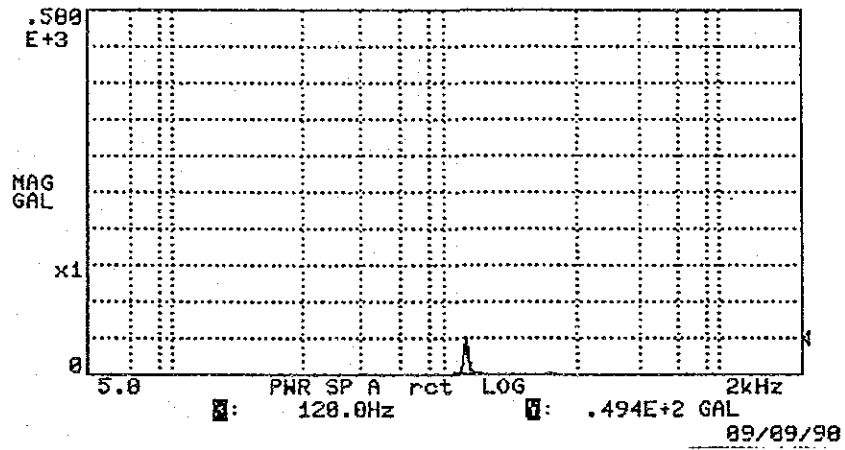
KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3H



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3V

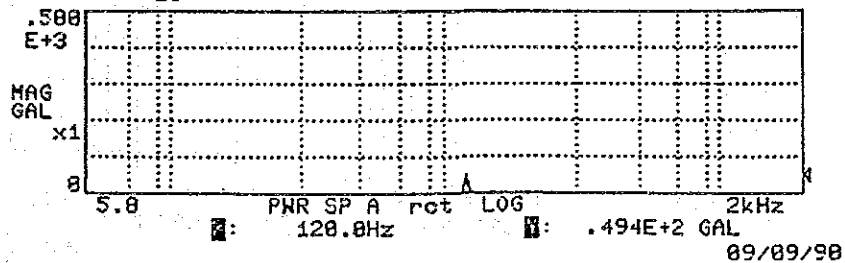


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3V

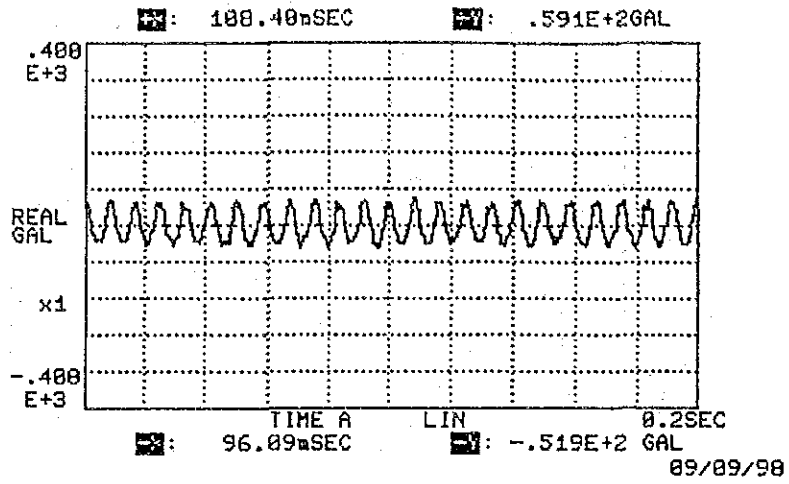


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-B NO.-3V

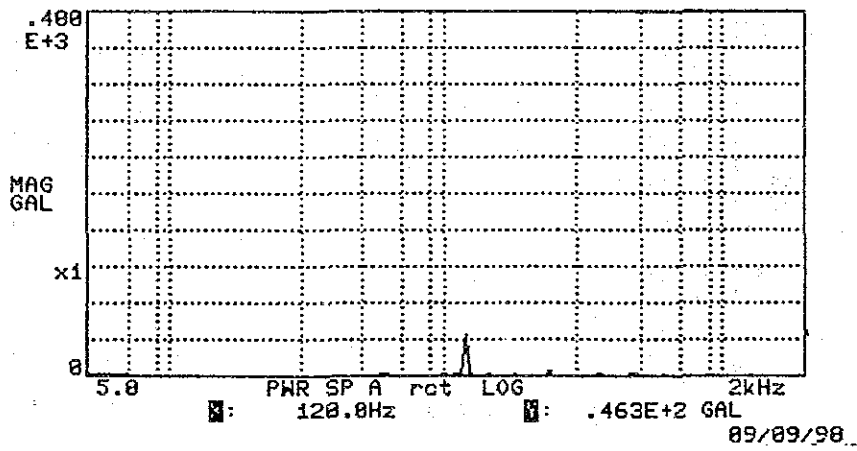
PWR SPECTRUM	ChA	
1	120.0Hz	$.494 \times 10^2 \text{ GAL}$
2	240.0	$.278 \times 10^1$
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1H

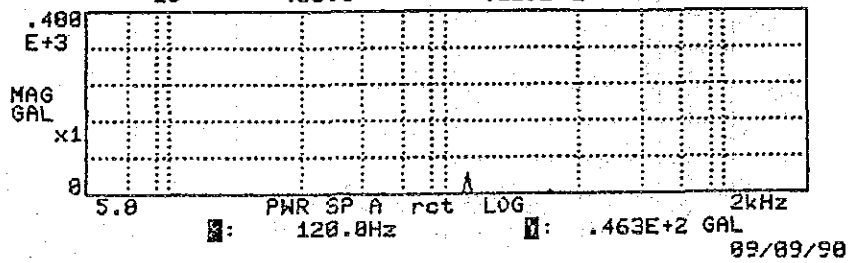


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1H

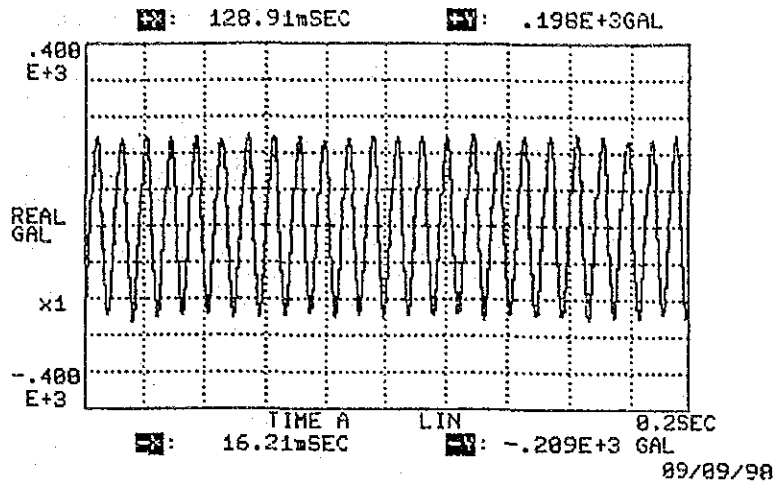


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1H

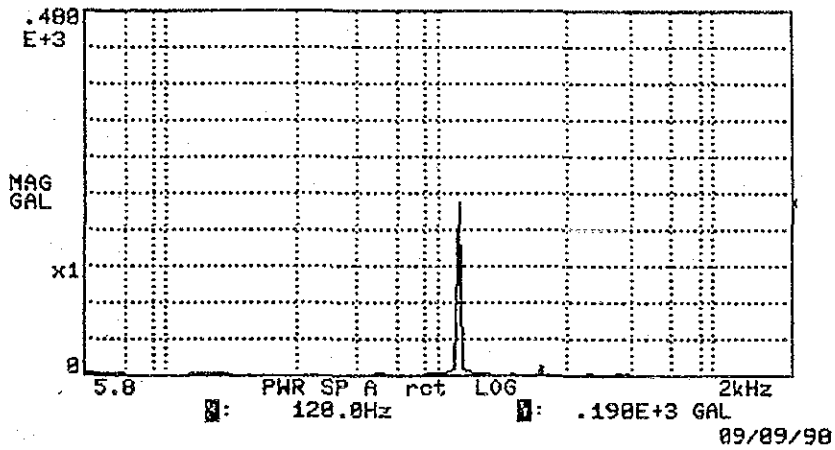
PWR SPECTRUM	ChA	
1	128.0Hz	.463E+2 GAL
2	240.0	.599E+1
3	480.0	.328E+1
4	680.0	.277E+1
5	68.0	.217E+1
6	108.0	.136E+1
7	145.0	.127E+1
8	188.0	.222E+1
9	360.0	.132E+1
10	460.0	.129E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1V

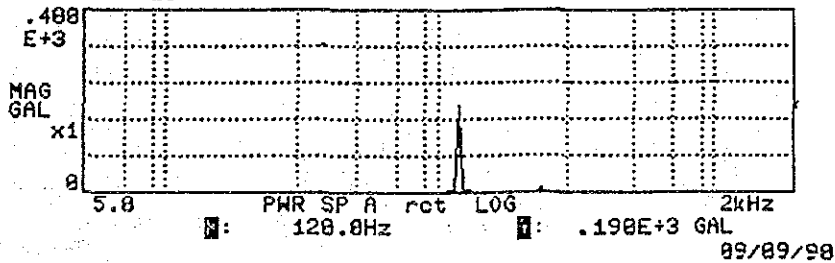


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1V

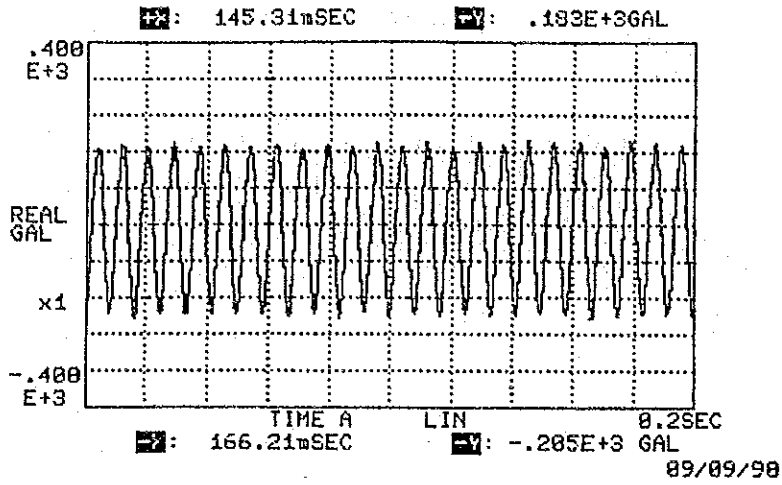


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-1V

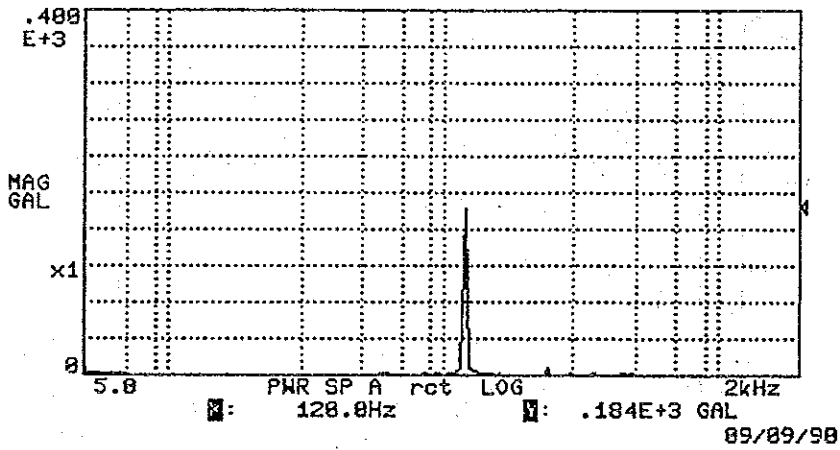
PWR SPECTRUM	ChA	
1	128.8Hz	.198E+3 GAL
2	246.8	.986E+1
3	368.8	.356E+1
4	15.8	.134E+1
5	68.8	.211E+1
6	185.8	.138E+1
7	468.8	.148E+1
8	488.8	.192E+1
9		
10		



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-2H

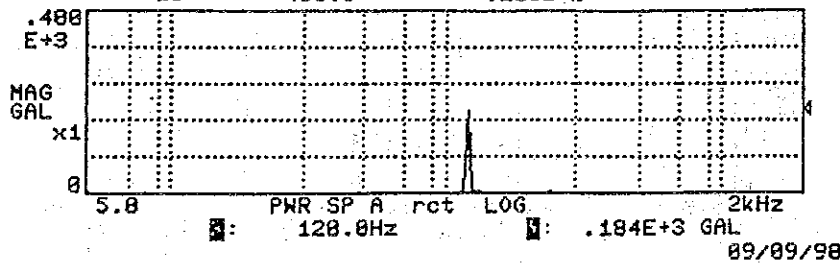


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-2H

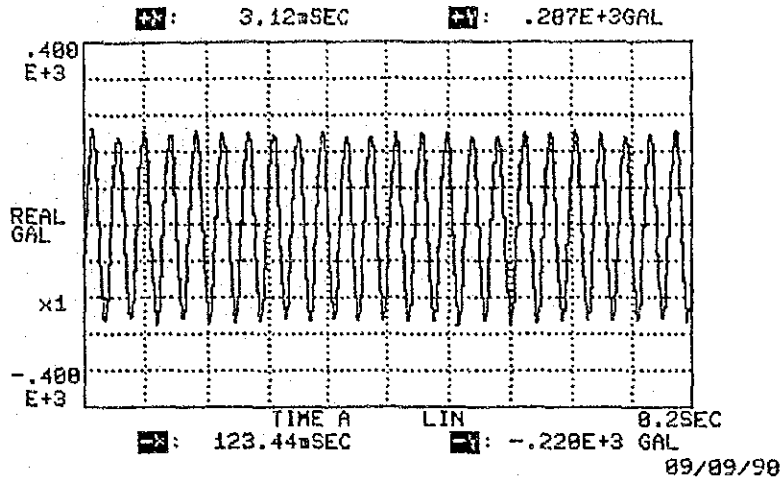


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-2H

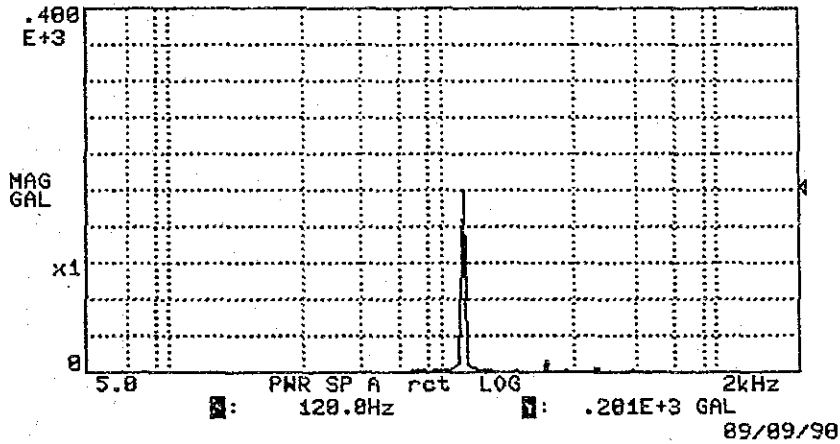
PWR SPECTRUM	ChA	
1	120.0 Hz	.184E+3 GAL
2	240.0	.829E+1
3	60.0	.305E+1
4	360.0	.337E+1
5	85.0	.141E+1
6	95.0	.169E+1
7	160.0	.135E+1
8	290.0	.148E+1
9	460.0	.137E+1
10	400.0	.228E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3H

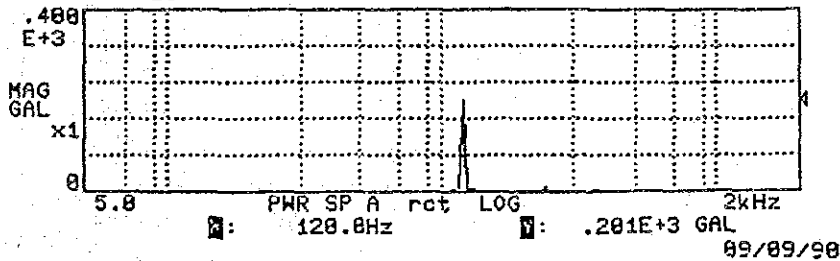


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3H

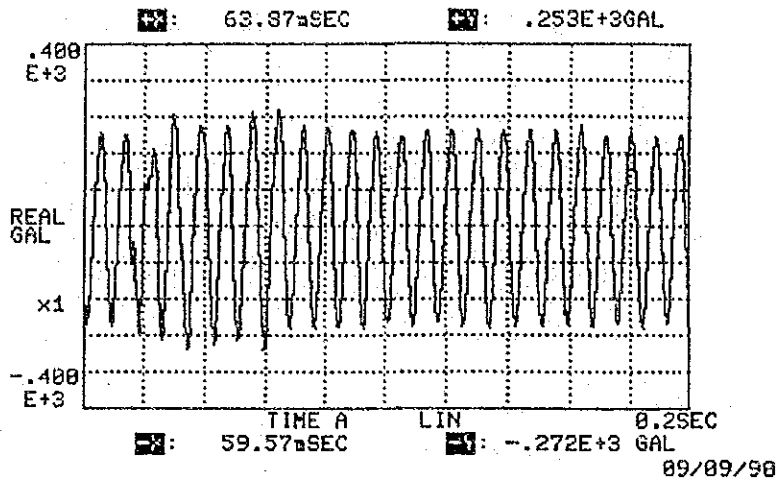


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3H

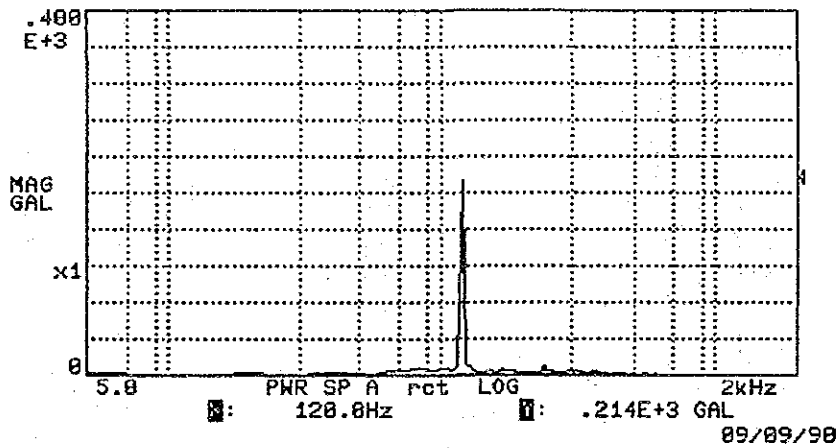
PWR SPECTRUM	ChA	
1	120.8 Hz	.201E+3 GAL
2	240.0	.122E+2
3	360.0	.418E+1
4	85.0	.131E+1
5	190.0	.139E+1
6	285.0	.130E+1
7	480.0	.172E+1
8		
9		
10		



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3V

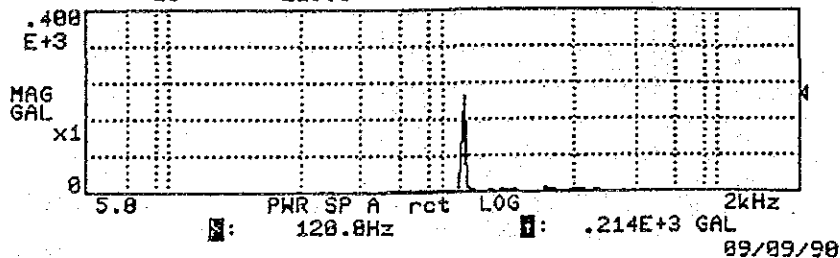


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3V

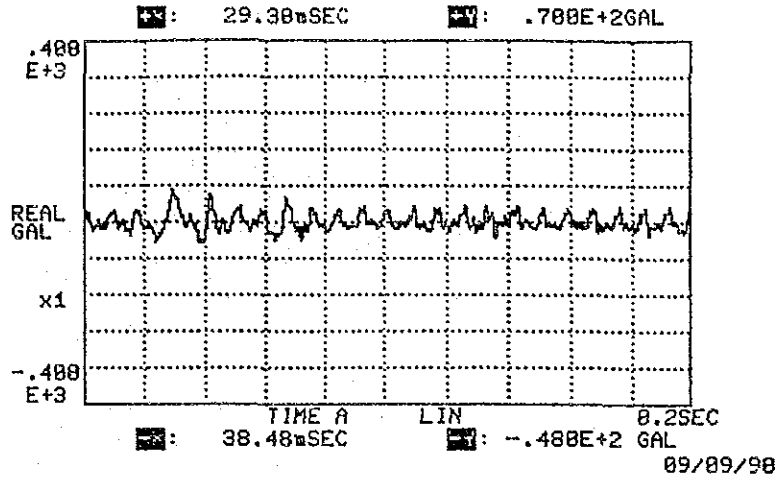


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-E NO.-3V

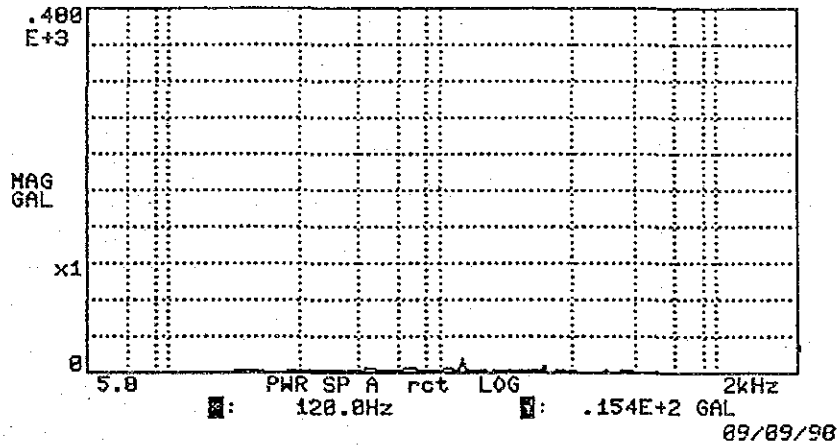
PWR SPECTRUM	ChA	
1	120.8Hz	.214E+3 GAL
2	240.8	.108E+2
3	80.8	.829E+1
4	105.8	.869E+1
5	170.8	.652E+1
6	360.8	.584E+1
7	155.8	.472E+1
8	320.8	.416E+1
9	40.8	.317E+1
10	215.8	.273E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1H

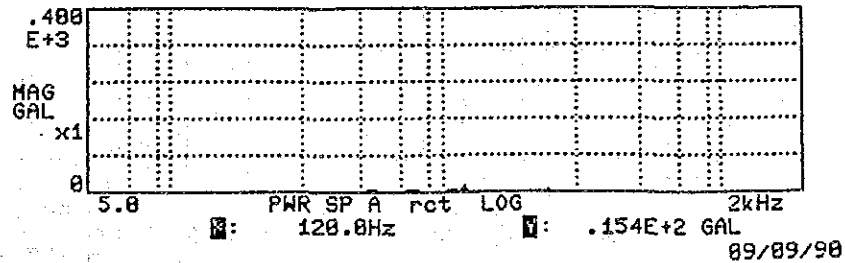


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1H

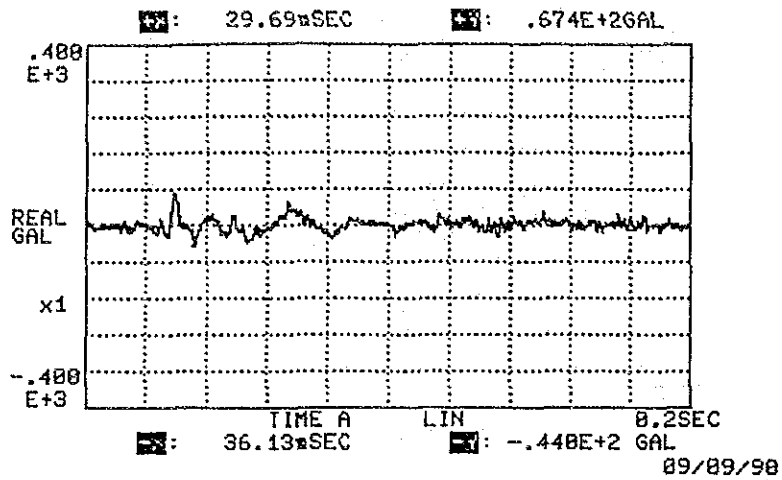


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1H

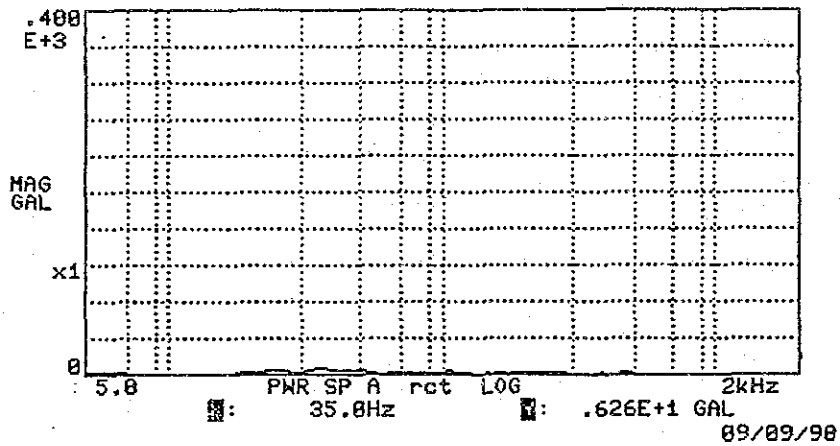
PWR SPECTRUM	ChA	
1	120.0Hz	.154E+2 GAL
2	240.0	.827E+1
3	88.0	.533E+1
4	105.0	.525E+1
5	55.0	.405E+1
6	155.0	.303E+1
7	170.0	.264E+1
8	465.0	.328E+1
9	488.0	.338E+1
10	28.0	.143E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1V

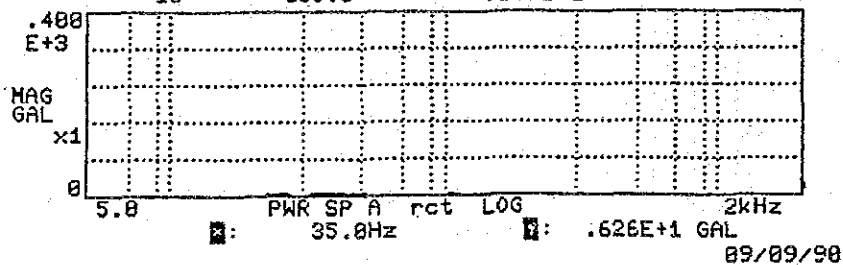


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1V

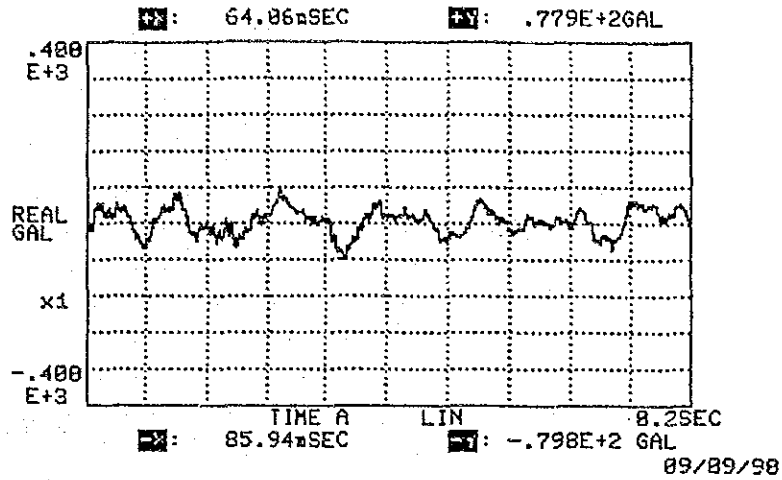


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-1V

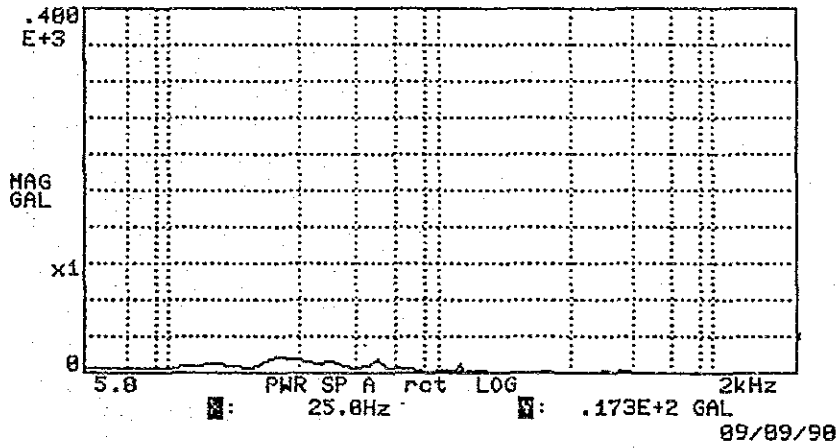
PWR SPECTRUM	ChA	
1	35.8Hz	.626E+1 GAL
2	25.8	.463E+1
3	185.8	.391E+1
4	98.8	.373E+1
5	128.8	.258E+1
6	248.8	.313E+1
7	465.8	.321E+1
8	145.8	.161E+1
9	178.8	.129E+1
10	185.8	.138E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-2H

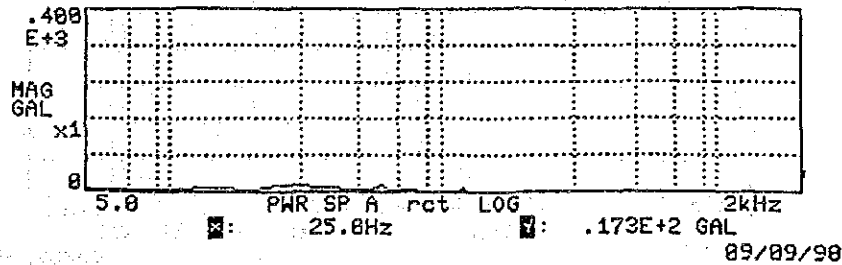


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-2H

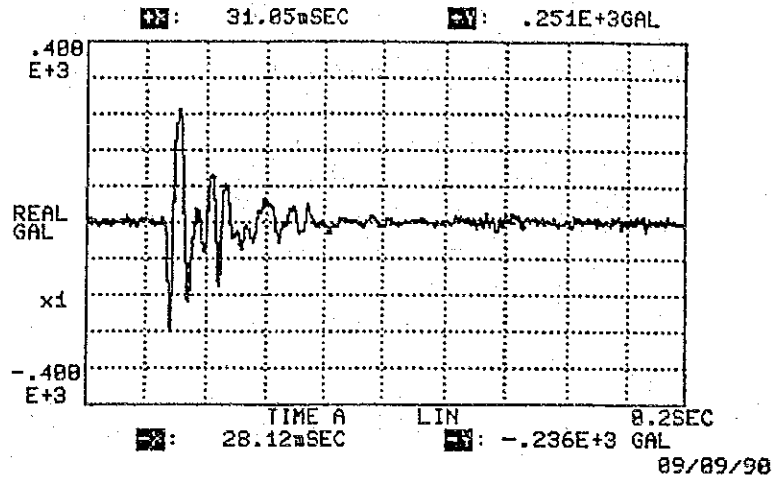


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-2H

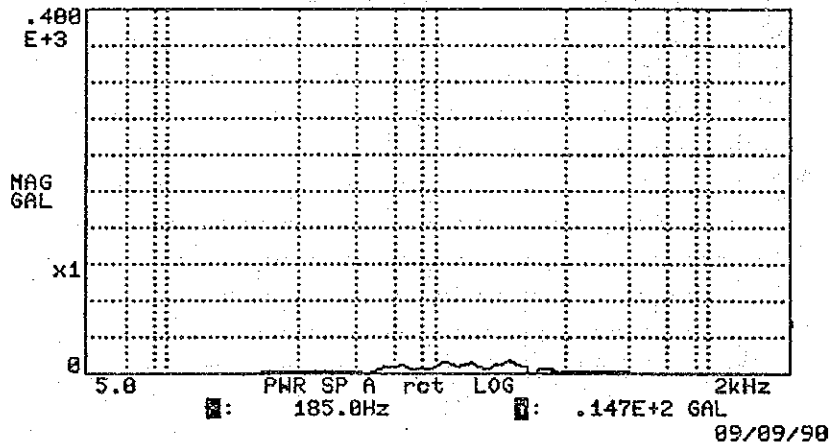
PWR SPECTRUM	ChA	
1	25.0Hz	.173E+2 GAL
2	60.0	.151E+2
3	40.0	.116E+2
4	120.0	.103E+2
5	15.0	.970E+1
6	135.0	.320E+1
7	240.0	.360E+1
8	465.0	.313E+1
9	400.0	.130E+1
10	410.0	.130E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3H

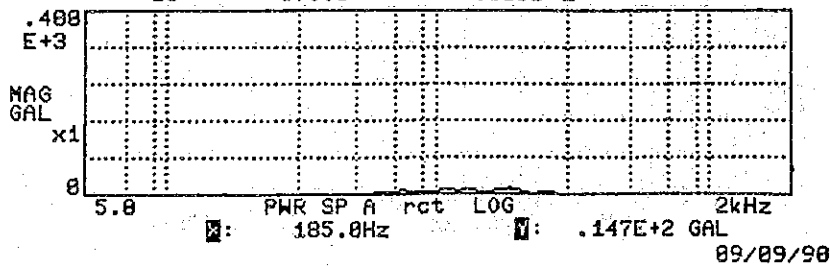


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3H

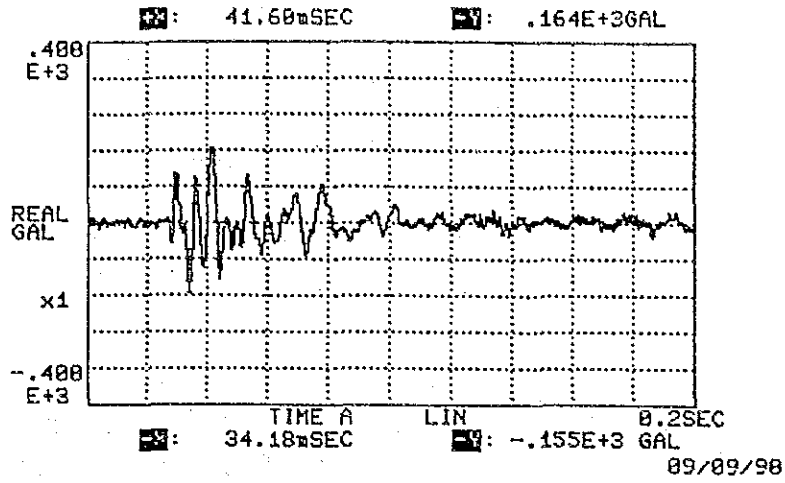


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3H

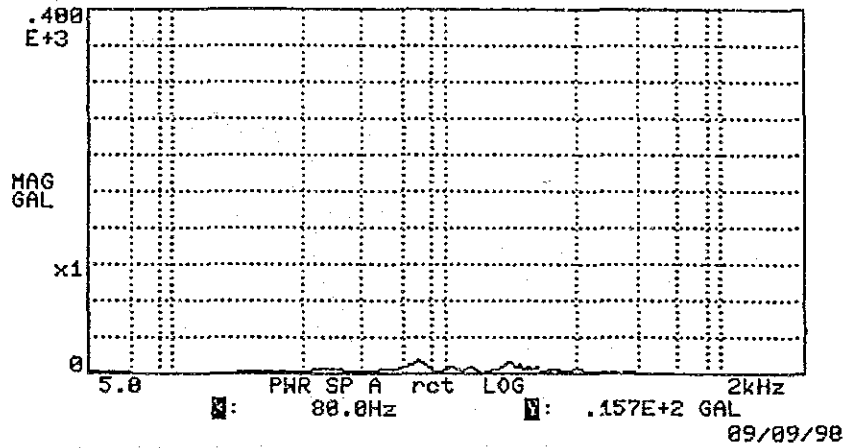
PWR SPECTRUM	ChA	
1	185.0Hz	.147E+2 GAL
2	110.0	.122E+2
3	135.0	.116E+2
4	75.0	.889E+1
5	255.0	.689E+1
6	35.0	.331E+1
7	310.0	.264E+1
8	340.0	.272E+1
9	360.0	.304E+1
10	375.0	.386E+1



KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3V

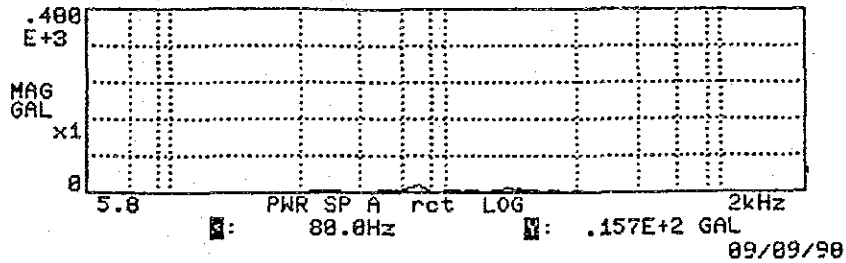


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3V

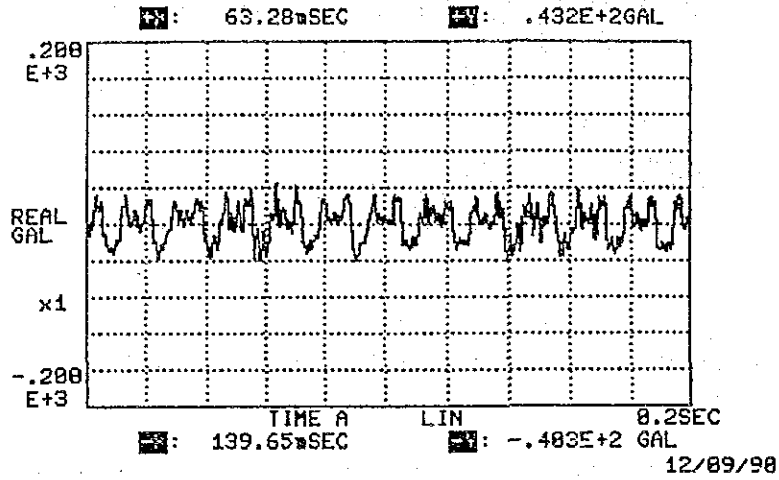


KALAYAAN P.S.P.P (II) BLASTING TEST CASE-F NO.-3V

PWR SPECTRUM	ChA	
1	80.0Hz	.157E+2 GAL
2	170.0	.131E+2
3	185.0	.961E+1
4	120.0	.767E+1
5	105.0	.685E+1
6	205.0	.742E+1
7	215.0	.747E+1
8	150.0	.533E+1
9	245.0	.530E+1
10	40.0	.397E+1

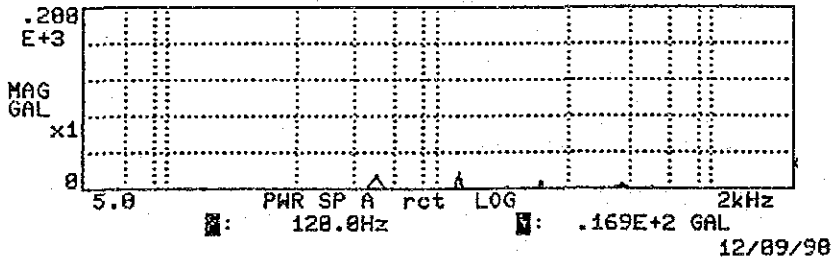


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-1H

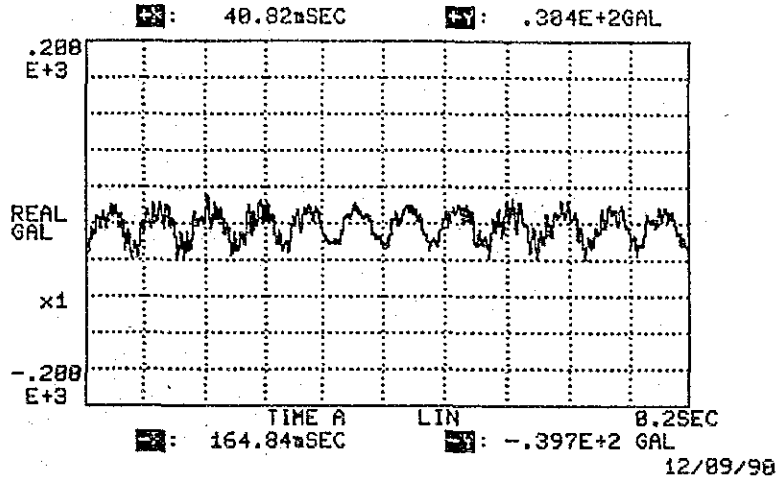


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-1H

PWR SPECTRUM	ChA	
1	120.0Hz	.169E+2 GAL
2	60.0	.155E+2
3	240.0	.847E+1
4	465.0	.448E+1
5	400.0	.483E+1
6	100.0	.315E+1
7	455.0	.296E+1
8	600.0	.271E+1
9	445.0	.238E+1
10	100.0	.169E+1

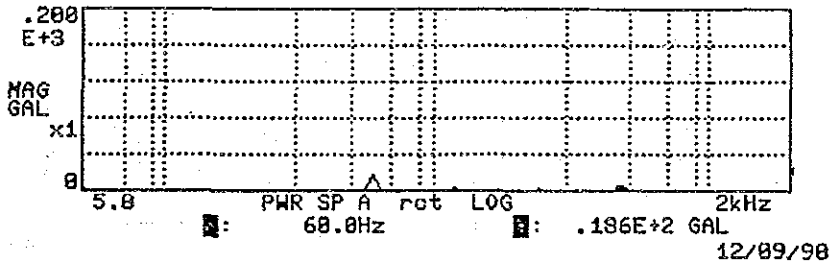


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-1V

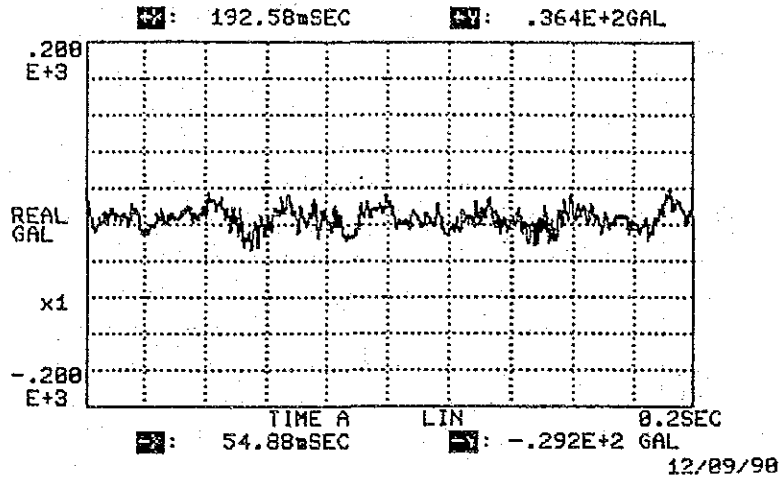


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-1V

PWR SPECTRUM	ChA	
1	60.0Hz	.186E+2 GAL
2	455.0	.521E+1
3	465.0	.472E+1
4	120.0	.422E+1
5	240.0	.331E+1
6	480.0	.230E+1
7	445.0	.139E+1
8	80.0	.750E+0
9	145.0	.834E+0
10	170.0	.838E+0

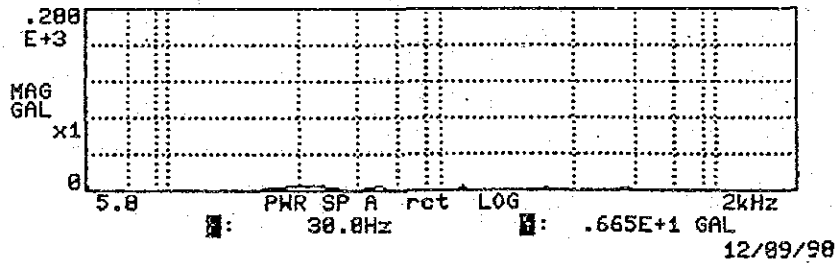


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-2H

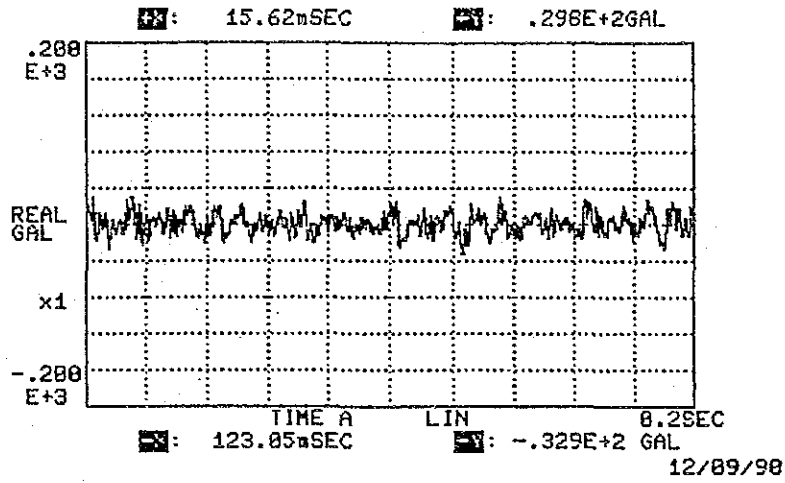


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-2H

PWR SPECTRUM	ChA	
1	30.0Hz	.665E+1 GAL
2	60.0	.531E+1
3	120.0	.518E+1
4	240.0	.398E+1
5	465.0	.357E+1
6	450.0	.283E+1
7	180.0	.173E+1
8	265.0	.130E+1
9	600.0	.139E+1
10	80.0	.189E+1

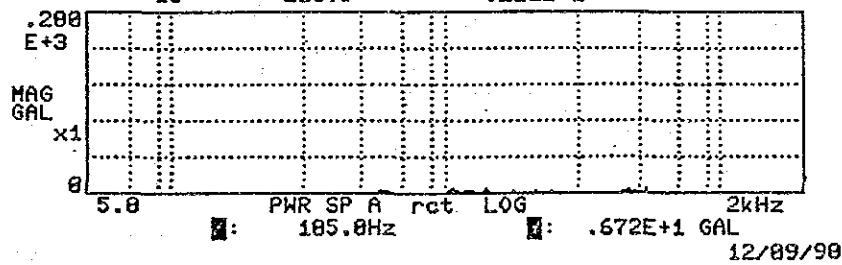


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-3H

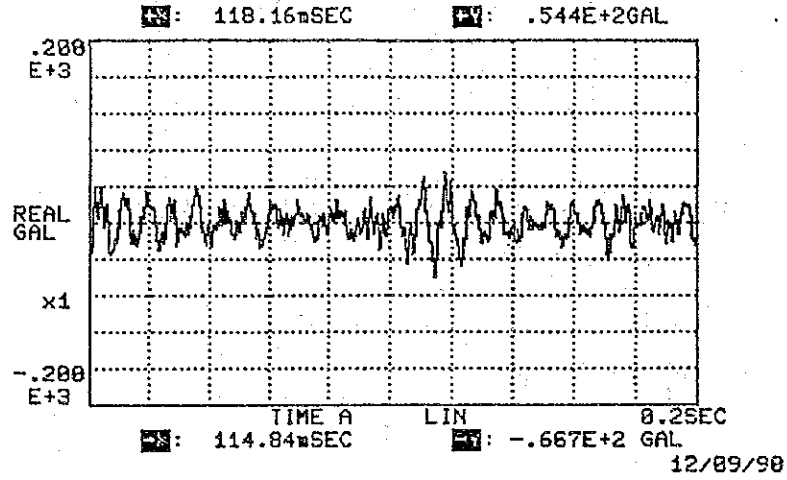


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-3H

PWR SPECTRUM	ChA	
1	105.0Hz	.672E+1 GAL
2	148.0	.543E+1
3	535.0	.561E+1
4	468.0	.486E+1
5	60.0	.397E+1
6	120.0	.315E+1
7	240.0	.284E+1
8	450.0	.294E+1
9	175.0	.200E+1
10	218.0	.211E+1

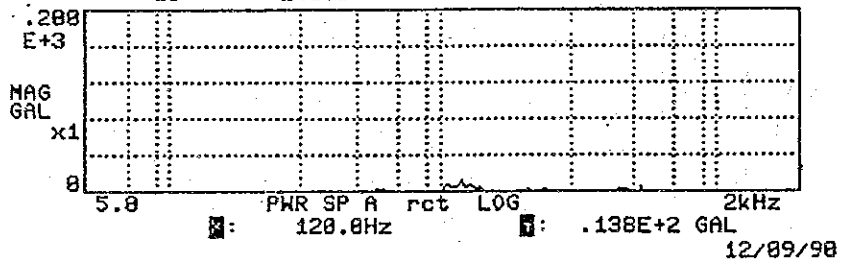


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-3V

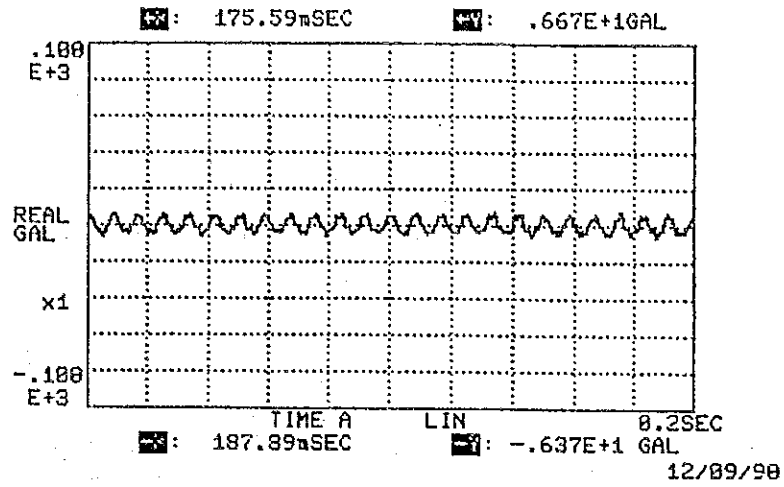


KALAYAAN P.S.P.P (II) BLASTING TEST POWER ON NO.-3V

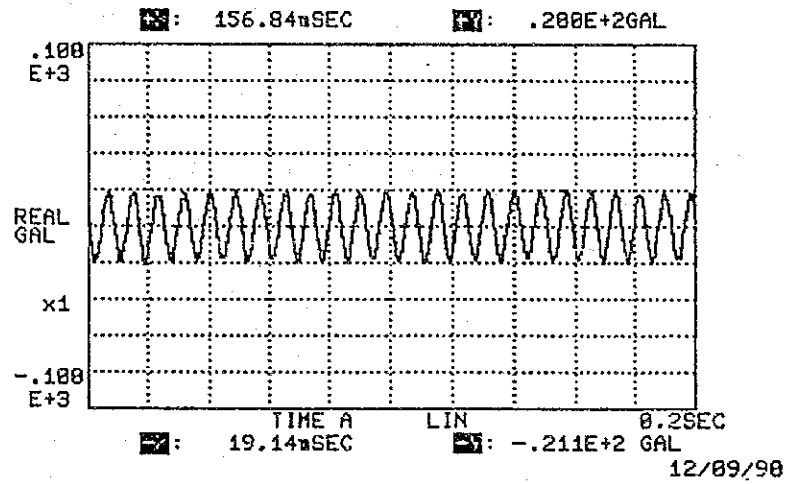
PWR SPECTRUM	ChA	
1	120.0Hz	.138E+2 GAL
2	105.0	.711E+1
3	130.0	.703E+1
4	140.0	.662E+1
5	535.0	.577E+1
6	60.0	.422E+1
7	460.0	.386E+1
8	210.0	.320E+1
9	450.0	.320E+1
10	240.0	.288E+1



KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-1H

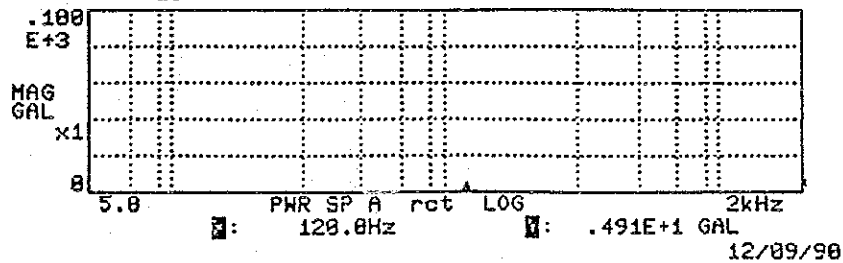


KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-1V

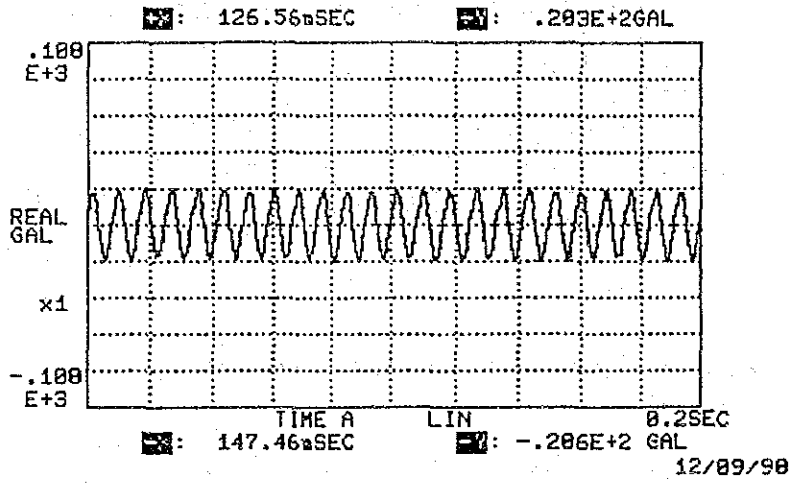


KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-1H

PWR SPECTRUM	CHA	
1	120.0Hz	.491E+1 GAL
2	468.0	.912E+0
3	188.0	.323E+0
4	248.0	.555E+0
5	488.0	.483E+0
6		
7		
8		
9		
10		

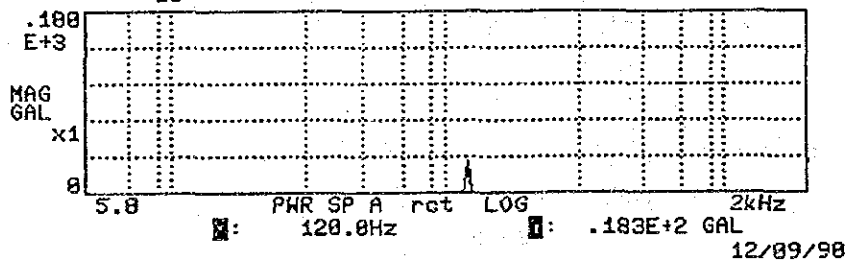


KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-2H

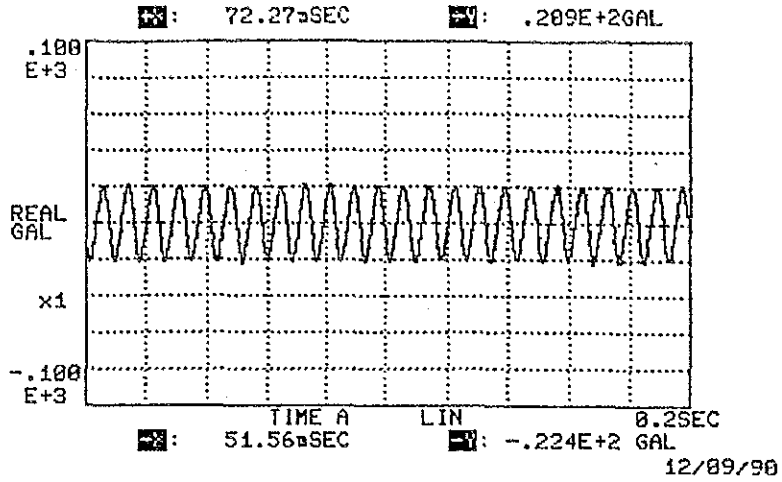


KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-2H

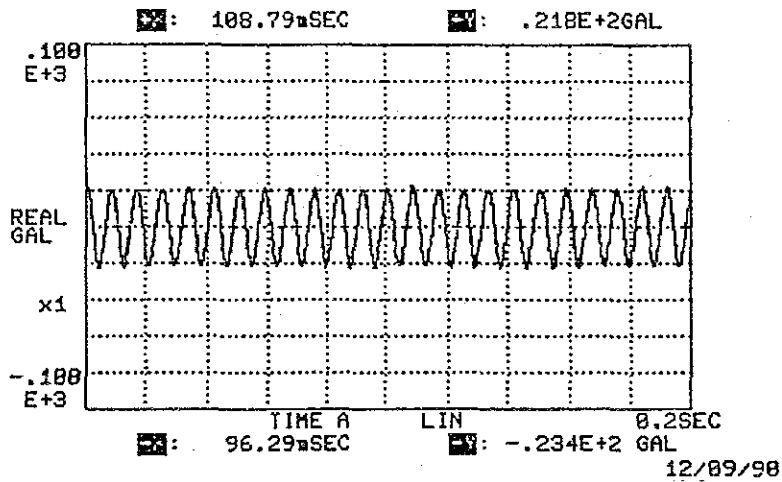
PWR SPECTRUM	ChA	
1	120.0Hz	.183E+2 GAL
2	240.0	.897E+0
3	460.0	.987E+0
4	360.0	.397E+0
5		
6		
7		
8		
9		
10		



KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-3H



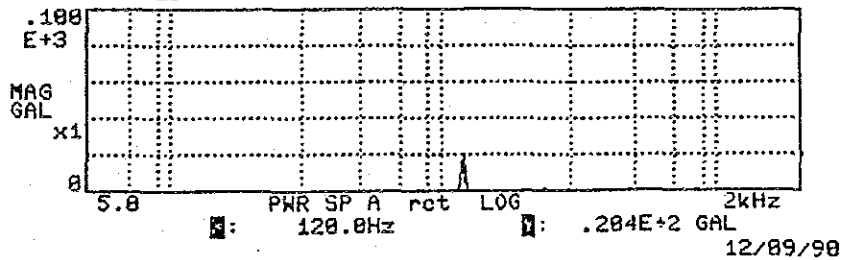
KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-3V



KALAYAAN P.S.P.P (II) BLASTING TEST POWER OFF NO.-3H

2kHz A:AC/ 5V B:AC/ 2V INST 0/16 DUAL 1k
 PWR SPECTRUM ChA

Line	Frequency (Hz)	Amplitude (GAL)
1	120.0Hz	.204E+2 GAL
2	240.0	.112E+1
3	360.0	.481E+0
4	465.0	.600E+0
5		
6		
7		
8		
9		
10		



Appendix 3 Results of Water Quality Test

[The page contains extremely faint and illegible text, likely due to low contrast or scanning quality. The text is arranged in several paragraphs, but the characters are too light to be transcribed accurately.]

Results of field Survey (Water Quality)

Water Quality

Some kinds of water quality tests were carried out at Intake, caliraya Reservoir and Tailrace.

The results were as follows.

		Jan. 22	23	24	25
Intake	CONDUCT. (us/cm)	176.1	195.0	161.6	X
	D.O. (ppm)	8.4	8.2	8.2	
	TEMP. (° c)	29.0	27.0	27.5	
	P.H.	6.4	6.7	6.9	
	TURB. (ppm)	150	200	100	
Caliraya Reservoir	CONDUCT. (us/cm)	106.8	X	X	82.7
	D.O. (ppm)	_____			5.5
	TEMP. (° c)	_____			24.5
	P.H.	_____			6.6
	TURB. (ppm)	_____			110
Tailrace	CONDUCT. (us/cm)	119.9	199.9	231.0	165.3
	D.O. (ppm)	_____	6.1	6.8	8.2
	TEMP. (° c)	_____	30.5	26.5	27.0
	P.H.	_____	6.6	6.9	7.5
	TURB. (ppm)	_____	240	230	100

JICA