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Introducing Coal-Water-Mix Fuels to the Philippines

Assessment of Project Feasibility

Volume V

Financial and Economic Analysis

Report to the
National Economic and Development Authority
Republic of the Philippines
on behalf of the
National Power Corporation
Development Bank of the Philippines

Report by
Development Sciences, Inc.
for
Office of Energy
U.S. Agency for International Development

April 1985

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Under Contract to:

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FINAL REPORT

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1.0 SUMMARY

Volume 5 is the last volume of a series of reports which describe and evaluate a project to introduce coal water mix (CWM) to the Philippines. This volume synthesizes data from all volumes and prepares a financial and economic analysis and estimates of net foreign exchange savings of the entire project.

Volumes 1 through 4 have previously examined the availability of Philippine resources and the magnitude of technical constraints which might possibly affect the project. Volume 1 established that there is an adequate supply of Semirara coal for the life of the project. Volume 2 established the feasibility of making a slurry from that coal. Volume 3 established the technical potential of converting all or part of the Sucat Station to CWM. Volume 4 defined the CWM water and pipeline pathway from the mine, to the CWM plant, and to the power plant. This volume, Volume 5, synthesizes all information from the previous four volumes and provides measures of economic and financial feasibility of the project, with stated assumptions.

The analysis is performed from the point of view of the National Power Corporation as purchaser of CWM fuel. Costs are assembled which cover costs of the mine to the conversion of the steam generators. Benefits are estimated using savings of foreign exchange from avoided oil imports after the foreign exchange costs of all segments of the proposed CWM conversion project are subtracted. The results are favorable as indicated by returns on investment (ROI) of 12% to 29% for a base coal price of $40/MT and returns on equity (ROE) for the same prices range from 38 to 78 percent. The foreign exchange impact has a net present value of $385 million and a cumulative foreign exchange savings over 15 years equaling approximately $1.4 billion.

Sensitivity tests using numerous variations of the input data provide insight to certain aspects of the project's vulnerability and strengths. Generally, the favorable economic and financial returns hold constant under the range of circumstances of reasonable risks that are tested. These tests do indicate, however, that the amount of investment that is required to provide an acceptable level of derating is a matter of economic choice with some levels being more favorable than others. The number of units that should be converted is also subject to further consideration. A number of factors need to be optimized before proceeding with plans for converting all units. Thus, an optimization phase is called for in which a set of further activities is accomplished to finalize the approach.

In sum, the introduction of CWM to the Philippines provides strong financial and economic benefits, especially in terms of foreign exchange savings. There is a basis for incentives to participants to implement a program. An optimization phase of less than one year is needed to deal with a short list of remaining items which need to be examined in greater detail, which include: coal prices at increased production levels, coal cleaning options, alternative slurry formulations and burner designs, detailed engineering plans, and a final review of proposed plant load factors which might lead to greater oil displacement and increased levels of utilization of the

Sucat units. In all cases, a conservative approach was taken to each of these issues so that in the optimization phase, the financial measures are likely to show an even better performance picture.

2.0 INTRODUCTION

Volumes 1-4 of this report present a detailed description and discussion of the technical aspects of the proposed Sucat CWM conversion project. These volumes illustrate that the proposed CWM conversion project is a technically feasible and viable project in the Philippines. They also present the capital and operating costs that are associated with each of the project segments.

This volume aggregates cost and performance data from Volumes 1-4 and, using that data, it performs a financial and economic analysis of the proposed conversion. The objective of this analysis is to evaluate the feasibility of the project and to examine its financial and economic attractiveness to private and public sector investors. An additional objective is to evaluate the project in terms of its foreign exchange benefits or costs to the Philippine nation.

This volume also outlines the methodology and the steps that were implemented during the economic, financial, and foreign exchange analyses. It contains the following sections. Section 3.0 presents a background for evaluating the proposed project and a brief description of the content of the other four volumes of this report. It also briefly describes the computer models and the major assumptions that were used in conducting the analysis. Section 4.0 presents the financial analysis of the proposed project. It outlines major project costs, projects cash flows, calculates financial parameters, and tests the sensitivity of these parameters to changes in key input assumptions. Section 5.0 then presents an economic analysis of the project which includes the foreign exchange impact of the total project. Section 6.0 briefly describes the employment impact of the project, while Section 7.0 presents conclusions and recommendations on future courses of action which are appropriate in light of the various findings.

3.0 BACKGROUND AND METHODOLOGY

This section provides the reader with a background to support the economic, financial, and foreign exchange analyses of the proposed conversion of Sucat station to CWM. Previous volumes have focused upon the technical feasibility and associated costs of various phases of the conversion project for each of the several project segments. This volume will bring together all the relevant cost data from these previous volumes to see whether, besides being technically feasible, the project is also financially and economically viable.

This section assembles relevant background material to provide the reader with the context with which to evaluate the financial and economic feasibility of this project. Section 3.1 presents a brief background summary of the previous four volumes of this study to provide the reader with a proper context with which to understand Volume 5. Section 3.2. presents a brief description of the methodology that is used in structuring the computer analyses that were used for the financial and economic analyses. Section 3.3 presents the major assumptions that were used in the computer models of the financial and economic analyses, and it briefly discusses the rationale behind the assumptions. Section 3.4 describes the four Sucat conversion scenarios that are being considered and explains the rationale behind their selection. Finally, Section 3.5 briefly summarizes the capital and financial requirements of the project.

3.1 A Summary of Volumes 1-4

Volumes 1 through 4 of this study present the analyses on which this volume builds. To prepare a background for this report, a brief recapitulation of the results of these volumes is presented in this section.

In Volume 1, the United States Geological Service (USGS) provides the basis for using Semirara coal. Semirara is the only well-explored coal deposit in the Philippines where approximately three million tons per year can be mined for the life of the project. Investments are needed to expand production from the current mine and to bring another pit into production.

In Volume 2, the Brookhaven National Laboratory (BNL) reports on the formulation and combustion of acceptable slurry-fuels made from Semirara coal. Preliminary CWM fuels have been prepared and combused by BNL and by participating commercial vendors. Further efforts are now required to formulate an optimum CWM fuel with larger batches of coal than previously have been shipped from the Philippines with a greater amount of time being allocated to combust and test an improved formulation. This optimization will occur during an optimization phase which is unlikely to require major investments. This work should result in better fuel performance and subsequently in even better economic and financial returns than those which are presented for the baseline slurry later on in this report.

In Volume 3, Burns and Roe, Inc. (B&R) provides alternative approaches to converting the four steam generating units at Sucat. B&R's work provides the capital costs for converting the units in either a Major retrofit (which includes the modification of pressure parts and a minimization of the unit's derating or a Minor retrofit (which proposes fewer alterations, although resulting in a larger derating). B&R also provides a schedule for converting all or some of the units. Based upon these alternatives, four major retrofit scenarios are presented and discussed in later sections of this report.

In Volume 4, Development Sciences Inc, with B&R's support, analyzes the other segments of this project from the mine to the power station. Capital costs are described for a plant to formulate slurry, barges to transport the slurry to Manila, and a retrofitted pipeline to take the slurry to Sucat station. Except for the mine and Sucat itself, these project segments are assumed to be based on private sector responsibilities, thus, the financial analysis includes private costs of capital. The other parts of the project are assumed to use public lending rates and terms.

In this report, Volume 5, Development Sciences Inc. brings all the elements together from the previous volumes and applies financial and economic and foreign exchange performance measures. The methodology and results are presented in the remaining sections of this report.

3.2 Description of Computer Model Calculations and Methodologies

Because of the great amounts of technical, economic, and cost data that have beeen developed relating to this project and because of the complexities of their relationships, several computer models have been constructed to perform the economic and financial analyses. The models have been developed to perform the following tasks.

- Analyze the financial and economic feasibility of the project from the perspective of the Sucat power station using the price of CWM as an input.

- Approximate the average cost of production of CWM for different sized CWM preparation facilities using the price of coal as input and the average production cost of CWM as an output.

- Approximate the average cost per metric ton of transporting CWM throughthe Rockwell pipeline using CWM volumes as input and estimating pipeline transport costs as output.

- Project the foreign exchange impact of each of the conversion scenarios using NPC oil generation plans, project foreign exchange costs and Philippine expenditures on imported oil as input and Philippine foreign exchange savings as an output.

These models are described in greater detail in Appendix A. An example of the format that is used in the financial model for the cash flow and financial calculations is presented as Exhibit 3.1.

Exhibit 3.1

Example of
Format Used In
Cash Flow Projection
For Sucat C&M Retrofit
(Scenario D) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
REVENUES ($000)														
ELECTRICITY REVENUES	0	33,049	57,521	57,521	115,042	225,992	243,123	243,123	243,123	243,123	243,123	243,123	243,123	243123
TOTAL REVENUES	0	33,049	57,521	57,521	115,042	225,992	243,123	243,123	243,123	243,123	243,123	243,123	243,123	243123
O & M EXPENSES ($000)														
FUEL	0	21,729	37,900	37,900	75,800	154,349	188,517	188,517	188,517	188,517	188,517	188,517	188,517	188517
LABOR	0	61	61	61	101	181	181	181	181	181	181	181	181	181
CONSUMABLES	0	50	50	50	100	215	215	215	215	215	215	215	215	215
SPARE PARTS	0	200	200	200	400	850	850	850	850	850	850	850	850	850
MISCELLANEOUS	0	9	9	9	19	39	39	39	39	39	39	39	39	39
INSURANCE	0	272	272	272	495	1,011	1,011	1,011	1,011	1,011	1,011	1,011	1,011	1011
LOCAL & PROPERTY TAXES	0	908	848	785	1,470	3,078	2,853	2,629	2,404	2,179	1,955	1,730	1,508	1508
ASH DISPOSAL	0	279	488	488	972	1,979	2,135	2,135	2,135	2,135	2,135	2,135	2,135	2135
TOTAL O & M EXPENSES	0	23,508	39,823	39,763	79,356	161,701	173,801	173,578	173,352	173,127	172,903	172,678	172,453	172453
OPERATING INCOME	0	9,543	17,698	17,758	35,686	64,291	69,322	69,546	69,771	69,995	70,220	70,445	70,669	70669
INTEREST	0	3,481	3,388	3,283	6,124	12,785	12,385	11,894	11,357	10,777	10,116	9,378	8,548	8548
DEPRECIATION	0	2,417	2,417	2,417	4,402	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8984
PRE- TAX INCOME	0	3,645	11,893	12,058	25,160	42,521	47,972	48,667	49,419	50,236	51,120	52,085	53,139	53139
INCOME/ FRANCISE TAX	0	661	1,150	1,150	2,301	4,520	4,852	4,852	4,852	4,852	4,852	4,852	4,852	4852
ITC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME	0	2,985	10,743	10,908	22,859	38,002	43,110	43,805	44,567	45,372	46,257	47,222	48,276	48278
PRINCIPAL	0	778	872	978	1,755	3,501	3,921	4,392	4,919	5,508	6,170	6,910	7,740	7740
DEPRECIATION	0	2,417	2,417	2,417	4,402	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8984
CASH FLOW	0	4,623	12,288	12,348	25,508	43,485	48,173	48,398	48,632	48,847	49,071	49,288	49,521	48521
CUM CASH FLOW	0	4,623	16,911	29,259	54,768	98,250	146,423	194,821	243,443	292,290	341,361	390,657	440,178	440178
DEBT SERVICE COVERAGE	0.0	2.2	4.2	4.2	4.5	3.9	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
NPV (TOT.INVEST,$000).....	$91,103		R.O.I..	26.0%										
NPV (EQUITY,$000).....$172,294			R.O.E..	70.9%										
o AVG.COST OF GEN.(CENTS/K	0.0	4.7	4.4	4.4	4.4	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.[illegible]	4.4
o LEVELIZED COST (CENTS/KW	6.5													
o PAYBACK- INVESTMENT *	0.00%	2.79%	10.21%	17.67%	33.08%	59.35%	88.44%	117.88%	147.05%	176.55%				
o PAYBACK- EQUITY *	0.00%	8.46%	30.95%	53.58%	100.24%	179.84%	289.01%	358.80%	445.59%					

*PAYBACK REPRESENTS THE PERCENTAGE OF THE TOTAL INVESTMENT THAT HAS BEEN PAID BACK THROUGH ANNUAL CASH FLOWS

1> Conversion of All Sucat Units, Major Retrofit.

3.3 Description of Base Case Scenarios

Four Sucat base case scenarios (A, B, C, and D) are evaluated in this analysis of the Sucat conversion project. The base cases differ from each other according to two factors: their conversion cost and the extent of the retrofits. Table 3.1 outlines the conditions assumed in each base case scenario.

Table 3.1

DESCRIPTION OF BASE CASE SCENARIOS

Scenario	Units Retrofitted to CWM	Extent of Retrofit	Retrofit Cost	Station Derating
A	Sucat 2	Minor	Minimum	38%
B	Sucat 2	Major	Maximum	25%
C	All Sucat Units	Minor	Minimum	38%
D	All Sucat Units	Major	Maximum	25%

Sucat 2 has been selected as the first unit to be converted to CWM fuel partly because of the compatability of its boiler to CWM fuel and partly because of its present availability. Although the conversion of Sucat 2 can be viewed as a stand-alone project, preliminary results indicate that the returns on the project will be significantly improved if the conversion of the total station is undertaken. As a result, the primary remaining difference between the four scenarios is the extent to which each of the four units are retrofitted. The Minor retrofit scenario is the minimum modication that is necessary to convert the Sucat boilers to burn CWM. The Minor modification results in the minimum retrofit capital expenditures to the Philippines, and approximately a 40 percent derating of Sucat from its nameplate capacity. The Major retrofit scenario results in a more extensive modification of the Sucat units at a higher retrofit cost with a lower derating of Sucat's nameplate capacity of approximately 25-30 percent.

3.4 Base Case Assumptions

Operational, economic, and financial assumptions for the Sucat conversion and other activities associated with the construction of a mine, a coal water preparation facility, a CWM pipeline, and barge transport are summarized in Exhibit 3.2. These assumptions are used in the base case computer model runs which estimate the financial and economic feasibility for each scenario. The assumptions are presented for public and private sector investments, for individual segments of the project, and for each retrofit scenario.

Exhibit 3.2

BASE CASE ASSUMPTIONS:
USED IN MODEL RUNS FOR EACH SEGEMENT
OF PROPOSED CWM PROJECT

I. Tax & Credit Assumptions*

A. Taxes	Utilities	Other Enterprises
• Income Tax	2% Franchise Tax (on Renewables)	35% Income Tax (On Net Income)
• Local & Property Tax	2.5%	2.5%
• Customs Duties on Imported Equipment (Average)	15%	15%
B. Tax Credits		
• Exemption from Taxes and Duties on Imported Equipment		
- Pioneer Enterprises	100%	100%
- Non-Pioneer Enterprises	50%	50%
• Credit on Domestically Purchased Equipment (Percent of Duties & Taxes on Similar Imported Equip.)		
- Pioneer Enterprises	100%	100%
- Non-Pioneer Enterprises	50%	50%
• Net Operating Loss Carryover (Not Applied for 2/85 Runs)	100%	100%
• Credit for Withholding Taxes Paid on Interest Payments		
- Pioneer Enterprises	100%	100%
- Non-Pioneer Enterprises (Not Applied for 2/85 Runs)	0%	0%
• Credit Equivalent For Net Value Earned	10%	10%

* For all sectors of the Project

Exhibit 3.2
BASE CASE ASSUMPTIONS
Page 2

II. Capital Structure Assumptions

	Utilities	Other Enterprises
Portion of Project Financed by Equity (%)	33	25
Required Return on Equity (%)	15	21
Debt Interest Rates (%)	12	18
Term of Debt (Years)	15	15
Short-Term Construction Financing Cost (%)	15	21

III. Fuel Characteristics and Cost Assumptions

- Design Plant Semirara Coal Analysis:

	As-Mined	Moisture-Free (Dry)	Results of Ash Reduction (Beneficiation)	
Moisture (%)	24.0	-	-	-
Ash (%)	13.64	17.95	8.0	4.0
Volatile Matter (%)	32.56	42.84	48.03	50.12
Fixed Carbon (%)	29.80	39.21	43.97	45.88
TOTAL	100.00	100.00	100.00	100.00
Higher Heating Value BTU/LB	7507	9877	10,968	11,425

- Semirara Coal Price — $40.00/MT
- Duty-Free Price of Imported Residual Oil — $28.00/Barrel

IV. Price and Cost Factors

A. Price Assumptions:

- Semirara Coal Price
  - Base Case — $40.00/MT
  - Sensitivity Analysis — $26-45.00/MT

Exhibit 3.2
Base Case Assumptions
Page 3

- CWM Price (To Sucat Station)
  - Base Case (Scenarios A-D) $39-45.00/MT
  - Sensitivity Analysis $34-47.00/MT
- CWM Sales Price* $38.00/MT
- Busbar Price of Electricity (On Luzon Grid) $.06/KWH
- Customer Demand Charge $1.10/KW

B. Insurance Premium Rates**

- Utilities .75%
- Other Enterprises 2.3 - 3.8%

C. Escalation Rates

- Fuel None
- Price None
- Equipment None

---

* For CWM Preparation Facility
** Leveled on Depreciable Base of Asset

V. Station Capacity and Operating Data

A. Sucat Station

Variable	Extent of Retrofit	Sucat 1	Sucat 2	Sucat 3	Sucat 4
• First Year of Service	Both	1992	1988	1991	1992
• Net Unit Capacity (MW)	Major	105	150	150	229
	Minor	90	123	123	187
• Net Plant Heat Rates (BTU/kwh)	Major	11,900	11,070	11,070	10,880
	Minor	11,960	11,080	11,080	10,930
• Capacity Factors (%)	Both	75	75	75	75
• Annual Hours of Operation	Both	8,760	8,760	8,760	8,760
• Line Transmission Losses	Both	3	3	3	3

B. Rockwell Pipeline

	Sucat 1	Sucat 2	Sucat 3	Sucat 4
• Pipeline CWM Flow Rate (MT/HR)*				
Minor	109	138	138	207
Major	1265	168.1	168.1	252.5

* For 50% CWM Fuel Loading

C. CWM Preparation Facility

Scenarios	A	B	C	D
Coal Input (000's MT/Yr)	541	660	2305	2809
CWM Output (000's MT/Yr)	828	1003	3536	4269
Number of Mill Trains	3	3	9	11
Plant Load Factor (%)	75	75	75	75

VI. Capital Costs

A. Sucat Station

Variable	Extent of Retrofit	Sucat 1	Sucat 2	Sucat 3	Sucat 4
• Plant Equipment Costs Including Electrostatic Precipitors ($000)	Major	16,500	22,000	19,600	26,500
	Minor	11,500	16,150	14,200	20,200
• $Cost/kw	Major	157	147	131	116
	Minor	128	131	115	108
• Undistributed Site Costs (% of equipment costs)	Both	15%	15%	15%	15%
• Engineering & Owners' Cost (% of equipment costs)	Both	15%	15%	15%	15%
• Total Plant Costs ($000)	Major	21,000	28,600	25,500	34,000
	Minor	15,000	21,000	18,460	26,000

• Total Financing Required* ($000)	Major	30,355	43,298	36,794	55,109
	Minor	22,030	32,416	27,352	42,720

* Includes land, working capital (1/6 of first year's O&M), interest during construction and import duties and excludes contingencies.

• Asset Lives (Yrs)	Both	15	15	15	15
• Construct. Periods (Yrs)	Both	2	3	2	3
• Foreign Exchange Portion (%)	Both	75	75	75	75

B. Rockwell Pipeline

	Current Pipeline	Current Plus New Pipeline
• Cost of Retrofit ($000)	$ 6,000	$ 12,500
• Total Construction Cost	7,245	15,094
• Total Financing Required	9,321	19,596
• Asset Lives	20	20
• Construction Period (Years)	2	2
• Foreign Exchange Portion (%)	87.5	87.5

C. CWM Preparation Facility

Scenarios	A	B	C	D
• Plant Equipment Costs ($000)	$ 23,209	$ 23,209	$58,080	$69,625
• Total Construction Costs ($000)	26,806	26,806	67,082	80,415
• Total Financing Required ($000)	35,387	36,707	87,294	104,531
• Asset Lives (Yrs)	20	20	20	20
• Construction Period (Yrs)	1-1/2	1-1/2	1-1/2	1-1/2
• Foreign Exchange Portion (%)	62	62	62	62

VII. Operations and Maintenance Expense

A. Sucat Station

Variable	Extent of Retrofit	Sucat 1	Sucat 2	Sucat 3	Sucat 4
• Fuel Cost	Major	29,400	37,900	37,900	64,120
	Minor	-	31,265	-	-
• Labor ($000)	Both	40	61	40	40
• Consumables	Both	40	50	50	75
• Spare Parts	Both	150	200	200	300
• Miscellaneous	Both	10	9	10	15
• Ash Handling	Major	377	486	486	822
($.50/MT CWM)	Minor	325	399	411	675
• Insurance	Major	188	272	223	327
	Minor	131	200	162	250
• Local Property Tax	Major	627	906	745	1092
	Minor	437	665	539	832
• Franchise Tax	Major	803	1150	1150	1751
	Minor	688	943	943	1430

Straight Line Depreciation Has Been Used

B. Rockwell Pipeline

	Current Pipeline Only	Current Plus New Pipeline
• Operation and Maintenance Expense ($000/Yr)	$ 850	$ 800*
• Other Operation Expenses ($000/Yr)	291	608

Straight Line Depreciation Has Been Used

* Since the computer runs that were performed for this report, Burns & Roe's estimate of O&M expenses has been revised to $300/year.

C. CWM Preparation Facility

Scenarios	A	B	C	D
• Annual O&M Expenses ($000/Yr)	2,540	2,680	6,690	7,700
• Other Non-Fuel Operating Expenses ($000/Yr)	1,581	1,693	4,061	4,868

Straight Line Depreciation Has Been Used

3.5 Capital and Financial Requirements

The financial requirements for the total project, assuming full conversion of all Sucat units (Scenario D), are presented in Table 3.3. These requirements have been used in calculating the average costs of CWM.

Total capital requirements for the project are also presented in Table 3. Three costs are given for the project: total equipment, total plant costs, and total financing costs. Total equipment costs include all direct expenditures of the equipment required to construct the plant. Total plant (or construction) costs include total equipment, undistributed site costs, engineering and owners' costs. Finally, total financing costs include total plant costs, land, working capital, pre-operating expenses, interest during construction, and import duties.

Total project costs are calculated using direct cost contingencies and engineering and owner cost estimates unique to each segment of the project and which ranged from 15-25 percent of total equipment. Total financing costs are estimated using costs of capital which are unique to each project sector. In this analysis, the mine construction and Sucat conversions are assumed to be publicly financed, while the other project segements were privately financed using the costs of capital as outlined in Exhibit 3.2.

Table 3.3

TOTAL PROJECT EXPENDITURES FOR SUCAT CONVERSION FOR SCENARIO D
($ Million)

	Project Segments					
Cost Category	Mine Construction	Preparation Facility Construction	Barge Conversion	Rockwell Pipeline Conversion	Sucat Conversion	Total Project Expenditures
Total Equipment	150.0	69.6	5.2	12.5	84.6	321.9
Total Plant Costs	173.3	80.4	6.0	15.0	109.0	383.7
Total Financing	232.3	104.5	7.8	19.6	164.4	528.6

4.0 FINANCIAL FEASIBILITY

Two ways of analyzing the attractiveness of converting Sucat station to burn CWM are to measure the project either in terms of its financial or economic feasibility. A project's financial feasibility measures the project's performance using costs, indicators, and methods normally of interest to private investors, while a project's economic feasibility measures the project's performance, in terms of more macro-oriented, nationally-oriented goals and objectives. This section focuses upon the financial feasibility of the proposed Sucat CWM conversion; Section 5.0 will later separately discuss its economic impact. The financial feasibility assessment of each scenario in this section is conducted by preparing a project income and cash flow state statement which represents the base case financial situation for each scenario. Financial indicators including the net present value on investment, net present value on equity, return on investment, return on equity, and debt coverage ratios are then calculated for each scenario.

Financial analysis includes consideration of taxes and tax credits and uses input and output prices that are assessed at market value in the Philippines. The whole analysis is performed in constant dollars and uses data that has been obtained from Burns and Roe Engineering, Development Sciences Inc., Economic Development Foundation of the Philippines, the National Power Company, and other Philippine data sources.

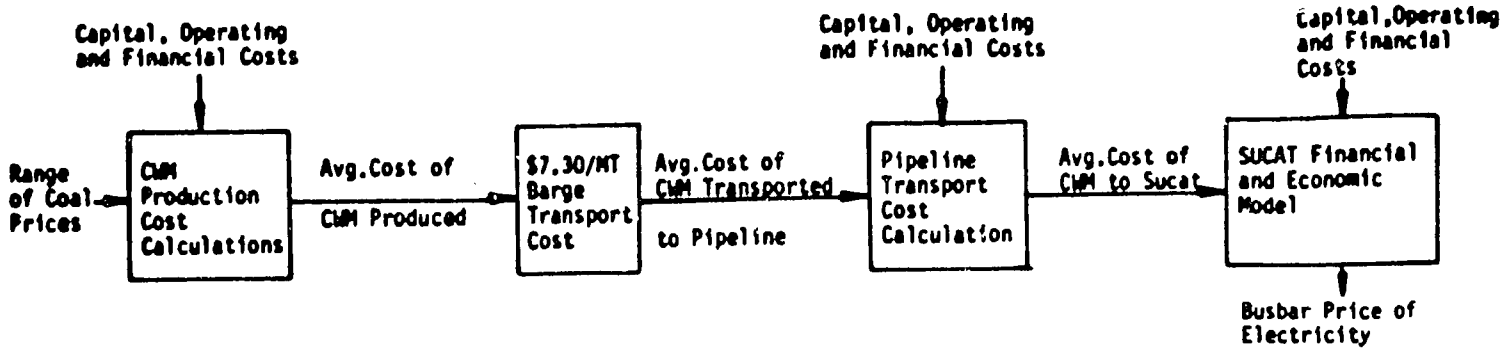
The remainder of this chapter presents the results of the financial analysis. Section 4.1 presents the methodology that is used in conducting the financial analysis. Section 4.2 presents an analysis of the financial feasibility of the project for each of the four retrofit scenarios. Section 4.3 examines the sensitivity of the financial feasibility of Scenario D to variations in different parameters which may impact the project. Finally, Section 4.4 formulates observations based upon the analyses of the previous sections.

4.1 Calculation of CWM Prices to Sucat Station

This section briefly describes the steps that have been taken to approximate the delivery cost of CWM to Sucat Station. It is important to outline the assumptions and the steps that are taken to estimate the cost of CWM because the cost of CWM to Sucat is a major factor having a significant effect upon the project's financial attractiveness. If the reader of this volume is not interested in this level of detail, or is solely interested in the financial results of the project, it is suggested that he or she omit reading this section and proceed directly to Section 4.2.

The price of CWM to Sucat Station has been approximated in this analysis by summarizing separate estimates of the average costs of producing CWM, shipping it via barge to Manila, and transporting it to Sucat Station by way of the Rockwell pipeline. This process is depicted in the following Figure.

Figure 4.1



The calculation of prices of CWM delivered to Sucat station is performed using a four step process:

Step 1. Estimate the Average Cost of CWM Production for Each Scenario

The average cost of CWM production is determined using a computer model which calculates the average cost of CWM production for each Sucat conversion scenario. Average costs are calculated for a range of coal prices using capital and operating cost data which are applicable to each scenario. Data inputs for the calculation of average costs for each scenario are outlined in Table 4.1. CWM production prices for each scenario are projected for the following per ton prices of coal: $26(P520), $35(P700), $40(P800), $42(P840), and $45(P900). These prices are based on a ------ of what NPC has paid in the past for coal which it has deemed to be of marginal quality ($26/ton) to a price which is 20 percent above a price currently agreed upon between NPC and the Semirara Coal Corporation at its Calaca power station.

Table 4.1

COSTS AND FUEL VOLUMES USED IN CWM PRODUCTION MODEL

Conversion Scenario	CWM Plant Capital Cost* ($Million)	Plant Operations & Maint. Costs* ($Million/yr)	Coal To Plant Input** (000's Mt/yr)	CWM Output** from Plant (000's Mt/yr)
A. Sucat 2, Minor Conversion	$23.2	$ 2.5	541	828
B. Sucat 2, Major Conversion	23.2	2.7	660	1,003
C. All Units, Minor Conversion	58.0	6.7	2,305	3,536
D. All Units, Major Conversion	69.5	7.7	2,809	4,269

* Burns and Roe, Inc.
** Development Sciences Inc.

The estimation of the average cost of CWM production assumes that the CWM preparation facility is privately owned with debt and equity costs of 18 and 21 percent respectively. The average cost of CWM production is calculated as the sum of operating and maintenance expenses, interest, depreciation, taxes, and return on equity divided by the volume of CWM produced. As Exhibit 4.1 illustrates, the average cost of producing CWM, including the price of solid coal at 50% loading, ranges from $25.80 and 36.80 per metric ton depending upon coal prices and the conversion scenario. The exhibit also reflects that larger CWM preparation facilities appear to achieve economies in scale which result in lower average costs of production for the full conversion scenarios.

Step 2. Estimate CWM Barge Transport Costs

An average price of $7.30 per metric ton of CWM is the assumed price of shipping CWM independent of shipment volumes from Semirara Island to the Rockwell Pipeline in Manila. This estimate is based upon verbal quotations from Philippine shipping companies. Oil barges with new CWM pumping equipment and on-board agitation equipment are assumed to be used for this transport.

Step 3. Estimate Average Cost of CWM Transport Through Rockwell Pipeline

The average cost of CWM pipeline transport in the Rockwell Pipeline is estimated using Burns and Roe, Inc. estimates of the conversion and operating costs of the pipeline. Average cost calculations assume private ownership of the pipeline. Costs and shipment volumes for each conversion scenario are outlined in Table 4.2. As the table shows, costs of CWM transportation range from $1.40 to $2.90 per metric ton. Apparent per-unit economies of pipeline transport occur because increases in capital and operating costs are more than offset by associated increases in pumping capacity and higher utilization.

Table 4.2

COSTS OF CWM PIPELINE TRANSPORT

Conversion Scenario	Capital Costs ($ 000)	Operation & Maint. Exp. ($ 000)	Volumes Transported (000 MT)	Range of Avg. Cost of Transp. ($)*	Assumed In Analysis ($)
A	$ 6,000	$ 850	828	$2.34-2.92	$2.80
B	6,000	850	1,003	2.07-2.72	2.40
C	12,500	1,150	3,536	1.59-1.73	1.70
D	12,500	1,150	4,269	1.43-1.55	1.50

* Varies according to assumed CWM transportation charges which affect income tax levels.

Exhibit 4.1

APPROXIMATION OF A RANGE OF COSTS OF COAL WATER MIX TO SUCAT STATION

Sucat Conversion Scenario	Units	As-Mined Coal Prices*	Average Cost of CWM Production**	Cost of CWM Barge Transport	Average Cost of Pipeline Transport	Cost of CWM to Sucat
A. Sucat 2,	($/MT)	$ 26-45	$30.80-36.80	$7.30	$2.80	$40.90-46.90
Minor Retrofit	($/MMBTU)***	1.58-2.73	2.45- 3.72	.70	.27	3.90- 4.47
B. Sucat 2,	($/MT)	26-45	27.80-33.90	7.30	2.40	37.50-43.60
Major Retrofit	($/MMBTU)***	1.58-2.73	2.34- 3.53	.70	.23	3.57- 4.15
C. All Units,	($/MT)	26-45	25.80-31.80	7.30	1.70	34.80-40.80
Minor Retrofit	($/MMBTU)***	1.58-2.73	2.14- 3.34	.70	.16	3.31- 3.89
D. All Units,	($/MT)	26-45	25.80-31.90	7.30	1.50	$34.60-40.70
Major Retrofit	($/MMBTU)***	1.58-2.73	2.15- 3.34	.70	.14	3.30- 3.88

* With a 20:1 Peso to Dollar exchange rate, the coal price equivalents are P520, D700, P800, P840, and P900 per metric ton respectively.

** Average cost of production for a CWM sales price of $38/MT and a 20% return on investor's equity.

*** Assumes 10.5 MMBTU/MT for a 50/50 CWM.

Step 4. Calculate the Average Cost of CWM to Sucat Station

Average costs are independently calculated to cover the variation in the costs among the different scenarios. Thus, the average cost of CWM to Sucat station for each Scenario is the sum of the average costs of producing CWM at the CWM preparation facility, of barging the CWM to the Rockwell Pipeline, and transporting the CWM to Sucat station by way of the pipeline. These costs are summarized in Exhibit 4.1 according to coal price for each conversion scenario.

Clearly, cost economies are evident which favor the larger conversion scenarios C and D. On average, CWM costs to Sucat for these scenarios are 7 to 17 percent lower than for the single Sucat 2 retrofit scenarios A and B. These economies result partly through economies achieved with larger scale CWM production levels and partly through economics achieved in pipeline transport.

4.2 Financial Analysis of Proposed Project

A financial analysis is conducted for each of the four Sucat conversion scenarios. Each analysis is conducted using cost and operating assumptions that are outlined in Section 3.3 and CWM prices as outlined in Exhibit 4.1. A $40.00 coal price has been assumed for all base case calculations. Although a price of $35.00 and $26.00 per metric ton appear to be closer to the prices that NPC is currently paying for its select and lower grade coals, the $40.00 per metric ton price is used in the base case financial analyses to allow for the possible additional costs of coal washing or beneficiation.

Cash flow projections and financial measures are formulated for each of the four Sucat conversion scenarios, assuming public sector financing of Sucat. These projections are summarized in Exhibit 4.2 and are individually presented for each of the four scenarios in Exhibits 4.3 through 4.6. The projections for each scenario present annual and cumulative cashflows, annual debt service coverage ratios, net present values, returns on equity and investment, and payback periods for each of the scenarios.

The financial data in Exhibit 4.2 indicate that, assuming the availability of capital and foreign exchange, the scenarios proposing the retrofit of all Sucat units are clearly preferable to the scenarios which provide for the conversion of Sucat 2 only. Assuming a $40.00 coal price, the full conversion scenarios yield returns on total investments of close to 27 percent, returns on investor equity of greater than 70 percent, and net present values of nearly $90 million. Furthermore, all financial indicators for the full conversion scenarios continue to remain attractive for coal price estimates through $45.00 per metric ton. Financial indicators for the scenarios which propose the conversion of Sucat 2 only, although less attractive than the full conversions, nevertheless yield reasonably favorable financial returns for certain coal price scenarios.

Exhibit 4.2

SUCAT BASE CASE FINANCIAL RETURNS

(For Different Coal Prices)

Sucat Conversion Scenario	Coal Price ($/MT)	Return on Investment (%)	Return on Equity (%)	Net Present Value ($Million)	(PMillion)
A. Sucat 2,	$26	23	62	$22	P440
	35	16	46	7	140
Minor	40	12	38	(2)	(40)
Retrofit	42	10	34	(5)	(100)
	45	7	29	(10)	(200)
B. Sucat 2,	26	27	73	42	840
	35	21	58	23	460
Major	40	18	50	13	260
Retrofit	42	17	47	10	200
	45	14	42	3	60
C. All Units,	26	40	101	151	3,020
	35	33	85	107	2,140
Minor	40	29	78	85	1,700
Retrofit	42	26	72	70	1,400
	45	24	67	56	1,120
D. All Units,	26	37	94	176	3,520
	35	30	80	122	2,440
Major	40	26	71	91	1,820
Retrofit	42	24	67	77	1,550
	45	21	61	58	1,160

Exhibit 4.3

Cash Flow Projection
For Sucat CWM Retrofit
(Scenario A) 1)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
REVENUES ($000)														
ELECTRICITY REVENUES	0	27,100	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47167
TOTAL REVENUES	0	27,100	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47,167	47167
O & M EXPENSES ($000)														
FUEL	0	20,781	38,210	38,210	38,210	38,210	38,210	38,210	38,210	38,210	38,210	38,210	38,210	38210
LABOR	0	61	61	61	61	61	61	61	61	61	61	61	61	61
CONSUMABLES	0	50	50	50	50	50	50	50	50	50	50	50	50	50
SPARE PARTS	0	200	200	200	200	200	200	200	200	200	200	200	200	200
MISCELLANEOUS	0	9	9	9	9	9	9	9	9	9	9	9	9	9
INSURANCE	0	200	200	200	200	200	200	200	200	200	200	200	200	200
LOCAL & PROPERTY TAXES	0	585	621	577	532	488	443	399	355	310	266	222	177	177
ASH DISPOSAL	0	229	399	399	399	399	399	399	399	399	399	399	399	399
TOTAL O & M EXPENSES	0	22,174	37,750	37,705	37,661	37,617	37,572	37,528	37,484	37,439	37,395	37,351	37,305	37305
OPERATING INCOME	0	4,926	9,418	9,462	9,506	9,551	9,595	9,639	9,684	9,729	9,772	9,817	9,861	9861
INTEREST	0	2,675	2,603	2,523	2,433	2,332	2,219	2,092	1,951	1,792	1,615	1,418	1,193	1193
DEPRECIATION	0	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1774
PRE- TAX INCOME	0	478	5,041	5,165	5,300	5,445	5,602	5,773	5,959	6,162	6,384	6,627	6,894	6894
INCOME/ FRANCISE TAX	0	542	943	943	943	943	943	943	943	943	943	943	943	943
ITC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME	0	(64)	4,097	4,222	4,358	4,502	4,659	4,830	5,016	5,218	5,440	5,684	5,951	5951
PRINCIPAL	0	598	670	750	840	941	1,054	1,180	1,322	1,480	1,658	1,857	2,080	2,080
DEPRECIATION	0	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774	1,774
CASH FLOW	0	1,112	5,202	5,248	5,290	5,335	5,379	5,423	5,468	5,512	5,555	5,601	5,645	5,645
CUM CASH FLOW	0	1,112	6,313	11,558	16,850	22,184	27,563	32,987	38,455	43,967	49,523	55,124	60,769	60,769
DEBT SERVICE COVERAGE	0.0	1.5	2.8	2.8	2.8	2.8	2.8	2.8	3.0	3.0	3.0	3.0	3.0	3.0

NPV (TOT.INVEST,$000)..... ($1,681) R.O.I.. 12.1% 12.1%
NPV (EQUITY,$000)..... $20,627 R.O.E.. 37.5%

o ANN.COST OF GEN.(CENTS/K	0.0	5.4	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0	5.0
o AVERAGE COST (CENTS/KWH)	5.1													
o PAYBACK- INVESTMENT *	0.00%	3.34%	18.98%	34.75%	50.85%	68.69%	82.85%	98.16%	115.50%	132.18%				
o PAYBACK- EQUITY *	0.00%	10.13%	57.51%	105.29%	153.48%	202.08%	251.08%	300.48%	350.28%					

*PAYBACK REPRESENTS THE PERCENTAGE OF THE TOTAL INVESTMENT THAT HAS BEEN PAID BACK THROUGH ANNUAL CASH FLOWS

1) Conversion of Sucat 2 Only, Minor Retrofit.

Exhibit 4.4

Cash Flow Projection
For Sucat C&M Retrofit
(Scenario B) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
REVENUES ($000)														
ELECTRICITY REVENUES	0	33,049	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57521
TOTAL REVENUES	0	33,049	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57,521	57521
O & M EXPENSES ($000)														
FUEL	0	23,401	40,815	40,815	40,815	40,815	40,815	40,815	40,815	40,815	40,815	40,815	40,815	40815
LABOR	0	61	61	61	61	61	61	61	61	61	61	61	61	61
CONSUMABLES	0	50	50	50	50	50	50	50	50	50	50	50	50	50
SPARE PARTS	0	200	200	200	200	200	200	200	200	200	200	200	200	200
MISCELLANEOUS	0	9	9	9	9	9	9	9	9	9	9	9	9	9
INSURANCE	0	272	272	272	272	272	272	272	272	272	272	272	272	272
LOCAL & PROPERTY TAXES	0	908	848	785	725	665	604	544	483	423	362	302	242	242
ASH DISPOSAL	0	279	488	488	488	488	488	488	488	488	488	488	488	488
TOTAL O & M EXPENSES	0	25,177	42,739	42,678	42,618	42,557	42,497	42,437	42,376	42,316	42,255	42,195	42,135	42135
OPERATING INCOME	0	7,872	14,782	14,843	14,903	14,964	15,024	15,084	15,145	15,205	15,266	15,326	15,387	15387
INTEREST	0	3,522	3,427	3,321	3,203	3,070	2,921	2,755	2,569	2,360	2,126	1,864	1,570	1570
DEPRECIATION	0	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2417
PRE- TAX INCOME	0	1,934	8,939	9,105	9,284	9,477	9,686	9,913	10,160	10,429	10,723	11,046	11,400	11400
INCOME/ FRANCHISE TAX	0	661	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1150
ITC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME	0	1,273	7,788	7,955	8,133	8,327	8,538	8,763	9,009	9,279	9,573	9,896	10,249	10249
PRINCIPAL	0	787	882	987	1,108	1,239	1,387	1,554	1,740	1,949	2,183	2,445	2,738	2738
DEPRECIATION	0	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2417
CASH FLOW	0	2,902	9,323	9,384	9,444	9,504	9,565	9,625	9,685	9,748	9,807	9,867	9,927	9927
CUM CASH FLOW	0	2,902	12,225	21,609	31,053	40,557	50,122	59,748	69,433	79,179	88,986	98,853	108,780	108709
DEBT SERVICE COVERAGE	0.0	1.9	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.8	3.8	
NPV (TOT.INVEST,$000).....	$13,395		R.O.I..	17.9%										
NPV (EQUITY,$000).....	$42,740		R.O.E..	50.0%										
o ANN.COST OF GEN.(CENTS/K	0.0	5.1	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
o AVERAGE COST (CENTS/KWH)	4.8													
o PAYBACK- INVESTMENT *	0.00%	8.83%	27.81%	49.34%	70.80%	92.80%	114.43%	138.41%	159.52%	180.77%				
o PAYBACK- EQUITY *	0.00%	20.08%	84.58%	149.50%	214.84%	280.58%	368.77%	413.38%	480.37%					

*PAYBACK REPRESENTS THE PERCENTAGE OF THE TOTAL INVESTMENT THAT HAS BEEN PAID BACK THROUGH ANNUAL CASH FLOWS

Exhibit 4.5

Cash Flow Projection
For Sucat CWM Retrofit
(Scenario C) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
REVENUES ($000)														
ELECTRICITY REVENUES	0	27,100	47,187	47,187	94,335	185,874	200,557	200,557	200,557	200,557	200,557	200,557	200,557	200557
TOTAL REVENUES	0	27,100	47,187	47,187	94,335	185,874	200,557	200,557	200,557	200,557	200,557	200,557	200,557	200557
O & M EXPENSES ($000)														
FUEL	0	17,928	31,265	31,265	62,531	127,998	138,534	138,534	138,534	138,534	138,534	138,534	138,534	138534
LABOR	0	61	61	61	101	181	181	181	181	181	181	181	181	181
CONSUMABLES	0	50	50	50	100	215	215	215	215	215	215	215	215	215
SPARE PARTS	0	200	200	200	400	850	850	850	850	850	850	850	850	850
MISCELLANEOUS	0	9	9	9	19	44	44	44	44	44	44	44	44	44
INSUR'NCE	0	200	200	200	381	742	742	742	742	742	742	742	742	742
LOCAL & PROPERTY TAXES	0	685	621	577	1,072	2,260	2,095	1,930	1,765	1,601	1,436	1,271	1,108	1108
ASH DISPOSAL	0	229	399	399	798	1,633	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1787
TOTAL O & M EXPENSES	0	19,339	32,805	32,760	65,381	133,823	144,428	144,283	144,038	143,933	143,769	143,804	143,439	143439
OPERATING INCOME	0	7,761	14,383	14,407	28,953	51,951	56,129	56,294	56,459	56,623	56,788	56,853	57,118	57118
INTEREST	0	2,808	2,538	2,458	4,569	9,818	9,302	8,949	8,553	8,109	7,612	7,058	6,433	6433
DEPRECIATION	0	1,774	1,774	1,774	3,212	6,598	6,598	6,598	6,598	6,598	6,598	6,598	6,598	6598
PRE- TAX INCOME	0	3,381	10,052	10,175	21,171	35,737	40,230	40,749	41,310	41,918	42,580	43,301	44,089	44089
INCOME/ FRANCISE TAX	0	542	943	943	1,887	3,717	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4011
ITC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME	0	2,839	9,109	9,232	19,285	32,019	36,219	36,738	37,298	37,907	38,569	39,290	40,078	40078
PRINCIPAL	0	583	852	731	1,310	2,631	2,947	3,300	3,695	4,140	4,637	5,193	5,816	5816
DEPRECIATION	0	1,774	1,774	1,774	3,212	6,598	6,598	6,598	6,598	6,598	6,598	6,598	6,598	6598
CASH FLOW	0	4,031	10,230	10,275	21,187	35,985	39,868	40,033	40,198	40,363	40,529	40,693	40,858	40858
CUM CASH FLOW	0	4,031	14,261	24,536	45,723	81,707	121,576	161,609	201,808	242,171	282,698	323,392	364,250	364250
DEBT SERVICE COVERAGE	0.0	2.4	4.5	4.5	4.9	4.2	4.6	4.6	4.6	4.6	4.6	4.6	4.7	
NPV (TOT.INVEST,$000)..... $84,682			R.O.I..	28.9%										
NPV (EQUITY,$000).....$145,692			R.O.E..	77.5%										
o AVG.COST OF GEN.(CENTS/K	0.0	4.7	4.4	4.4	4.4	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5
o LEVELIZED COST (CENTS/KW	4.5													
o PAYBACK- INVESTMENT *	0.00%	3.24%	11.45%	19.70%	38.72%	85.62%	97.84%	129.79%	162.07%	194.40%				
o PAYBACK- EQUITY *	0.00%	8.01%	34.71%	59.71%	111.27%	198.85%	295.87%	383.30%	491.13%					

*PAYBACK REPRESENTS THE PERCENTAGE OF THE TOTAL INVESTMENT THAT HAS BEEN PAID BACK THROUGH ANNUAL CASH FLOWS

1> Conversion of All Sucat Units, Minor Retrofit.

Exhibit 4.6

Cash Flow Projection
For Sucat C&M Retrofit
(Scenario D) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
REVENUES ($000)														
ELECTRICITY REVENUES	0	33,049	57,521	57,521	115,042	225,992	243,123	243,123	243,123	243,123	243,123	243,123	243,123	243123
TOTAL REVENUES	0	33,049	57,521	57,521	115,042	225,992	243,123	243,123	243,123	243,123	243,123	243,123	243,123	243123
O & M EXPENSES ($000)														
FUEL	0	21,729	37,900	37,900	75,800	154,349	188,517	188,517	188,517	188,517	188,517	188,517	188,517	188517
LABOR	0	61	61	61	101	181	181	181	181	181	181	181	181	181
CONSUMABLES	0	50	50	50	100	215	215	215	215	215	215	215	215	215
SPARE PARTS	0	200	200	200	400	850	850	850	850	850	850	850	850	850
MISCELLANEOUS	0	9	9	9	19	39	39	39	39	39	39	39	39	39
INSURANCE	0	272	272	272	495	1,011	1,011	1,011	1,011	1,011	1,011	1,011	1,011	1011
LOCAL & PROPERTY TAXES	0	908	848	785	1,470	3,078	2,853	2,629	2,404	2,179	1,955	1,730	1,508	1508
ASH DISPOSAL	0	279	408	488	972	1,879	2,135	2,135	2,135	2,135	2,135	2,135	2,135	2135
TOTAL O & M EXPENSES	0	23,508	39,823	39,783	79,356	181,701	173,801	173,576	173,352	173,127	172,903	172,678	172,453	172453
OPERATING INCOME	0	9,543	17,698	17,758	35,686	64,291	69,322	69,546	69,771	69,995	70,220	70,445	70,669	70669
INTEREST	0	3,481	3,388	3,283	6,124	12,765	12,365	11,894	11,367	10,777	10,116	9,378	8,546	8546
DEPRECIATION	0	2,417	2,417	2,417	4,402	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8984
PRE- TAX INCOME	0	3,646	11,893	12,058	25,160	42,521	47,972	48,667	49,419	50,234	51,120	52,085	53,139	53139
INCOME/ FRANCISE TAX	0	881	1,150	1,150	2,301	4,520	4,882	4,882	4,882	4,882	4,882	4,882	4,882	4882
ITC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME	0	2,985	10,743	10,908	22,859	38,002	43,110	43,805	44,557	45,372	46,257	47,222	48,278	48278
PRINCIPAL	0	778	872	978	1,755	3,501	3,921	4,392	4,919	5,508	6,170	6,910	7,740	7740
DEPRECIATION	0	2,417	2,417	2,417	4,402	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8,984	8984
CASH FLOW	0	4,623	12,288	12,348	25,508	43,485	48,173	48,398	48,622	48,847	49,071	49,296	49,521	49521
CUM CASH FLOW	0	4,823	18,911	29,259	54,768	98,250	146,423	194,821	243,443	292,290	341,361	390,657	440,178	440178
DEBT SERVICE COVERAGE	0.0	2.2	4.2	4.2	4.5	3.9	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3

NPV (TOT.INVEST,$000)..... $81,103 R.O.I.. 28.0%
NPV (EQUITY,$000).....$172,294 R.O.E.. 70.9%

o AVG.COST OF GEN.(CENTS/K	0.0	4.7	4.4	4.4	4.4	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4
o LEVELIZED COST (CENTS/KW	4.5													
o PAYBACK- INVESTMENT *	0.00%	2.79%	10.21%	17.67%	33.08%	58.35%	88.74%	117.88%	147.05%	178.55%				
o PAYBACK- EQUITY *	0.00%	8.46%	30.95%	53.58%	100.24%	179.84%	289.31%	358.80%	445.58%					

*PAYBACK REPRESENTS THE PERCENTAGE OF THE TOTAL INVESTMENT THAT HAS BEEN PAID BACK THROUGH ANNUAL CASH FLOWS

1> Conversion of All Sucat Units, Major Retrofit.

In general, the financial returns for the Major versus Minor retrofit of all Sucat units appear to be comparable to each other. The Minor retrofit of all Sucat units (Scenario C) yields returns on equity and investment slightly greater than the Major retrofit (Scenario D), while the Major retrofit (Scenario D) yields net present values which are approximately 10.0 percent greater than Scenario C. Thus, each has its advantages. The difference occurs because the increases in KWH, capital costs, and O&M expenses that are associated with the Major conversion alternative reduce the ROI and ROE as compared to the Minor conversion; however, increases in rated capacity and associated increases in electric revenues result in greater net present values for the Major retrofit option.

The small change in net plant heat rates between the Major and Minor conversion scenarios and the closeness of the financial returns suggest that it may not make sense, purely from a financial point-of-view, to implement the major conversion scenario unless the electric demand on the Luzon grid is such that it requires the extra capacity that the Major scenario conversion provides.

Postulating that a publicly-oriented investment group would have a minimum cutoff point on ROI for proposed projects of approximately 14.0 percent, the returns for the Sucat conversion indicate that this project could be attractive as a public sector investment. For example, the returns on investment using $35.00 coal in all four scenarios exceed this cutoff point, the returns for $40.00 coal exceed this measure in three instances.

4.3 Sensitivity Analysis

Sensitivity analyses are performed in this study using conversion Scenario D as a base case to test the sensitivity of the project's returns to changes in assumptions of major input variables. Although Scenarios C and D appear to be roughly comparable in their financial attractiveness, Scenario D is used in the sensitivity analysis because of its potentially greater foreign exchange savings.

The sensitivity analysis varies assumptions about Sucat's capacity factors, plant construction costs, costs of capital, and conversion schedule. The analysis also assesses the impact of changes to the assumed busbar price of electricity and the CWM fuel Btu content. Exhibit 4.7 summarizes the sensitivity of the project's returns to changes in each of these assumptions. Table 4.3 further analyzes the sensitivities presented in Exhibit 4.7 by comparing the percentage changes in the project's return on investment and NPV to every percent change in each of the sensitivity variables.

As Exhibit 4.7 and Table 4.3 indicate, the project's financial attractiveness is most sensitive to changes to the busbar price of electricity and the CWM fuels' Btu content.

Exhibit 4.7

SENSITIVITY ANALYSIS
OF CONVERSION SCENARIO D*
TO CHANGES IN SELECTED VARIABLES

Sensitivity Variables	Scenario	Return on Investment (%)	Return on Equity (%)	Net Present Value ($Million)	Net Present Value (PMillion)
Capacity Factor	Base Case (75%)	26	71	$ 91	P1820
	65%	22	63	59	1180
	55%	17	54	26	520
Busbar Price of Electricity	5.5 c/kwh	14	45	5	100
	Base Case (6.0)	26	71	91	1820
	6.5 c/kwh	37	94	177	3540
Cost of Capital	3% Increase in D&E**	23	64	42	840
	Base Case (12% & 15%)	26	71	91	1820
	3% Decrease in D&E	30	81	165	3300
Capital Costs	Higher (+20%)	20	58	56	1120
	Base Case	26	71	91	1820
CWM Btu Content	Higher (+10%)	35	90	160	3200
	Base Case (7507)	26	71	91	1820
Convert All Units except Sucat 1	Exclude Sucat 1	32	86	102	2040
	Base Case	26	71	91	1820

* Scenario D assumes the conversion of all Sucat units with a major retrofit assuming a Philippine coal priced at $40/metric ton.

** Debt and Equity Cost

Table 4.3

CHANGE IN FINANCIAL ATTRACTIVENESS CAUSED BY
A ONE PERCENT CHANGE TO INPUT VARIABLES

A One Percent Change In Sensitivity Variable	Results in a:	Percent Change In: ROI	NPV
Capacity Factor		1.3	2.7
Price of Electricity		5.5	11.9
Cost of Capital		.5	2.7
Station Construction Cost		1.2	1.9
Fuel BTU Content		3.5	7.6
Fuel Price		1.2	2.6

The project's attractiveness is least sensitive to the project's cost of capital.

The sensitivity of the project to the busbar price of electricity occurs because the price directly affects revenue levels. In the cases analyzed, an 8 percent increase in the price of electricity results in a 40 percent increase in the project's net present value and returns on investment and equity. In other words, every one percent change in the price of electricity will result in a 5.5 percent change in the project's return on investment and a 11.9 percent change in its NPV. This sensitivity will become more important to analysis of the project's feasibility with the planned termination of the Philippine government's subsidies to NPC later this year. This impact will be discussed further in Section 4.5.

The financial returns of the project are similarly highly sensitive to changes in the CWM's Btu content. One implication of this sensitivity is the possible desirability of higher CWM fuel loadings, for example, through formulation techniques available to CWM fuel manufacturers, or using beneficiation to reduce ash content. The measures could be taken if it is found that the advantages gained through higher fuel Btu content are not offset by higher coal and/or preparation costs.

The financial attractiveness of the project is also sensitive to Sucat's capacity factors, or the percentage of time that the station is used to generate electricity throughout the year. Assuming that all generation is marketed, a 13 percent increase or decrease in the plant's capacity factor results in almost a 20 percent change to the project's return on investment and a 35 percent change to its net present value. These results indicate that it will be most advantageous to operate the plants at the highest capacity factors possible.

Another important observation to make from the sensitivity analysis is that the project's financial attractiveness improves by approximately 20 percent if the conversion of Sucat 1 is omitted or delayed by several years. This improvement to the project's financial attractiveness arises from several factors. First, Sucat 1 is the smallest unit and, hence, costs more to convert on a per KW basis than the other three Sucat units: costing approximately $160 per KW versus the average cost of $130/kw for Sucat units 2, 3, and 4. Second, Sucat 1 combusts fuel less efficiently than the other three with a plant heat rate of 11,900 Btu/Kwh for a 50-50 blend as compared to heat rates of 10,880 to 11,070 Btu/Kwh for the other three plants. This poorer efficiency results in higher fuel expenses on a Kwh basis as compared to the other units. Finally, Sucat 1's non-fuel-related operations and maintenance expenses are also higher than the other plants on a per Kwh basis.

Finally, the project's financial attractiveness is least sensitive to changes in the retrofit capital costs: A 20 percent increase in the plant's capital cost decreases the project's ROI by 23 percent and its NPV by 38 percent. Thus, a one percent change in capital costs result in only a 1.2 and a 1.9 percent change in the project's ROI and NPV respectively.

4.4 General Observations

Several immediate observations can be formulated on the financial attractiveness of the CWM conversion project based on the information presented in the previous three sections.

First, the high sensitivity of the project's financial attractiveness to the busbar cost of electricity will assume increasing importance because of the pending termination of subsidies to NPC by the Philippine government this year. If these subsidies are terminated, as it appears they will be, NPC will be under greater pressure to increase rates to its customers to make up the resulting cash deficits. If subsequent rate increases do result to customers on the Luzon grid, the financial returns of this project will become even more attractive than they currently are, assuming that higher prices do not reduce demand to the level such that reduced kwh consumption off-sets the effects of higher revenues to NPC. This is an area that needs to be examined more closely in the next phase of work.

Second, in general, the financial attractiveness of the Sucat CWM conversion project appears to be significant. This attractiveness is reflected through the project's returns and its net present values, which appear to be potentially attractive to both public and private sector investors. In addition, based upon the preliminary feasibility results, it does not appear that this attractiveness should significantly change even with negative variation of any one sensitivity factor.

Third, based only upon the base case financial analysis of the four Sucat conversion scenarios, it is not immediately clear which of the full conversion options (Scenarios C & D) is the most efficient course of action to pursue. The major conversion scenario (Scenario D) was selected for sensitivity analysis somewhat arbitrarily because, based upon initial observa-

tions, both Major and Minor retrofit alternatives appear to be attractive in terms of their respective internal rates of return and net present values. It was also felt that Scenario D might be more preferable because of its greater foreign exchange impact. A final determination of which of the two alternatives is most efficient from the Philippines' or a private investor's perspective, however, must be made through further analysis. This determination will be influenced by the respective foreign exchange impacts of each alternative, expectations on plant load levels, system demand growth rates, and the availability of investment capital.

Next, the sensitivity of the financial results to changes in each plant's capacity factor implies that the proposed project's financial attractiveness will be the greatest if the converted Sucat units are used as baseload capacity. Since, as will be demonstrated in Section 5.0, it appears that the proposed CWM plants will be more effective from a foreign exchange perspective to run than existing oil-fired generation on the grid, there should be an incentive for NPC to use them as baseload capacity whenever possible. However, since it's not clear that NPC's plant loading process is based solely upon an economic dispatch selection criteria, it is not certain that Sucat will consistently be used as a baseload station.

Finally, partly because of the potential economic and financial advantages of running the Sucat CWM plants at baseload capacity, and partly because of the possible financial advantages that accrue to the project by delaying or omitting the conversion of the Sucat 1 unit as illustrated in Exhibit 4.7, an appropriate project strategy may be the delay or the ultimate cancellation of the conversion of Sucat 1. This course of action would help to ensure that the other converted Sucat units are run at higher capacity factors until load growth requires increased grid capacity. A final decision on the most appropriate strategy regarding the conversion of Sucat 1 will be affected by a range of factors, and should be investigated in the next phase of this analysis. Further observations regarding the conversion of Sucat 1 are presented in Section 5.5.

5.0 ECONOMIC FEASIBILITY AND FOREIGN EXCHANGE ANALYSIS

Although structurally similar to financial analyses, economic analyses differ from financial analysis in several respects. Economic analysis is conducted with a national perspective and is most often used by national economic planners. Economic analysis measures a project in terms of its contribution to the country's national objectives and the extent that the project's benefits compare favorably against the benefits of other available projects in the country.

Two types of economic analysis have been performed during this study: One in which an analysis is performed using shadow factors and excluding government transfer payments, and one where a foreign exchange analysis is conducted to measure the foreign exchange impact of the project.

5.1 Economic Analysis

An economic analysis of the proposed CWM conversion project is important to highlight from a Philippine perspective, the benefits of the project to the nation rather than only to the investor. This analysis is performed exclusive of national transfer taxes, national subsidies, and possible distortions to the prices of goods and services in the domestic market. Although economic analysis is similar in many ways to financial analysis, (because project returns and net present values are calculated), economic analysis is different in several ways. First economic analysis does not include consideration of national taxes, duties, and tax credits in the calculation of project feasibility, since national taxes and credits are transfer payments from one sector of the national economy to another sector.

Second, economic analysis uses adjustments, or "shadow factors", to alter selected domestic rates and prices to remove the effect of localized price distortions in the Philippines. To offset the impact of these distortions, a shadow factor of 1.2 has been applied to the price of foreign exchange in this analysis; and a shadow factor of 0.6 has been applied to the cost of unskilled Philippine labor. These shadow factors were developed by the Economic Development Foundation during this project and are based upon their conversations with government officials and international development banks.

In addition, economic domestic coal costs for publicly owned Semirara coal of $20 and $26 per metric ton have been used. These costs are considered appropriate estimates of the economic cost of Semirara coal production, because of the conclusions of a 1981 mining feasibility study that was performed by Dames and Moore, consulting engineers.

Assuming public Philippine ownership of the mine, the average cost of producing CWM for each coal price is outlined in Table 5.1. Average costs vary from $15-20 per metric ton of CWM. These costs are roughly 40-50 percent of the cost of CWM that are used in the financial analysis using $40 per metric ton coal.

Table 5.1

ECONOMIC ANALYSIS

AVERAGE COST OF CWM PRODUCTION

	Economic Price of Coal ($MT)	Average Cost CWM ($/MT)
Public Ownership	$20	$ 15.20
	26	18.10

Exhibit 5.1 and Table 5.1 emphasize that the economic attractiveness of this project to the Philippines is quite substantial. The project yields returns on investment of greater than 50 percent, returns on equity of well over 100 percent, and net present values on the project in the range of $300-450 million. As Exhibit 5.1 illustrates, changes to the assumptions in the coal price do not significantly alter the project's attractiveness.

5.2 Foreign Exchange Analysis

A second way of analyzing national economic benefits associated with converting the Sucat power station to CWM is to examine the project's foreign exchange impact. It is important to stress that the economic or financial attractiveness of a project and the foreign exchange impact of a project are distinctly different measures of a project's attractiveness. They are different because an economic or financial analysis measures the economic or financial attractiveness of a project using parameters such as net present values, rates of return, and payback periods, while a foreign exchange impact analysis measures the net foreign exchange gain or loss resulting from a project during its lifetime.

This section examines the amounts and the sensitivity of the foreign exchange savings that result from this project. Section 5.2.1 estimates the net foreign exchange requirements of the project, and it outlines the methodology that is used to calculate foreign exchange impacts. Section 5.2.2 discusses the financial foreign exchange implications of each of the four Sucat scenarios from a financial prospective, and it identifies measures to compare them to each other for each scenario. Section 5.2.3 tests the sensitivity of the foreign exchange impact to variations in different parameters which may affect the net level of foreign exchange requirements. Section 5.3 estimates the foreign exchange impact of the project from an economic point-of-view using shadow prices that were introduced earlier in Section 5.1. Finally, Section 5.4 formulates observations based upon the analysis in the preceding sections.

Exhibit 5.1

SENSITIVITY ANALYSIS
OF
ECONOMIC RETURNS
IN BASE CASE
SUCAT CONVERSION*

Variable	Assumption	Return on Investment (%)	Return on Equity (%)	Net Present Value ($M)**	Net Present Value (PM)**
Electricity Price					
• Base Case***	6.0 (¢/kwh)	54	133	$366	P7,320
• Price Decrease	6.5 (¢/kwh)	62	152	454	9,080
Coal Price					
• Base Case	$20.00/MT	54	133	366	7,320
• Price Decrease	26.00/MT	48	121	314	6,280

* Retrofit All Units, Major Conversion.

** $M - Million Dollars, PM - Million Pesos.

*** Base Case $20/MT cost of coal production and a 6.0c/kwh cost of electricity production to NPC.

5.2.1 Methodology to Estimate CWM Foreign Exchange Benefits to the Philippines

This section briefly describes the steps that have been taken to estimate the project's foreign exchange impact. It is important to outline these steps because the validity of the assumptions that have been made in implementing these steps will greatly impact this project's foreign exchange savings. If the reader of this volume is not interested in understanding the specific steps that were taken, it is suggested that he or she briefly scan this section and proceed directly to Section 5.2.2.

The proposed plan to convert Sucat station to burn CWM in place of oil results in foreign exchange costs and benefits to the Philippines. The costs occur from expenditures of foreign exchange that are required to fund the project. For the proposed CWM conversion project, these costs include foreign exchange expenditures associated with the expansion of production at Semirara, the construction of a CWM preparation facility, the conversion of oil barges to transport CWM, the proposed conversion of the Rockwell pipeline, and the planned conversion of Sucat station.

Foreign exchange benefits occur when expenditures of foreign exchange associated with the import of foreign commodities are avoided. For the proposed CWM project, benefits to the Philippines will occur by the country being able to avoid importing oil for use in domestic electricity generation. Benefits that may arise from the possible deferral of investments in new generating capacity arising from a greater utilization of the Sucat Station with its conversion to CWM, have not been considered in this analysis. As such, the estimation of the magnitude of foreign exchange benefits to the Philippines only considers the comparison of the foreign exchange benefits less the project's foreign exchange costs, resulting in a calculation of a net foreign exchange savings.

A computer model has been developed to evaluate the foreign exchange impact of this project. To estimate net benefits, the model proceeds through the following steps:

Step 1. <u>Estimate Foreign Exchange Costs of the Total Project</u>

Foreign exchange costs are estimated for each of the individual project sectors (i.e., Sucat conversion, pipeline conversion, CWM preparation facility construction, etc.), and are aggregated to determine the total foreign exchange cost of the project. Foreign exchange costs for each of the sectors are estimated by determining the annual interest and principal payments associated with their associated long-term project financing. Total long-term project financing for each project segment includes the cost of equipment, engineering and owner's costs, land, working capital (estimated at 2 months of annual O&M expenses), import duties, and interest during construction (IDC). IDC is calculated on a quarterly basis for the entire construction period and is capitalized as part of the long-term project financing. It is also assumed that a substantial portion of the foreign exchange requirements of the construction and long-term project debt is financed through foreign

banks. Thus, foreign exchange outflows do not begin to take place until the Sucat station is generating electricity using CWM and is directly displacing oil-fired generation on the NPC system.

The foreign exchange requirements of each segment of the project as depicted in Figure 4.1 include debt service (interest plus principal) on each segment's total required investment adjusted by the percentage portion of that investment that is financed by foreign debt. It is assumed that the Sucat Station conversion and Semirara mine development are financed with public sector borrowing terms while the construction of the CWM plant and the modification of barges and the Rockwell pipeline are financed on private sector loan terms (see Exhibit 3.2 for borrowing terms assumed). The estimate of the foreign exchange portion of total financing for each project segment is based on best judgements of individual experts who are closely familiar with each project sector. The assumptions that have been made regarding the foreign exchange portions of the financial requirements of each project segment are outlined in Table 5.2.

Table 5.2

FOREIGN EXCHANGE PORTION OF PROJECT INVESTMENT
FOR ALL SCENARIOS

Sector Requiring Investment	Foreign Exchange Portion (%)
Sucat Station	75%
Rockwell Pipeline	65
CWM Barges	60
CWM Preparation Facility	62
Semirara Mine	70

The foreign exchange requirements of each project sector for each of the four scenarios are presented in Exhibit 5.2. Estimates for Scenarios C and D are presented for the partial (1988 - 1990) conversion, and for the full conversion (1992 +). The estimates range from $9-11 million per year for the partial conversion (Scenarios A and B) to $49-56 million per year outflow for the full conversion (Scenarios C and D). As Exhibit 5.2 reflects, foreign exchange outflows for the coal mine do not begin until the next Semirara mine is fully constructed and supplying coal to the fully converted Sucat station in 1992.

Step 2. Estimate Displaceable NPC Oil Generation

Although several sources and NPC officials have been consulted regarding the portion of current and planned oil-fired NPC generation that is capable of being displaced by Sucat CWM generation, a definitive estimate of displaceable oil capacity is not available. First, conversations with NPC officials have resulted in varying estimates of displaceable capacity. Several officials have cited the need to maintain oil capacity on the grid for voltage regulation purposes. However, a consensus does not appear to exist about

Exhibit 5.2

ANNUAL FOREIGN EXCHANGE REQUIREMENTS FOR
EACH INVESTMENT SECTOR
(By CWM Scenario)

Investment Sector	A Sucat 2 Minor Retrofit ($ 000)	B Sucat 2 Major Retrofit ($ 000)	C All Units Minor Retrofit ($ 000)		D All Units Major Retrofit ($ 000)	
	1988+	1988+	1988-1990	1992+	1988-1990	1992+
Sucat Station	3,300	4,420	3,300	12,740	4,445	17,080
Rockwell Pipeline	1,200	1,200	1,200	2,510	1,200	2,610
CWM Barges	400	400	400	1,200	410	1,200
CWM Preparation Facility	4,330	4,500	4,330	10,670	4,500	12,780
Coal Mine	0	0	0	22,170	0	22,170
Total Annual Foreign Exchange Requirements	$9,230	$10,520	$9,230	$49,290	$10,555	$55,840

the minimum amount of oil capacity that is needed to maintain proper voltage levels on all parts of the Luzon grid or, if in fact it is needed at all. For example, one official has indicated that the need to use oil generation for voltage regulation may be avoided with the installation of capacitors on the grid. Second, NPC/WASP computer simulation runs of projected power plant dispatching with and without a simulation of projected CWM conversions have, in several cases, resulted in confusing interpretations of how oil generation would be displaced.

Despite concerns that NPC estimates may under-represent the amount of oil generating capacity on the NPC Luzon grid that can be displaced by CWM generation, NPC estimates have nevertheless been used to estimate foreign exchange savings. The estimates of displaceable oil capacity developed in this section have been based upon three assumptions:

- The Manila 1 and 2 units are not needed for voltage regulation, and, thus, can be placed on spinning reserve.
- Oil-fired generation that is planned for the Sucat 1-4 units in the NPC October 1984 Generation Plan is not needed for voltage regulation since Sucat boilers under CWM will provide the voltage regulation function.
- The oil generation that is displaced by Sucat using CWM in NPC's WASP computer simulations,* will serve as a guide to the amount of oil generation that is in fact necessary to regulate voltage on the Luzon grid.

Using these assumptions, the minimum amount of oil-fired capacity on the Luzon grid that is likely to be capable of being displaced by CWM generation ranges from 1410 GWH in 1988 to 3485 MWH in 1995. These estimates are presented in Table 5.3.

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* "Coal Water Mix (Fuel) Studies for Introduction to the Philippines," January 1985, National Power Corporation.

Table 5.3

ESTIMATES OF DISPLACEABLE OIL GENERATION CAPACITY ON THE LUZON GRID

	1988	1989	1990	1991	1992	1993	1994	1995
Projected NPC Oil Generation (GWH)	3440	3390	4040	3890	4120	3990	3660	4680
Displaceable Oil Generation (GWH)	1410	2420	3070	2790	3030	3090	2880	3485
Potential Oil Capacity Displaced (%)	41	61	76	72	74	77	79	74

Step 3. Estimate Net Foreign Exchange Savings

The foreign exchange savings that can be achieved by converting Sucat to CWM is estimated in the following manner:

FE = (G) (P) (OR)

Where:

FE - potential foreign exchange savings available to the Philippines in avoided US dollar expenditures for imported oil.

G - Projected Sucat CWM generation which displaces oil generation (with upper bounds of CWM generation being set by the amount of displacable oil generation).

P - Duty-free price of imported residual fuel oil to the Philippines.

OR - Average amount of oil required per megawatt hour generated on the NPC system.

The duty-free price of imported residual oil to the Philippines which is used in this analysis is $28 per barrel, while NPC's system average usage of oil per MWH of electricity generated is 1.8 barrels*. This oil use estimate is based on NPC estimates of projected oil consumption and generation for each of its oil-fired power plants in its October 1984 Plan.

Step 4. Estimate Net Foreign Exchange Savings

Estimates of the project's foreign exchange costs (Step 1) are subtracted for the project's oil foreign exchange savings (Step 3) to yield a net foreign exchange savings for the project.

5.2.2 Annual Net Foreign Exchange Savings

Estimates of the project's annual net foreign exchange savings have been developed for each of the four scenarios. A summary of these estimates is presented in Exhibit 5.3. These estimates have been developed using a Lotus 1-2-3 computer model, whose structural logic is outlined in Appendix A. Detailed summaries of the foreign exchange savings for each of the scenarios are presented as Exhibits 5.4 through 5.7 in this chapter.

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* This estimate of 1.8 barrels of oil per MWH electricity generated is calculated using NPC estimates of oil consumption and generation for its oil-fired generating stations in the October 1984 Plan.

Exhibit 5.3

FOREIGN EXCHANGE IMPACT

SUMMARY OF NET FOREIGN EXCHANGE SAVINGS FOR EACH SUCAT CONVERSION SCENARIO

Scenario	Net Present Value ($ Million)	15-Year Cumulative* Savings* ($ Million)	15-Year Cumulative* Savings* (P Million)
A. Sucat 2 Minor Retrofit	152	434	8,680
B. Sucat Major Retrofit	188	544	10,880
C. All Units, Minor Retrofit	363	1,260	25,200
D. All Units, Major Retrofit	383	1,390	27,800

* During the period 1988 - 2002

Exhibit 5.4

Estimates of Foreign Exchange
Savings to the Philippines
Resulting from the Sucat CWM Retrofit
(Scenario A) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PROJECTED NPC OIL GENERATION (GWH)	2,050	3,441	3,393	4,043	3,893	4,118	3,594	3,050	4,678	4,678	4,675	4,678	4,678	4,678	4,678	4,678	4,678
LESS: DISPLACABLE OIL GENERATION ON LUZON GRID (GWH)	1,478	1,408	2,419	3,038	2,791	3,032	3,085	2,884	3,485	3,485	3,485	3,485	3,485	3,485	3,485	3,485	3,485
NPC OIL FOREX REQUIREMENTS ON LUZON GRID($000)	$149,128	$173,434	$171,004	$203,780	$198,194	$207,455	$201,311	$184,402	$235,788	$235,788	$235,788	235,788	235,788	235,788	235,788	235,788	235,788
FOREIGN EXCHANGE REQUIREMENTS FOR CWM PROJECT ($000)	0	0,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388	9,388
OIL FOREIGN EXCHANGE SAVED BY CWM PROJECT($000)	0	22,851	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507	39,507
NET SAVINGS (LOSS) OF FOREIGN EXCHANGE ($000)	$0	$13,263	$30,119	$30,119	$30,111	$30,111	$30,111	$30,111	$30,111	$30,111	$30,111	30,111	30,111	30,111	30,111	30,111	30,111
CUMULATIVE SAVINGS OF FOREIGN EXCHANGE ($000)	$0	$13,263	$43,382	$73,501	$103,612	$133,722	$163,833	$193,944	$224,054	$254,165	$284,276	$314,386	$344,497	$374,609	$404,718	$434,829	$464,940
NET PRESENT VALUE (AT 13.0% DISCOUNT RATE)	$152,284 (000'S)																
SUCAT GENERATION UTILIZED(%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

1> Conversion of Sucat 2 Only, Minor Retrofit.

Exhibit 5.5

Estimates of Foreign Exchange Savings to the Philippines Resulting from the Sucat CMM Retrofit (Scenario B) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PROJECTED NPC OIL GENERATION (GWH)	2,959	3,441	3,383	4,043	3,893	4,118	3,994	3,659	4,878	4,878	4,878	4,878	4,878	4,878	4,878	4,878	4,878
DISPLACABLE OIL GENERATION ON LUZON GRID (GWH)	1,476	1,409	2,419	3,088	2,791	3,032	3,085	2,884	3,465	3,465	3,465	3,465	3,465	3,465	3,465	3,465	3,465
NPC OIL FOREX REQUIREMENTS ON LUZON GRID ($000)	$149,128	$173,434	$171,006	$203,780	$198,194	$207,455	$201,311	$184,402	$235,768	$235,768	$235,768	235,768	235,768	235,768	235,768	235,768	235,768
FOREIGN EXCHANGE REQUIREMENTS FOR CMM PROJECT ($000)	0	10,502	10,502	10,502	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510	10,510
OIL FOREIGN EXCHANGE SAVED BY CMM PROJECT($000)	0	27,623	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179	48,179
NET SAVINGS (LOSS) OF FOREIGN EXCHANGE ($000)	$0	$17,121	$37,677	$37,677	$37,669	$37,669	$37,669	$37,669	$37,669	$37,669	$37,669	37,669	37,669	37,669	37,669	37,669	37,669
CUMULATIVE SAVINGS OF FOREIGN EXCHANGE ($000)	$0	$17,121	$54,798	$92,476	$130,145	$167,813	$205,482	$243,151	$280,820	$318,489	$356,158	$393,827	$431,496	$469,165	$506,833	$544,502	$582,171
NET PRESENT VALUE (AT 13.0% DISCOUNT RATE)		$188,268 (000'S)															
SNEAY GENERATION UTILIZED(%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

1> Conversion of Sucat 2 Only, Major Retrofit.

Exhibit 5.6

Estimates of Foreign Exchange
Savings from the Sucat C&M Retrofit
Resulting from the Sucat C&M Retrofit
(Scenario C) 1/

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PROJECTED NPC OIL GENERATION (GWH)	2,959	3,441	3,383	4,043	3,893	4,118	3,894	3,059	4,878	4,878	4,878	4,878	4,878	4,878	4,878	4,878	4,878
DISPLACABLE OIL GENERATION ON LUZON GRID (GWH)	1,328	1,268	2,177	2,782	2,512	3,235	2,770	2,532	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138	3,138
NPC OIL FOREX REQUIREMENTS ON LUZON GRID ($000)	$149,128	$173,434	$171,004	$203,780	$189,194	$207,455	$201,311	$184,402	$235,788	$235,788	$235,788	235,788	235,788	235,788	235,788	235,788	235,788
FOREIGN EXCHANGE REQUIREMENTS FOR C&M PROJECT ($000)	0	9,228	9,228	9,228	39,075	49,284	49,284	49,284	49,284	49,284	49,284	49,284	49,284	49,284	49,284	49,284	49,284
OIL FOREIGN EXCHANGE COSTS SAVED BY C&M PROJECT($000)	0	22,651	39,507	39,507	78,014	158,651	139,810	127,820	159,087	159,087	159,087	159,087	159,087	159,087	159,087	159,087	159,087
NET SAVINGS (LOSS) OF FOREIGN EXCHANGE ($000)	$0	$13,425	$30,281	$30,281	$39,939	$108,369	$90,526	$78,336	$109,783	$109,783	$109,783	109,783	109,783	109,783	109,783	109,783	109,783
CUMULATIVE SAVINGS OF FOREIGN EXCHANGE ($000)	$0	$13,425	$43,706	$73,987	$113,926	$220,292	$310,818	$389,054	$497,738	$608,519	$715,302	$824,085	$932,868	$1,041,651	$1,150,433	$1,259,216	$1,367,999
NET PRESENT VALUE (AT 13.0% DISCOUNT RATE)	$383,148 (000'S)																
SUCAT GENERATION UTILIZED(%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	83.1%	78.0%	100.0%	100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

1/ Conversion of All Sucat Units, Minor Retrofit.

Exhibit 5.7

Estimates of Foreign Exchange
Savings from the Sucat C&M Retrofit
Resulting from the Sucat C&M Retrofit
(Scenario D) 1>

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PROJECTED NPC OIL GENERATION (GWH)	2,858	3,441	3,393	4,043	3,893	4,116	3,894	3,858	4,678	4,678	4,678	4,678	4,678	4,678	4,678	4,678	4,678
DISPLACABLE OIL GENERATION ON LUZON GRID (GWH)	1,478	1,409	2,419	3,088	2,791	3,032	3,085	2,884	3,485	3,485	3,485	3,485	3,485	3,485	3,485	3,485	3,485
NPC OIL FOREX REQUIREMENTS ON LUZON GRID ($000)	$148,128	$173,434	$171,004	$203,780	$188,194	$207,455	$201,311	$184,402	$235,768	$235,768	$235,768	235,768	235,768	235,768	235,768	235,768	235,768
FOREIGN EXCHANGE REQUIREMENTS FOR C&M PROJECT ($000)	0	10,538	10,538	10,538	42,325	55,842	55,842	55,842	55,842	55,842	55,842	55,842	55,842	55,842	55,842	55,842	55,842
OIL FOREIGN EXCHANGE SAVED BY C&M PROJECT($000)	0	27,623	48,179	48,179	96,358	152,838	155,478	145,332	175,630	175,630	175,630	175,630	175,630	175,630	175,630	175,630	175,630
NET SAVINGS (LOSS) OF FOREIGN EXCHANGE ($000)	$0	$17,085	$37,641	$37,641	$54,033	$96,996	$99,634	$89,490	$119,788	$119,788	$119,788	119,788	119,788	119,788	119,788	119,788	119,788
CUMULATIVE SAVINGS OF FOREIGN EXCHANGE ($000)	$0	$17,085	$54,726	$92,368	$146,401	$243,396	$343,030	$432,520	$552,309	$672,097	$791,886	$911,674	$1,031,463	$1,151,251	$1,271,039	$1,390,828	$1,510,616
NET PRESENT VALUE (AT 13.0% DISCOUNT RATE)	$383,282 (000'S)																
SUCAT GENERATION UTILIZED(%)	100.0%	100.0%	100.0%	100.0%	100.0%	80.8%	78.3%	71.4%	88.2%	88.2%	88.2%	88.25%	88.25%	88.25%	88.25%	88.25%	88.25%

> Conversion of All Sucat Units, Major Retrofit.

Exhibit 5.3 points out that the net foreign exchange impacts* of each of the four Sucat conversion scenarios is potentially significant. The 15-year cumulative net savings of foreign exchange for the Sucat 2 conversion in Scenarios A and B is $434-544 million, while the savings for full CWM conversion alternatives in Scenarios C and D range from $1,260-1,390 million respectively. The net present value** of the net foreign exchange savings to the Philippines ranges from $152-188 million for the Sucat 2 only conversion to $363-383 million for the full conversions.

Several observations can be made about the foreign exchange impacts in Exhibit 5.3 - 5.7. First, despite the somewhat substantial foreign exchange requirements that will be required to convert Sucat, construct a CWM preparation facility, open a mine, and create other infrastructural requirements for the project, net foreign exchange savings are positive for each conversion scenario in every year of the project. This positive foreign exchange flow to the Philippines occurs because the annual foreign exchange savings are so significant in every year of the project that they offset the relatively large foreign exchange outflows from the country.

Second, under Scenarios C and D, the Philippines can expect to recover, after full conversion of all four units, roughly a $100-120 million savings annually in foreign exchange over a 15-year period. This level of savings can be significantly increased if assumptions in the base case are changed as will be illustrated in the sensitivity analysis in Section 5.3.

Third, because of constraints imposed on the amount of NPC oil generation that can be displaced during a particular year or from estimates formulated in Step 2, the converted Sucat CWM plants are not operated at full capacity during the 1992-1995 period. This under-utilization of the converted Sucat CWM capacity is greater in Scenario D than it is in Scenario C. This under-utilization of Sucat capacity has implications on the total unit capacity that should be converted as well as on the timing of those conversions. These implications will be discussed in greater detail in Section 5.5.

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* To repeat, the "net" foreign exchange impacts represent the savings accrued to the Philippines through not having to import oil for electricity generation, less the foreign exchange outflow incurred as a result of investments in each of the investment sectors associated with the CWM project.

** The net present values were calculated using a 13 percent discount rate which represents the base case weighted average cost of debt (12.0 percent) and equity (15.0 percent) to the public sector in the Philippines.

Table 5.4

CHANGE IN FOREIGN EXCHANGE IMPACT
CAUSED BY A ONE PERCENT CHANGE TO
INPUT VARIABLES

A One Percent Change In:	Results in a:	Percent Change In: NPV	Percent Change In: Cumulative Savings
Oil Price		1.9	1.4
Plant Capacity Factor			
• To 65%		.2	.1
• To 55%		.9	.7
Displacable NPC Oil Generation		1.3	1.6
Exchange Rate		0	1.0

5.2.3 Foreign Exchange Sensitivity Analysis

A sensitivity analysis has been performed on Sucat conversion Scenario D in which assumptions are altered regarding variables which may most significantly affect the project's net foreign exchange savings. The assumptions changed included those relating to the duty-free imported price of oil to the Philippines, Sucat plant capacity factors, Sucat construction plans and schedules, foreign exchange rates, and estimates of NPC's displaceable oil capacity. A summary of these sensitivity runs is presented in Exhibit 5.8.

As Exhibit 5.8 illustrates, net foreign exchange savings from the Sucat conversion using the new assumptions is most sensitive to changes in world oil prices and the amount of oil capacity that is displaceable on the NPC system. Net foreign exchange savings is least sensitive to changes in Sucat's construction schedules and its plant capacity factors.

Table 5.4 further analyzes the sensitivity of the project's foreign exchange impact to changes in key variables. It evaluates the percentage change that occurs in the project's foreign exchange impact for every 1 percent change in a key sensitivity variable. As the table illustrates, foreign exchange earnings are particularly sensitive to imported oil prices. This sensitivity occurs because approximately 1.8 barrels of oil are saved for every MWH of oil-fired capacity that is displaced on the NPC system. As the table illustrates, a 1 percent incremental change in world oil prices results in roughly a 2 percent change in the net present value of the project and a 1.4 percent change in its 15-year cumulative savings.

Initially, the foreign exchange savings is insensitive to changes in plant capacity factors -- at least for Scenario D -- because the converted Sucat CWM capacity is not fully utilized in the early 1990's. Thus, a 15 percent change in average plant capacity factor from 75 percent to 65 percent results in a reduction of the NPV of foreign exchange savings by only 2 percent because of the excess plant capacity on the system. The sensitivity, however, increases as the excess capacity is used up. Scenarios A, B, and C, however, would probably be more sensitive to changes in plant factors because less excess generation exists under those scenarios, and the CWM capacity would be directly displacing oil generation on the NPC system.

In general, the project's foreign exchange savings exhibits sensitivity to changes in Sucat conversion plans. For example, the acceleration or delay of the scheduled conversion dates for Sucat units 1, 3, and 4 by one year, results in an 11 percent change in net present values of the foreign exchange saved for each alternative. Of particular interest is the change that occurs to cumulative savings by delaying or cancelling the conversion of Sucat 1. These actions result in improved project NPVs which are 5 percent greater than the base case scenario. The reason this improvement occurs is that, at least initially, Sucat 1 is not fully used to displace oil-fired generation, since the generation from the converted Sucat units 2, 3, and 4 is capable of displacing most of the existing displaceable oil capacity on the system.

This fact is further highlighted by the results of the sensitivity run in which it is assumed that the amount of displaceable capacity on the Luzon grid has been underestimated by 20 percent. The results of this sensitivity

Exhibit 5.8

FOREIGN EXCHANGE IMPACT

SENSITIVITY ANALYSIS FOR
SUCAT CONVERSION SCENARIO D*

Variable	Options	Net Present Value ($ Million)	15-Year Cumulative Savings ($ Million)	15-Year Cumulative Savings (P Million)
Oil Price	$ 22	223	954	19,000
	25	303	1,177	23,540
	Base Case ($28)	385	1,400	28,000
	31	466	1,622	32,440
	35	574	1,910	38,200
Plant Capacity Factors	Base Case (75%)	385	1,400	28,000
	65%	372	1,378	27,560
	60%	338	1,266	25,320
	55%	293	1,132	22,640
Sucat Conversion Plans	Base Case	385	1,400	28,000
	Accelerate Units 1,3 & 4 by 1 Yr	428	1,600	32,000
	Delay Units 1, 3 & 4 by 1 Yr.	340	1,190	23,800
	Delay Sucat 1 by 2 Yrs.	392	1,406	28,120
	Cancel Sucat 1	403	1,387	27,740
Displaceable Oil Generation	Base Case	385	1,400	28,000
	20% Increase	482	1,839	36,780
Foreign Exchange Rates				
	17.5 Peso/1 US $	385	1,400	24,500
	20.0 Peso/1 US $	385	1,400	28,000
	22.5 Peso/1 US $	385	1,400	31,500

* Conversion of all Sucat units with a major retrofit and assuming a $28/bbl. duty free price of oil to the Philippines.

run indicate that a 20 percent increase in displaceable capacity results in a 25 percent increase in the project's NPV and a 31 percent increase in its cumulative foreign exchange savings. The improved results indicate that the Sucat 1 unit is being used more efficiently as it is being used to replace the greater amount of displaceable oil-fired generation.

5.3 The Shadow Foreign Exchange Impact

The shadow foreign exchange impact of the proposed conversion upon the Philippines is also estimated. The shadow foreign exchange impact reflects the net foreign exchange impact of the project on the country excluding internal transfer taxes, import duties, and credits. It also reflects the assumed true economic cost of factors of commodities such as labor and foreign exchange.

The shadow foreign exchange impact of converting the Sucat units to CWM is presented in Exhibit 5.8. In performing the analysis, shadow factors of 1.2 and .6 were applied to Philippine foreign exchange and non-skilled domestic labor. A comparison of the "shadow economic" impact in Exhibit 5.8 to the non-"shadow, financial" foreign exchange impact of the project previously described and presented in Exhibit 5.2 shows that the shadow foreign exchange impact results in an approximate 12 percent improvement in the project's NPV and a 6 percent improvement in its cumulative foreign exchange savings.

5.4 General Observations

Several immediate observations are relevant to the Sucat conversion project's foreign exchange impact.

First, the extent of the project's foreign exchange savings is affected by several factors. They include:

- The amount of oil-fired capacity that is capable of being displaced on the Luzon grid.
- World oil prices.
- NPC demand growth, which will increase the amount of projected NPC oil-fired generation that can be displaced.
- The strength of the Philippine Peso against the US dollar.
- The timing of the Sucat conversion plans.
- The capacity factors of the converted CWM units.

Second, assuming reasonably conservative assumptions regarding plant operations and fuel costs, the net foreign exchange savings impact of the project is substantial. Even under a reduced world fuel price scenario of $22 per barrel, the Philippines will save close to $1 billion in foreign

Exhibit 5.9

ECONOMIC ANALYSIS

FOREIGN EXCHANGE IMPACT
USING PHILIPPINE SHADOW PRICES*

Oil Price ($/Bbl)	Net Present Value ($ Million)	15-Year Cumulative Savings* ($ Million)	15-Year Cumulative Savings* (P Million)
$ 22	$ 251	$ 1,013	P 20,260
25	340	1,250	25,000
Base Case ($28)	431	1,488	29,760
31	520	1,743	34,860
35	640	2,067	41,340

* This analysis assumes a 1.2 shadow price on foreign exchange and a .6 shadow price on unskilled labor. Cash flows are discounted at a 13.0 percent cost of capital to NPC and cumulative savings are for the 15 year period between 1988 and 2002.

exchange over the next 15 years because of the project. Using the more moderate, base case assumptions, the Philippines will save approximately $1.4 billion with a net present value of $383 million, or approximately a savings of $100 million a year in foreign exchange during the period. If increases in oil prices are assumed -- or Philippine economic, or "shadow", factors are considered -- the foreign exchange impact of the project improves even more markedly, achieving cumulative savings of close to $2 billion during the period. Foreign exchange savings can also be significantly improved by faster demand growth rates or increases in the amount of displaceable oil capacity on the Luzon grid that can be achieved.

Finally, it may not be immediately necessary to convert Sucat 1 to CWM using the conversion schedule for the Sucat units that has been tentatively established by Burns and Roe in Volume 3. In fact, based upon the project's financial analysis and foreign exchange impact results, it is not entirely clear whether Sucat 1 should be converted to burn CWM at all. Several factors will affect the wisdom of this conversion.

One factor is whether the amount of oil capacity on the NPC system that can be displaced by CWM remains the same as has been projected in this analysis.* If estimates of the amount of displaceable oil-fired capacity remain roughly the same as present estimates, then conversion of Sucat 1 might be delayed or indefinitely postponed. If, on the other hand, estimates of the amount of displaceable oil-fired capacity on the Luzon grid increase significantly over what current estimates are now, then Sucat 1 should probably be converted since its generation will directly displace oil and the plant is likely to be used at a higher level of utilization.

Another question affecting the conversion of Sucat 1 to CWM, assuming its capacity is capable of displacing oil-fired generation, is whether it is the most efficient oil-fired unit on the Luzon grid to convert to CWM. Sucat 1's per megawatt conversion and operating costs of Sucat 1 are greater than the other three Sucat units while its plant heat rate is 7-10% less than Sucat units 2, 3, and 4. It may be inefficient to convert Sucat 1 to CWM to achieve foreign exchange savings. Conversion of the Manila or Bataan units may be preferable, either because of improved plant operating characteristics or smaller financial requirements. In addition, it is possible that, if converted, these other plants would not need to burn oil for voltage regulation purposes, thereby adding to the amount of oil-fired capacity of the Luzon grid that can be displaced. This would result in greater savings to the country in foreign exchange.

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* The amount of oil-fired capacity that can be displaced by CWM is also affected by possible increases in electricity demand growth. If electric demand growth increases over currently projected levels of 4.0 percent per year, then oil capacity will be used more heavily than is predicted in the NPC October 1984 plan, and, as a result, will result in a greater amount of oil-fired capacity that can be displaced.

6.0 EMPLOYMENT IMPACT

In addition to having a significant impact upon the outflow of foreign exchange from the Philippines, the retrofitting of Sucat station to a coal-water-mix fuel will also have an associated employment impact. This employment impact will occur through the creation of new jobs in both the construction and the operation of facilities associated with the project. This impact will occur in several sectors of the project including coal mine development and production, CWM facility construction and operation, CWM barge transportation, pipeline conversion and transportation, and the Sucat power station conversion and operation. The impact that is estimated in this analysis is developed for Scenario D.

6.1 Methodology

The employment impact of the Sucat retrofit project reflects the incremental employment impact that would not have occured without the introduction of the Sucat project to the Philippines. The impact is estimated by determining the number of man-hours, or new jobs, that are created by the project and by estimating the subsequential salary impact that occurs with and without employee benefits. The shadow employment impact is also estimated in this study by employing a shadow wage factor for the unskilled labor category.

The number of jobs that are created by the Sucat project include new jobs that result from the construction of new project-related facilities, as well as from the subsequent operation of those facilities. In this study, employment opportunities for each of these categories are delineated according to the following project sectors: coal production, coal transportation, coal-water-mix production, coal-water-mix transportation, pipeline conversion, and the Sucat station retrofit.

Man-months of work are estimated for the construction phase of the project because of the intermittent nature of many types of construction jobs. Total employment impact is estimated for each sector of the project according to management, skilled, and unskilled labor categories and by using average monthly salaries to calculate a total project impact. Employment impact for the operational phase of the project, on the other hand, is estimated using the number of new jobs that are created by the project and that will continue to exist during the plant's operations.

Philippine labor costs for each project sector and worker category have been developed by the Economic Development Foundation using Philippine labor data obtained from Philippine government sources. Estimates of the number of employment opportunities for each sector have been developed by Development Sciences Inc. and Burns and Roe Engineering.

6.2 Impact on Employment

The introduction of CWM to Sucat station will have a moderate employment impact on the Philippines. As is outlined in Exhibit 6.1 and summarized in Exhibit 6.2, the proposed project will result in a one-time $12.7 or P251 million increase in Philippine salaries during the construction activities of the project. The project will also result in an annual increase of $2.1, or P42.7, million in Philippine salaries once all parts of the project complete construction and begin operations.

The greatest employment impact during the construction phase of the project occurs in the coal production and Sucat conversion sectors where each sector comprises 40 and 47 percent respectively of the total project's construction impact. On the other hand, the coal production sector has the greatest employment impact in the Philippines during the operational phase of the project, because of the labor-intensive nature of coal mining work. Coal mining operations are estimated to make up over 71 percent of the employment impact of the project during its operational phase with the creation of 678 new jobs. The operation of Sucat station will have the second-most significant employment impact with the creation of 70 new jobs, or an estimated annual impact of $2.1 million.

The project's shadow employment impact is also calculated using shadow factors of 1.0 for management and skilled labor and .6 for unskilled labor. As both exhibits illustrate, the shadow employment impact of the project does not vary significantly from the project's employment impact using market labor rates, declining only by 11 percent in the project's construction phase and by 14 percent during its operational phase. The diluted impact occurs because, in general, unskilled labor comprises a lesser proportion of the total job opportunities in each sector than opportunities for management or skilled labor.

Exhibit 6.1

Employment Impact Of Coal-Water-Mix Development On The Philippines (By Project Sector)

(BY SECTOR)

SECTOR	CONSTRUCTION: Job Category	Man Months Required	Percent Domestic Jobs	Average Monthly Salary ($)	Average Monthly Salary (P)	Annual Salary Impact (P000)	Annual Impact W/Benefits (P000)	Shadow Wage Benefits (P000)
COAL PRODUCTION	Managemen	2700	100%	$250	5,000	13,500	27,339	27,339
	Skilled L	6300	100%	$175	3,500	22,050	35,831	35,831
	Unskilled	7200	100%	$150	3,000	21,600	35,100	21,080
	Specialis	36	100%	$2,000	40,000	1,440	2,917	2,917
COAL TRANSPORT	(NO JOBS CREATED)							
COAL- WATER MIX PRODUCTION	Managemen	375	100%	$250	5,000	1,875	3,798	3,798
	Skilled	2,125	100%	$175	3,500	7,438	12,088	12,088
	Unskilled	1,250	100%	$150	3,000	3,750	6,094	3,656
COAL- WATER MIX TRANSPORTATION	(NO JOBS CREATED)							
ROCKWELL PIPELINE	Managemen	136	100%	$250	5,000	680	1105	1105
	Skilled	772	100%	$175	3,500	2,702	4,391	4,391
	Unskilled	704	100%	$150	3,000	2,112	3,432	2,059
SUCAT PLANT CONVERSION	Management	2463	100%	$250	5,000	12,315	20,012	20,012
	Skilled	13982	100%	$175	3,500	48,887	79,409	79,409
	Unskilled	4102	100%	$150	3,000	12,306	19,987	11,998
Employment Totals		42,125				150,635	251,511	225,882

OPERATIONS: Job Category	Total Jobs	Percent Domestic Jobs	Average Monthly Salary ($)	Average Monthly Salary (P)	Annual Salary Impact (P000)	Annual Impact W/Benefits (P000)	Shadow Wage Benefits (P000)
Miners	231	100%	$80	1,200	3,326	5,405	5,405
Geologists	15	100%	$500	10,000	1,800	2,925	2,925
Administration	81	100%	$250	5,000	4,860	6,843	6,843
Services	351	100%	$80	1,600	7,582	12,320	7,392
(NO JOBS CREATED)							
Plant Management	5	100%	$225	4,500	270	548	548
Operators- Skill	20	100%	$110	2,200	528	858	858
Maint.-Unskilled	10	100%	$50	1,000	120	195	117
Captain	1	100%	$311	6,225	75	152	152
Chief & 2nd Mate	2	100%	$191	3,815	92	148	148
Engineers	6	100%	$216	4,328	312	508	508
Seamen	12	100%	$118	2,315	333	542	325
Pumphouse	12	100%	$90	1,800	259	421	421
Management	5	100%	$250	$5,000	300	488	488
Skilled	27	100%	$175	3,500	1,134	1,843	1,843
Unskilled	21	100%	$150	3,000	756	1,228	737
Management	9	100%	$250	5000	540	1,085	1,085
Skilled	53	100%	$175	3500	2,226	3,617	3,617
Unskilled	8	100%	$150	3000	288	468	281
Employment Totals	869				24,800	42,725	38,623

Exhibit 6.2

Summary Of
Employment Impact Of
Coal-Water-Mix Development
In The Philippines

SECTOR	CONSTRUCTION: MAN MONTHS REQUIRED	CONSTRUCTION: SALARY & BENEFITS PER YEAR (P000)	CONSTRUCTION: ANNUAL DOLLAR IMPACT ($000)	CONSTRUCTION: SHADOW DOLLAR IMPACT ($000)	OPERATIONS: TOTAL JOBS CREATED	OPERATIONS: SALARY & BENEFITS PER YEAR (P000)	OPERATIONS: ANNUAL DOLLAR IMPACT ($000)	OPERATIONS: SHADOW DOLLAR IMPACT ($000)
I. COAL PRODUCTION	16,236	101,187	$5,059	$4,357	678	30,493	$1,525	$1,278
II. COAL TRANSPORTATION	(NO JOBS CREATED)				(NO JOBS CREATED)			
III. COAL- WATER MIX PRODUCTION	3,750	21,978	$1,099	$977	35	1,601	$80	$76
IV. COAL- WATER MIX TRANSPORTATION	(NO JOBS CREATED)				33	1,771	$89	$78
V. PIPELINE CONVERSION	1,612	8,928	$446	$378	53	3,680	$184	$159
VI. SUCAT STATION CONVERSION	20,527	119,418	$5,971	$5,571	70	5,180	$259	$250
TOTALS	42125	251,511	$12,578	$11,283	878	42,725	$2,138	$1,841

Assumptions:

$/Peso Exchange Rate..... 20

Employee Extra-Salary Benefits	Percent of Salary	Peso Lump Sum
Mgt.	102.5%	1058.7
Other	62.5%	56.7

Shadow Wage Rates	Shadow Factor	
Management	1.0	Current Market Rates
Skilled	1.0	Current Market Rates
Unskilled	0.6	

7.0 REVIEW OF RISKS AND OUTSTANDING ISSUES

This volume has outlined a financial and an economic analysis to develop measures of project performance of interest to investors in the public and private sectors. The synthesis of the project, when formulated in monetary terms, strongly indicates that the introduction of CWM to the Philippines should generate substantial benefits for the NPC. The analysis is not segmented for each potential investor. From the viewpoint of an individual private or public investor, the attractiveness of the project will vary according to competing investment opportunities that are available to the investor. For competing investments to be preferred, they will have to show returns better than the ranges discussed in this volume. These returns will have to be better than:

- Financial Analysis:
  - Returns on Investment - 27% for the major conversion scenarios
  - Returns on Equity - 75% for the major conversion scenarios
  - Net Present Value - $88 million for all units, major retrofit
- Economic Analysis:
  - Returns on Investment - 54% for the Base Case, all units, major retrofit
  - Returns on Equity - 133% for a base case, all units, major retrofit
  - Net Present Value - $366 million for all units, major retrofit
- Net Foreign Exchange Savings:
  - 15-Year Cumulative Savings - $1.4 billion for all units, major retrofit
  - Net Present Value - $383 million for all units, major retrofit

This monetary synthesis will undoubtedly appear attractive to many interested parties, though a review of the assumptions would be prudent, since not all investors can borrow money at the public and private rates that are used in this analysis. Furthermore, a synthesis of a project based only on monetary terms can overlook uncertainties and risks associated with the expected benefits. To assure that the technical uncertainties do not expose investors to an unreasonable financial risk, the entire project design has been reviewed, and the remaining uncertainties are analyzed to assure that the inter-related aspects of the project are consistently addressed. The brief review that follows indicates how parts of the CWM system have been

related to each other and what next steps toward further optimization are required before project capital is committed.

The sequence of analysis of uncertainty begins with the coal supply and progresses through the major components of the project to the final combustion of CWM fuel at Sucat. The coal supply raises both quantity and quality issues. The quantity issue is minor if the Semirara Coal Corporation can find the appropriate financing to open the Himalian and/or the Panian pits. Assuming the existence of a long-term contract, financing should pose no problem to the development of adequate coal supplies on Semirara. Mines elsewhere can be employed to serve customers that might have otherwise used Semirara coal. Further, despite a residual uncertainty about sea water seepage into the Panian pit, sufficient time exists to resolve the water issue before it impacts the project with unanticipated costs.

The primary quality issue regarding Semirara coal is the variability of the coal's moisture and ash content. The coal's delivered ash content to the customer has varied significantly over time. This variability can negatively handicap the project with extra transport costs, plant deratings, CWM plant problems, and repetition of the disputes that have already occurred between supplier and user. This issue, however, can be controlled by the introduction of coal cleaning methods and selective mining techniques.

This discussion suggests that, in order to produce a more homogeneous coal, there must be an Optimization Phase undertaken which includes, among other considerations discussed below, coal beneficiation efforts and an examination of mining techniques. In the meantime, the financial analysis for the Sucat conversion uses a pessimistic basis for its Base Case assumptions of 13.64 percent ash as-received coal. Shipment of coal with less ash content than this assumption will only improve the project's positive findings and further diminish the investor's risk.

The next area for possible uncertainty is in fuel formulation. Several issues exist in this area. First, the baseline slurry is loaded with 50 percent solids for the calculation of benefits, once again a pessimistic fuel situation. It is likely, however, that higher coal loadings can be achieved through practical means such as coal beneficiation, cost-effective additive packages, and other steps associated with improving commercial slurries. Given the results obtained so far for the small samples received by Brookhaven National Laboratory from the slurry manufacturers, it is clear that higher loading levels than the 50 percent solids are likely to be achieved; although it is unclear at what additional cost. Consequently, further refinement of the CWM is called for in the Optimization Phase. Once again, the Base Case coal cost of $40/ton used in the financial analysis should leave room for selective mining and/or further fuel formulation work.

The stability of the baseline CWM fuel is also an issue. This problem can be addressed with additives, devices such as air lances or agitators, or recirculation pumps for use during storage. Practical means are available to manage the risks of fuel settling at a small marginal cost, and this provision is already made and tested in the current project design.

Another slurry-related issue is the specification of commercial-scale burners to combust the fuel. Current burner and nozzle designs will be reviewed, further testing can be performed during the Optimization Phase, and matters relating to the likely preheat requirements can be addressed. Moreover, considerable work already completed in the United States has led to the likely development of suitable burner equipment within the timeframe for this project.

The transportation of the CWM to Sucat contains uncertainties, but as with the resolution of other uncertainties, ameliorative measures are available to deal with them well within sensible cost parameters. Water transport by barge is not likely to be an area for concern.

Pipeline transport is a possible source of added costs. The existing pipeline from Batangas was considered originally as the means of transportation, but uncertainties regarding the possibility of solids building up and clogging flow, particularly in the upward-flowing parts of the line call for a more cautious approach.

During at least the initial conversion of Sucat, the short, level 10" pipeline from Rockwell can inexpensively be used to gain experience. If problems occur with this line, they can be detected through pressure monitoring. In addition, devices known as "pigs" can be run through the pipeline for periodic pipeline cleaning, and in-line fuel mixers can be placed intermittently along the pipeline. In sum, several measures can be pursued without significant cost. If even these measures should fail, then a new, shorter pipeline, beginning perhaps at Cavite, could be designed to handle the CWM. Should no problems occur, then consideration could be given once again to use of the Batangas pipeline for the full conversion of the plant.

Next, once the CWM fuel arrives at Sucat, conservative design assumptions have been made to deal with additional potential uncertainties relating to the design of pipes for cleaning of input fuel flow and the design of special ash handling facilities. Throughout this project, design assumptions have been quite conservative to allow for a margin of error. Finally, conversion plans have been designed to occur via several sequential steps so that learning from each step can be applied to the next increment.

A further precaution has also been taken. The boilers will remain dual-fuel capable in case problems occur at any stage in the total system between the mine and the boiler. Plans have been formulated to have oil inventories remain on-site and the burners intact to deal with start-up and with emergency circumstances.

It is important to note that the system design is also conservative with reference to costs and capabilities. The residual risks associated with CWM fuels are generally identifiable and the conversion schedule is based on risk minimization. Prior to each major capital commitment in a new plant, a phase of work will be designed to test the occurence of possible variations from the plan. All activities during this study have had this conservatism in mind, and the next phase--a phase for optimization of coal characteristics,

slurry formulation, and burner adaptation--is also expected to proceed with the same spirit of prudence.

Beyond these technical issues, a few uncertainties remain which either may affect NPC policy or which can await further attention until after the conversion of Sucat 2. One policy matter deals with the level of utilization of a converted Sucat station. In this analysis, a 60 and 75 percent derated station MW capacity was assumed to be used at 75 percent capacity factor. Plant utilization levels less than this will affect the economics of the project, but the capacity level used closely conforms to the most recent NPC October 1984 generation plan.

An additional question exists concerning the amount of oil-fired capacity on the Luzon grid that is capable of being displaced by CWM-fired generation. Depending on how this issue is treated, the foreign exchange savings are raised or lowered, although once again, the analysis uses approximately the same levels as NPC's October 1984 generation plan. In addition, depending on the results, it may not make sense to convert the last unit of Sucat.

A final important policy issue is whether permission can be obtained to defer the installation of pollution control equipment on a converted Sucat 2 unit until after operations over a reasonable period of time prove to be successful.

Other issues that will facilitate the implementation of a more fine-tuned analysis will be covered in the Optimization Phase. Thus, when a slurry formulation and burner are approved, the differences in CWM cost estimates and consumption will have a lower margin of error. When the mining operations are reviewed, the capital cost of expanding production at the Unong pit and coal prices for a given specification will be firmer. Similarly, further analysis will focus on the segments of the project that are of interest to investors other than the NPC.

A recommendation which can be made with a minimum of qualification is that the project benefits appear attractive, and work should begin on detailed engineering for the minor retrofit of Sucat Unit 2 right away. Before ordering equipment, however, a concurrent Optimization Phase should include further evaluation of the issues listed above. This Optimization Phase should help to avoid surprises and disappointment before major expenditures of capital are committed.

APPENDIX A

DESCRIPTION AND PRINTOUT OF LOTUS COMPUTER MODELS USED FOR ECONOMIC AND FINANCIAL ANALYSIS

Due to the large amounts of technical and economic data that have been generated by project participants and the complexities of financial calculations using discounted cash flows, several computer models were constructed to store and process the data for the financial and economic analysis. Because of the varied objectives of the study, different models are required for different functions. This appendix briefly describes each of these models.

The first model developed for this study is used to analyze the financial and economic feasibility of the project from the perspective of Sucat station (the Sucat Model). This model accepts the price of CWM as an input at the plant gate and, using pertinent cost data regarding capital and operating costs and performance data relevant to the plant, it generates cash flows and financial measures of the project's feasibility.

The model is separated into seven distinct segments, each with a distinct function. All segments are integrated to generate cash flow and financial information regarding the investment. The individual segments are as follows:

- Fuel Data--Fuel characteristics and costs include inputs for fuel prices, fuel Btu content, coal ash and moisture content, coal blend percentages, and oil prices (duty-free and duty-excluded).

- Station Capacity and Operational Data---Station data are separated for the individual units and include inputs for in-service dates, net unit capacity, net unit heat rates, capacity factors, hours of operation, and transmission losses. The segment calculates all data regarding annual generation, salable energy, and levels of annual fuel consumption.

- Capital Costs--Capital cost data are separated and included on an individual station basis with specific data for unit equipment costs, undistributed site costs, engineering and owners' costs, land, first year's working capital, interest during construction, import duties, total financing required, and the depreciable capital base. Separate data inputs are also included for asset lives, construction periods, and the foreign exchange portion of plant equipment.

- Operations and Maintenance Expenses--O&M expense data are broken out for each plant and include inputs for labor, consumables, spare parts, miscellaneous, ash handling, insurance, and fuel expenses.

- Capital Structure--Financing is assumed to occur on a unit-by-unit basis and includes inputs regarding debt/equity ratios, required returns on equity, debt interest rates, debt and equity financing, debt life, and construction financing costs.

- Revenue and Cost Data--Price and rate data are used to calculate various plant revenues and costs. Data are entered for coal prices, the busbar price of electricity, customer demand charges, fuel inflation, and insurance rates.

- Taxes and Credits--All taxes, credits, and investment incentives, which affect public and private sector investments, are detailed and incorporated into the model including franchise and income taxes, local and property taxes, taxes on imported equipment, tax exemptions on domestic equipment, tax credits on domestic equipment, and tax credits on net value earned.

Each model segment interacts with other segments to formulate cash flow projections for the project. An example of the format used in the model for the cash flow projections is presented as Exhibit 3.1. Financial measures describing the project's return on investment, return on equity, net present value on investment, net present value on equity, debt service coverage, and the project's payback period are calculated in the model. This model is also used in the economic analysis of the project with the inclusion of appropriate shadow factors and the exclusion of government tariffs and subsidies.

A second computer model has been developed for use to estimate the average cost of production of CWM for different size coal-water-mix preparation facilities. This model is structurally similar to the first model in its calculation of the average cost of production and its use of data from the seven major input categories. The model differs in that input and output volumes are for metric tons of coal and coal-water-mix instead of electricity. This model is further described in Section 4.1.1, Step 1.

A third computer model has been developed to estimate the average cost per metric ton of transporting CWM through the converted Rockwell pipeline. This model is structurally similar to the first two models, but it calculates average cost based on CWM flow rates and the capital and operating costs of converting the pipeline for each scenario. This model is discussed further in Section 4.1.3, Step 3.

A fourth computer model has been developed to estimate the foreign exchange impact of each of the conversion scenarios. The model contains a section that is structurally similar to the first model since it has levels of costs and generation from the Sucat units. It estimates the foreign exchange impact of the entire Sucat project from the mine to power plant conversion. The model additionally contains a separate section which projects the amount of oil-fired NPC generation capacity that is capable of being displaced by the Sucat generation. The methodological approach of this model is explained further in Section 5.2.1.

Exhibit A.1 presents the program logic of the computer model which is used to estimate the financial and economic feasibility of the Sucat CWM conversion project. The model was programmed using Lotus 1-2-3 programming language. The photocopied summary on the following pages displays a portion of the worksheets that were created as part of the model. The summary is presented for illustrative purposes only. It does not display all the data

on the worksheet because the data were part of a 360 x 35 matrix that would be difficult to copy for a report. The program logic of the Lotus worksheet discussed above is incapable of being printed in this appendix since it is part of the resident memory of the computer. The names of the Sucat units in the appendix correspond as follows to those in the text:

- Gardner 1 is Sucat 1
- Gardner 2 is Sucat 2
- Snyder 1 is Sucat 3
- Snyder 2 is Sucat 4

Exhibit A.2 presents the program logic of the computer model which is used to estimate the net foreign exchange impact of the Sucat CWM conversion project. The model was also programmed using Lotus 1-2-3 programming language. The xeroxed summary on the following pages displays a portion of the worksheets that were created as part of the model and similar to Exhibit A.1. The summary does not display all the data on the worksheet because the data were part of a matrix that is too large to xerox for this report.

LOTUS WORKSHEET USED IN FINANCIAL AND ECONOMIC IMPACT ANALYSIS

```
PROGRAM TDATALC.FINAN.FEASIBILITY OF SUCAT POWER STATION CONVERSION
      2 ASSUMPTIONS:
      3 -----------
      4 (B)TAXES,RATES,AND BTU ASSUMPTIONS: (F) CREDITS:
      5 ---------------------------------- -----------
I/P(%) 6      2.0% INCOME/FRANCISE TAX RATE      50.0% EXEMPTION FROM
      7           LOCAL AND PROPERTY TAX               CAP.EQ.TAX
I/P(%) 8      2.5%  RATE(%)                      10.0% ITC ON DOMESTIC
      9           IMPORTED MACHINERY CAPITAL           EQUIPMENT
I/P(%)10     15.0%  EQUIPMENT TAX (%)
     11      0.75% INSURANCE(3-7 TIMES .75% FOR A PRIVATE COMPANY)
     12      4,939  BTU/LB.CWM(CALC'D ON LNS 275-279)
     13 10889393  BTU CWM/MT                          NET OPERATING
     14                                            ?  LOSS CARRYOVER
I/P(%)15      0.75% DOLLARS PER PESOS                 TAX CREDIT ON
I/P(P)16        20  EXCHANGE RATE (P/$)            5.0%  NET VALUE EARNED
I/P(%)17      60.2% PLANT MW,REFLECTING 1ST YR'S CWM TESTS
     18
*********************************************************************
*** NOTE: ALL PERCENT INPUTS MUST HAVE '%' SIGN IN FORMAT 'XX.X%' THROUG
     21  B. INDIVIDUAL PLANT DATA:                  GARDNER 1
     22 -------------------------                   ---------
     23      --------------------
I/P(#)24      PROJECT CONSTRUCTION START DATE (19XX)        1990
I/P(#)25      PROJECT IN- SERVICE DATE(19XX,POST-1977)      1992
I/P(#)26      NET UNIT CAPACITY (MW)                         105
     27       NET UNIT CAPACITY(MW,1ST YR'S TESTS)           105
I/P(%)28      1ST YEAR CAPACITY FACTOR (%)                    43%
I/P(%)29      FOLLOWING YRS CAP FACTOR (%)                    75%
I/P(#)30      POTENTIAL HRS OF OPER. (HRS/YR)               8760
I/P(#)31      PLANT HEAT RATE (BTU/KWH)                    11900
I/P(%)32      NORMAL TRANSMISSION LOSSES (%)                   3%
I/P(%)33      OTHER TRANSMISSION LOSSES (%)                    0%
     34       1ST YEAR SALABLE ENERGY (MWH)               383,649
     35       FOLLOWING YRS. SALABLE ENERGY (MWH)         669,155
     36       GROSS GENERATION- 1ST YEAR (MWH)            395,514
     37       GROSS GENERATION- FOLLOWING YRS. (MWH)      689,850
     38       YEARS UNTIL ASSET BEGINS CONSTRUCTION             5
     39       YEARS UNTIL ASSET BEGINS OPERATION                5
     40       FUEL CONSUMED-1ST YR MT OF CWM)             432,220
     41       FUEL CONSUMED-FOL YRS (MT OF CWM)           753,873
     42       FUEL COST-1ST YR ($000)                     $16,857
     43       FUEL COST-FOLLOWING YRS ($000)              $29,401
     44
     45 GENERAL ASSUMPTIONS USED IN ANALYSIS
     46 ------------------------------------
     47 NPC PRICE ASSUMPTIONS:
I/P($)48   CUSTOMER ENERGY CHARGE (CENTS/KWH)              $0.060
     49
I/P($)50   CUSTOMER DEMAND CHARGE ($/KW)                    $1.10
     51
I/P($)52      ELECTRICITY PRICE(CENTS/KWH)   (NOT USED        5.5
     53       FUEL PRICE (US$/MT)                         $39.00
     54
     55
     56
```

Exhibit A.1 (Continued)

```
     57
     58
     59  D. FUEL INFLATION RATE(%)
     60
     61
     62
     63 II. CAPITAL COST ASSUMPTIONS                                (G)
I/P(%)64  A. FOR.EXCHNG.COMPONENT OF CAP.COSTS (%)                 75.0%
     65  B. TIMING AND DISTRIBUTION OF EXPENDITURES:
     66       o NUMBER OF YEARS REQUIRED TO CONSTRUCT FACILITIES:
     67
     68                              GARDNER1 GARDNER2    SYNDER 1
     69                              -------- -------     --------
I/P(#)70        - ENTER CONST. TIMES       2        3           2
     71          (YEARS 1-3 ONLY)
     72  C. ACTUAL EXPENDITURES:   GARDNER1 GARDNER2    SYNDER 1
     73     --------------------   -------- -------     --------
     74       o YEAR 1              $14,923   $5,285     $18,125
     75       o YEAR 2               15,431   29,207      18,669
     76       o YEAR 3              (25,779)   8,806     (31,359)
     77                              ------   ------      ------
     78          TOTAL               $4,576  $43,298      $5,435
     79 ***NOTE ASSET LIFE SHOULD BE COMPATABLE TO THE TERM LIFE OF
     80 ***LOANS WHICH ARE INCURRED FOR THE ASSET
     81
     82
     83 ------------------------------------------------------------
     84 III. CAPITAL COST DATA
I/P($)85  STEAM GENERATOR AND AUX'S     7500     9000        9000
I/P($)86  CWM HANDLING AND STORAGE      1600     2100        1800
I/P($)87  ELECTROSTATIC PRECIPITATOR    2600     3200        3200
I/P($)88  ASH HANDLING AND STORAGE      1500     3700        1800
I/P($)89  MISC. MECHANICAL EQUIPMENT     300      500         500
I/P($)90  CIVIL/ STRUCTURAL              900     1000        1000
I/P($)91  ELECTRICAL MODIFICATIONS      2100     2500        2300
I/P($)92
I/P($)93
     94 --------------------          ------   ------      ------
     95 TOTAL EQUIPMENT                16500    22000       19600
     96                               ======   ======      ======
     97 MARGIN OF ERROR IN
IP(%)98  EQUIPMENT COST ESTIMATE....       0%       0%          0%
     99
     100                              -----    -----       -----
     101  TOTAL EQUIP.INC'L ERROR      16500    22000       19600
IP(%)102  o CONTINGENCIES..      15%   2475     3300        2940
     103                              ------   ------      ------
     104    TOTAL ERECTED COST        18975    25300       22540
     105     ENGIN.&OWNER COST(15%)    2475     3300        2940
     106       (INCL'D W/C.C.)        ======   ======      ======
     107    TOTAL CONSTRUCTION COST   21450    28600       25480
IP($)108     LAND                         0        0           0
     109     WORKING CAP-1/6 OF O&M    5283     7050        7012
     110     I.D.C. ($000)             3621     7648        4302
     111     IMPORT DUTIES       (IMPORT EQ.TAX FOR NON/NPC)
     112                              ------   ------      ------
```

```
     113   TOTAL FINANCING REQUIRED $30,355  $43,298     $38,794
     114                            ======   ======      ======
     115   DEPRECIATION BASE        $25,071  $36,248     $29,782
***REMAIN     (LINES107+110)A AND SCHEDULES IS LOCATED AT LINE (A300)**
     117   CAP. COST ESCALATION RATES
     118      EQUIPMENT(%)              0.0%
     119      LABOR(%)                  0.0%
     120   ANNUAL INFLATION RATE(%)
     121
     122
     123
     124
     125
     126
     127
     128
     129 ------------------------------------
     130
     131
IP(%)132
     133
     134 IV. O. & M. EXPENSES       GARDNER1 GARDNER2     SNYDER1
IP(%)135 ----------- -------       -------- --------     -------
     136 o PERCENTAGE FIXED COSTS        25%      25%         25%
     137 o CAPACITY FACTOR UPON WHICH
     138     O&M EXPENSE ESTIMATES
     139     ARE BASED:                75.0%    75.0%       75.0%
     140
IP($)141  LABOR                         40       61          40
IP($)142  CONSUMABLES                   40       50          50
IP($)143  SPARE PARTS                  150      200         200
IP($)144  MISCELLANEOUS                 10        9          10
     145  ASH DISPOSAL ($.50/MT C&M)    377      501         501
     146  FUEL EXPENSES               29401    39072       39072
     147  LOCAL & PROPERTY TAXES        627      906         745
     148  FRANCHISE TAX                 803     1147        1147
     149  INSURANCE                     188      272         223
     150                               -----   ------       -----
     151 ANNUAL O&M EXPENSES($000)   $31,636  $42,218     $41,988
     152
     153
     154
     155
     156
     157
     158
     159
     160
     161
     162
     163
     164
     165
     166 ------------------------------------------------------------
     167 *** FINANCING INSTRUCTIONS: ENTER % OF PROJECT TO BE FINANCED W
     168 ***CASH AND EQUITY, LOTUS WILL CALC. THE $ AMOUNT OF DEBT REQ'D
```


61

```
     169 ** ENTER AMT'S WITH '%' USING THE FORMAT 'XX.X%'
     170                                GARDNER1 GARDNER2     SNYDER1
     171 V.. FINANCIAL ASSUMPTIONS      -------- -------      -------
     172  A. EQUITY ASSUMPTIONS:
IP(%)173   o % PROJECT EQUITY            33.0%    33.0%       33.0%
     174   o EQUITY FINANCING($)      $10,017  $14,289     $12,142
IP(%)175   o EQUITY COST (%)             15.0%    15.0%       15.0%
     176   o AVERAGE COST OF EQUITY     15.0%   AVERAGE % EQUITY
     177  B.DEBT ASSUMPTIONS:                   IN PROJECT.............
     178   O DEBT FINAN. REQ'D ($)    $20,338  $29,010     $24,652
IP(%)179   O ANN.INT.RATE(%)             12.0%    12.0%       12.0%
     180   O QTRLY.INT.RATE(%)           3.0%     3.0%        3.0%
IP(#)181   O TERM OF DEBT(YRS.)           15       15          15
     182   O ANNUAL PAYMENTS ($000)    $2,986   $4,259      $3,619
     183                               -------  -------     -------
     184 TOT.FIN.REQ'D (LINE A113)     30,355   43,298      36,794
     185 TOTAL INVESTMENT REQUIRED ($000)     $165,556
     186                                      =======
     187   WEIGHTED AVG. COST
     188   OF CAPITAL (%) ....         13.0%    13.0%       13.0%
     189 SUCAT AVERAGE COST OF CAPITAL...        13.0%
                                                 ====

     192          SCHEDULE FOR PROJECTING INVESTMENT FLOWS FOR EACH PLAN
     193
     194                1987     1988     1989     1990      1991
     195 PLANT          ----     ----     ----     ----      ----
     196 GAR.1:(I)       0        0        0        0         0
     197       (E)       0        0        0        0         0
     198 GAR.2:(I)       0   43,298        0        0         0
     199       (E)       0   14,289        0        0         0
     200 SNY.1:(I)       0        0        0        0    36,794
     201       (E)       0        0        0        0    12,142
     202 SNY.2:(I)       0        0        0        0         0
     203       (E)       0        0        0        0         0
     204 ANN.EQ.I.      $0  $14,289       $0       $0    $12,142
     205 TOTAL INVESTMENT..$165,556    TOT.. EQUITY...    $54,634
     206
     207 --------CONSTRUCTION FINANCING ASSUMPTIONS-----------------
     208
     209 CONSTRUCTION FINANCING      GARDNER1 GARDNER2    SNYDER 1
     210 ---------------------       -------- -------     --------
     211  O AMOUNT ($000)             21,450   28,600      25,480
IP(%)212  O INTEREST RATE(%)            15.0%    15.0%       15.0%
     213  O TERM OF LOAN (MOS)          24       36          24
     214
     215 ------------------------------------------------------------
     216
     217 ***********************************************************
     218 **** CALCULATION OF PRICE AND BTU CONTENT OF CWM AT SUCAT******
     219 ***********************************************************
     220 VARIABLES                    COAL SOURCE A     COAL SOURCE B
     221 ---------                    -------------     -------------
IP($)222 o $/TON PRICE OF DRY COAL     $40.00            $56.60
     223   - (PESO PRICE)
IP(#)224 o BTU/ DRY POUND COAL         9,877             13,165
```

Exhibit A.1 (Continued)

```
IP(%)225 o PERCENT MOISTURE CONTENT      24.0%                 1.9%
IP(%)226 o PERCENT COAL IN MIX             50%                  50%
IP(%)227 o % OF COAL TYPE IN CWM          100%                   0%
     228
     229  = BTU CONTENT/ COAL SOURCE    4,939    -----          0
     230  = CWM BTU CONTENT                      4,939
     231  = PRICE/ WET TON COAL        $26.32                $0.00
     232
     233  = COAL TRANSPORT COST
IP($)234          ($/TON)               $0.00                $4.00
     235                                -----    -----       -----
     236 O PRICE OF CWM AT CWM
     237    PLANT GATE ($/WMT)                  $26.32
     238 O CWM PRODUCTION COSTS                   30.2
     239          ($/MT)
IP($)240 O CWM PIPELINE COSTS                    $1.50
     241
     242 O CWM TRANSPORT COSTS
IP($)243          ($/MT)                         $7.30
     244 ------------------------------          -----
     245 COST OF CWM TO SUCAT ($/WMT)            $39.00
     246
     247 ------------------------------------------------------------
     248 DISTRIBUTION OF QUARTERLY EXPENDITURES FOR
     249 1,2,3, AND 4 YEAR CONSTRUCTION PROJECTS
     250 YEARS IN
     251 PROJECT                  1        2        3          4
     252 -------                  --       --       --         --
IP(%)253 ONE YEAR PROJECT       7.0%    54.0%    94.0%      100.0%
     254
IP(%)255 TWO YEAR PROJECT       1.5%     7.0%    22.0%       54.0%
     256
IP(%)257 THREE YEAR PROJECT     8.0%     3.4%     7.0%       14.0%
     258
IP(%)259 FOUR YEAR PROJECT      0.8%     1.5%     4.0%        7.0%
     260 ==================
     261 (CONT'D)
     262
     263 ONE YEAR PROJECT
     264
     265 TWO YEAR PROJECT
     266
IP(%)267 THREE YEAR PROJECT    94.0%    97.0%    99.0%      100.0%
     268
IP(%)260 FOUR YEAR PROJECT     70.0%    83.0%    91.0%       94.0%
     270
     271
     272 ============================================================
     273 MAJOR ASSUMPTIONS IN MODEL
     274 o I.D.C. IS CAPITALIZED RATHER THAN EXPENSED
     275 o AVERAGE COST OF CAPITAL IS USED AS DISCOUNT RATE
     276    UNLESS OTHERWISE STATED
     277 o DEPRECIABLE BASE INCLUDES TOTAL CONST. COST, IDC,
     278    AND IMPORT DUTIES
     279 o TOTAL FINANCING INCLUDES TOTAL CONST., LAND, 2MOS. WORKING
     280    CAPITAL, IDC, AND IMPORT DUTIES
```

281 o CONSTRUCT.FINANCING INCLUDES TOTAL CONST. COST,IDC,AND LAND
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311	DEPRECIATION ASSUMPTIONS:	GARDNER1	GARDNER2	SNYDER 1
312	----------	--------	--------	--------
313	TOTAL:	100.0%	100.0%	100.0%
314	------	-----	-----	-----
IP(%)315	3 YR.PROPT(% OF CAP.COST)	0.0%	0.0%	0.0%
IP(%)316	5 YR.PROPT(% OF CAP.COST)	0.0%	0.0%	0.0%
IP(%)317	10 YR.PROP(% OF CAP.COST)	0.0%	0.0%	0.0%
IP(%)318	15 YR.PROP(% OF CAP.COST)	100.0%	100.0%	100.0%
IP(%)319	20 YR.PROP(% OF CAP.COST)	0.0%	0.0%	0.0%
320	----------			
321	3 YR. DEPREC SCHED.	0.33	0.45	0.22
322	5 YR DEPREC. SCHED.	0.2	0.32	0.24
323	10 YR DEPREC. SCHED.	0.1	0.18	0.16
324	15 YR DEPREC. SCHED.	0.07	0.12	0.12
325	(NOT USED)			
326	ACRS. DEPREC. SCHED.	0.07	0.12	0.12
327				
328	DEPRECIATION SCHEDULES	1	2	3
329	----------PERIODS	--	--	--
330	GARDNER 1:			
331	S.L ($000)	1,671	1,671	1,671
332				
333	GARDNER 2:			
334	S.L. ($000)	2,417	2,417	2,417
335				
336	SNYDER 1:			

10

Exhibit A.1 (Continued)

337	S.L. ($000)	1,985	1,985	1,985
338	SNYDER 2:			
339	S.L. ($000)	2,911	2,911	2,911

11

EXHIBIT ___

SUMMARY OF SUCAT GENERATION
AND OPERATING STATISTICS
(BY INDIVIDUAL BOILERS)**

	1987	1988	1989	1990
TOTAL SUCAT				
Generation (MWH)	0	548,069	855,935	855,935
Revenues ($000)	$0	$33,049	$57,521	$57,521
Fuel Costs ($000)	0	21,729	37,900	37,900
I.D.C.	0	7,648	0	0
GARDNER 1				
Generation (MWH)	0	0	0	0
Revenues ($000)	$0	$0	$0	$0
Fuel Costs ($000)	0	0	0	0
I.D.C.	0	0	0	0
GARDNER 2				
Generation (MWH)	0	548,069	855,935	855,935
Revenues ($000)	$0	$33,049	$57,521	$57,521
Fuel Costs ($000)	0	21,729	37,900	37,900
I.D.C.	0	7,648	0	0
SNYDER 1				
Generation (MWH)	0	0	0	0
Revenues ($000)	$0	$0	$0	$0
Fuel Costs ($000)	0	0	0	0
I.D.C.	0	0	0	0
SNYDER 2				
Generation (MWH)	0	0	0	0
Revenues ($000)	$0	$0	$0	$0
Fuel Costs ($000)	0	0	0	0
I.D.C.	$0	$0	$0	$0

FOOTNOTE: FUEL COSTS=((MWH*PLANT H.R.*1000)/BTU PER MT C&M)* $/

** I.D.C. HAS BEEN CALCULATED AND PHASED IN CASE THE OPTION IS SELECTED TO EXPENSE RATHER THAN CAPITALIZE IDC.

57
58

1	2	3	4	5	6	7

=====SUCAT POWER STATION=====

1987	1988	1989	1990	1991	1992	1993
0	33,049	57,521	57,521	115,042	225,992	243,123
0	33,049	57,521	57,521	115,042	225,992	243,123
0	21,729	37,900	37,900	75,800	154,349	166,517
0	61	61	61	101	181	181
0	50	50	50	100	215	215
0	200	200	200	400	850	850
0	9	9	9	19	39	39
0	272	272	272	495	1,011	1,011
0	906	846	785	1,470	3,078	2,853
0	279	486	486	872	1,979	2,135
0	23,506	39,823	39,763	79,356	161,701	173,801
0	9,543	17,698	17,758	35,686	64,291	69,322
0	3,481	3,388	3,283	6,124	12,785	12,365
0	2,417	2,417	2,417	4,402	8,984	8,984
0	3,646	11,893	12,058	25,160	42,521	47,972
0	661	1,150	1,150	2,301	4,520	4,862
0	0	0	0	0	0	0
0	2,985	10,743	10,908	22,859	38,002	43,110
0	778	872	976	1,755	3,501	3,921
0	2,417	2,417	2,417	4,402	8,984	8,984
0	4,623	12,288	12,348	25,506	43,485	48,173
0	4,623	16,911	29,259	54,766	98,250	146,423
ERR	2.2	4.2	4.2	4.5	3.9	4.3

$91,103 R.O.I... 26.0%
$172,294 R.O.E... 70.9%

73

ERR	4.7	4.4	4.4	4.4	4.6	4.5
4.5						
(43,298)	4,623	12,288	(24,445)	(59,958)	43,485	48,173
(14,289)	4,623	12,288	206	(2,897)	43,485	48,173
26.0%	ERR	200.4%	48.2%	77.0%	-201.7%	ERR
70.9%	ERR	ERR	ERR	ERR	-201.7%	ERR
80,629	91,103	151,860	186,364	174,090	224,325	321,211
152,486	172,294	210,820	232,982	249,362	281,521	321,138
0	32,088	48,882	48,398	95,571	195,184	206,741
788,193	890,579	974,177	1,052,041	1,140,303	1,192,857	1,152,645
13842182	15640293.	17123897.	18392357.	18825589.	20489063.	19395680.
0.00%	2.79%	10.21%	17.67%	33.08%	59.35%	88.44%
0.00%	8.46%	30.95%	53.56%	100.24%	179.84%	268.01%

FINANCIAL CASH FLOWS FOR
SUCAT GENERATING STATION
($000)

	PROJECT YE		
	1	2	3
	1987	1988	1989
TOTAL SUCAT			
Principal Payments	0	778	872
Interest Payments	0	3,481	3,388
Annual Depreciation	0	2,417	2,417
Income Tax Credits			
Property Taxes	0	906	846
Francise/ Income Taxes	0	661	1,150
Insurance	0	272	272
GARDNER 1			
Principal Payments	0	0	0
Interest Payments	0	0	0
Annual Depreciation	0	0	0
Income Tax Credits	0	0	0
Property Taxes	0	0	0
Francise/ Income taxes	0	0	0
Insurance	0	0	0
GARDNER 2			
Principal Payments	0	778	872
Interest Payments	0	3,481	3,388
Annual Depreciation	0	2,417	2,417
Income Tax Credits			
Property Taxes	0	906	846
Francise/ Income Taxes	0	661	1,150
Insurance	0	272	272
SNYDER 1			
Principal Payments	0	0	0
Interest Payments	0	0	0
Annual Depreciation	0	0	0
Income Tax Credits			
Property Taxes	0	0	0
Francise/ Income Taxes	0	0	0
Insurance	0	0	0

14

169

170 SNYDER 2

171	Principal Payments	0	0	0
172	Interest Payments	0	0	0
173	Annual Depreciation	0	0	0
174	Income Tax Credits			
175	Property Taxes	0	0	0
176	Francise/ Income Taxes	0	0	0
177	Insurance	0	0	0

*****NOTE-DEPRECIATION IS CURRENTLY SET WITH S.L.******
*****TO CHANGE TO ACRS,DDB, OR SOD...THE LINE NUMBERS IN THE ABOVE TABLE
*****MUST BE CHANGED TO THE #'S CORRESPONDING TO THE DEPREC. SCHED.AT
***** LINES A316...A350

182

183 GARDNER 1: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. PE

184 ---

185	PERIOD(QTR.)	1	2	3
186		--	--	--
187	A. PROJECT COMPLETED (%)	1.5%	7.0%	22.0%
188	B. AVG.CAP.OUTSTANDING (%)	0.8%	4.3%	14.5%
189	C. INTEREST RATE/QTR. (%)	3.8%	3.8%	3.8%
190	D. INT. PAID ON CAPITAL ($000)	6	34	117
191	E. CUM. INTEREST PAID ($000)	6	40	157
192	F. INT. PAID ON CUM.INT.($000)	0	2	6
193	G. CUMULATIVE OF (F.) ($000)	0	2	8
194	H. CUMULATIVE I.D.C. ($000)	6	42	164

195

196 GARDNER 2: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. PE

197 ---

198	PERIOD(QTR.)	1	2	3
199		--	--	--
200	A. PROJECT COMPLETED (%)	8.0%	3.4%	7.0%
201	B. AVG.CAP.OUTSTANDING (%)	4.0%	5.7%	5.2%
202	C. INTEREST RATE/QTR. (%)	3.8%	3.8%	3.8%
203	D. INT. PAID ON CAPITAL ($000)	43	61	56
204	E. CUM. INTEREST PAID ($000)	43	104	160
205	F. INT. PAID ON CUM.INT.($000)	2	4	6
206	G. CUMULATIVE OF (F.) ($000)	2	6	12
207	H. CUMULATIVE I.D.C. ($000)	45	110	171

208

209 SNYDER 1: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. PER

210 ---

211	PERIOD(QTR.)	1	2	3
212		--	--	--
213	A. PROJECT COMPLETED (%)	1.5%	7.0%	22.0%
214	B. AVG.CAP.OUTSTANDING (%)	0.8%	4.3%	14.5%
215	C. INTEREST RATE/QTR. (%)	3.8%	3.8%	3.8%
216	D. INT. PAID ON CAPITAL ($000)	7	41	139
217	E. CUM. INTEREST PAID ($000)	7	48	186
218	F. INT. PAID ON CUM.INT.($000)	0	2	7
219	G. CUMULATIVE OF (F.) ($000)	0	2	9
220	H. CUMULATIVE I.D.C. ($000)	7	50	195

221

222 SNYDER 2: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. PER

223 ---

224	PERIOD(QTR.)	1	2	3

225		—	—	—
226 A. PROJECT COMPLETED	(%)	0.0%	3.4%	7.0%
227 B. AVG.CAP.OUTSTANDING	(%)	4.0%	5.7%	5.2%
228 C. INTEREST RATE/QTR.	(%)	3.8%	3.8%	3.8%
229 D. INT. PAID ON CAPITAL	($000)	52	74	87
230 E. CUM. INTEREST PAID	($000)	52	125	192
231 F. INT. PAID ON CUM.INT.	($000)	2	5	7
232 G. CUMULATIVE OF (F.)	($000)	2	7	14
233 H. CUMULATIVE I.D.C.	($000)	54	132	206

234
235
236
237
238 WORKSHEET TO CALCULATE INTEREST, PRINCIPAL,
239 AND PAYMENT SCHEDULES FOR EACH SUCAT GENERATING STATION
240

241 PERIOD...	1	2	3
242	—	—	—
243 Gardner 1:			
244 Annual Payments($000)	$2,986	$2,986	$2,986
245 Principal ($000)	546	611	684
246 Interest ($000)	2,441	2,375	2,302
247 Gardner 2			
248 Annual Payments ($000)	$4,259	$4,259	$4,259
249 Principal ($000)	778	872	976
250 Interest ($000)	3,481	3,388	3,283
251 Snyder 1			
252 Annual Payments($000)	$3,619	$3,619	$3,619
253 Principal ($000)	661	741	829
254 Interest ($000)	2,958	2,879	2,790
255 Snyder 2			
256 Annual Payments($000)	$5,421	$5,421	$5,421
257 Principal ($000)	990	1,109	1,242
258 Interest ($000)	4,431	4,312	4,179

259
260 Operations and Maintenence Schedules
261 ----------
262

263	1987	1988	1989
	---	---	---
264 TOTAL SUCAT:			
265 A. Fixed	0	0	0
266 Variable	0	ERR	ERR
267 B. Labor	0	61	61
268 Maintenence	0	50	50
269 Materials	0	200	200
270 Utilities	0	9	9
271 Ash Disposal	0	279	485

272
273
274 GARDNER 1:

275 A. Fixed	0	0	0
276 Variable	0	ERR	ERR
277 B. Labor	0	0	0
278 Maintenence	0	0	0
279 Materials	0	0	0
280 Utilities	0	0	0

16

Exhibit A,1 (Continued)

281	Ash Disposal	0	0	0			
282							
283							
284	GARDNER 2						
285	A. Fixed	0	0	0			
286	Variable	0	ERR	ERR			
287	B. Labor	0	81	81			
288	Maintenance	0	50	50			
289	Materials	0	200	200			
290	Utilities	0	9	9			
291	Ash Disposal	0	279	486			
292							
293							
294	SNYDER 1						
295	A. Fixed	0	0	0			
296	Variable	0	0	0			
297	B. Labor	0	0	0			
298	Maintenance	0	0	0			
299	Materials	0	0	0			
300	Utilities	0	0	0			
301	Ash Disposal	0	0	0			
302							
303							
304	SNYDER 2						
305	A. Fixed	0	0	0			
306	Variable	0	0	0			
307	B. Labor	0	0	0			
308	Maintenance	0	0	0			
309	Materials	0	0	0			
310	Utilities	0	0	0			
311	Ash Disposal	0	0	0			
312							
313							
314							
315							
316							
317							

0.06	0.04	0.02				
0.07	0.06	0.05	0.04	0.03	0.03	0.02
ERR	ERR	ERR	ERR	ERR	ERR	ERR
8	9	10	11	12	13	14
--	--	--	--	--	--	--
1,671	1,671	1,671	1,671	1,671	1,671	1,671
2,417	2,417	2,417	2,417	2,417	2,417	2,417

77

1,985	1,985	1,985	1,985	1,985	1,985	1,985
2,911	2,911	2,911	2,911	2,911	2,911	2,911

73

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      1
      2 THIS WORKSHEET CALCULATES THE FOREIGN EXCHANGE IMPACT OF REPLA
      3 NPC OIL GENERATION WITH COAL WATER MIX AT SUCAT POWER STATION.
      4 IT ESTIMATES NPC OIL GENERATION BASED ON NPC DATA, AND ESTIMAT
      5 HOW MUCH OF THAT GENERATION CAN BE REPLACED BY CWM GENERATION.
      6 USING A DUTY-FREE PRICE OF OIL TO THE PHILIPPINES, IT THEN
      7 CALCULATES THE FOREIGN EXCHANGE EXPENDITURES SAVED THRU THAT G
      8 I.GENERATION & PRODUCTION DATA..............................
      9  A. CONSTANTS AND VARIABLES
     10      4,839  CWM BTU CONTENT IS CALCULATED ON LINES 270-279
     11 10889392. Btu CWM/MT (MT ASSUMES 2205 LBS/MT....BBLS.assume 9.
I/P  12      3413 (3413 btu/kwh)
     13
     14
I/P  15      0.05 DOLLARS PER PESOS
I/P  16      17.5 EXCHANGE RATE (PESOS PER DOLLA(TO BE CHANGED)
     17
     18       2.5%  LOCAL AND PROPERTY TAXES
     19       2.0%  FRANCISE TAX
     20       0.8%  INSURANCE
     21  B. INDIVIDUAL PLANT DATA:                          GARDNER 1
     22 -------------------------                          ---------
     23      ---------------------
I/P  24      PROJECT CONSTRUCTION START DATE (19XX)              1989
I/P  25      PROJECT IN- SERVICE DATE(19XX,POST-1977)            1992
I/P  26      NET UNIT CAPACITY (MW)                               105
I/P  27      NET UNIT CAPACITY (MW)                               105
I/P  28      1ST YEAR CAPACITY FACTOR (%)                         43%
I/P  29      FOLLOWING YRS CAP FACTOR (%)                         75%
I/P  30      POTENTIAL HRS OF OPER. (HRS/YR)                     8760
I/P  31      PLANT HEAT RATE (BTU/KWH)                          11900
I/P  32      NORMAL TRANSMISSION LOSSES (%)                        3%
I/P  33      OTHER TRANSMISSION LOSSES (%)                         0%
     34      1ST YEAR SALABLE ENERGY (MWH)                    383,649
     35      FOLLOWING YRS. SALABLE ENERGY (MWH)              669,155
     36      GROSS GENERATION- 1ST YEAR (MWH)                 395,514
     37      GROSS GENERATION- FOLLOWING YRS. (MWH)           689,850
     38      YEARS REQUIRED TO CONSTRUCT FACILITY                   2
     39      YEARS UNTIL ASSET BEGINS OPERATION                     5
     40      FUEL CONSUMED-1ST YR MT OF CWM)                  432,220
     41      FUEL CONSUMED-FOL YRS (MT OF CWM)                753,873
     42      FUEL COST-1ST YR ($000)                          $16,857
     43      FUEL COST-FOLLOWING YRS ($000)                   $29,401
     44
     45 GENERAL ASSUMPTIONS USED IN ANALYSIS
     46 ------------------------------------
     47 NPC PRICE ASSUMPTIONS:
I/P  48    CUSTOMER ENERGY CHARGE (CENTS/KWH)                    0.06
     49
     50    PRICE CWM (US$/MT)                                  $39.00
     51
     52
     53    TAX AND DUTY FREE PRICE OF OIL                      $28.00
     54
     55 II. CAPITAL COST ASSUMPTIONS
I/P  56   A. FOR. EXCHNG COMPONENT OF CAP. COSTS(%)          NOT USED
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19

Exhibit A.2 (Continued)

	57	B. TIMING AND DISTRIBUTION OF EXPENDITURES:			
I/P	58	1. YEAR 1 EXPENDS (%)	54%	14%	54%
I/P	59	2. YEAR 2 EXPENDS (%)	46%	75%	48%
I/P	60	3. YEAR 3 EXPENDS (%)	0%	11%	0%
I/P	61	4. YEAR 4 EXPENDS (%)			
	62	*** SEE QUARTERLY BREAKOUT OF EXPENDITURES AS OUTLINED ON I.D.			
	63	C. ACTUAL EXPENDITURES			
	64	1. YEAR 1 ($)	16,392	5,968	19,867
	65	2. YEAR 2 ($)	13,963	31,969	16,924
	66	3. YEAR 3 ($)	0	4,689	0
	67	4. YEAR 4 ($)			
	68	***USES TOTAL FINANC. REQUIRED,NOT TOTAL CONSTRUCTION COST****			
	69	***NOTE ASSET LIFE SHOULD BE COMPATABLE TO THE TERM LIFE OF			
	70	***LOANS WHICH ARE INCURRED FOR THE ASSET			
I/P	71	F. ASSET LIFE (YRS)	15	15	15
	72	----------			
	73	----------			
	74	III. CAPITAL COST DA3%			
I/P	75	BOILER MODIFICATIONS	7500	22000	19600
I/P	76	CWM SYSTEM	1600		
I/P	77	ELECTROSTATIC PRECIPITATOR	2600		
I/P	78	ASH HANDLING SYSTEM	1500		
I/P	79	MISC. MECHANICAL EQUIPMENT	300		
I/P	80	CIVIL/ STRUCTURAL	900		
I/P	81	ELECTRICAL MODIFICATIONS	2100		
I/P	82	INSTRUMENTATION AND CONTROLS			
I/P	83				
I/P	84				
I/P	85				
I/P	86				
I/P	87				
	88	----------	---	---	---
	89	TOTAL EQUIPMENT	16500	22000	19600
	90		---	---	---
	91	TOTAL EQUIPMENT	16500	22000	19600
	92	UNDISTR'BTED SITE COSTS(15%	2475	3300	2940
	93		---	---	---
	94	TOTAL ERECTED COST	18975	25300	22540
	95	ENGIN.& OWNER COST(15%)	2475	3300	2940
	96	(INCL'D W/ C.C.)	======	======	======
	97	TOTAL CONSTRUCTION COST	21450	28600	25480
I/P	98	LAND	0	0	0
	99	WORKING CAP-1/6 OF O&M	5283	7044	7009
	100	I.D.C. ($000)	3621	6981	4302
	101	IMPORT DUTIES ($000)			
	102		---	---	---
	103	TOTAL FINANCING REQUIRED	$30,355	$42,626	$36,791
	104		======	======	======
	105				
	106	DEPRECIATION BASE	25,071	35,581	29,782
	107				
	108				
	109				
	110				
	111				
	112				

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     113
     114
     115
     116
     117
     118
     119
     120
     121 ------------------------------------
     122 IV. O. & M. EXPENSES          GARDNER1  GARDNER2      SNYDER1
     123 --------------------          --------  --------      -------
     124  C. SEPARATE BREAKOUT OF O&M EXP
     125     ------------------------------------------
I/P  126       LABOR                          $40       $61         $40
I/P  127       MAINTENANCE- LABOR              40        50          50
I/P  128       MAINTENANCE-MATERIALS          150       200         200
I/P  129       UTILITIES                       10         9          10
I/P  130       ASH DISPOSAL                   377       486         486
I/P  131       FUEL EXPENSES               29,401    39,072      39,072
I/P  132       LOCAL & PROPERTY TAXES         627       890         745
I/P  133       FRANCHISE TAX                  803     1,147       1,147
I/P  134       INSURANCE                      188       267         223
     135                                     -----    ------       -----
     136 ANNUAL. O&M EXPENSES($000)       $31,636   $42,181     $41,973
     137
     138
     139 ------------------------------------------------------------
     140 *** FINANCING INSTRUCTIONS: ENTER % OF PROJECT TO BE FINANCED
     141 ***CASH AND EQUITY, LOTUS WILL CALC. THE $ AMOUNT OF DEBT REQ'
     142 ** ENTER AMT'S WITH '%' USING THE FORMAT 'XX.X%'
     143                                GARDNER1  GARDNER2      SNYDER1
     144 VI. FINANCIAL ASSUMPTIONS      --------  -------      -------
     145
     146  A. EQUITY ASSUMPTIONS:
I/P  147    O % PROJECT EQUITY              33.0%     33.0%       33.0%
     148    O EQUITY FINANCING($)         $10,017   $14,066     $12,141
I/P  149    O EQUITY COST (%)               15.0%     15.0%       15.0%
     150  B.DEBT ASSUMPTIONS:
     151    O DEBT FINAN. REQ'D ($)       $20,338   $28,559     $24,650
I/P  152    O ANN.INT.RATE(%)               12.0%     12.0%       12.0%
     153    O QTRLY.INT.RATE(%)              3.0%      3.0%        3.0%
I/P  154    O TERM OF DEBT(YRS.)             15        15          15
     155    O ANNUAL PAYMENTS ($000)       $2,986    $4,193      $3,619
     156                                  -------   -------     -------
     157 TOT.FIN.REQ'D (LINE A113)        30,355    42,626      36,791
     158 TOTAL INVESTMENT REQUIRED ($000)          $163,829
     159                                           =======
     160   WEIGHTED AVG. COST
     161   OF CAPITAL (%) ....            13.0%     13.0%       13.0%
     162 SUCAT AVERAGE COST OF CAPITAL...            13.0%
     163                                             ====
     164
     165          SCHEDULE FOR PROJECTING INVESTMENT FLOWS FOR EACH PL
     166
     167              1987      1988      1989      1990       1991
     168 PLANT        ----      ----      ----      ----       ----
```


41

Exhibit A.2 (Continued)

169	GAR.1:(I)	0	0	0	0	0
170	(E)	0	0	0	0	0
171	GAR.2:(I)	0	42,826	0	0	0
172	(E)	0	14,066	0	0	0
173	SNY.1:(I)	0	0	0	0	36,791
174	(E)	0	0	0	0	12,141
175	SNY.2:(I)	0	0	0	0	0
176	(E)	0	0	0	0	0

177 TOTAL INVESTMENT.... $163,829 TOTAL EQUITY..... $54,064

178

179

160 -------CONSTRUCTION FINANCING ASSUMPTIONS----------

181

	182	CONSTRUCTION FINANCING	GARDNER1	GARDNER2	SNYDER 1
	183	----------	--------	--------	--------
	184	0 AMOUNT ($000)	21,450	28,600	25,480
I/P	185	0 INTEREST RATE(%)	15.0%	15.0%	15.0%
I/P	186				

187

188

189

190 APPROXIMATE FOREIGN EXCHANGE SAVINGS POTENTIALLY AVAILABLE
191 TO THE PHILIPPINES THROUGH THE CONVERSION OF
192 SUCAT POWER STATION TO COAL WATER MIX

193

194		1987	1988	1989
195		----	----	----
196	PROJECTED NPC OIL			
197	GENERATION (GWH)	2,959	3,441	3,393
198	LESS:			
199	REPLACABLE OIL GENERATION			
200	ON NPC SYSTEM (GWH)	1,476	1,409	2,419
(LESS	.0% FOR PEAKING)			
202	FOREIGN EXCHANGE REQUIREMENTS*			
203	FOR IMPORTED OIL ($000)	$149,128	$173,434	$171,004
204				
205	FOREIGN EXCHANGE REQUIREMENTS**			
206	FOR CWM PROJECT ($000)	0	10,538	10,538
207				
208	OIL FOREIGN EXCHANGE COSTS***			
209	SAVED BY CWM PROJECT($000)	0	27,623	48,179
210		-------	-------	-------
211	NET SAVINGS (LOSS) OF			
212	FOREIGN EXCHANGE ($000)	$0	$17,085	$37,641
213				
214	CUMULATIVE SAVINGS OF			
215	FOREIGN EXCHANGE ($000)	$0	$17,065	$54,726
216				
217	NET PRESENT VALUE (AT			
218	13.0% DISCOUNT RATE)		$383,282 (000'S)	
219				
220	PROJECT PAYBACK****	0	10.4%	33.4%
221				
222	NET FUEL COSTS	$0	($4,644)	($258)
223	(FOREX SAVINGS-CWM FUEL COSTS)			
224				

91

Exhibit A.2 (Continued)

225	CUMULATIVE NET SAVINGS	$0	($4,844)	($4,903)
226	SUCAT GENERATION UTILIZED(%)	100.0%	100.0%	100.0%
227	NET PRESENT VALUE (I)	339,218	383,282	461,233
228	INVESTMENT CASH FLOW (0)	(42,626)	17,085	37,641

229 * Projected oil NPC oil consumption * the duty- free cost of
230 imported oil to the Philippines
231 ** Foreign exchange requirements of the C&M project equal the
232 principal and interest payments of the equipment required to
233 rennovate Sucat to burn C&M * the foreign component of the
234 plant's capital costs.
235 *** Calculated as projected plant generation * bbls.of importe
236 oil/MWH displaced * the duty- free price of imported oil.
237 **** Calculated using total plant investment required and the
238 annual savings (loss) in foreign exchange to the Phillipines.
239
240
241 **INSERT % OF OIL CAPACITY OTHERWISE NOT DESIGNATED
242 **ON LINE P 254 ON THE NPC SYSTEM THAT CAN NOT BE REPLACED
I/P 243 **** BY C&M GENERATION..... .0%<<<<<<<<<<<
244
245 THE MAGNITUDE OF THE FOREIGN EXCHANGE SAVING DEPENDS UPON
246 SEVERAL FACTORS, WHICH INCLUDE:
247 O THE PRICE OF IMPORTED OIL
248 - INCLUDING CONSIDERATION OF THE SHADOW PRICE TO THE
249 PHILIPPINES OF IMPORTED OIL AND FOREIGN EXCHANGE.
250 O HOW MUCH OIL CAPACITY MUST REMAIN ON THE SYSTEM
251 - HOW WELL THE SUCAT UNITS CAN BE USED IN A PEAKING CAPACITY
252 - UNCERTAINTIES RELATING TO CAPACITORS:
253 = DOES NPC PLAN TO INSTALL THEM ANYWAYS
254 = ARE THEY NECESSARY FOR VOLTAGE REGULATION
255 = CAN THEY BE USED FOR VOLTAGE REGULATION AND REPLACE OIL
256 UNITS
257 O HOW MUCH OIL CAPACITY CAN EVENTUALLY BE REPLACED
258 O HOW ACCURATE ARE THE NPC DEMAND FORECASTS
259 - ARE THEY OPTIMISTIC OR DO THEY UNDERESTIMATE DEMAND
260 WHEN THE DEBT OF THE PROJECT IS BEING RE-PAID THROUGH A
261 LONG-TERM INTERNATIONAL LOAN
262 O THE TIMING OF BEING ABLE TO BRING THE SUCAT UNITS ON-LINE
263 O OTHER CONSIDERATIONS TO A SMALLER DEGREE SUCH AS THE TERMS
264 OF FINANCING ETC....
265
266
267 **********
268 **********
269 **** CALCULATION OF PRICE AND BTU CONTENT OF C&M AT SUCAT*****
270 **********

271	VARIABLES	COAL SOURCE A		COAL SOURCE
272	---	---		---
I/P 273	O $/TON PRICE OF DRY COAL	$42.50		$56.60
274	- (PESO PRICE)	744		991
I/P 275	O BTU/ DRY POUND COAL	9,877		13,165
I/P 276	O PERCENT MOISTURE CONTENT	24.0%		1.9%
I/P 277	O PERCENT COAL IN MIX	50%		50%
I/P 278	O % COAL SOURCE IN C&M	100%	AVG. BTU	0%
279	= BTU CONTENT/WET TON COAL	4,939	4,939	0
280	= PRICE/ WET TON COAL	$27.96		$0.00

Exhibit A.2 (Continued)

	281	= COAL TRANSPORT COST			
I/P	282	($/TON)	$0.00		$4.00
	283		---	---	---
	284	0 PRICE OF CWM AT CWM			
	285	PLANT GATE ($/WMT)		$27.96	
	286	0 CWM PRODUCTION COSTS($/MT)		30.2	
I/P	287	0 CWM TRANSPORT COSTS ($/MT)		$7.30	
	288				
I/P	289	o CWM PIPELINE TRANSPORT COSTS		$1.50	
	290	----------		---	
	291	COST OF CWM TO SUCAT ($/WMT)		$39.00	

Exhibit A.2 (Continued)

FINANCIAL CASH FLOWS FOR
SUCAT GENERATING STATION
($000)

	1	2
	1987	1988
TOTAL SUCAT		
total payments	$0	$4,193
Principal Payments	0	766
Interest Payments	0	3,427
GARDNER 1		
Total Payments	$0	$0
Principal Payments	0	0
Interest Payments	0	0
GARDNER 2		
Total Payments	$0	$4,193
Principal Payments	0	766
Interest Payments	0	3,427
SNYDER 1		
Total Payments	$0	$0
Principal Payments	0	0
Interest Payments	0	0
SNYDER 2		
Total Payments	$0	$0
Principal Payments	0	0
Interest Payments	0	0

EXHIBIT ___

SUMMARY OF SUCAT GENERATION
AND OPERATING STATISTICS
(BY INDIVIDUAL BOILERS)

	1987	1988	1989
TOTAL SUCAT			
Generation (MWH)	0	548,069	955,935
Fuel Costs ($000)	0	21,729	37,900
GARDNER 1			
Generation (MWH)	0	0	0
Fuel Costs ($000)	0	0	0
GARDNER 2			
Generation (MWH)	0	548,069	955,935
Fuel Costs ($000)	0	21,729	37,900
SNYDER 1			
Generation (MWH)	0	0	0
Fuel Costs ($000)	0	0	0
SNYDER 2			
Generation (MWH)	0	0	0
Fuel Costs ($000)	0	0	0

Exhibit A.2 (Continued)

GARDNER 1: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST.

PERIOD(QTR.)		1	2
A. PROJECT COMPLETED	(%)	1.5%	7.0%
B. AVG.CAP.OUTSTANDING	(%)	0.8%	4.3%
C. INTEREST RATE/QTR.	(%)	3.8%	3.8%
D. INT. PAID ON CAPITAL	($000)	6	34
E. CUM. INTEREST PAID	($000)	6	40
F. INT. PAID ON CUM.INT.	($000)	0	2
G. CUMULATIVE OF (F.)	($000)	0	2
H. CUMULATIVE I.D.C.	($000)	6	42

GARDNER 2: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST.

PERIOD(QTR.)		1	2
A. PROJECT COMPLETED	(%)	0.8%	3.4%
B. AVG.CAP.OUTSTANDING	(%)	0.4%	2.1%
C. INTEREST RATE/QTR.	(%)	3.8%	3.8%
D. INT. PAID ON CAPITAL	($000)	4	23
E. CUM. INTEREST PAID	($000)	4	27
F. INT. PAID ON CUM.INT.	($000)	0	1
G. CUMULATIVE OF (F.)	($000)	0	1
H. CUMULATIVE I.D.C.	($000)	4	28
			.0

SNYDER 1: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. P

PERIOD(QTR.)		1	2
A. PROJECT COMPLETED	(%)	1.5%	7.0%
B. AVG.CAP.OUTSTANDING	(%)	0.8%	4.3%
C. INTEREST RATE/QTR.	(%)	3.8%	3.8%
D. INT. PAID ON CAPITAL	($000)	7	41
E. CUM. INTEREST PAID	($000)	7	48
F. INT. PAID ON CUM.INT.	($000)	0	2
G. CUMULATIVE OF (F.)	($000)	0	2
H. CUMULATIVE I.D.C.	($000)	7	50

SNYDER 2: WORKSHEET TO CALCULATE I.D.C. FOR A 3 YEAR CONST. P

PERIOD(QTR.)		1	2
A. PROJECT COMPLETED	(%)	0.8%	3.4%
B. AVG.CAP.OUTSTANDING	(%)	0.4%	2.1%
C. INTEREST RATE/QTR.	(%)	3.8%	3.8%
D. INT. PAID ON CAPITAL	($000)	5	27
E. CUM. INTEREST PAID	($000)	5	32
F. INT. PAID ON CUM.INT.	($000)	0	1
G. CUMULATIVE OF (F.)	($000)	0	1
H. CUMULATIVE I.D.C.	($000)	5	34

Exhibit A.2 (Continued)

DISTRIBUTION OF QUARTERLY EXPENDITURES
FOR 1, 2, 3, AND 4 YEAR CONSTRUCTION PROJECTS

PROJECT LENGTH	QUARTERS 1	2	3
ONE YEAR PROJECT	7.0%	54.0%	94.0%
TWO YEAR PROJECT	1.5%	7.0%	22.0%
THREE YEAR PROJECT	0.8%	3.4%	7.0%
FOUR YEAR PROJECT	0.8%	1.5%	4.0%

PROJECTED NPC OIL GENERATION..(OCTOBER 1984 PLAN)

PLANT:	1985	1986	1987
BATAAN 1	439,380	407,750	420,650
BATAAN 2	205,550	97,560	127,210
TEGEN 1	477,340	384,430	390,350
TEGEN 2	441,670	367,730	362,280
SUCAT 1	660,430	601,290	629,700
SUCAT 2	158,810	34,660	63,590
SUCAT 3	15,760	7,700	31,680
SUCAT 4	7,630	7,570	7,690
MALAYA 1	7,550	7,540	7,560
MALAYA 2	1,715,120	1,310,420	1,466,040
	3484310	2721340	2958890

WORKSHEET TO CALCULATE INTEREST, PRINCIPAL,
AND PAYMENT SCHEDULES FOR EACH SUCAT GENERATING STATION

Exhibit A.2 (Continued)

I/P	169							
I/P	170				PERIOD...	1	2	
I/P	171					---	---	
I/P	172	Gardner 1:						
I/P	173	Annual Payments($000)				$2,986	$2,986	
I/P	174	Principal ($000)				546	611	
	175	Interest ($000)				2,441	2,375	
	176	Gardner 2						
	177	Annual Payments ($000)				$4,193	$4,193	
	178	Principal ($000)				766	858	
	179	Interest ($000)				3,427	3,335	
	180	Snyder 1						
	181	Annual Payments($000)				$3,619	$3,619	
	182	Principal ($000)				661	741	
	183	Interest ($000)				2,958	2,879	
	184	Snyder 2						
	185	Annual Payments($000)				$5,318	$5,318	
	186	Principal ($000)				972	1,088	
	187	Interest ($000)				4,346	4,230	
	188							
	189							
	190							
	191							
	192							
	193							
	1998	1999	2000	2001	2002	2003		
	---	---	---	---	---	---		
	4,678	4,678	4,678	4,678	4,678	4,678		
	3,485	3,485	3,485	3,485	3,485	3,485		
	235,768	235,768	235,768	235,768	235,768	235,768		
	55,842	55,842	55,842	55,842	55,842	55,842		
	175,630	175,630	175,630	175,630	175,630	175,630		
	---	---	---	---	---	---		
	119,788	119,788	119,788	119,788	119,788	119,788		
	$911,674	$1,031,463	$1,151,251	$1,271,039	$1,390,828	$1,510,616		
	483.36%	483.36%	483.36%	483.36%	483.36%	483.36%		
	72,187	72,187	72,187	72,187	72,187	72,187		

88

397,675	397,675	397,675	397,675	397,675	397,675
86.25%	86.25%	86.25%	86.25%	86.25%	86.25%
596,037	538,113	472,865	398,913	315,383	221,003
119,788	119,613	119,788	119,768	119,789	114,362

230
% I/P 231
232
233 PROGRAM TO ESTIMATE FOREIGN EXCHANGE IMPACT
I/P 234 OF PHILIPPINES COAL-WATER MIX PROJECT
235
% I/P 236 NPC STATISTICS: PLANNED NPC OIL GENERATION (CAPACITY FACTOR $
237 ----------

	PLANT	1985	1986	1987
238	PLANT	1985	1986	1987
239	-----	----	----	----
240	Bataan 1	.0%	1.1%	.0%
241	bataan 2	.0%	5.0%	.0%
242	Tegen 1	47.2%	44.3%	44.5%
$243	Tegen 2	46.1%	43.5%	41.3%
244	Gardner 1	53.5%	53.4%	47.9%
245	Gardner 2	0.4%	0.5%	3.6%
246	Snyder 1	0.4%	0.4%	1.8%
$247	Synder 2	0.3%	0.3%	.0%
248	Malaya 1	0.3%	0.3%	.0%
249	Malaya 2	.0%	.0%	.0%

250
$251
252 NPC STATISTICS:PROJECTED FUEL CONSUMPTION (000'S BBLS)
253 ----------

I/P 254	PLANT	MW	1985	1986	1987
$255	-----	--	----	----	----
256	Bataan 1	75	602	575	586
257	bataan 2	150	14	14	47
258	Tegen 1	100	689	647	634
259	Tegen 2	100	674	636	623
260	Gardner 1	150	1,172	1,169	1,067
261	Gardner 2	200	13	13	15
262	Snyder 1	200	13	13	13
263	Synder 2	300	13	13	13
264	Malaya 1	300	13	13	13
265	Malaya 2	350	1515	1507	1703

266
267 NPC STATISTICS:DISPLACABLE NPC OIL GENERATION BY PLANT (000 M
268 ----------

269	PLANT	1985	1986	1987
270	-----	----	----	----
271	Bataan 1	7	7,227	0
272	Bataan 2	13	65,700	0
273	Tegen 1	413,384	388,243	389,820
274	Tegen 2	404,186	381,323	361,788
275	Gardner 1	703,121	701,150	629,406
276	Gardner 2	7,709	7,884	63,072
277	Snyder 1	7,534	7,534	31,536
278	Synder 2	7,621	7,621	0
279	Malaya 1	7,621	7,621	0
280	Malaya 2	31	3	0

Exhibit A.2 (Continued)

TOTAL GENERATION	1,551,227	1,574,306	1,475,623

CALCULATION OF AVERAGE NPC PLANT OIL CONSUMPTION/ MWH (BBLS)

PLANT		1985	1986	1987
Bataan 1		91628.6	79.6	8919330.3
Bataan 2		1065.4	0.2	357686.5
Tegen 1		1.7	1.7	1.6
Tegen 2		1.7	1.7	1.7
Gardner 1		1.7	1.7	1.7
Gardner 2		1.7	1.6	0.2
Snyder 1		1.7	1.7	0.4
Synder 2		1.7	1.7	49467.3
Malaya 1		1.7	1.7	494672.8
Malaya 2		49412.9	491519.9	55544683.6
AVERAGE....	1.8	14211.9	49161.1	6536584.6

CALCULATION OF FOR. EXCNHNG. REQ'S OF CWM PROJECT

		1987	1988	1989
INTEREST AND PRINCIPAL PAYMENTS FOR SUCAT - FOREX PORTION		$0	$4,193	$4,193
@	106.0%	0	4,445	4,445
I & P PAYMENTS FOR CWM BARGE (DIRECT INPUT) - FOREIGN EXCHANGE PORTION		0	510	510
@	80.0%	0	408	408
ROCKWELL PIPELINE - FOREIGN EXCHANGE PORTION			1,376	1,376
@	87.0%	0	1,197	1,197
I & P PAYMENTS FOR CWM PLANT (DIRECT INPUT) - FOREIGN EXCHANGE PORTION		0	5,407	5,407
@	83.0%	0	4,488	4,488
I & P PAYMENTS FOR COAL MINE (DIRECT INPUT) - FOREIGN EXCHANGE PORTION		0	0	0
@	70.0%	0	0	0
TOTAL CWM CAPITAL REQ'		$0	$11,486	$11,486
- FOREX PORTION		$0	$10,538	$10,538

337 **** ROUTINE TO ESTIMATE THE AMOUNT OF THE GENERATION ON THE
338 **** NPC SYSTEM THAT WILL NOT BE ABLE TO BE REPLACED BY CWM
339
340 PROCEDURE: ENTER LOTUS LOGIC ON LINE 254,CELLS S THROUGH AD,
341 THAT SELECTS AND ADDS NPC CAPACITY FROM THE TABLE IN
342 LINES 145-158 THAT CANNOT BE REPLACED BY CWM GENERATION
343 O THIS GENERATION IS THEN SUBTRACTED FROM TOTAL GENERATION
344 FOR THE NPC SYSTEM ON LINE A197
345

	1987	1988	1989
346			
347	---	---	---
348 NON- REPLACABLE CAPACITY			
349 ON THE NPC SYSTEM	0	0	0