PD-ABB-166
66887

Lakhra Coal Mine and Power Generation Feasibility Study
Economic and Financial Feasibility

Submitted to:

U.S. Agency for International Development
Islamabad, Pakistan

Water and Power Development Authority
Lahore, Pakistan

Draft Final Report
September 16, 1986

ICF INCORPORATED International Square
1850 K Street, Northwest, Washington, D. C. 20006

ICF INCORPORATED International Square, 1850 K Street, Northwest, Washington, D. C. 20006 (202) 862-1100

September 29, 1986

Mr. John Morgan
Office of Energy and Environment
U.S. Agency for International Development
Islamabad, Pakistan

Dear John:

In response to your telex [No. 2798] I have sent copies of ICF's draft final report on the Economic and Financial Feasibility of the Lakhra Coal Mine and Power Generation Project to the North American Coal Corporation, the Bechtel Power Corporation, the Ebasco Overseas Corporation, CDF International, and Costain Mining Limited. I am also sending you 12 more copies of this report for your use and distribution.

I have also taken this opportunity to correct some minor errors in the September 8, 1986 draft report. Slight changes have been made to the graphs in Figures ES-3, II-1, and II-3 and three typographical errors have been corrected.[1] Otherwise, these reports (dated September 16, 1986) are the same as the September 8th version you have reviewed. I have also sent five copies of this revised report to Bob Ichord.

Best Regards.

Sincerely,

Ted

Theodore R. Breton
Vice President

CC: C.R. Miercourt, North American Coal
P.R. Cassidy, Bechtel Power
G. Goodman, Ebasco Overseas
M. Francois, CDF International
R.H. Samuel, Costain Mining
R. Ichord, USAID

[1] The revised graphs are consistent with the ICF briefing provided to USAID on September 15, 1986 in Washington, D.C.

LAKHRA COAL MINE AND POWER GENERATION FEASIBILITY STUDY

Economic and Financial Feasibility

Submitted to:

U.S. Agency for International Development
Islamabad, Pakistan

Water and Power Development Authority
Lahore, Pakistan

DRAFT FINAL REPORT
September 16, 1986

ICF INCORPORATED

PREFACE

This ICF Draft Final Report is being distributed simultaneously to numerous interested organizations for review and comment. It has not been reviewed by the U.S. Agency for International Development or the Pakistan Water and Power Development Authority.

All of the analyses, findings, and conclusions presented in this report are those of ICF Incorporated. The views expressed herein are not to be construed as representing official USAID or WAPDA policy.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	ES-1
INTRODUCTION	i-1
History of the Project	i-1
JICA Study Scope and Results	i-1
WAPDA/PMDC/SWEC Study Scope and Results	i-2
Donor Agency Responses to the Studies	i-3
Scope of the Project Reappraisal	i-5
Alternatives Reviewed in the Reappriasal	i-6
Organization of the Report	i-7
I. LAKHRA PROJECT OPTIONS	I-1
Description of the Recommended Project Configuration	I-1
Project Configurations Evaluated	I-3
Economic Cost Estimation Process	I-5
Discount Rate Selection	I-5
Shadow Price Factors	I-7
Lakhra Coal Reserves Available for the Project	I-7
Coal Quality	I-9
Adequacy of Reserves for the Alternative Projects	I-10
Mining Plans and Production Costs	I-11
Comparison With Previous Studies	I-14
Electricity Production Costs	I-14
Alternative Estimates of Underground Mining Costs	I-18
Issues and Potential Problems with the Alternative Mining Plans	I-20
Surface Mine Issues	I-21
Underground Mine Issues	I-21
Recommended Lakhra Project Configuration	I-24
Site Selection	I-25
Coal Washing	I-26
II. LAKHRA PROJECT ECONOMIC FEASIBILITY	II-1
Approach Used to Evaluate Project Economic Feasibility	II-1
Baseload Power Cost of the Alternative Projects	II-2
Imported Oil Plant Characteristics	II-3
Imported Coal Plant Characteristics	II-3
Capital Cost Estimates Used in this Analysis	II-5
Economic Cost of Power	II-6
Effect of Rupee Depreciation	II-8
Least Cost Capacity Expansion Analysis	II-9
Least Cost Plans Prepared	II-10
Key Assumptions Used in the Plans	II-11
Results of the Base Oil Price Planning Analysis	II-11
Results of the High Oil Price Planning Analysis	II-16
Base Oil Plan Results with Additional Rupee Devaluation	II-17

TABLE OF CONTENTS
(Continued)

	Page
Other Benefits and Costs of the Lakhra Project	II-18
Technological Advance in the Coal Sector	II-19
Skilled Job Creation	II-20
Foreign Exchange Requirements	II-20
Energy Supply Diversification	II-20
Project Internal Rate of Return	II-21
Conclusions	II-22
III. PROJECT FINANCIAL PLANS	III-1
Financing Requirements/Sources/Terms	III-2
Tax and General Financial Assumptions	III-5
Revenue Requirements to Meet Cash Flow Needs	III-6
Review of Illustrative Power Plant Financial Plans	III-6
Financial Feasibility of the Project	III-8
APPENDIX A: Lakhra Project Power Plant Site Selection	A-1
APPENDIX B: Coal Washing Economics	B-1
APPENDIX C: Comparison of Boyd Mining Plans with Previous Studies	C-1
APPENDIX D: Load Forecasts	D-1
APPENDIX E: Least Cost Capacity Expansion Analysis	E-1
APPENDIX F: Shadow Prices/Foreign Exchange Rates	F-1
APPENDIX G: Oil Price Forecasts	G-1
APPENDIX H: World Coal Markets and Imported Coal Prices	H-1
APPENDIX I: Lakhra Project Internal Rate of Return	I-1
APPENDIX J: Financial Plan Details and Annual Cash Flows	J-1

LIST OF TABLES

Table		Page
I-1	Exploratory Drilling on Main PMDC Tract	I-8
I-2	Estimated Coal Resources/Reserves on Main PMDC Tract	I-8
I-3	Revaining Recoverable Reserves at Lakhra off Main PMDC Tract	I-9
I-4	Quality of Lakhra Coal on Main PMDC Tract	I-10
I-5	Adequacy of Proven Reserves To Meet Project Requirements	I-10
I-6	Coal Production Costs For Alternative Projects	I-13
I-7	Comparison of Boyd and Previous Mining Cost Estimates	I-15
I-8	Base Case Power Plant cost and Operating Assumptions	I-15
I-9	Economic Costs of Lakhra Coal and Power	I-17
I-10	Project Economic Costs with Lower Underground Mining Costs	I-19
II-1	Base Case Lakhra, Imported Oil and Coal Plant Assumptions	II-4
II-2	Economic Cost of Baseload Power from the Alternative Plants	II-7
II-3	Effect of Rupee Depreciation on Baseload Power Economic Cost	II-9
II-4	Base Oil Price Capacity Expansion Plan Without the Lakhra Project	II-12
II-5	Changes to Base Oil Price Plan with Best Lakhra Case Project Costs	II-13
II-6	Comparison of Oil Prices in Plans to Recent Forecasts	II-18
III-1	Initial Capital Financing Requirements	III-3
III-2	Illustrative Sources of Funds to Meet Capital Requirements	III-4
III-3	Illustrative Loan/Equity Terms Used in the Plans	III-5

LIST OF FIGURES

Figures		Page
I-1	Lakhra Power Project Location	I-2
I-2	Lakhra Surface Mining Costs	I-11
I-3	Lakhra Underground Mining Costs	I-12
I-4	Leased Areas in the Lakhra Coalfield	I-23
II-1	Levelized Economic Cost of Baseload Power from Imported Coal and Oil Plants	II-14
II-2	Economic Cost of Power from Lakhra Project Base Oil Price Plan	II-15
II-3	Economic Cost of Power from Lakhra Project High Oil Price Plan	II-17
II-4	Economic Cost of Power from Lakhra Project 35 Percent Rupee Depreciation Plan	II-19
II-5	Effect of Lakhra Plant on Energy Supply Diversification in Fiscal Year 1994	II-22
III-1	Required Coal Prices to Match Financing Conditions	III-7
III-2	Project Revenues Required Under Illustrative Financing Conditions	III-9
III-3	Project Revenue Requirements Versus 1985 WAPDA Revenues	III-10

EXECUTIVE SUMMARY

Least cost capacity expansion studies show that Pakistan will require over 2000 MW of baseload thermal generating capacity over the fiscal year 1992-95 period. The Lakhra coal mine and power plant has been proposed as a project which could help meet this requirement.

When asked to finance the Lakhra project, potential donor agencies identified numerous issues which had to be successfully addressed before financing could be provided. USAID has funded a series of in-depth engineering, environmental, economic, social, and financial feasibility studies to address these issues. This report presents the results of the economic and financial feasibility study.

DESCRIPTION OF THE PROPOSED PROJECT

The proposed Lakhra power project consists of a two-unit 500 MW minemouth power plant and a mining complex to produce 2.7 million metric tones/year of lignite. The coal mines would consist of two large surface mines which would operate for thirty years with supplemental production from smaller underground mines which have a shorter operating life. The surface mines would produce about 2.4 million tonnes of coal per year.

Lakhra coal is a relatively high-BTU lignite; on average it is expected to have the following characteristics at the power plant:

	As Received	Dry
Moisture	32.0%	---
Ash	21.1%	31.0%
Sulfur	5.1%	7.6%
Heat of Combustion	3180 kcal/kg.[1]	4670 kcal/kg.

Extensive testing of the coal indicates that it will burn very well in a properly designed boiler. Nevertheless, the ash includes a high proportion of iron, which gives the coal a high slagging and fouling potential. The high sulfur content gives the coal a high corrosion and air pollution potential. Further, the coal has a propensity for self-combustion.

The proposed power plant would utilize large boilers to minimize slagging and fouling. The boilers are designed to operate at low gas velocities to minimize the potential corrosion caused by the abrasive characteristics of Lakhra coal. These design parameters should facilitate the safe and reliable operation of the power plant despite the undesirable properties of Lakhra coal.

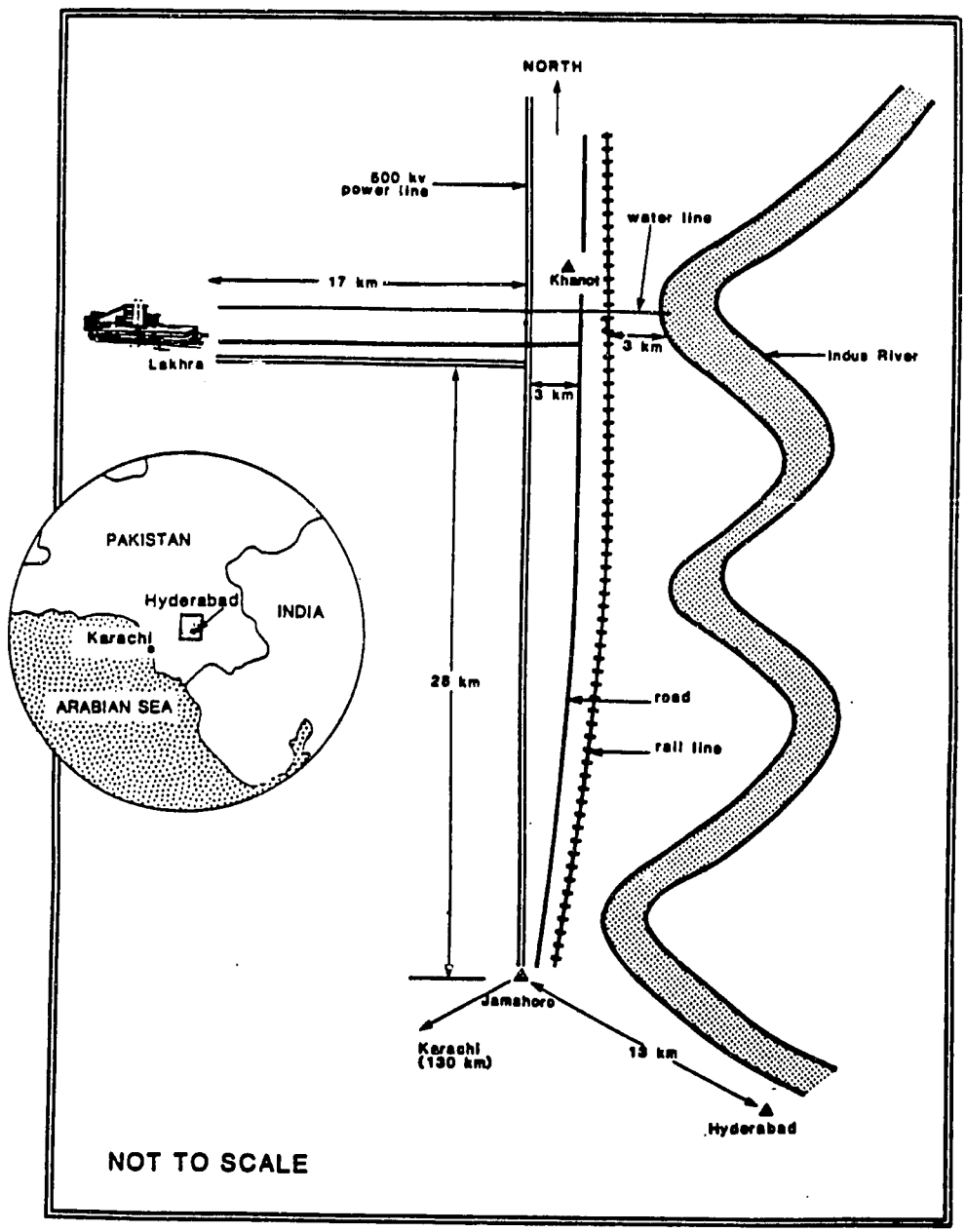
Although Lakhra coal is subject to spontaneous combustion, stockpiling is possible if proper procedures are followed. Nevertheless, the principal source of incremental coal supplies would be spare surge capacity in the surface mine operation.

---

[1] Approximately 5720 BTU/lb.

FIGURE ES-1

Lakhra Power Project Location



Tests indicate that about 90 percent of the sulfur in the coal would be burned and without scrubbing would exit the stack in the form of sulfur dioxide and sulfates. At a 70 percent annual capacity utilization, the uncontrolled sulfur dioxide emissions from the two units would average about 685 tonnes per day on an annual basis. The environmental analysis has confirmed that there is no background ambient SO2 present at the Lakhra site and that the high stack utilized for the plant would ensure that local ambient SO2 levels remain low. Therefore, no significant environmental impacts are anticipated.

LAKHRA PROJECT OPTIONS STUDIED

The feasibility studies included a review of a variety of mining plans and power plant configurations. The mining plans included all-underground, all-surface, and underground/surface combinations producing from 1.0 to 4.3 million metric tones per year. Power plants ranging in size from 180 to 700 MW were studied for siting in Lakhra (the minemouth location), Khanot, and Jamshoro.

Three very different projects were evaluated in detail as part of the final Lakhra project selection process:

- A 700 MW (two-unit) power plant with partial flue gas desulfurization fueled by coal produced principally from surface mines.
- A 500 MW (two-unit) power plant (with no scrubber) fueled by coal produced principally from surface mines.
- A 250 MW power plant fueled by coal produced only from underground mines on the main PMDC tract and on privately leased areas to the south.

The Base Case coal production costs are shown in Table ES-1 for the three projects outlined above. The coal production costs are similar for the 500 MW and 250 MW project. The coal production costs for the 700 MW project are lower due to the economies of scale in the surface mines.

Figure ES-2 summarizes the final estimates of the economic cost of baseload power for these three projects. Power generation costs are shown for

Table ES-1
Coal Production Costs for Alternative Lakhra Projects
(Mid-1985 dollars)

Project		Cost Per Tonne				Cost per Mill Kcal	
Plant Size	Mines	Direct	Infrastructure	Mgmt Fee	Total	Kcal/kg	Cost
700 MW	300 UG	21.20	7.15			3030	
	3450 Surf	37.60	1.40			3200	
	3750	36.30	1.85	1.50	39.65	3190	12.43
500 MW	300 UG	21.20	7.15			3030	
	2400 Surf	41.00	1.80			3200	
	2700	38.80	2.40	1.50	42.70	3180	13.43
250 MW	1400 UG	32.10	7.90		40.00	3030	13.20

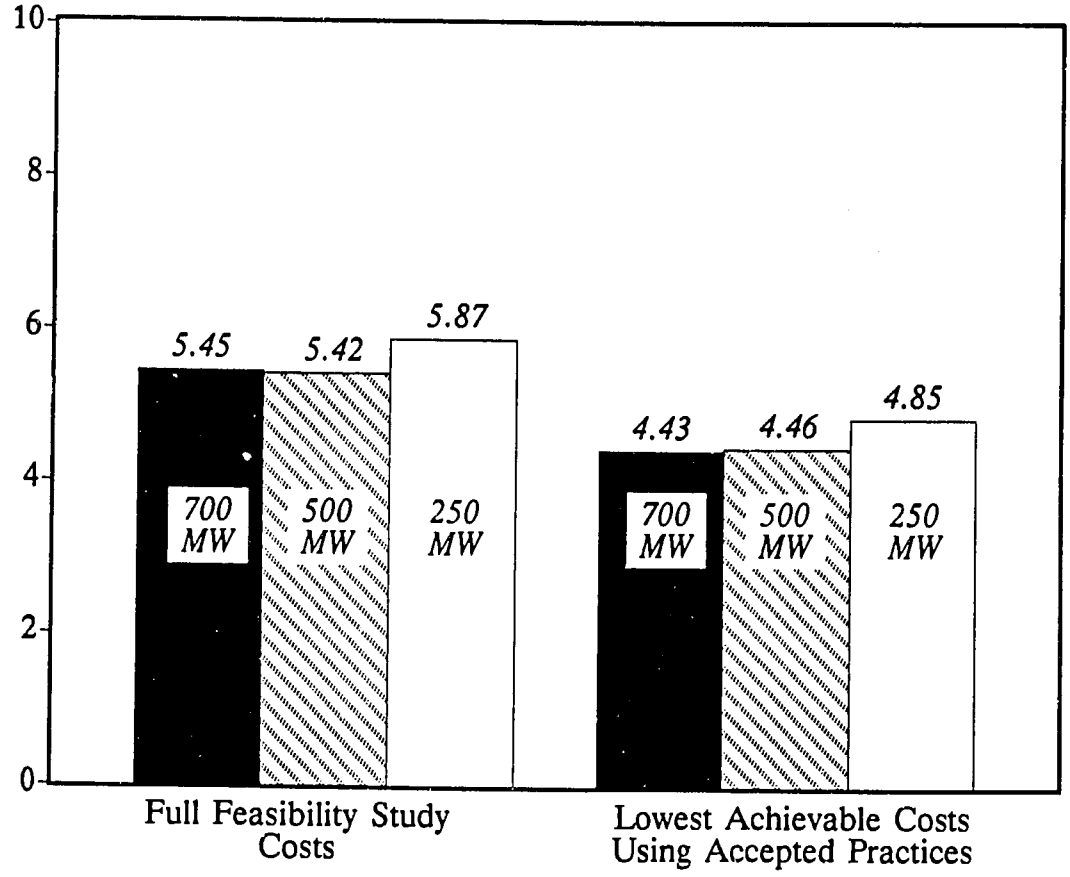
two levels of engineering cost assumptions; the full Base Case engineering feasibility study costs and the lowest achievable costs using accepted mining practices. Both sets of costs show the 500 MW and 700 MW project to be similar in cost and the 250 MW project (with all underground mining) to be more costly on a kw-hr basis. The 250 MW project is more costly on a kw-hr basis because of the significant infrastructure required for any power plant which is constructed to burn Lakhra coal.

The finding that the 250 MW project would produce power at higher cost than the larger projects is controversial. Some observers believe that underground mining costs would be sufficiently low to make the 250 MW project power costs lower than the cost in the larger projects which rely on surface mining. The engineering contractor has maintained, however, that reliable, safe, underground mining which recovers a reasonable proportion of the coal in place will be much higher cost than existing mining operations in the Lakhra coal fields, potentially as high in cost as surface mining.

The 700 MW project without environmental controls would have lower costs than the 500 MW project, but it is disadvantaged by the inclusion of a flue-gas scrubber which removes 50 percent of the sulfur emissions from one unit in the plant. This scrubber would be required to enable the 700 MW project to meet donor agency SO2 emission guidelines.

Figure ES-2

Economic Cost of Power From Alternative Lakhra Projects
(1985 U.S. Cents per Kwh)



Recommended Lakhra Project Configuration

Based on a thorough review of these projects, the 500 MW project appears to be the option that best balances all of the varied considerations important to a Lakhra power plant. Sufficient coal reserves have been proven on the available site to fuel the 500 MW project for 30 years.

The 700 MW project is undesirable because it requires a potentially troublesome flue gas scrubber and significantly more initial capital. Given the lack of experience in Pakistan with a large coal-fired power plant, adding a scrubber to the plant would make plant operation a considerable challenge, particularly in the early years.

The 250 MW project is less attractive than the 500 MW project because it is likely to have many more implementation problems. First, reserves have not been fully proven for the 250 MW project for its full 30-year life, and coal supply negotiations would be more complex. Some coal would have to be supplied from private leases, and arrangements would have to be worked out with one or more private lease owners. Second, reliability problems are anticipated and could be significant. The conditions for underground mining at Lakhra are difficult, and there is no experience with the type of mining plan required for the 250 MW project. Finally, health and safety in the mines could well become an important issue. Standards are not enforced currently, and it remains uncertain whether a strong, enforceable mine safety and health program can be properly designed and implemented. Particularly if the coal supply contract has a fixed price, the pressure will be considerable to skimp on important health and safety practices, to reduce costs by concentrating on the most easily mined deposits, and to deliver coal which does not meet specifications. Given this pressure, the potential for serious and chronic conflicts between WAPDA, the private mine operators, and the mine inspectors is very significant.

The 250 MW project could potentially be the lowest cost Lakhra project. If the mining techniques required to reliably supply coal on a large scale had previously been demonstrated in Pakistan, supply reliability and expected production cost would be far less uncertain, and the 250 MW project might be the preferred alternative. Given what is known today, however, the 500 MW Lakhra project appears to be the best of the potential configurations examined for implementation at the present time.

Potential donor agencies had requested that costs and benefits of the additional scrubbing be examined. Scrubbing for the 500 MW project was not selected due to the high cost, the potential for reducing plant availability, and the small to negligible environmental benefit which would result.

Site Selection

The Lakhra site was rated superior from both an environmental and an economic cost perspective. Lakhra coal is unusually high in sulfur content, and the SO_2 emissions from a 500 MW power plant could have adverse effects on vegetation and on sensitive human populations if the plant were sited at Khanot or at Jamshoro. No adverse effects were predicted for a plant sited at Lakhra.

A plant sited at Lakhra could also produce power at slightly lower economic cost than plants sited at either Khanot or Jamshoro. Although some infrastructure costs would be higher for a minemouth plant (e.g. transmission and water lines), the coal transport savings more than offset the higher infrastructure costs.

ECONOMIC COST OF BASELOAD POWER FROM THE LAKHRA PLANT AND ITS ALTERNATIVES

Two fossil fuel power projects which potentially could be constructed in Pakistan in lieu of the Lakhra project (500 MW) are:

- An imported (furnace) oil plant (300 MW); and
- An imported coal plant near Karachi (460 MW).

While these projects differ in size, they are substitutes for the Lakhra project in the sense that all the power plants would be operated initially as baseload plants.

There has been some concern that these projects are not substitutes because power grid stability requirements in Pakistan dictate where plants can be sited. While each plant has unique transmission line requirements, grid stability is not a problem and is not a relevant criterion for evaluating the Lakhra project.

Capital Cost Estimates Used in This Analysis

Gilbert Commonwealth International (GCI) and the John T. Boyd Company (Boyd) have developed their power plant and mining equipment capital cost estimates assuming that this equipment would be produced or at least supplied by companies in the OECD countries. Given the current state of the market, GCI believes that the cost of the power plant equipment would likely be 20 percent below the full cost estimates if bids were received today. By 1987 or 1988 when bids are finally received for all of the components in the Lakhra complex, costs may still be 20 percent below full OECD costs, or they may have increased. In any event, the capital cost estimates in the engineering feasibility studies are conservative and are likely to exceed the bids received for power plant equipment in the near-term.

The John T. Boyd Company mining cost estimates are based on U.S. equipment costs. Boyd believes that some discounts off their Base Case capital costs are possible, but Boyd does not think this possibility is sufficiently likely to affect the Base Case estimates.

Economic Cost of Baseload Power

The levelized economic costs of generating baseload power for the Lakra, imported coal, and imported oil plants are shown in Table ES-2. These costs were developed using a 10 percent real discount rate. As discussed at length in Chapter I, this rate is considered to be appropriate for evaluating power projects in developing countries.

Table ES-2

Economic Cost[1] of Baseload Power from the Alternative Plants (1985 U.S. ¢ per kw-hr)

Alternative Projects	Base Case	Reduced Cost Case	Best Lakhra Case
Lakhra 500 MW Power Plant	5.42	5.07	4.46
Imported Coal Plant	4.09	4.00	4.00
Imported Oil Plant	4.59	4.53	4.53

The Base Case results in the table correspond to the full engineering costs in the feasibility studies. Under the Base Case economic cost assumptions the Lakhra project cannot provide power as cheaply as either an imported oil or an imported coal plant. Baseload power from the Lakhra project is 33 percent more expensive than baseload power from an imported coal plant and 18 percent more expensive than baseload power from an imported oil plant.

The Reduced Cost Case shown in the table is based on the reduced set of costs for the power plants developed at the Lahore meetings in April 1986. The coal cost is the same as in the Base Case. The cost of power generation is lower for all the generating alternatives in the Reduced Cost Case, but the Lakhra plant's power cost is reduced more than the power cost of the alternatives. Despite this relative improvement in the Lakhra project's generation cost, baseload power from the Lakhra project is still 12 percent more expensive than power from the imported oil plant and 27 percent more expensive than power from the imported coal plant.

The Best Lakhra Case shown in Table ES-2 corresponds to the reduced capital costs for the power plant due to current depressed market conditions and a 20% reduction in Lakhra Base Case coal costs due to outstanding management and/or possible reductions in the capital equipment costs for the mines. The Best Lakhra Case is designed to determine whether the Lakhra project is economically feasible under the most optimistic assumptions considered to be achievable by the engineering feasibility contractors.

The Base Case coal cost is based on productivity assumptions which are considerably below the level of productivity normally achieved in the OECD countries. The John T. Boyd Company is confident that any reasonably competent management team can produce coal at the cost estimated in the Base Case.

Nevertheless, Boyd believes that an outstanding management team with the full backing of the government of Pakistan could reduce the Base Case coal production cost by twenty percent. There are examples of this kind of management in coal mining operations in developing countries, but unfortunately they are not the norm.

Under the Best Lakhra Case assumptions the Lakhra project produces baseload power at an economic cost which is less than the cost of power from the imported oil plant. The economic cost of baseload power from the Lakhra

plant is still 10 percent greater, however, than baseload power from the imported coal-fired plant.

The stand-alone project analysis provides some important insights into the relative economics of the Lakhra project. The stand-alone analysis is not sufficient, however, to provide a complete view of the Lakhra projects' economic feasibility because:

- An (incremental) imported coal plant is not available to substitute for the Lakhra project in the identical time period.
- An imported oil plant quite likely would not be operated as a baseload plant over its useful life.

As a result, a least-cost capacity expansion analysis must be performed to determine under what conditions the Lakhra project would be an attractive component of the power supply system in Pakistan over the relevant planning period.

LEAST-COST CAPACITY EXPANSION ANALYSIS

Figure ES-3 shows how the levelized long-run system marginal cost compares to the levelized economic cost of baseload power from an oil-fired and an imported coal-fired plant over the 30-year project period proposed for the Lakhra project (1992-2022). A review of the figure reveals that the long-run system marginal cost is less than the cost of baseload power from an imported oil plant and greater than the cost from an imported coal plant in both the Base and the High oil price plans.

Over the fiscal year 1992-2022 period the marginal power cost in the system is closer to the baseload oil power cost principally because imported coal plants are not available early in the period. In the late 1990s the long-run system marginal cost moves much closer to the imported coal baseload power cost. Since the Lakhra plant produces power at a cost above the imported coal plant in all cases, this means that there is a potential "window" for the Lakhra coal plant in the early 1990s. Once imported coal plants become available, the Lakhra project is much less economically attractive.

Figure ES-4 shows how the economic cost of power from the Lakhra project compares to the long-run marginal cost of power in the least-cost capacity expansion plan under Base oil price conditions. The economic cost of power from the Lakhra plant is shown as a percent of the long-run marginal cost of power in the least-cost plan. As noted in the figure, the Lakhra project economic costs shown do not take the project's unquantified benefits into account. A review of the figure reveals that without these benefits the economic cost of power from the Lakhra plant exceeds the long-run marginal cost of power in the least cost plan over almost the entire range of potential Lakhra project costs. Only with the project cost at the level in the Best Lakhra Case is the project clearly part of a least cost capacity expansion plan. Over the rest of the range of potential project costs, power from the Lakhra project is as much as 30 percent above the long-run marginal cost of power in the least cost plan.

Figure ES-3
Levelized Economic Cost of Baseload Power from Imported Coal and Oil Plants
(Percent of Long-Run System Marginal Cost Over 1992-2022 Period)

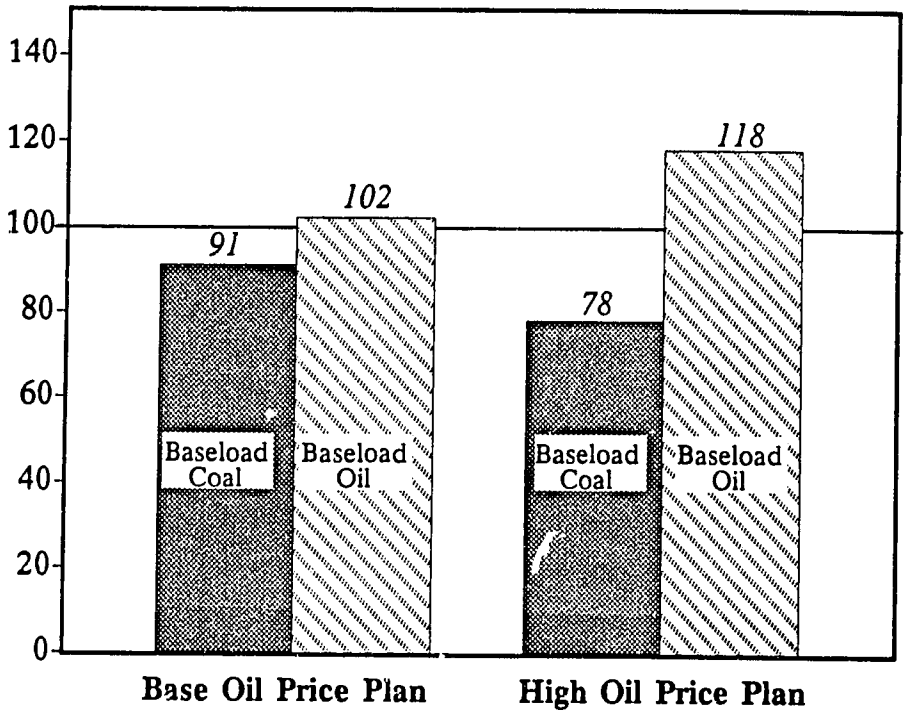
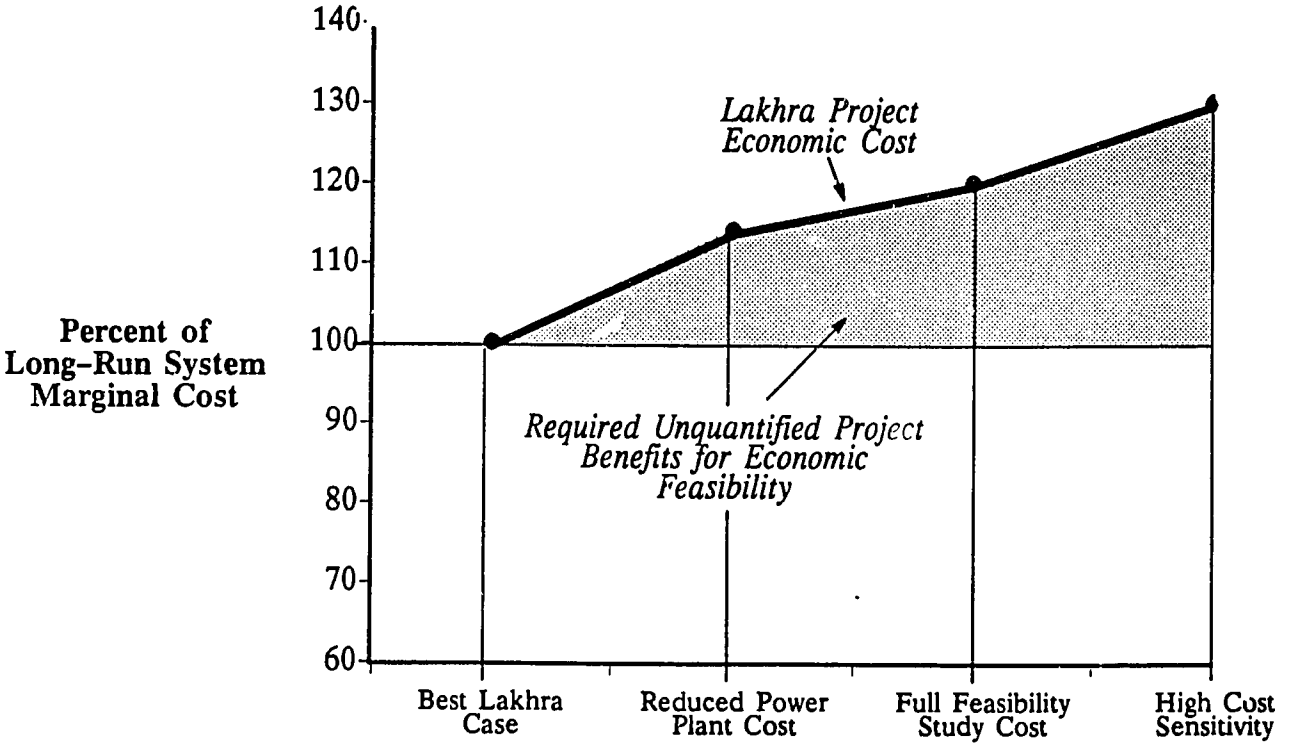


Figure ES-4
Economic Cost of Power from Lakhra Project
Base Oil Price Plan



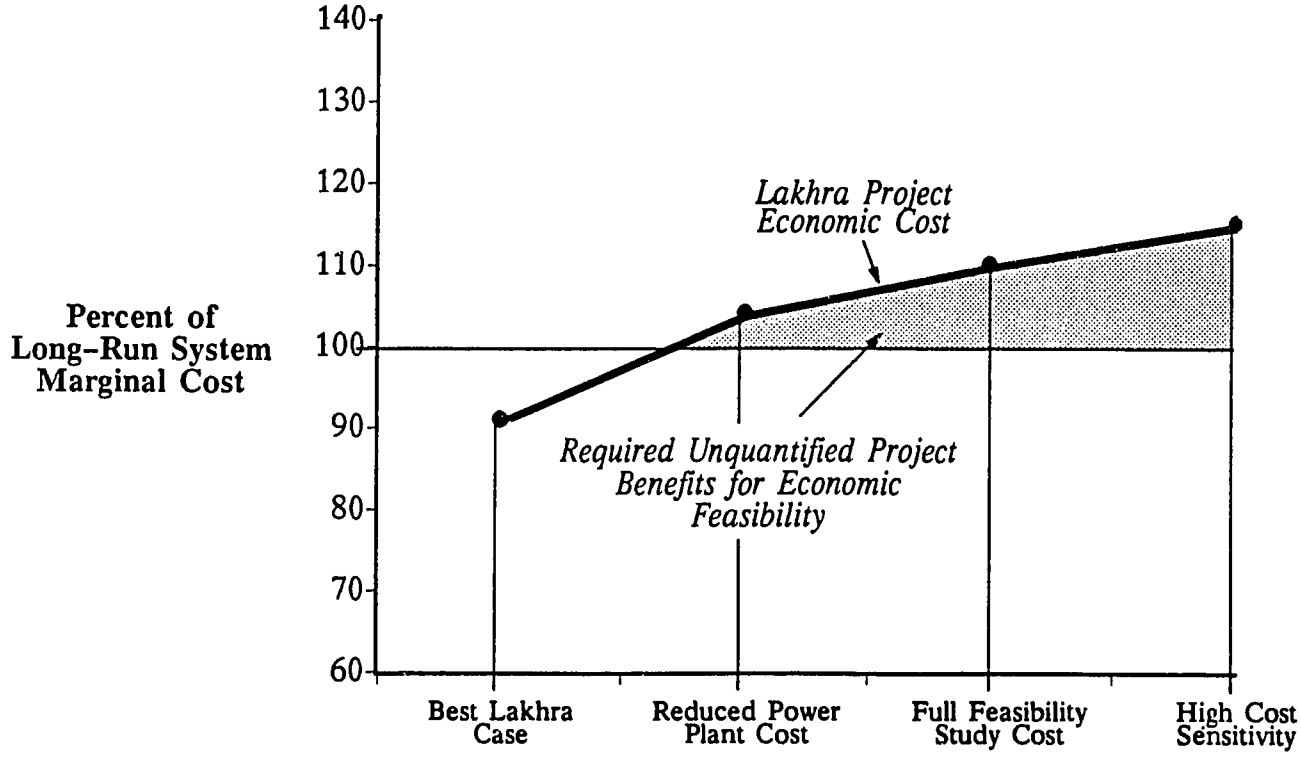
The High cost sensitivity case shown in Figure ES-4 (and ES-5) has not been mentioned previously. Although the focus in the study up to this point has been on the potential for reducing the Lakhra project's costs, the project's cost could be higher than the Base Case estimated in the engineering feasibility studies. For example, Boyd has indicated that mining costs could range from ten percent above Base Case costs to twenty percent below these costs.

Base Oil Price Plan Results with Additional Rupee Devaluation

Sensitivity analyses have been performed to test the effect of higher oil prices and addition rupee depreciation on the Lakhra project's economic feasibility. While oil prices could go up above the level in the Base oil price plan, ICF believes that a more likely change to the assumptions in that plan is additional devaluation of the rupee. Figure ES-5 shows how the economic cost of power from the Lakhra project compares to the long-run marginal cost of system power under these conditions. (The results shown are approximate because no formal least-cost plan was developed using these assumptions.) A review of the figure reveals that the Lakhra project is much more competitive if the rupee depreciates significantly. For example, the economic cost of power from the Lakhra project in the Reduced Power Plant Case is less than 5 percent above the long-run system marginal power cost.

Figure ES-5

Economic Cost of Power from Lakhra Project
35 Percent Rupee Depreciation Plan



OTHER BENEFITS AND COSTS OF THE LAKHRA PROJECT

The Lakhra power project would provide Pakistan with certain benefits which would not be available if the other project alternatives were selected in lieu of the Lakhra project. These benefits include the transfer of technology to the Pakistani mining sector, the creation of skilled jobs for Pakistanis in the coal production sector, a reduction in foreign exchange requirements, reduced dependence on imported energy, and power system energy supply diversification. The only offsetting cost is the higher environmental emissions associated with the Lakhra project than with either the imported oil or imported coal projects.

One of the most important benefits of the Lakhra power project is the exposure and training in modern coal mining methods that would be provided to local mining companies. The existing coal industry in Pakistan is characterized by primitive mining techniques and little knowledge about the extent and quality of its coal reserves. The implementation of a modern large-scale mining enterprise would have significant technology transfer benefits.

Energy Supply Diversification

The WAPDA power system has been principally dependent on hydropower and gas-fired thermal units for its power supply in the past. The limited availability of gas for incremental power generation (at least under the current regulatory system for gas) and the long construction time required for hydroelectric dams is forcing Pakistan to turn to other energy sources to produce power. Currently, additional power is being generated principally by increasing the system's use of imported oil.

Figure ES-6 shows the proportion of electric power generated by different energy sources in FY 1994 with and without the 500 MW Lakhra project (for a normal hydro availability case). If the capacity expansion plan is carried out without the 500 MW Lakhra project, Pakistan will depend on oil and gas-fired generation for about 45 percent of its electricity in that year. Hydroelectric and oil/gas units will together account for 88 percent of total generation.

If the Lakhra project were constructed, dependence on oil/gas units would drop from 45 to 39 percent in FY 1994. This reduction would provide Pakistan with some additional system energy supply diversification and would reduce exposure to oil price volatility.

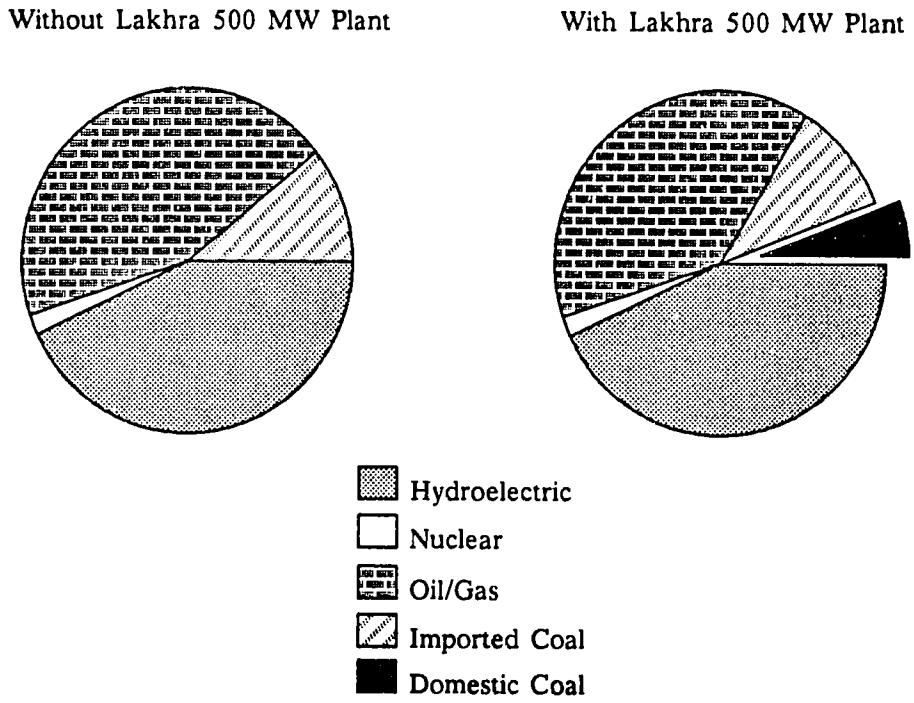
PROJECT INTERNAL RATE OF RETURN

Electricity is currently priced below its long-run marginal production cost on the WAPDA system. Even with the commitments made to the World Bank to raise prices, future prices are projected to remain below long-run marginal production cost. As a result, project revenues are not expected to equal Lakhra project costs, and the project will not provide a positive (nominal) return on investment.

The benefits of the project have been calculated by estimating the value of electricity to the nation, which exceeds the projected price. Based on this analysis the Lakhra project is projected to have a social IRR (in real

Figure ES-6

Effect of Lakhra Plant on Energy Supply Diversification in Fiscal year 1994



terms) of 19.4 percent. Few non-power projects have a higher social IRR, which indicates that investment in the Lakhra project is an attractive use of investment capital in Pakistan. If an alternative power generation project provides power at a lower economic cost than the Lakhra project, then it would have a higher IRR than the Lakhra project and would be preferable.

CONCLUSIONS RELATED TO ECONOMIC FEASIBILITY

Clearly the likely level of Lakhra project costs is key to determining whether the Lakhra project is economically feasible. If the Lakhra project's costs turn out to be similar to the Base Case estimates developed in the engineering feasibility studies, then the project will supply power at an economic cost which is about 20 percent greater than the long-run marginal cost of power in the Base oil price plan. Under these circumstances the Lakhra project can only be considered economically feasible if the addition of its unquantifiable benefits (noted above) raise the total benefits of the project by 20 percent.

ICF believes that a large portion of the unquantifiable benefits are likely to be available through other projects not yet evaluated at a cost which is less than 20 percent of the Base Case Lakhra project's costs. As such, ICF does <u>not</u> believe that the Lakhra project is economically feasible at the Base Case level of costs estimated in the engineering contractor feasibility reports.

As discussed earlier, the power plant equipment industry is currently depressed due to the low level of international demand for new large power plants. In addition, low-cost equipment producers outside the OECD countries are increasingly participating in the bidding for international projects and providing bids below the level estimated in engineering feasibility studies. As such, the probability of lowering the project costs to the level in the Reduced Power Plant Cost case is currently quite high.

The critical issue is whether significant reductions can be obtained in the Base Case feasibility study mining costs. Boyd has indicated than an expatriate firm with outstanding management could reduce the Base Case estimated costs by up to 20 percent. If a significant reduction can be obtained, then the economic cost of power from the Lakhra project would be at least within 10 percent of the long-run marginal cost in the least-cost plan. At this level of project economic cost, donor agencies and the government of Pakistan may decide that the unquantified economic benefits are sufficient to proceed with the project.

Given the likelihood that the rupee may decline in value, the significant possibility that bids will be significantly lower than the Base Case engineering feasibility study estimates, and the unquantified benefits of the project, ICF believes there is a reasonable chance that the Lakhra project is economically feasible. Nevertheless, given the current uncertainty about the likely cost of the project, ICF cannot unilaterally state that the 500 MW project is economically feasible.

FINANCIAL PLANS

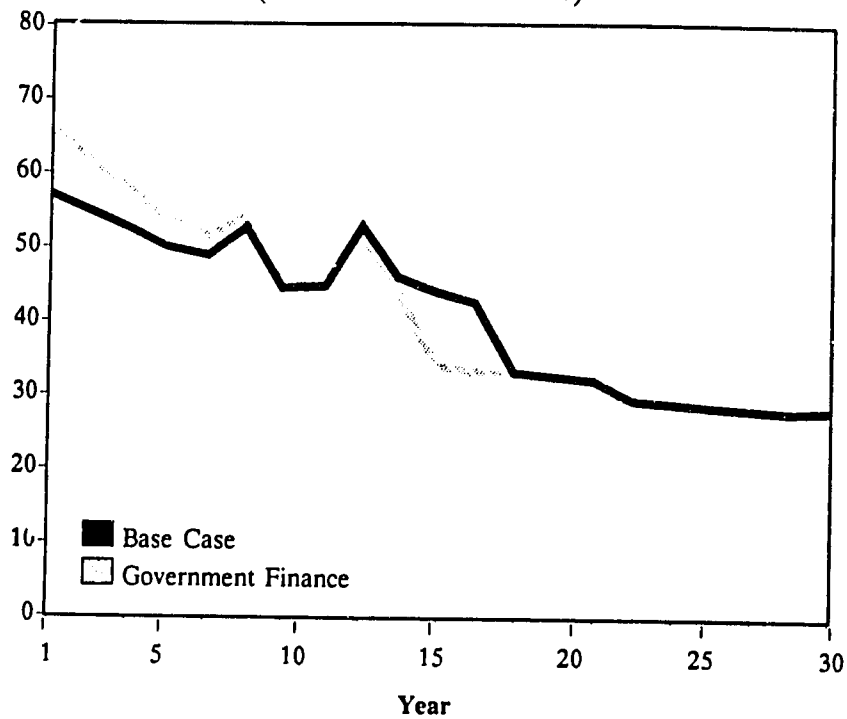
The Lakhra 500 MW power project is a large project with a very large initial capital requirement. According to current plans, the project will be divided into two components. For this reason, separate financial plans have been developed for the mines and the power plant.

Pakistan's normal practice is to provide loans for foreign capital through the government at standard rates even if there is a donor agency loan to support the project. As a result, project financing plans may be developed two ways, either by assuming the project receives the foreign loans or by assuming that the project receives government loans of the same amount but with different terms.

Figure ES-7 shows the revenue required per tonne to cover the mine's operating costs and finance payments. Two (low duty) cases are shown: the Base Case, in which the loans flow directly to the project; and the Government Finance Case, in which all the foreign loans are replaced with government loans to the project.

The terms of the loans are such that the price of coal (in real terms) is highest in the first year and declines over time. In the Base Case (loans made to the project), the first year price is $57.60/tonne (1985 dollars), and the average price for the first five years is $53.20/tonne. This price compares to a levelized cost (at a 7% real discount rate) of $40.00/tonne over thirty years.

FIGURE ES-7
Coal Prices Required Under Illustrative Financing Conditions
(1985 Dollars Per Tonne)



The price is considerably higher in the High Duty Case (not shown). The first year cost in the High Duty Case is $63.80/tonne (1985 dollars) and the average cost for the first five years is $58.60/tonne.

The financial plans for the power plant have been developed under the assumption that they are financed 100 percent through debt. Each power plant financial plan uses coal costs developed using consistent coal mine financial assumptions (i.e. the Base Case power plant is matched to the Base Case coal mine financial plan).

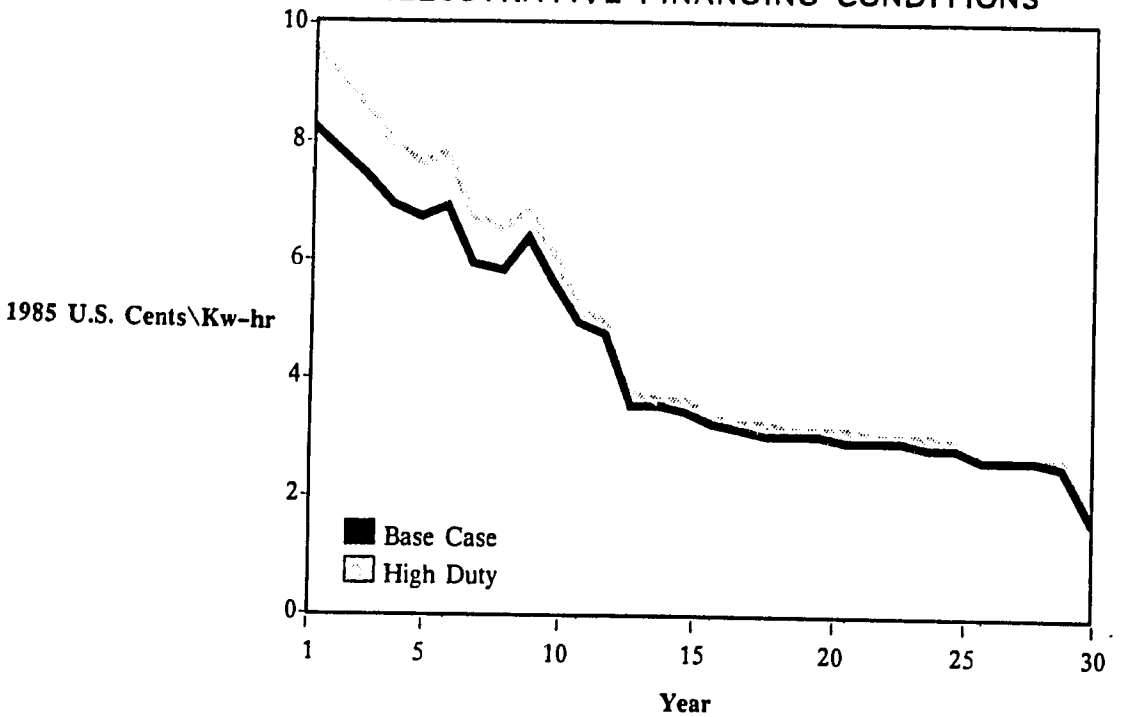
The electricity price at the bus bar required over time to meet project revenue needs is shown in Figure ES-8. Two cases are shown, the Base (low-duty) Case and the High Duty Case. In the Base Case financial plan (loans made to the project and low import taxes and duties), the price per kw-hr (1985 dollars) is 8.3 cents in the first year and 7.5 cents on average over the first five years. These prices compare to a levelized cost (at a 7% real discount rate) of 5.5 cents per kw-hr. The price is quite high in the early years because the coal price is high in those years and many of the power plant project loans must be paid back relatively quickly.

FINANCIAL FEASIBILITY OF THE PROJECT

The availability of funds for the Lakhra project depends critically on the finding on the part of the donor agencies that the project is part of a least cost capacity expansion plan for Pakistan. USAID and the development banks tentatively have earmarked funds for the Lakhra project, but these funds will be made available only after each institution concludes that the project is economically feasible.

FIGURE ES-8

PROJECT REVENUES[1] REQUIRED UNDER ILLUSTRATIVE FINANCING CONDITIONS



[1] Prices measured at the bus bar. The price to customers would be significantly higher to account for transmission and distribution costs and losses.

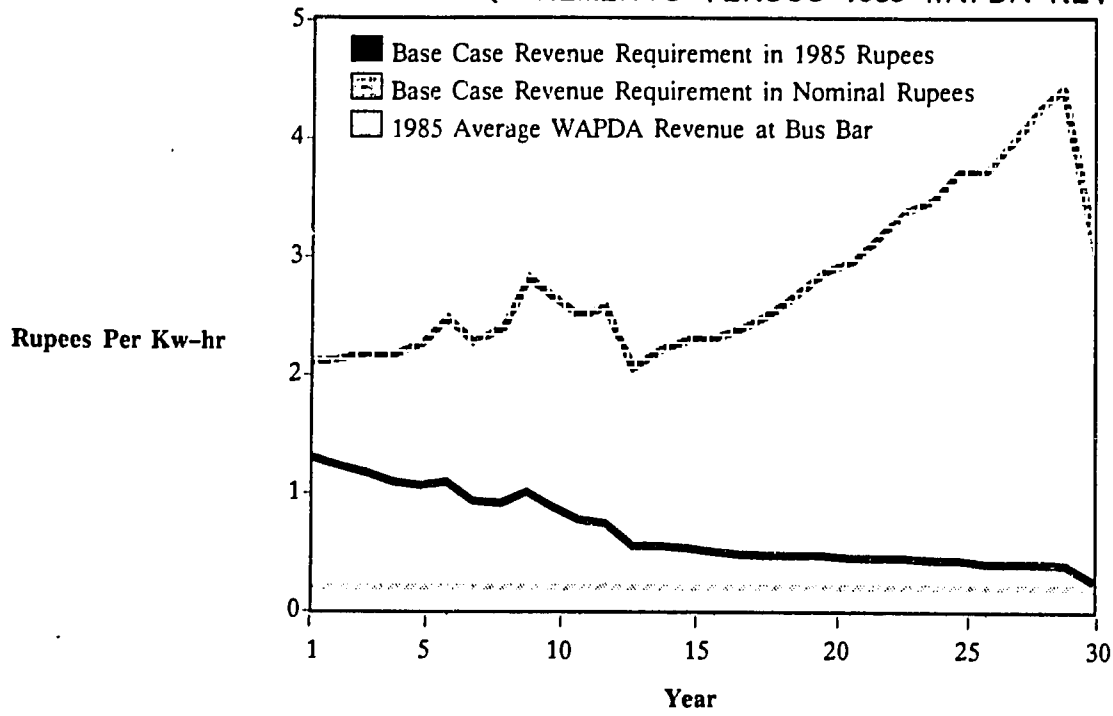
Of equal importance to the project's financial feasibility is WAPDA's capability to pay the Lakhra project's operating and financial costs over the project's useful life. As shown in Figure ES-9, during the first five years of operation WAPDA will require 2.2 rupees per kw-hr at the bus bar in nominal terms (which is about 1.1 rupees per kw-hr in 1985 terms) to cover the costs of the project.

Adjusting for transmission and distribution costs and the 29.3% loss rate, WAPDA had only .23 rupees per kw-hr to cover generation costs out of current revenues in 1985. This amount is shown in the figure. The current tariff contribution to generation is only 20 percent of the amount which will be required (in constant rupees) to cover the full costs of the Lakhra project in the initial years.

WAPDA can afford to pay the full cost of some new projects even if the revenues collected per kw-hr generated (net of transmission and distribution costs) are below the full cost of these plants. Nevertheless, the number of new generating plants under construction and slated for construction over the next six years is quite high. Clearly tariffs will have to be raised very significantly <u>in real terms</u> to enable WAPDA to pay the costs of the Lakhra project and the costs of the other projects planned and under construction. Satisfactory resolution of the tariff issue may be required before some donors will agree to provide financing for the Lakhra project.

FIGURE ES-9

PROJECT REVENUE REQUIREMENTS VERSUS 1985 WAPDA REVENUES[1]



[1] Prices and available revenues measured at the bus bar. The price to customers would be significantly higher to account for transmission and distribution costs and losses. The revenues shown are the revenues available net of transmission and distribution costs.

RESPONSE TO ISSUES RAISED BY DONOR AGENCIES

Pre-feasibility/feasibility studies of the Lakhra project were performed previously, but numerous issues were raised by donor agencies in response to WAPDA's request for funds to finance a 300 MW power plant at Jamshoro in 1984. These issues have been studied, many were found to be important, and the proposed Lakhra project has been completely redesigned as a result.

Delineation of Reserves and Geological Structures: Extensive additional drilling has been undertaken on the main PMDC tract, more reserves have been proven, and the proposed mining plan has been completely redesigned in response to the new information.

Coal Quality: Extensive testing of the Lakhra coals was performed. The estimated energy content was significantly reduced, and the estimated moisture and ash content of the run-of-mine coal was increased relative to the earlier studies. The engineering contractors are now confident that the quality of the coal has been correctly measured.

Coal Production Methods and Cost: The proposed mining plan was completely revised, the use of local equipment was reduced, and the proposed scale of the surface mines was greatly increased to improve reliability and take advantage

of surface mine economics of scale. Coal cost estimates were increased somewhat on a per-tonne basis and very significantly on a per-kcal basis relative to the most recent study (PMDC/WAPDA/SWEC) but are lower than the costs in the prior study (JICA).

Coal Preparation: Extensive analysis of coal washing technical and economic feasibility was performed. Coal washing was found to greatly increase coal supply costs and the total amount of coal which would have to be mined to fuel the power plant. It is not economically feasible.

Power Plant Site: An extensive analysis of the cost of power from plants at different sites was undertaken. A minemouth plant (at Lakhra) was found to generate power at lower cost than a plant sited elsewhere and to be more benign from an environment standpoint.

Environmental Controls: The proposed plant was found to have significant SO2 emissions. An environmental analysis determined that these emissions could cause problems if the plant were constructed at Khanot or Jamshoro, but would not have any significant adverse effects at the Lakhra power plant site.

Institutional Arrangements: The proposed mining plan is based on expatriate management, and plans are progressing to set up an independent corporation to produce Lakhra coal. If expatriate mine managers and power plant advisors are given sufficient authority in the early years, the project should operate well.

Project Reliability: Given the right institutional arrangements, the project should be quite reliable. The engineering feasibility contractors are confident that the project is technically feasible and likely to be very reliable. The provision of back-up fuel oil and imported coal supplies was investigated and rejected for economic and logistic reasons. Imported coal is not a good back-up option because the quality of the coal would be very different from Lakhra coal and considerable investment would be required to develop on imported coal supply system. A back-up fuel oil supply system could be provided, but it would raise system costs.

Overall-Economic Feasibility: The Lakhra power project is a relatively high-cost thermal power plant. At the Base Case costs estimated in the engineering feasibility studies, it is not an economically feasible project. If these costs could be reduced by 10-20 percent, the project would form part of a least-cost capacity expansion plan, particularly when the project's unquantifiable benefits are taken into account. The project would provide significant skilled jobs for Pakistani workers, would provide valuable technology transfer benefits to the mining sector, and would provide a hedge against potential additional depreciation of the rupee.

INTRODUCTION

This report presents the results of an economic and financial feasibility study of a proposed two-unit power plant complex in Pakistan fueled by coal mined in the Lakhra coal fields. The analysis performed is based on the work of numerous contractors employed by the United States Agency for International Development (USAID). The work performed includes mining, power plant, and power system engineering feasibility studies, a study of Pakistan's coal markets, analyses of the proposed project's environmental impacts and social soundness, and economic and financial feasibility analysis.

HISTORY OF THE PROJECT

In the early 1960s the Geological Survey of Pakistan and the U.S. Geological Survey carried out a systematic geological investigation of the coal resource base at Lakhra. They concluded that the coal in the Lakhra coal fields was principally a high grade lignite with a relatively high sulfur and ash content and that underground mining might be economically feasible.

In 1967 a Polish firm, contracted by the West Pakistan Industrial Development Corporation, completed a mining and power feasibility study. The firm concluded that an underground mining operation could produce one million tons per year of Lakhra coal to supply a 250 MW power station.

By 1976 high oil prices had spurred serious interest in constructing the proposed 250 MW plant. The Pakistan Mineral Development Corporation (PMDC) identified a 52 square kilometer area within the Lakhra coal fields as the site available to supply coal for the proposed plant. In 1978 the government of Pakistan initiated a feasibility study of a coal mine and power plant project using coal from the designated PMDC site.

JICA Study Scope and Results[1]

The Japanese International Cooperation Agency (JICA) carried out an extensive study of the proposed power plant and the associated coal mines over the 1979-81 period. As part of its study JICA undertook drilling and other exploratory geological work at the 52 square kilometer PMDC site in the Lakhra coal fields. JICA also assessed the feasibility of siting a power plant at three alternative sites near or at the coal fields; Lakhra, Khanot, and Jamshoro.

The JICA team recommended the construction of a 300 MW power plant at Jamshoro, fueled by about 1.2 million tonnes of coal per year produced from a combination of surface and underground mines as follows:

Surface:	950,000 tonnes per year
Underground:	220,000 tonnes per year

---

[1] Japan International Cooperation Agency, Feasibility Study for Lakhra Coal Mining and Power Station Project, Volumes 1 and 2, February 1981.

Surface mining was recommended as the preferred mining option for a majority of the required coal production due to the particular geologic conditions at the PMDC site.

The 300 MW power plant size was selected based on the 1.2 million tonnes of coal estimated to be available annually from the PMDC tract, the coal's estimated energy content, and the plant's heat rate. The JICA team estimated that the energy content of the coal would be 3820 kcal/kg (6900 BTU/lb) and that the plant's heat rate would be 2570 kcal/kw-hr. The team also estimated that Lakhra coal (excluding taxes and import duties) could be produced at the mine-mouth for about $57 per tonne (1985 dollars).[2]

The Jamshoro site was selected as the best site based on an overall comparison of physical conditions, availability of back-up fuel and water, access to transmission lines, and overall construction cost. The Jamshoro power plant site was found to be the lowest cost because the JICA team assumed that a worker's colony would not have to be constructed at the Jamshoro site. Since the Jamshoro site is close to the town of Hyderabad, they assumed that housing and support services would be available in Hyderabad.

JICA compared the cost of electricity from the 300 MW power plant (which included a flue gas scrubber) to an oil-fired power plant using various oil price escalation rates and project discount rates. Given the assumptions used in the cost comparision, the Lakhra power project was shown to be economically superior to an oil-fired alternative. An alternative power project using imported coal was not evaluated.

WAPDA/PMDC/SWEC Study Scope and Results[3]

The wide difference between the JICA cost estimates and actual mining costs in existing mines south of the main PMDC tract (a difference of over $30 per tonne in 1985 dollars) caused local Pakistani organizations to question the validity of the JICA estimates. In response, Pakistani government officials contacted USAID and requested assistance in performing another review of the Lakhra power project's feasibility.

Stone and Webster Engineering Corporation (SWEC) was retained by USAID to work with WAPDA and PMDC in a complete review of existing knowledge and previous studies related to the proposed Lakhra power project. The review did not include any additional field studies.

The WAPDA/PMDC/SWEC team developed a proposed mining plan to produce about 1.4 million tonnes/year. This plan had some different features than proposed

---

[2] ICF analysis of cost projections cited in JICA, op. cit., Vol. II; Tables 2-1 through 2-7 and 3-1 through 3-12 using a 10 percent real discount rate.

[3] Water and Power Development Authority (WAPDA), Pakistan Mineral Development Corporation (PMDC), and Stone and Webster Engineering Corporation (SWEC), Lakhra Coal and Power Development Project Review, April 1983.

in the earliest studies, but the emphasis on surface production of coal was similar to the JICA plan:

Surface:	1,140,000 tonnes/year
Underground:	250,000 tonnes/year

The required annual coal tonnage estimate was raised above those indicated in the earliest JICA work principally because the power plant heat rate was increased significantly. The WAPDA/PMDC/SWEC team also slightly reduced the assumed energy content of the coal to 3780 kcal/kg. The assumed size and annual utilization rate of the power plant were identical in both studies. Hence, a greater quantity of coal was deemed necessary to achieve the same generation specified in the JICA study.

The WAPDA/PMDC/SWEC team again recommended that a 300 MW power plant be sited at Jamshoro and be supplied with coal by rail from the Lakhra mines. The team concluded that 300 MW was the appropriate size for the plant from a power system perspective, even though the estimated recoverable reserves on the PMDC tract could support a larger plant. The team concluded that construction of a 600 MW plant would increase WAPDA's generating capacity reserve requirements and raise total costs more than construction of two 300 MW plants. Consequently, they recom- mended that the power supply system be expanded using 300 MW units.

The WAPDA/PMDC/SWEC team reduced the mining cost estimates in the JICA study by reducing the amount of equipment required, assuming the deep mines would use the surface excavations for mine entrances, and reducing the estimated operating costs. Their final cost estimate for Lakhra coal (containing 3780 kcal/kg) at the mine-mouth was about $37 per tonne (1985 U.S. dollars). This was 35 percent less than the cost estimated by the JICA team on a per tonne basis.[4] The total fuel cost for the power plant was only 23 percent lower, however, because the estimated coal requirement for the plant was 13 percent higher.

The WAPDA/PMDC/SWEC team again concluded that electricity from a Lakhra power plant would be cheaper than from an oil-fired plant. However, they also concluded that electricity from the Lakhra plant would be 6% more expensive than electricity from an imported coal plant, assuming that the existing coal unloading facilities at Port Qasim could be used to supply the imported coal plant.

Donor Agency Responses to the Studies

Based on the revised cost estimates provided by the WAPDA/PMDC/SWEC team, WAPDA decided to construct the 300 MW Lakhra power project. Subsequently, WAPDA requested financial support for the Lakhra power project from USAID, the World Bank, and the Asian Development Bank. These institutions indicated

---

[4] ICF analysis of costs cited in WAPDA/PMDC/SWEC, op. cit., Tables 8-1 and 8-2 using a 10 percent real discount rate, including some ICF assumptions as necessary to deal with the limited documentation for the cost estimates in the report.

their potential interest in the project, but they were not willing to proceed without more analysis of several key aspects of the project. The issues raised were as follows:

- Delineation of Reserves and Geological Structures: Donor agency officials were convinced that sufficient reserves were available on the PMDC tract to support the project. However, they were concerned that more drilling was necessary to further define the reserves and the surrounding geological structures before detailed mine development plans could be completed.

- Coal Quality: Donor agency officials were concerned that the quality of the coal was uncertain and that the sulfur content might be so high that expensive emission controls would be required on the plant. They were also concerned that existing studies had not adequately determined the energy content of the coal due to the loss of moisture between mining and testing.

- Coal Production Methods and Cost: Donor agency officials were concerned that the likely coal production costs were very high. They were also skeptical about the desirability of certain aspects of the mining plan proposed in the WAPDA/PMDC/SWEC report. Specifically, they thought that the heavy reliance on local equipment might be unwise. Additionally, some officials suggested that an all-surface plan might be superior to the combination surface/underground plan.

- Coal Preparation: Donor agency officials suggested that coal washing might be an economical way to reduce the high levels of sulfur and ash in the coal.

- Power Plant Site: Donor agency officials questioned the decision to site the plant at Jamshoro because transportation costs would be higher for the Jamshoro site than for the other sites, which were closer to the mines.

- Environmental Controls: Donor agency officials requested that a complete environmental impact analysis be performed and that the costs of meeting different environmental standards be examined.

- Institutional Arrangements: Donor agency officials were concerned that the project be organized with sufficient foreign expertise and management control to ensure the successful outcome of a complex project of a type new to Pakistan. USAID was particularly concerned that private participation in the project be assured.

- Project Reliability: Donor agency officials were concerned that the project be structured to reduce the

risk of failure. They specifically suggested that the Lakhra coal be blended with imported coal or that an oil back-up system be included in the power plant.

- Overall Economic Feasibility: Donor agency officials were concerned that the project be shown to be economically feasible, particularly since Lakhra coal is poor in quality and the production cost estimates were high relative to mining costs in other parts of the world.

The wide scope of issues identified by the donor agency officials indicates that they did not find the existing feasibility studies adequate for their purposes. Further investigation was clearly necessary before a specific project could be approved for financing.

Scope of the Project Reappraisal

USAID and WAPDA decided to undertake a comprehensive reappraisal of the proposed Lakhra power project, including a substantial amount of new field studies. Six studies were initiated using U.S. contractors in 1985. The contractors and the scope of their efforts were as follows:

- John T. Boyd Company. The John T. Boyd company was retained to conduct an exploratory drilling program in the Lakhra coal fields, reassess the coal reserves on the designated PMDC site, develop alternative mining plans and the associated coal production costs, assess coal washing costs, and develop costs for transporting coal from the mines to Khanot and Jamshoro.

- Gilbert Commonwealth International (GCI). GCI was retained to develop detailed design and cost estimates for Lakhra coal-fired power plants sited at Lakhra, Khanot, and Jamshoro (including differential transmission costs) and rough estimates of the cost of an imported oil plant and an imported coal plant sited in the Karachi or Port Qasim area. The Lakhra power plant design and cost estimates were based on extensive burn tests of both washed and unwashed coal and included options with extensive environmental controls. GCI was also directed to work with WAPDA staff to determine whether a Lakhra power project would form part of a least cost generation plan for Pakistan.[5]

---

[5] GCI and WAPDA staff used the Wien Automatic System Planning (WASP III) Model to develop these plans. The WASP Model was installed at WAPDA headquarters in Lahore in January 1985, and all the computer analyses were performed there.

- Social Soundness Team. Dr. Arthur Helweg, Iqbal Niazi, and Saskia Vleer were retained to assess the social soundness (i.e., the compatibility of the project with the existing social structure) of the Lakhra power project and to recommend actions which could reduce any potential adverse social effects of the project.

- Environmental Sciences and Engineering (ESE). ESE was retained to perform an environmental and socio-economic assessment of the effects of the various Lakhra mining and power plant alternatives. The scope of the assessment included air quality dispersion modeling for the three plant sites and a rough analysis of the environmental effects of an alternative imported coal plant.

- Bank of America Limited (BAIL). BAIL was retained to evaluate the financial implications of alternative institutional arrangements for the coal mine and power plant portions of the project, to investigate the availability of funds for the project from Donor Agencies, and to assist in preparing the solicitation(s) for construction of the project.

- ICF Incorporated. ICF was retained to assemble and coordinate the information developed by the other contractors, to evaluate the alternative Lakhra project options, and to perform an economic feasibility study of the best Lakhra project. The economic analysis was performed using cost and other information obtained from the other contractors and shadow price and benefits estimates obtained from the World Bank or developed by ICF. ICF also developed illustrative financial plans for the Lakhra power project.

The USAID contractors were directed to perform their studies in sufficient depth to satisfy the potential donor agencies that all the issues relating to the Lakhra power project had been thoroughly addressed.

This draft final report provides ICF's evaluation of the economic feasibility of the Lakhra power project based on the information available to ICF on September 2, 1986. Since most of the contractor studies were complete at that time, ICF believes that the results presented here are fully consistent with the USAID-sponsored feasibility studies.

ALTERNATIVES REVIEWED IN THE REAPPRAISAL

The initial intent of the reappraisal was to confirm the economic feasibility of the proposed 300 MW power plant sited at Jamshoro and fueled with Lakhra coal mined at the main PMDC tract. During the course of the reappraisal it became clear that Jamshoro was not the best site for the power plant and that 300 MW was not the optimal project size.

The following Lakhra project configurations were reviewed:

- Power plants sited at Jamshoro, Khanot, and Lakhra
- Power plant sizes from 180 to 700 MW, including either one or two units
- Flue gas desulfurization at 22.5, 50, and 75% SO2 reduction
- Alternative mining plans with underground mines ranging from 300,000 to 1.4 million tonnes per year and surface mines ranging from 750,000 to 4 million tonnes per year.
- Coal supplied to the power plant in a run-of-mine and washed condition.

Ultimately a 500 MW mine-mouth plant fueled by a predominately surface mining operation was selected as the best project configuration from a technical, economic, and environmental stand point. This project includes a 300,000 tonne per year underground mine and surface mines producing 2.4 million tonnes of coal per year. Coal washing was rejected principally on economic grounds.

Both oil-fired and imported coal-fired power plants were evaluated as potential alternatives to the best Lakhra project. Since feasibility studies for these other alternatives are also being performed, this study is based on a thorough, consistent, and current set of engineering cost and operating assumptions for all of these plants.

ORGANIZATION OF THE REPORT

This report consists of three chapters and nine appendices documenting the detailed analyses performed during the course of this study. Chapter I describes the Lakhra project configurations reviewed during the course of the study. These configurations are analyzed from a technical, environmental, and economic standpoint.

Chapter II presents the economic feasibility analysis of the best Lakhra project configuration identified in Chapter I. The Lakhra project is compared to imported oil and imported coal alternatives on a cost per kw-hr basis and is analyzed to determined whether it forms part of a least cost capacity expansion plan for Pakistan.

Chapter III presents financial plans for the best Lakhra project configuration identified in Chapter I. Separate plans are provided for the mining and power plant portions of the project.

I. LAKHRA PROJECT OPTIONS

A wide variety of project configurations were assessed for generating power using coal from the Lakhra coal fields. In this feasibility effort the principal criterion for selecting the best project option was least economic cost per kw-hr of power generated; consistent with technical feasibility, proven reserves, project reliability, and environmental constraints.

The most difficult part of the project definition effort was identifying the least cost mining plans appropriate for the coal reserves made available for the project. The size of the power plant and the location of the plant site were important but secondary aspects of the project evaluation effort.

DESCRIPTION OF THE RECOMMENDED PROJECT CONFIGURATION

The recommended Lakhra power project consists of a two-unit 500 MW minemouth power plant, a mining complex to produce 2.7 million metric tonnes/year of lignite, and the associated infrastructure. The diagram shown in Figure I-1 shows the location of the project site in Pakistan and the detail of the infrastructure requirements.

The power plant would be located about two kilometers from the mines and about twenty kilometers west of Khanot, which is about 30 kilometers north of Jamshoro. A road, a 500 KV transmission line, and a water pipeline would be constructed between Lakhra and the Khanot area. The Khanot area is the location closest to Lakhra that is situated on Pakistan's north-south highway, railroad, and transmission line. Khanot also has good access to water from the Indus river, which is located about three kilometers to the east. One of the existing 500 KV lines running from Jamshoro to the north would be opened at Khanot and extended to the Lakhra power project. Transmission system planning studies show this to be the best transmission option.

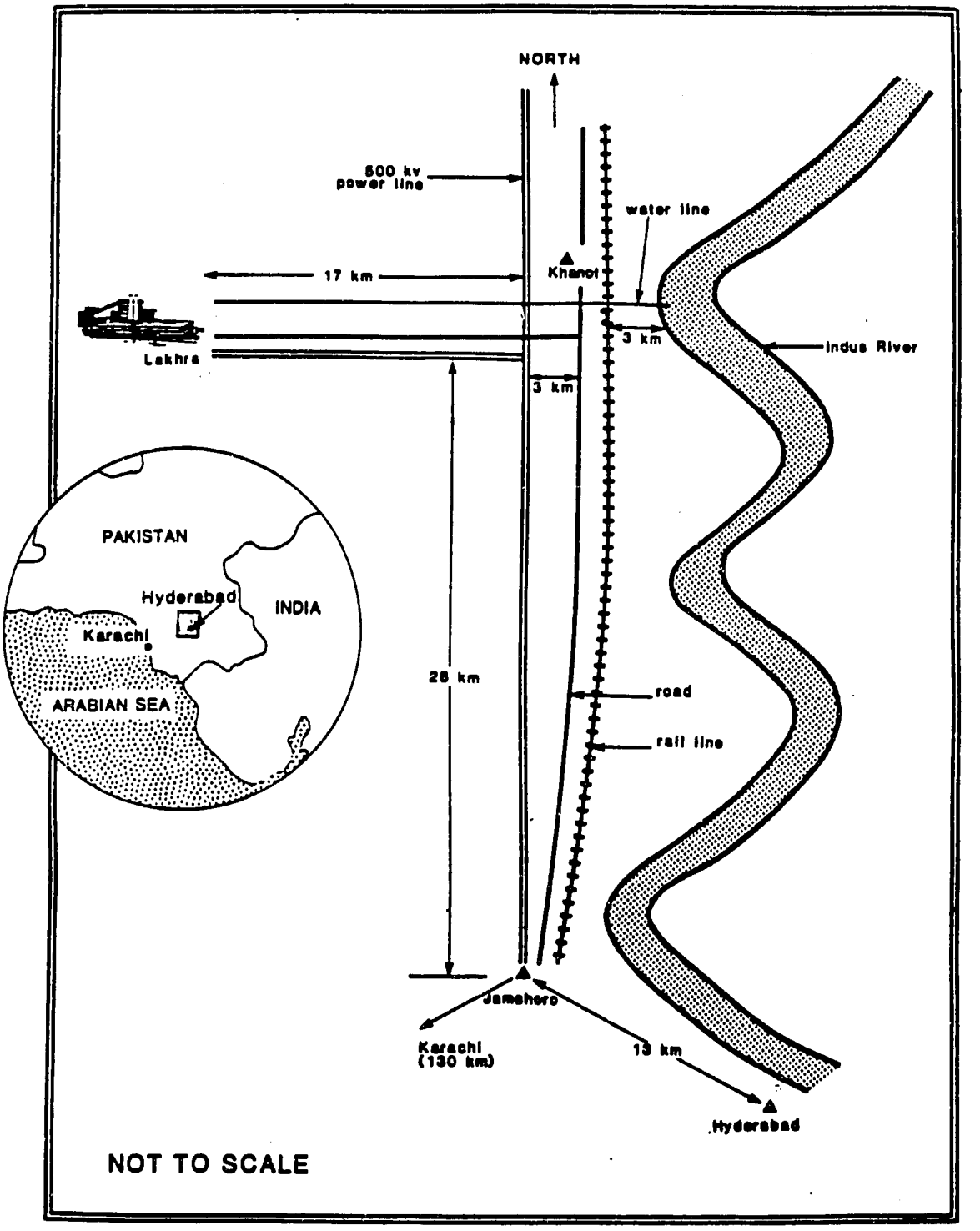
Construction is scheduled to begin in 1987. The first 250 MW unit would commence operation in late 1991 and the second unit in 1992 approximately 12 months following the first. Coal production would increase in conjunction with the start-up and operating schedule of the two power plants.

The coal mines would consist of two large surface mines which would operate for thirty years with supplemental production from smaller underground mines which have a shorter operating life. The surface mines would produce about 2.4 million tonnes of coal per year. The underground mines would produce about 300,000 tonnes of coal per year. The total annual coal production would be 2.7 million metric tonnes once the mines are in full operation, continuing at this rate over the anticipated 30-year lifetime of the power plant.

Lakhra coal is a relatively high-BTU lignite. Extensive testing of the coal indicates that it will burn very well in a properly designed boiler, and no fuel oil is required for flame stabilization. Nevertheless, the ash includes a high proportion of iron, which gives the coal a high slagging and fouling potential. Additionally, the sulfur content of the coal is unusually high, which gives the coal a high corrosion and air pollution potential. Further, the coal has a propensity for self-combustion. These characteristics

FIGURE I-1

LAKHRA POWER PROJECT LOCATION



have important implications for the design and operation of the power plant and for the mining plans for extracting coal from the Lakhra field. The recommended power plant/mining project is designed to ensure technical feasibility and reliability using Lakhra coal.

The proposed power plant would consist of two 250 MW units with two flues utilizing a common stack. The power plant units employ very large boilers designed to operate at a system pressure of 1800 psi and a temperature of 950°F. The boiler specifications have been established to minimize slagging and fouling. The large boilers have high capital costs but are required to deal with the high iron content and the relatively low heating value of the Lakhra coals. The boilers are designed to operate at low gas velocities to minimize the potential corrosion caused by the abrasive characteristics of Lakhra coal. These design parameters should facilitate the safe and reliable operation of the power plant despite the undesirable properties of Lakhra coal.

Although Lakhra coal is subject to spontaneous combustion, stockpiling is possible if proper procedures are followed. The stockpile would be regularly compacted and would not exceed one meter in depth. This practice should prevent any combustion problems while providing a coal supply which can be used during unanticipated disruptions of mine production. Nevertheless, the principal source of incremental coal supplies in the reference mine feasibility design is spare surge capacity in the surface mining operation. Other possibilities for incremental coal supplies exist, as discussed in the detailed mine feasibility report.

The coal would be pulverized prior to feeding into the boiler. Tests of the coal indicate that some sulfur would be removed in this operation, and some would be captured or retained in the fly ash. Tests indicate that about 90 percent of the sulfur in the coal would be burned and would exit the stack in the form of sulfur dioxide or primary sulfates.

At a 70 percent annual capacity utilization, the uncontrolled sulfur dioxide emissions from the two units would average about 685 tonnes per day on an annual basis. The environmental analysis has confirmed that there is no background ambient SO_2 present at the Lakhra site and that the high stack utilized for the plant would ensure that local ambient SO_2 levels remain low. Therefore, no environmental impacts of concern would result from the Lakhra power plant.

The power plant would be owned and operated by WAPDA. The coal reserves are currently the property of the Pakistan Mineral Development Corporation (PMDC). The current plan is to create a new private corporation, the Lakhra Mine Development Corporation (LMDC), which would own and operate the mines. WAPDA would negotiate a long-term contract with the LMDC for coal supplies. A foreign-owned mining company with significant surface mining experience would manage the overall mining operation on either a contract or equity basis.

PROJECT CONFIGURATIONS EVALUATED

Four very different projects were evaluated in detail as part of the Lakhra project selection process:

- A 300 MW power plant fueled by coal produced in surface and underground mines located on the main PMDC tract in the Lakhra coal fields.

- A 700 MW (two-unit) power plant with alternative levels of flue gas desulfurization fueled by coal produced principally from surface mines on the main PMDC tract.

- A 500 MW (two-unit) power plant (with no scrubber) fueled by coal produced principally from surface mines on the main PMDC tract.

- A 250 MW power plant fueled by coal produced from underground mines on the main PMDC tract and on privately leased areas to the south.

Other project options were also considered, including a 550 MW and a 180 MW power plant, but these options were essentially variations of the four projects shown above. In addition, three sites were considered for the power plant: Jamshoro, Khanot, and Lakhra (i.e. the minemouth). Alternative coal transport systems were evaluated for delivering coal to the Khanot and Jamshoro sites. Finally, both flue gas scrubbing and coal washing were evaluated as potential alternatives to reduce SO2 emissions.

The initial project configuration evaluated was similar to the one proposed by the SWEC/PMDC/WAPDA team. This project included a 300 MW power plant, several underground mines producing 650,000 tonnes per year, and a surface mine producing 750 thousand tonnes of coal per year. Later when the estimated energy content of the coal was reduced, the required size of the surface mine was increased to 1.0 million tonnes per year. This project was found to be uneconomic due to the high cost of coal production from the relatively small surface mine. Nevertheless, the very low estimated cost of underground coal production from the central portion of the main PMDC tract indicated that whatever mining plan was adopted, some portion of the production should come from underground mines.

The second project configuration examined included a 700 MW power plant, an underground mine producing 300,000 tonnes per year and two surface mines producing 4 million tonnes per year. This mining plan was believed to be the largest possible consistent with the coal reserves available on the main PMDC tract. With Boyd's final coal energy content estimates, operation of the 700 MW plant would only require surface mine production of 3.45 million tonnes of coal per year. The 700 MW project without environmental controls had lower costs per kw-hr produced than the 300 MW project due to the economies of scale achieved with the surface mine and power plant, but it was found to be environmentally unacceptable. To meet international sulfur dioxide emission standards this plant would have to have a flue gas scrubber. Such a project is potentially unattractive because it would be technically more complex and could be difficult to finance due to the large amount of capital required.

The third project configuration evaluated was the largest power plant which could be constructed to meet World Bank SO2 emission guidelines without

the use of a flue gas scrubber. After extensive consultations with potential donor agencies, WAPDA and other responsible parties concluded that 500 MW was the maximum permissible plant size (at least for the purposes of the feasibility study) that did not involve the use of flue gas scrubbers. To meet this plant's coal requirements, the required surface mine production was initially estimated to be 2.7 million tonnes per year. With Boyd's final coal quality estimates, the required surface mine production was reduced to 2.4 million tonnes per year.

Concurrent with the project evaluations, the John T. Boyd Company carried out an extensive drilling and logging program. Early in May 1986 Boyd determined that there were more reserves on the main PMDC tract suitable for underground mining than previously estimated. Based on these findings a fourth project configuration was examined. This option was a 250 MW power plant supplied by numerous underground mines producing 1.0 million tonnes per year on the main PMDC tract and 400,000 tonnes per year on private leases located to the south of the main PMDC tract.

ECONOMIC COST ESTIMATION PROCESS

All of the project configurations are capital-intensive projects which would provide baseload power to the WAPDA system. As such, these projects are substitutes for each other and can be compared on a stand-alone basis. These projects were compared on a levelized economic cost basis, using the following approach:

- All costs were compared using mid-1985 U.S. dollars.
- All costs were levelized using a 10 percent discount rate.
- All local costs were multiplied by a .77 shadow factor to adjust for the overvaluation of the Pakistani rupee in mid-1985.

Discount Rate Selection

Investment projects may be evaluated using a number of different methods. Two methods commonly used are (1) projecting revenues and costs and calculating internal rates of return and (2) discounting costs and benefits using the opportunity cost of capital and comparing the present discounted value of the costs to the present discounted value of the benefits. In the case of power projects, generation alternatives can best be compared by examining discounted costs since the output of all the alternative projects is the same (kilowatt-hours of electricity). Those alternatives providing electricity at the lowest cost generally are preferred, although other factors and considerations not quantified in terms of costs could dictate the selection of a higher-cost option.

The selection of the discount rate is a very critical element in the analysis. The use of a high discount rate will make capital-intensive projects less attractive because the initial capital investment is not discounted very much while the benefits of the project and the costs in later years (generally operating and maintenance costs) will be discounted heavily.

Studies of existing large capital projects in developing countries often show that the actual realized return on investment is very low, frequently less than 5 percent. On the other hand, feasibility studies for these projects generally project much higher returns, usually greater than 10 percent (real). The difference is due to the frequency of cost overruns during construction, delays in making the projects operational, and lower than anticipated capacity utilization once operation begins.

Squire, Little, and Durdag define the accounting rate of interest (ARI) as the real discount rate which should be applied to investments whose inputs and outputs have been valued using shadow prices.[1] They determined that the average ARI for Pakistan in the 1970s was only about 2 percent because many of the large public investment projects during that period were not very successful.[2]

Other analysts have estimated much higher ARIs for Pakistan. Tsakok adopts 6.0 percent as the best estimate[3] and cites three other sources which give ranges from 7.3 to 13.0 percent (real).[4] In their recent study of shadow prices for the Kalabagh Dam project, Markandya, Pearce, and Parker estimate that the ARI in Pakistan is 4.6 percent.[5]

The World Bank has been providing loans for power projects for a long time and has considerable experience with implementation of these projects. Fifty-six completed power projects were evaluated during the 1979-83 period to compare actual results with the projected results in the original feasibility study. These evaluations determined that the projects have generally met their physical objectives, but delays in completion averaged 20 months and cost overuns averaged 39 percent.[6]

The World Bank has adopted 10 percent (real) as its standard for power project evaluation in all countries. The use of a 10 percent discount rate ensures that capital is likely to provide a reasonable return on investment even if the project is not implemented as efficiently, as easily, or at as low a cost as anticipated by the project's sponsors. Consistent with this philosophy ICF has used a 10 percent discount rate in this economic feasibility study. Implicit in the use of this discount rate is a "risk"

---

[1] Lyn Squire, M.D. Little, and Mete Durdag, "Application of Shadow Pricing to Country Economic Analysis with an Illustration from Pakistan," World Bank Staff Working Paper, No. 330, June 1979, pp. 6-7.

[2] Ibid, p. 10.

[3] I. Tsakok, Shadow Prices for Pakistan, draft June 26, 1981, p. 65.

[4] Ibid, Annex 1, p. 11.

[5] A. Markandya, D. Pearce, A. Parker, Shadow Prices in Pakistan, January 1986, p. 60.

[6] Warren C. Baum and Stokes M. Tolbert, Investing in Development; Lessons in World Bank Experience, 1985, p. 178.

adjustment for potential unanticipated but expected problems in project implementation and operation.

Shadow Price Factors

When investment projects are to be compared which use large amounts of foreign capital, care must be taken to ensure that foreign and local costs are evaluated in a fair and consistent manner. There are many reasons why the use of market prices may exaggerate the true local costs of a project. If market costs exceed the true costs of local components of a proposed project, then local costs must be reduced as part of the project evaluation.

In Pakistan the high tariffs on certain imported goods create a structural overvaluation of the rupee. In addition, the mid-1985 Pakistani exchange rate was not sustainable due to the very significant surplus of imports relative to exports at that time. This imbalance was sustained by very large worker remittances from overseas, which are expected to diminish. The import tariffs and the worker remittances together were estimated to cause a significant overvaluation of the rupee in mid-1985 when the costs were estimated for this project. Between mid-1985 and June 1986 the rupee has already depreciated by about 13 percent in real terms. For this reason all local costs were multiplied by .77 in this study to provide a better estimate of the likely project economic costs. Appendix F presents the basis for this factor in detail.

LAKHRA COAL RESERVES AVAILABLE FOR THE PROJECT

Knowledge of the extent and quality of the available coal reserves is a critical starting point for a feasibility study of a coal-fired power project. Uncertainty about the extent and quality of the available reserves was cited as a major issue by the potential donor agencies prior to the commencement of the USAID-funded feasibility studies.

Three of the project configurations examined rely entirely on coal produced on the main PMDC tract in the Lakhra coal fields. The 250 MW project fueled by coal produced entirely from underground mines would obtain about 70 percent of its coal from the main PMDC tract. Accordingly, the main PMDC tract has been the focus of the coal resource analysis.

Almost all of the exploratory drilling carried out in the Lakhra area has been on the main PMDC tract. Table I-1 provides a summary of the drilling performed to date. As shown, 72 holes were drilled prior to 1984. Since that time, USAID has funded the drilling of 106 additional holes to improve the knowledge of the coal resources on the tract.

Based on the drilling results, the John T. Boyd Company has estimated that 174 million tonnes of coal resources are in place on the main PMDC tract. Boyd estimates that 116 million tonnes could be extracted using surface mines. Alternatively 31 million tones could be extracted using underground mines. Reliance on underground mining implicitly sterilizes a large portion of otherwise surface-minable reserves. A summary of Boyd's estimates is shown in Table I-2.

TABLE I-1

EXPLORATORY DRILLING ON MAIN PMDC TRACT

Source	Number of Holes	Date
Geological Survey of Pakistan	3	Mid-1960s
PMDC	19	1975-76
JICA	50	1979
USAID	10	1984
USAID/BOYD	96	1985-86

Source: John T. Boyd, Final Lignite Reserve and Quality-Phase II, Lakhra Coal Project, Volume 11, May 28, 1986, p. 3-8.

TABLE I-2

ESTIMATED COAL RESOURCES/RESERVES ON MAIN PMDC TRACT (Million Tonnes)

	In-Place	Run-of-Mine Production
Resources	174.0	164.8
Reserves[1]		
Surface Mineable	122.2	115.7
Underground Mineable	59.5	30.7

[1] The surface mineable and underground mineable reserves are not additive.

Source: John T. Boyd Company, Final Lignite Reserve and Quality-Phase II, Lakhra Coal Project, Volume 11, May 28, 1986, p. 4-6.

No exploratory drilling was carried out by Boyd off the main PMDC tract. Due to the low level of exploratory drilling performed by private entities and the focus of the Boyd effort exclusively on the main PMDC tract, proven reserves outside the main PMDC tract are quite small. This does not mean that the actual quantities of coal reserves are small, but merely that they have not been proven to exist according to generally accepted geologic criteria. Boyd has made some very rough (conservative) estimates of the coal resources originally available and the remaining recoverable reserves off the main PMDC tract. These estimates are shown in Table I-3.

Boyd estimates that there were 203 million tonnes of coal originally in-place in the Lakhra coal fields outside the main PMDC tract, of which about 147 million tonnes remain. If these resources are mined efficiently using underground mining methods, Boyd estimates that 54 million tones of coal could be recovered. If the ongoing Lakhra mining practices continue, total recovery is likely to be significantly lower.

TABLE I-3

REMAINING RECOVERABLE[1] RESERVES AT LAKHRA OFF MAIN PMDC TRACT (Million Tonnes)

	Originally In-Place	Produced	Sterilized	Remaining	Remaining Recoverable
Lailian Seam	162	9	40	113	45[2]
Other Seams	41	1	6	34	9[3]
	203	10	46	147	54

[1] Using underground mining methods.
[2] 40% of remaining.
[3] 25% of remaining.

Source: John T. Boyd Company private conversations with ICF staff

Coal Quality

The in-place and run-of-mine quality of the available coal has also been an important issue. After extensive testing and computer simulation, Boyd has concluded that the Lakhra coal on the main PMDC tract has a higher moisture content and lower energy content per tonne than estimated in previous feasibility studies. Boyd's estimates of coal quality from surface and underground mines on the main PMDC tract are shown in Table I-4.

As mentioned earlier, the JICA team estimated that run-of-mine Lakhra coal energy content would average 3820 kcal/kg. The PMDC/WAPDA/SWEC team reduced this estimate to 3780 kcal/kg. Boyd reduced these estimates of Lakhra coal

energy content by over 15 percent to 3020-3200 kcal/kg on an as-received basis.

Adequacy of Reserves for the Alternative Projects

Proven reserves are sufficient to meet the 30-year coal requirements for the project configurations which include surface mines. Sufficient reserves for the planned 30-year project life have not been proven for the project configuration in which only underground mining is utilized. As noted below, however, a significant portion (over 73 percent) of the required reserves for an all-underground project have been proven on the main PMDC tract. A comparison of project coal requirements and proven reserves is shown in Table I-5.

The all-underground project would require 11.3 million tonnes of coal from private leases in the Lakhra coal fields south of the main PMDC tract. Since Boyd estimates that 54 million tonnes of coal are recoverable from these leases, proving up 11.3 million tonnes should be feasible.

TABLE I-4

QUALITY OF LAKHRA COAL ON MAIN PMDC TRACT

	As Received				Dry		
	Moisture	Ash	Sulfur	Kcal/kg	Ash	Sulfur	Kcal/kg
Surface Mines	32%	20.9%	5.1%	3200	30.7%	7.6%	4700
Underground Mines	32%	23.2%	5.2%	3020	34.1%	7.6%	4430

Source: John T. Boyd Company, Final Lignite Reserve and Quality - Phase II, Lakhra Coal Project, Volume 11, May 28, 1986, p. 5-11.

TABLE I-5

ADEQUACY OF PROVEN RESERVES TO MEET PROJECT REQUIREMENTS

Project Size	Coal Requirements (Million Tonnes)	Proven Reserves on PMDC Tract (Million Tonnes)	Additional Reserves Required (Million Tonnes)
300 MW	49.5	82.9	0
700 MW	112.5	122.9	0
500 MW	81.0	122.9	0
250 MW	42.0	30.7[1]	11.3

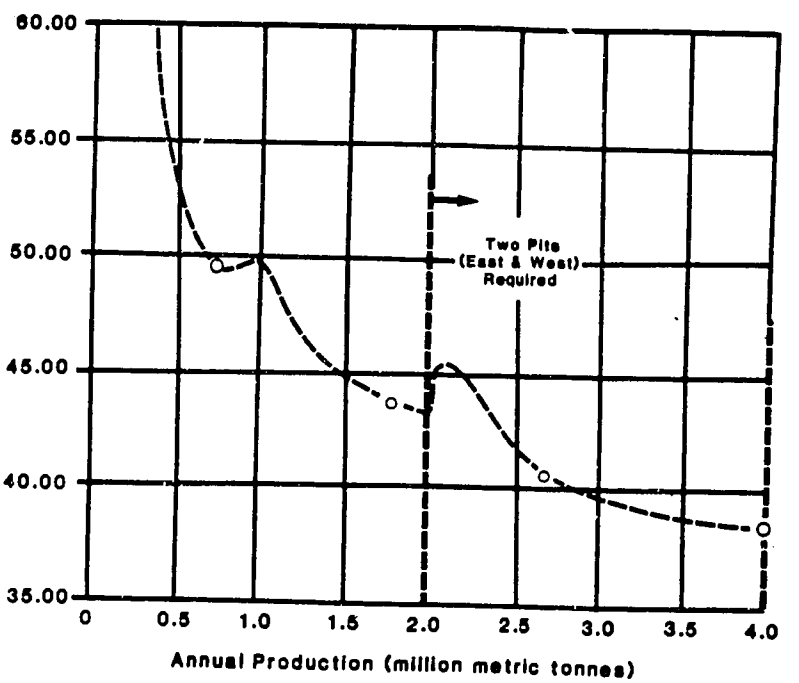
[1] This configuration utilizes only underground mining. Only 30.7 million tonnes of proves reserves on the main PMDC tract are suitable for underground mining.

MINING PLANS AND PRODUCTION COSTS

The amount of coal required annually to fuel a power plant depends on the plant's heat rate, the coal's energy content, and the plant's annual capacity utilization. Because Boyd's estimates of Lakhra coal quality changed significantly during the feasibility study, the amount of coal required for the different power plant configurations also changed. Rather than redo all the mining plans, Boyd provided cost curves based on some specific plans which could be used to estimate the cost of production for alternative plans. Cost curves were provided separately for surface mining and underground mining. These costs are shown in Figures I-2 and I-3.

FIGURE I-2

LAKHRA SURFACE MINING COSTS[1]
(Mid-1985 Dollars/Tonne)

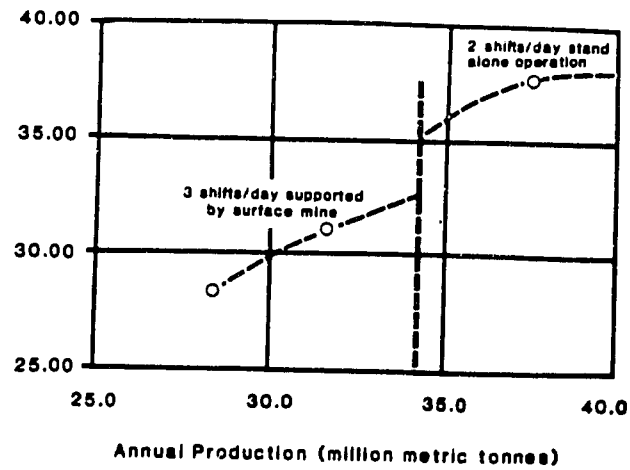


[1] Includes infrastructure costs but does not include management fees.

Source: John T. Boyd Company, Conceptual Alternative Mining Plans - Phase I, Lakhra Coal Project, Volume 9C, p. 3-12.

FIGURE I-3

LAKHRA UNDERGROUND MINING COSTS[1]
(Mid-1985 Dollars/Tonne)



[1] Includes infrastructure costs but does not include management fees.

Source: John T. Boyd Company, Conceptual Alternative Mining Plans - Phase I, Lakhra Coal Project, Volume 9C, p. 3-13.

The cost curves are very different for the surface and underground mines. Costs per tonne fall as the size of the surface mines increases due to economies of scale. In contrast, Boyd projects rising costs per tonne as the amount of coal produced from underground mines increases. Underground mining costs as developed by Boyd rise because (1) less attractive seams must be mined, (2) delivery problems and costs increase as the number of mines increase, and (3) Boyd assumes mine operations normally will operate only two shifts per day in lieu of three to increase mine reliability when surface mines are not available to provide back-up production capability.

Boyd has used the coal quality and production cost curves to develop coal supply cost estimates for the four project configurations cited earlier. These estimates are shown in Table I-6. The costs shown in the table include a $1.50 per tonne management fee for the plans utilizing surface mines. The surface mines were assumed to be managed by an expatriate mining company, and Boyd has maintained that these firms will not provide equity participation with a 10 percent real return unless they also receive this management fee.

A review of the various mining plans in Table I-6 reveals that the coal costs are relatively similar between the plans. The lowest cost, however, is associated with the largest mines. Boyd estimates that the cost of coal would be $39.65 per tonne (1985) dollars for the plan supplying the 700 MW power plant. Reducing the size of the surface mines to supply a 500 MW power plant raises the average coal cost by $3.05 per tonne to $42.70 per tonne.

TABLE I-6

COAL PRODUCTION COSTS FOR ALTERNATIVE PROJECTS
(Mid-1985 Dollars)

	Project		Cost Per Tonne				Cost per Mill Kcal	
	Plant Size	Mines	Direct	Infrastructure	Mgmt Fee	Total	Kcal/kg	Cost
1.	300 MW	650 UG	24.00	7.15			3030	
		1000 Surf	47.20	2.80			3200	
		1650	38.15	4.50	1.50	44.15	3130	14.11
2.	700 MW	300 UG	21.20	7.15			3030	
		3450 Surf	37.60	1.40			3200	
		3750	36.30	1.85	1.50	39.65	3190	12.43
3.	500 MW	300 UG	21.20	7.15			3030	
		2400 Surf	41.00	1.80			3200	
		2700	38.80	2.40	1.50	42.70	3180	13.43
4.	250 MW	1400 UG	32.10 1/	7.90 1/		40.00 1/	3030	13.20

1/ At USAID's request Boyd developed a variety of all underground mining cost estimates. The costs shown here are for Underground Case 3. Case 3 costs were developed by ICF and Boyd to take into account anticipated supply shortfalls during the first five years of full production. Boyd recommends that the Case 3 costs be used in comparisons of the all-underground mining plan with the other mining plans.

Source: John T. Boyd Company telex No. 86-84, August 14, 1986.

ICF INCORPORATED

As mentioned earlier, a small surface mine has very high unit costs. The 1.0 million tonne per year surface mine designed to supply the 300 MW power plant produces coal at a cost of $51.50 per tonne. The average cost of coal for the 300 MW project is $45.80 per tonne due to the contribution to the overall coal requirements from cheaper underground mines. This plan was determined to be unacceptable from an economic standpoint and was not actively evaluated as an option in the final feasibility assessment.

Boyd has estimated that an all-underground mining plan could supply a power plant at a cost of $36.50 per tonne, which would be the lowest cost coal supply option. Boyd maintains, however, that the all-underground mining plan is less reliable than the other plans. Predicted shortfalls in the first five years of full production raise Boyd's estimated cost (levelized over 30 years) from the underground mines to $40.00 per tonne. Boyd has recommended that the $40.00 per tonne estimate be used in comparing the all-underground case to the other mining plans. Since the coal mined underground is projected to have a lower energy content than the surface-mined coal, the cost on a per-kcal basis for the all-underground mining plan is similar to the cost of coal in the 500 MW project, which uses a combination surface and underground mining plan.

Comparison With Previous Studies

The cost of producing coal at Lakhra has long been a controversial issue. Table I-7 provides a comparison of the Boyd estimates with the JICA and PMDC/WAPDA/SWEC estimates. The Boyd mining costs for the 300 MW project are shown because they are the most comparable to the earlier studies. A more extensive comparison is provided in Appendix C.

The costs shown in Table I-7 are not the full costs of coal production; they do not include infrastructure costs or management fees because the earlier cost estimates did not include these cost elements. A review of the costs reveals that Boyd's costs are closest to the PMDC/WAPDA/SWEC estimates on a per tonne basis. With Boyd's lower estimate of coal energy content, however, the cost per kcal rises to a level more similar to the JICA study.

As discussed in Appendix C, the PMDC/WAPDA/SWEC cost estimates are not well-documented and were developed with the specific intent to reduce the JICA cost estimates. The Boyd estimates have a much stronger basis, and by design they appear to be more conservative. It is not surprising that the Boyd costs are higher than the PMDC/WAPDA/SWEC estimates.

ELECTRICITY PRODUCTION COSTS

Ultimately, the alternative project configurations can only be evaluated by comparing them on a cost per kw-hr basis, or what is often referred to as a "bus-bar" cost basis. The principal assumptions used in the baseload power cost analysis for each of the major alternatives considered in the final feasibility assessment, i.e., the 700 MW, 500 MW, and 250 MW project configurations, are shown in Table I-8. [The costs for the 300 MW project are not shown because the economics of the mining plan were considered to be unacceptable, particularly in comparison to the other alternatives evaluated.] All of the power plants are assumed to be sited at Lakhra.

TABLE I-7

COMPARISON OF BOYD AND PREVIOUS MINING COST ESTIMATES[1]
(Mid-1985 Dollars)

Source	Plant Size	Size of Mines (tonnes per year)	Energy Content (kcal/kg.)	Cost/Tonne	Cost/Mill Kcal
JICA	300 MW	1200	3820	54.30	14.20
PMDC/WAPDA/ SWEC	300 MW	1400	3780	34.10	9.00
Boyd	300 MW	1650	3130	38.20	12.20

[1] Estimates exclude infrastructure costs and management fees.

TABLE I-8
Base Case Power Plant Cost and Operating Assumptions
(Mid-1985 dollars)

Project	Average Capital Costs ($/kw)	Operating Costs: Fixed ($/kw-yr)	Operating Costs: Variable ($/MW-hr)	Operating Costs: Fuel Cost ($/mill kcal)	Heat Rate (kcal/kw-hr)	Capacity Utilization
700 MW	963[1]	5.93	2.67	12.43	2826	.69
500 MW	970[2]	7.66	2.30	13.43	2786	.70
250 MW	1147	10.44	2.30	13.20	2786	.56/.70[3]

[1] Includes $35/Kw for transmission and substation and $92/Kw for scrubber costs (50% scrubbing on one unit).

[2] Includes $50/Kw for transmission and substation costs.

[3] Plant operates at 56% of capacity during years 2 through 5 of operations and at 70% in year 1 and after year 5. The pre-production stockpile is used to attain 70% capacity utilization in year 1. The reduced utilization is not plant-related but reflects Boyd's views on potential coal supply reliability problems.

Source: Gilbert Commonwealth International, Lakhra Coal Mine and Power Generation Feasibility Study; Power Plant Feasibility, Volume III, pp. 8-27, 8-39, 8-45, and information about WASP run assumptions.

A review of the plant cost assumptions reveals the significant economies of scale associated with the second generating unit. Due to the significant infrastructure costs, adding a second unit reduces capital costs per Kw of installed capacity by 15 percent. Significant economies of scale also accrue in the fixed operating cost category.

The flue gas scrubbing costs significantly offset the economies of scale obtained by increasing the plant size from 500 MW to 700 MW. Capital costs per unit of installed capacity are almost the same for the two plants. Also, the addition of the scrubbing unit causes the plant heat rate and the variable operating cost per kw-hr to be higher in the 700 MW plant than in the 500 MW plant. The annual capacity utilization is assumed to be about the same for the 700 MW and 500 MW alternatives, but problems with the scrubber could reduce further the capacity utilization of the 700 MW plant.

The economic costs of coal and power for the 700 MW, 500 MW, and 250 MW project configurations are shown in Table I-9. All local costs in the table were multiplied by .77 to account for the overvaluation of the Pakistani rupee in July 1985. The Base Case costs shown are based on the costs in the engineering studies and are expressed in constant, mid-1985 dollars.

A review of the costs in Table I-9 indicates that the projected electricity supply costs are very similar for the 500 MW and 700 MW project configuration. The 700 MW project includes a flue gas scrubber which eliminates 50 percent of the emissions from one 250 MW unit. The additional capital and operating costs associated with this scrubber offset the economies of scale associated with the larger mines and power plant.

The power plants would be technically very similar in all of the projects and could be expected to face similar operating challenges. The only major difference is related to the flue gas scrubber on the 700 MW power plant. A flue gas scrubber is in essence a chemical plant which removes SO2 from the power plant exhaust gas stream and creates a sludge. Although scrubbers are now proven technology, they complicate the operation of a power plant and can reduce power plant availability if operational problems arise. As Pakistan has no experience with scrubbers and no service industry to deal with them, problems can be expected to occur. The economic analysis shows the 500 MW and 700 MW plants to be similar in cost (assuming only a 1 percent reduction in capacity utilization due to problems with the scrubber). Power supply requirements, financing capability and overall system reliability considerations are other criteria that influence the choice between the 500 MW and 700 MW project configurations. All things considered, the 500 MW plant without the scrubber is the preferred option of the two.

The electricity supply costs are significantly higher with the 250 MW all-underground alternative when the $40.00 per tonne coal supply cost is used in the analysis. The 250 MW project includes almost the same water line, road, and transmission line capital requirements, but the project supplies only half the power of the 500 MW alternative. As a result, even with similar coal supply costs, the cost of electricity is significantly higher.

TABLE I-9

ECONOMIC COSTS[1] OF LAKHRA COAL AND POWER
(Mid-1985 dollars)

Alternative	Base Case[2]			Best Lakhra Case Power Cost
	Coal Cost		Power Cost	
	(Per tonne)	(Per Mill kcal)	(¢/kw-hr)	(¢/kw-hr)
700 MW/Surface Mines	35.40[3]	11.10	5.45	4.43[7]
500 MW/Surface Mines	37.80[4]	11.90	5.42	4.46[7]
250 MW/Underground Mines	34.30[5]	11.30	5.87[6]	4.85[8]

[1] Levelized cost assuming plants begin in 1992, operate for 30 years and are sited at Lakhra. Local costs multiplied by .77 shadow factor (equivalent to 30% penalty on foreign costs).

[2] Economic costs are based on original engineering costs cited in feasibility studies, memos, and telexes. No adjustment is made for more optimistic powerplant costs and mine productivity.

[3] Based on Boyd costs of $38.50 per tonne plus $1.50 per tonne management fee (total $40.00 per tonne before shadow factor) at a 10 percent discount rate.

[4] Based on Boyd costs of $41.20 per tonne plus $1.50 per tonne management fee (total $42.70 per tonne before shadow factor) at a 10 percent discount rate.

[5] Based on Boyd costs of $40.00 per tonne at a 10 percent discount rate (before shadow factor).

[6] Assumes 56% capacity utilization during years 2 to 5 of operation.

[7] Power plant capital costs reduced on first unit by 20% and second unit by 10% and coal production costs reduced 20%.

[8] Power plant capital costs reduced by 20 percent. Coal production targets met and mine costs reduced by 10%.

Recent power project construction costs in Pakistan have been significantly lower than projected in engineering feasibility studies.[7] For this reason an alternative set of cost estimates was developed. The Best Lakhra Case shown includes the following more optimistic assumptions:

- Power plant capital costs are reduced by 20% on the first unit and by 10% on the second unit (in constant dollars)
- Surface-mined coal costs are reduced by 20% (in constant dollars)
- All-underground coal production targets are met and costs are reduced by 10%.

The economic costs for the three project configuration are reduced under these assumptions, but the relative attractiveness and ranking of the different project configurations remain unchanged. The likelihood that these cost reductions can be obtained is discussed in more detail in Chapter II.

Alternative Estimates of Underground Mining Costs

The coal production costs developed by Boyd for the all-underground mining plan are significantly higher than the production costs in existing mines for many reasons:

- Boyd's plan recovers a higher proportion of the resources-in-place and utilizes some high-cost reserves.
- Boyd's plan utilizes only two shifts per day to ensure spare mining capacity is available if capacity is lost due to fires or cave-ins.
- Boyd assumes production shortfalls will occur initially because the mining plan requires major technological and institutional changes in the way mining is performed.
- Boyd's plan provides for a substantial improvement in miner living and working conditions so that a year-round work force can be attracted and maintained.

---

[7] If project costs are less than forecast, this change could be due in part to lower nominal costs as a result of a fall in the inflation rate or to a reduction in real or constant dollar costs. The analysis in this study is in constant dollars, so any cost reduction must be due to a fall in constant dollar costs to be valid. Such a fall can occur during periods of intense competition in the international market for power plants. It is generally recognized that such a condition has existed and currently exists due to a significant decline in world demand for new large electrical generating facilities.

- Low-Cost Infrastructure Case: In addition to the assumptions in the Best Theoretical Case, infrastructure cost is reduced without affecting worker productivity or production reliability. [Boyd does not support this assumption.]

The economic cost of coal and baseload power for the two lower cost underground mining cases are shown in Table I-10. The Base Case feasibility study costs for the 500 MW and 250 MW projects are shown for comparison purposes.

TABLE 1-10

PROJECT ECONOMIC COSTS WITH LOWER UNDERGROUND MINING COSTS (Mid-1985 dollars)

	Coal Cost			Power Cost
	Boyd Costs	Economic Costs		Economic Costs
	(Per Tonne)	(Per Tonne)	(Per Mill Kcal)	(¢/kw-hr)
500 MW/Surface Mines	42.70	37.80	11.10	5.42
250 MW/Underground Mines				
Base Case	40.00	34.30	11.30	5.87
Best Theoretical Case	31.35	26.90	8.90	5.23
Low Cost Infrastructure	28.70	24.60	8.10	5.05

USAID/Pakistan staff believe that Boyd's assumptions are too conservative and that the living facilities proposed by Boyd are more expensive than necessary.[8] Accordingly, Boyd has developed two additional low mining cost cases.

- Best Theoretical Case: New drilling is assumed to identify new coal reserves which have seams with a thickness of 2.0-2.5 meters. Production is performed by 3-4 reliable, qualified, independent mining companies with no shortfalls and no cost increases due to poor performance.

The results of this analysis clearly indicate that the 250 MW project configuration with the much lower mining costs would be more attractive than the 500 MW project configuration. The dilemma for the feasibility analysis is that these lower cost plans require that new reserves be proven which have better characteristics than the reserves (suitable for underground mining)

[8] USAID/Pakistan Telex No. LK-2373 (Lakhra Project Underground Mine Costs), August 13, 1986.

which have been proven to date. In addition, the lower costs are based on operating and productivity assumptions which Boyd is unwilling to accept as a likely outcome. While these cases are possible, they should be viewed as sensitivity analyses relative to the Base Case or Best Lakhra Case results.

ISSUES AND POTENTIAL PROBLEMS WITH THE ALTERNATIVE MINING PLANS

The analysis above indicates that on a comparable reliability basis the 500 MW project is expected to have lower economic costs than the 250 MW project. The uncertainty and the potential implementation problems related to these projects are very different, however, because the mining plans associated with these two project configurations are completely different. In this section the key issues and potential problems with the alternative mining plans are identified and discussed.

The 500 MW project includes a 2.4 million tonne per year surface mine and a small underground mine. Some of the key characteristics of the mining plan for this project are as follows:

- Overall mining project is managed by expatriates with expatriate equity.
- Underground mine is managed by a local mining company.
- Surface mine uses state-of-the-art technology.
- Project is capital-intensive with significant local skilled labor involvement.
- The surface mine has a high stripping ratio.
- The surface mine production costs are high relative to mines elsewhere in the world.
- The <u>key issue</u> is the coal production cost.

The 250 MW project would be supplied by numerous underground mines operating concurrently both on and off the main PMDC tract. Some of the characteristics of the all-underground mining plan are as follows:

- Overall project is managed by local mining companies with local equity.
- Additional coal reserves must be proven and purchased from private mining companies.
- Mining conditions are difficult and problems with fires and roof cave-ins are a certainty.
- Underground mines use semi-mechanized techniques which are more modern than techniques currently used.

- Proposed mining plan requires significant organizational changes relative to existing mining operations, which raises concerns about supply reliability, especially in the early years of production.

- The production costs are high relative to operations elsewhere in the world.

- The key issues are proven reserve availability, health and safety, supply reliability, reserve sterilization, production cost, and the price of reserves from private lease-holders.

The economic feasibility of the alternative Lakhra project configurations is also a key issue, but it is not limited to any specific configuration. This issue is addressed in Chapter II of this report.

Surface Mine Issues

The key issue for the 500 MW alternative is the coal production cost. Lakhra coal ranges in quality from lignite to subbituminous coal. Lignite is mined in many parts of the world using surface mining techniques. The problem at Lakhra is that the coal seams are relatively thin and the overburden is substantial relative to the aggregate seam thickness. The net effect is a high projected cost per unit of energy produced using surface mining techniques.

Because Pakistan has no previous experience operating large surface mines, the mining feasibility contractor has used estimates of equipment productivity 20 percent below levels obtained in developed countries to estimate coal production costs. These low productivity assumptions contribute to the high cost of production. In addition, the expatriate firm to be brought in to manage the surface mining operation is expected to demand a substantial management fee to offset the considerable financial risk borne in a 30-year project. This fee further raises the estimated production cost.

Over time it may be possible to increase productivity in the mining operation and reduce costs. There are examples of expatriate-managed mines operating in developing countries at very high levels of productivity. It may also be possible to reduce production costs through price discounts on new equipment (from manufacturers or mining companies) in the current depressed market.

Lower productivity and higher costs than estimated are also a possibility. Companies in Pakistan often have difficulties importing needed materials, parts, and equipment. These difficulties can reduce equipment availability, raise costs, and create supply problems.

Underground Mine Issues

The key issues for the underground mines are proven reserve availability, health and safety, supply reliability, reserve sterilization, production cost, and the price for coal from private leases.

Proven reserve availability is an issue if the power plant is larger than 180 MW because the proven reserves suitable for underground mining on the main PMDC tract cannot support a larger plant for its full 30-year expected life. Additional coal would have to be obtained from leases mostly located to the south of the explored tract. While this is an issue, Boyd as noted earlier judges that adequate reserves can be found within the Lakhra coal field to support this plant. Hence, the issue is a temporal one related to (1) the need to prove all reserves for the full 30-year life of the plant, and (2) the classification of reserves as proven according to specific geologic criteria. Clearly, more explanatory drilling outside the main PMDC tract will "prove up" more reserves. Figure I-4 shows the location of the private leases relative to the main PMDC tract.

Health and safety is a key issue because conditions in the existing mines at Lakhra are poor and health and safety standards are not enforced. The geologic conditions at Lakhra for underground mining are unattractive due to (1) an immediate weak claystone roof above the main coal seam overlain by unconsolidated silica sand in some locations and poorly cemented sandstones above the main seam in other locations, and (2) the susceptibility of Lakhra coals to spontaneous combustion.

Working conditions in the existing mines are primitive; most mines do not have electricity or mechanical transport systems. Roof supports are composed of poor quality timber. Reliance on natural ventilation leads to year-round mine temperatures between 83 and 110°F and high humidity. Shelter is provided for males only. Underground workers are migrant laborers who disappear in the summer. Migrant workers reportedly return home in part because they are physically exhausted after six months in the mines. Drinking water is untreated river water.

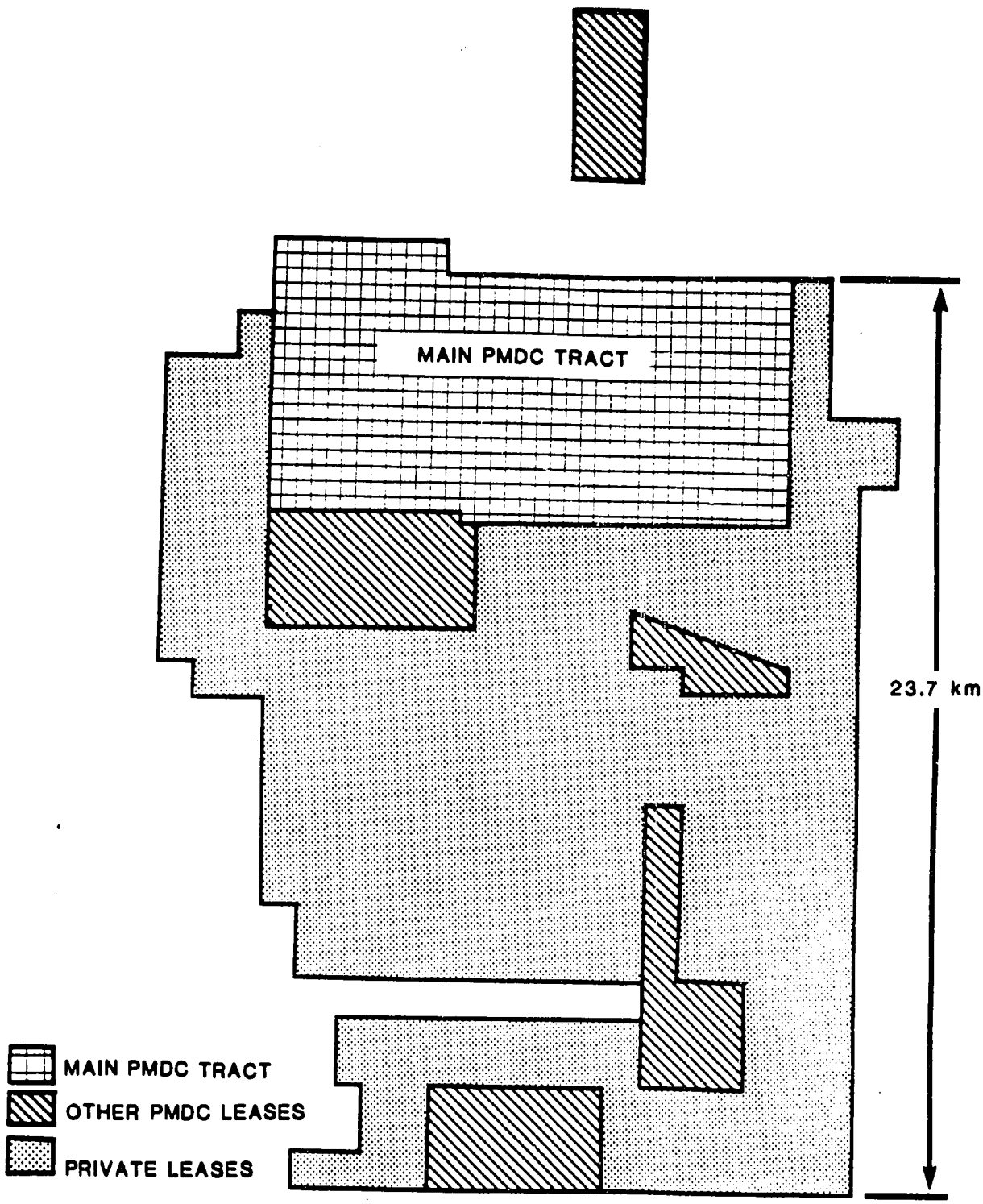
The companies and mining inspectors who determine the conditions in the existing mines are the same ones who would presumably manage and regulate any new underground mines. For this reason the likely health and safety conditions in an all-underground mining alternative is an important issue.

Supply reliability is also an important concern with an all-underground mining operation. Boyd's all-underground mining plan is designed to handle the serious problems in the mines due to fires and cave-ins and takes into account the time, coal reserves, and equipment likely to be lost. Nevertheless, the proposed mining plan has not previously been demonstrated under the difficult geologic conditions in the Lakhra coalfield. One aspect of the design--the use of only two shifts per day--increases costs but also builds in substantial surge production potential which could be used if one of several mines had to be temporarily closed.

The concern about supply reliability is especially great during the start-up period when the work force is not likely to be as productive as later on. Boyd's plan institutes many new techniques and employment practices relative to the existing mines. The existing piecework pay schemes and small working parties would be replaced with wages, large work groups, and specialization. Boyd expects that start-up problems would cause coal supply shortfalls at the power plant in the first five years of full production.

FIGURE I-4

LEASED AREAS IN THE LAKHRA COALFIELD



Supply reliability is a major issue because there is no acceptable back-up energy supply for the power plant if the mines cannot meet production requirements. The existing mines are not considered an acceptable back-up supply source due to health and safety and other concerns. Lakhra's isolation makes the use of other energy sources as a back-up supply quite difficult.

Reserve sterilization is a principal concern with the all-underground mining plan. The 123 million tonnes of proven coal reserves on the main PMDC tract are suitable principally for surface mining. Only 31 million tonnes of these coal reserves are suitable for underground mining. The extraction of the 31 million tonnes of underground reserves would sterilize (i.e., render useless) the remaining 92 million tonnes of surface reserves.

From an economic standpoint the sterilization of reserves is not a concern if the production of the reserves is not economically feasible. In this particular case sterilization through underground mining should be avoided unless the surface mines are shown to be uneconomic.

Production cost is a serious issue with the all-underground mining plan because Boyd's estimated costs are quite high. The production cost in existing private mines (prior to inventory losses) is estimated to be $10-15 per tonne (1985 dollars). In contrast, Boyd's 30-year levelized estimate of direct costs for more modern underground mines is over $29 per tonne.

The existing mining methods are widely conceded to be inappropriate for several reasons:

- The existing mines are small and typically produce about 10,000 tonnes/year. Approximately 150 of these mines would be required to supply a 250 MW plant. The transportation and delivery logistics for such a large number of mines would be untenable.

- The coal recovery rates from existing mines are low. The mines are designed to remove the best coal at the lowest cost, so that they can be closed with little financial loss if the coal ignites or if the roof collapses.

- As mentioned earlier, health and safety conditions in the existing mines are unacceptable.

Although production costs are certain to be much higher with Boyd's mining plan, it is clear that existing practices cannot be used to support a 250 MW power plant.

RECOMMENDED LAKHRA PROJECT CONFIGURATION

Based on a review of all of the characteristics of these projects, the 500 MW project appears to be the option that best balances all of the varied considerations important to a Lakhra power plant. The 700 MW project is undesirable because it requires a flue gas scrubber and significantly more initial capital. If the scrubber had serious operational difficulties and one

unit of the plant were shut down, then the annual capacity utilization would drop and the cost per kw-hr produced would rise above the cost of the 500 MW project. If the scrubber had operational difficulties and the plant were not shut down, then emissions would exceed the donor agency guidelines specified for this project.

Given the lack of experience in Pakistan with a large coal-fired power plant, adding a scrubber to the plant would make plant operation a considerable challenge, particularly in the early years. The overall project is sufficiently complex and the coal sufficiently difficult to handle that operational difficulties must be expected even without a scrubber. The 500 MW project, therefore, is considered to be superior to the 700 MW project.

The 250 MW project is less attractive than the 500 MW project because it is likely to have many more implementation problems. First, reserves have not been fully proven for the 250 MW project for its full 30-year life, and coal supply negotiations would be more complex. Some coal would have to be supplied from private leases, and arrangements would have to be worked out with one or more private lease owners. Second, reliability problems are anticipated and could be significant. The conditions for underground mining at Lakhra are difficult, and there is no experience with the type of mining plan required for the 250 MW project. Finally, health and safety in the mines could well become an important issue. Standards are not enforced currently, and it remains uncertain whether a strong, enforceable mine safety and health program can be properly designed and implemented. Particularly if the coal supply contract has a fixed price, the pressure will be considerable to skimp on important health and safety practices, to reduce costs by concentrating on the most easily mined deposits, and to deliver coal which does not meet specifications.[9] Given this pressure, the potential for serious and chronic conflicts between WAPDA, the private mine operators, and the mine inspectors is very significant.

As shown in the underground mine cost sensitivity analysis, the 250 MW project could potentially be the lowest cost Lakhra project. If the mining techniques required to reliably supply coal on a large scale had previously been demonstrated in Pakistan, supply reliability and expected production cost would be far less uncertain, and the 250 MW project might be the preferred alternative. Given what is known today, however, the 500 MW Lakhra project appears to be the best of the potential configurations examined for implementation at the present time.

Site Selection

The scope of the feasibility studies included a thorough evaluation of three possible sites for the power plant. The evaluation examined the Jamshoro, Khanot, and Lakhra sites from environmental, economic cost, staff living conditions, and project reliability viewpoints. The results of this evaluation are described in Appendix A.

---

[9] The on-going mining in the Lakhra fields confirms that production costs can be reduced by sacrificing potentially recoverable reserves, health and safety practices, supply reliability, and consistent quality.

The Lakhra site was rated superior from both an environmental and an economic cost perspective. Lakhra coal is unusually high in sulfur content, and the emissions from a 500 MW power plant could have adverse effects on vegetation and on sensitive human populations. Air dispersion modeling carried out by ESE indicated that the plume from a power plant burning Lakhra coal could damage vegetation located in the Indus River Valley if the plant were sited at Khanot and could combine with the plumes from the Jamshoro oil-fired power plants to adversely affect the Liaquat Medical College and Hospital. The College and Hospital could also be adversely affected if the plant were sited at Jamshoro. No adverse effects were predicted for a plant sited at Lakhra.

A plant sited at Lakhra could also produce power at slightly lower economic cost than plants sited at either Khanot or Jamshoro. Although some infrastructure costs would be higher for a minemouth plant (e.g. transmission and water lines), the coal transport savings more than offset the higher infrastructure costs.

A plant sited at Lakhra might also be more reliable than a plant sited at Jamshoro or Khanot because the plant would not be dependent on a coal transport system. On the other hand, a back-up furnace oil supply would be more difficult to provide a minemouth plant.

During the course of the study WAPDA decided to construct additional oil-fired power plants at the proposed Jamshoro site. This decision made Jamshoro even less attractive as a potential site for the Lakhra power plant.

The principal drawback with the Lakhra minemouth site relates to the living conditions there. Lakhra has an arrid climate, and it is isolated. The Khanot site was investigated as an alternative to Lakhra in part for this reason. The Khanot site is only 20 kilometers east of Lakhra, but its location in the Indus Valley along major transportation arteries makes living conditions superior there. The best solution is to site the power plant at Lakhra and seriously consider siting the power plant workers' colony at Khanot.

Coal Washing

Coal washing was proposed as a means to improve the quality of Lakhra coal. Coal washing reduces the ash and sulfur content of the coal and potentially could make coal handling easier, reduce corrosion in the power plant, and limit or eliminate the need for flue gas scrubbing.

Extensive testing of the Lakhra coal indicated that coal washing was not desirable. The tests indicated that some of the coal's characteristics would improve, but handling would remain a problem and about 22 percent of the coal's already low energy content would be lost. As a result, 29 percent more coal would have to be mined to meet plant requirements if the coal were washed.

More importantly, an economic analysis of coal washing showed it to be a poor investment. Coal washing was estimated to raise the total economic costs of supplying electricity by about 12 percent. This analysis is documented in Appendix B.

II. LAKHRA PROJECT ECONOMIC FEASIBILITY

A proposed investment project is economically feasible if it has an Internal Rate of Return (IRR) which is superior to other potential projects. For this analysis to be correct from a national perspective, the calculations must be performed exclusive of taxes and subsidies and must include adjustments to costs if necessary to account for non-market effects on domestic prices (e.g., tariffs or quotas on imported goods or currency controls).

Power projects have two characteristics which set them apart from other potential projects from an analytical standpoint. First, power projects must be evaluated within the context of a power system. A proposed power project typically does not operate and, therefore, cannot be evaluated on a stand-alone basis. Second, the value of a project often cannot be determined based on the price of electricity. Electricity prices are generally regulated or set based on average system costs or other considerations and usually are not representative of what electricity is worth to the nation.

APPROACH USED TO EVALUATE PROJECT ECONOMIC FEASIBILITY

Power generating units are constructed, operated, and dispatched within a power system to meet load requirements at the lowest possible incremental cost. Coal and nuclear units are normally constructed and operated as baseload units. Oil and gas units may be constructed and operated as baseload, intermediate, or peaking units, depending on the type of unit (e.g., steam vs. combustion turbines), the availability of other generating alternatives, and fuel costs. Hydroelectric units are usually dispatched to use all the water available and to displace the units with the highest incremental generating cost. Hence, to evaluate a proposed project the proper comparisons are utility system costs under different assumptions about the incremental capacity under consideration. The net effect is that it may be possible to evaluate two baseload plant alternatives on a stand-alone basis, but such a comparison is misleading if there is any likelihood that the alternatives would not be operated and dispatched in the same way over their useful life if either were incorporated into the existing power system.[1]

If a power system is meeting its load demand and charging prices equal to the long-run marginal cost of supplying electricity,[2] then the selection of a project as part of a least-cost generating plan will ensure that the project is superior to other non-power projects. In this case consumers are implicitly

---

[1] For example, suppose that two steam units were constructed, one using coal and one using oil, and that their full cost of generating baseload power were identical. The coal plant is more capital-intensive, so its operating cost must be lower. If at any time over the two plants' useful lives they were not both needed, the coal plant would be operated preferentially. Therefore, over the life of both plants (unless oil prices decline) the coal plant is more likely to operate in a "baseload" mode.

willing to pay at least the true cost of the project. The consumer benefits are greater than or equal to project costs, and the project is justified on economic grounds.

When power is priced below its marginal supply cost, consumers may demand and use power for purposes which provide less benefit to them than the cost incurred by the nation to provide it. In this situation a power project could be of less value than a non-power project even if the power project (1) is needed to eliminate outages occurring at the low price charged and (2) forms part of a "least-cost" generation plan.

If electricity is priced below its long run marginal cost, a least-cost generation analysis is necessary but not sufficient to evaluate the economic feasibility of a proposed power project. An analysis must also be performed to ensure that the power generated has value to the nation in excess of its cost.

ICF has used the following approach to evaluate the economic feasibility of the 500 MW Lakhra project configuration in this study:

- Compare the economic cost of baseload power from the Lakhra project to imported coal and imported oil alternatives.
- Identify the economic conditions under which the Lakhra project forms part of a least-cost capacity expansion plan.
- Evaluate the unquantified costs and benefits associated with the Lakhra project.
- Estimate the social IRR of the Lakhra project.

BASELOAD POWER COST OF THE ALTERNATIVE PROJECTS

Two fossil fuel power projects which potentially could be constructed in Pakistan in lieu of the Lakhra project (500 MW) to meet future electricity requirements are:

- An imported (furnace) oil plant at Jamshoro (300 MW); and
- An imported coal plant near Karachi (460 MW).

---

[2] The marginal cost of supplying electricity is the variable cost. This is the cost which could be saved if the last unit of electricity were not generated. In the long-run, in an expanding supply system, the last unit of electricity is supplied by constructing a new power plant. Consequently, the long-run marginal cost is the full unit cost of constructing and operating a new power plant. During off-peak hours this cost is likely to be the cost of a baseload plant, but during peak hours this cost is likely to be the cost of a peaking plant (e.g., a combustion turbine). Hence, the marginal cost to meet incremental demand depends on when during the day that demand occurs.

While these projects differ in size, they are substitutes for the Lakhra project in the sense that all the power plants would be operated initially as baseload plants. Over time the oil plant would tend to be operated less because its variable cost of power generation would rise as oil prices rise.

There has been some concern that these projects are not substitutes because power grid stability requirements in Pakistan dictate where plants can be sited. This issue has been analyzed by Gilbert Commonwealth International. While each plant has unique transmission line requirements, grid stability is not a problem and is not a relevant criterion for evaluating the Lakhra project.

The proposed Lakhra power project was described in detail in Chapter I. Briefly, it is a two-unit baseload 500 MW power plant sited in the Lakhra coal fields and connected to the North-South 500 KV WAPDA transmission line at Khanot. The costs of the project were outlined in Chapter I and are summarized in Table II-1. The alternative projects and their costs are discussed below.

Imported Oil Plant Characteristics

The oil-fired alternative examined in this analysis is a 300 MW unit within a larger complex sited at Jamshoro. This plant was selected as an alternative because units like this are currently being constructed and more are planned. The plant would be supplied with imported furnace oil by rail or pipeline from the coast and would be connected to the North-South 500 KV WAPDA transmission line at Jamshoro. More than one 300 MW unit would be required to substitute for the proposed 500 MW Lakhra project, but the costs of the alternatives can be compared on a kw-hr basis.

The principal cost and operating assumptions for the oil-fired plant are shown in Table II-1. The furnace (oil) costs used in the analysis are consistent with ICF's Summer/Fall 1986 Base Case oil price forecast, the most recent World Bank forecast, and the mean of the "most likely" oil price forecasts supplied to the California Energy Commission by 28 organizations in June 1986. In this forecast, 3.5% sulfur furnace oil is available in Jamshoro for $17.00/barrel (1985 dollars) in 1992, rising at 3% annually (in real terms) for the remainder of the forecast period. The rationale behind ICF's Base Case forecast is presented in Appendix G.

Imported Coal Plant Characteristics

The imported coal plant alternative examined in this analysis is a 460 MW unit within a four-unit complex sited in the Port Qasim area. A prefeasibility study is underway to examine the economics of such a plant[3]. The plant would be located within two kilometers of the Indian Ocean port, and coal handling port facilities would have to be constructed as part of the coal supply system. The plant most likely would be connected to the power grid at Karachi.

---

[3] Shawinigan Integ Inc., Prefeasibility Study for an Imported Coal-fired Thermal Power Station Near Karachi in Pakistan, Interim Report, August 1985.

Table II-1

Base Case Lakhra, Imported Oil and Coal Plant Assumptions (1985 dollars)

Plant Type	Capital Costs [1] ($/kw)	Operating and Maintenance Cost Fixed ($/kw-yr)	Operating and Maintenance Cost Variable ($/MW-hr)	Heat Rate (kcal/kw-hr)	Capacity Utilization (percent)
Lakhra Coal	970[2]	7.68	2.30	2,786	70
Imported Oil	558	6.00	2.00	2,391	77
Imported Coal	758	7.00	3.00	2,403	73

	Base Case Fuel Costs
Lakhra Coal	$42.70/tonne ($13.42/kcal) before application of .77 shadow factor to local cost component.
Furnace Oil	$17.00/barrel ($10.73/million kcal) in 1992 with escalation at 3%/yr (real).
Imported Coal	$53.50/tonne ($8.10/million kcal) in 1992 with real escalation at 1%/yr.

[1] Capital costs include power plant related colony and infrastructure, transmission, contingency and engineering costs. Interest during construction is not included.

[2] Average capital costs for both Lakhra units.

Sources: Power plant costs from Gilbert Commonwealth International. Lakhra coal costs from the John T. Boyd Company. Imported oil and imported coal costs from ICF.

The principal cost and operating assumptions for the coal-fired plant are shown in Table II-1. The costs used for the imported coal unit are the average costs for each unit in the four-unit complex. The costs include port and handling facilities and the incremental transmission cost associated with the addition of incremental generating capacity in Karachi in lieu of the Lakhra power plant. The costs include $32/kw for incremental transmission capital cost and $0.50/MW-hr fixed operating costs to account for transmission losses between Karachi and Jamshoro.

The fuel costs used in the analysis were developed using coal production and supply costs in Australia and the cost of shipping coal to Pakistan. This cost is estimated to be $53.50 (1985 dollars) in 1992, rising at 1% annually (in real terms). Port handling costs in Pakistan are not included in the fuel price because they are included in the power plant costs. The rationale for this forecast is presented in Appendix H.

The shipping cost is significantly affected by the size vessel used to transport coal to Pakistan. Currently, Port Qasim can be served by 50,000 DWT vessels in fair weather and up to 30,000 DWT vessels in rough weather during the southwest monsoon.[4] The port was originally designed to handle 75,000 DWT ships. The imported coal supply cost estimate assumes that sufficient dredging is undertaken to permit the use of 75,000 DWT vessels.

No scrubbers are included in the capital costs shown. The imported coal would be low in sulfur, and Environmental Science and Engineering's analysis indicates that up to 2000 MW of imported coal generating capacity could be sited in the Karachi area without causing significant air quality problems.

Incremental capacity in an imported coal complex cannot be made available as soon as the Lakhra plant. Since imported coal plants are likely to be built whether or not the Lakhra project is constructed, an incremental imported coal project to substitute for the Lakhra project would have to be phased into the construction schedule for the planned imported coal complex(es). For this reason, construction of an <u>incremental</u> imported coal unit would lag the Lakhra plant by 3 to 5 years.

CAPITAL COST ESTIMATES USED IN THIS ANALYSIS

Estimating the likely capital cost for internationally-bid energy projects is currently quite difficult for three reasons:

- The demand for capital equipment is currently quite low. As a result, some suppliers are submitting very low bids which only cover their variable costs in order to obtain enough sales to avoid going out of business.

- Extremely low cost producers of capital equipment (e.g. South Korean firms and China) have recently begun to respond to international requests for project bids. Their bids are often considerably below the bids submitted by firms in the OECD countries.

- Over the last year some very significant changes in relative currency values have occurred. As a result, firms in the U.S. and countries with currencies pegged to the U.S. dollar have become more competitive relative to firms in Europe and Japan. These changes make historical bids unrepresentative of future bids for energy projects.

---

[4] Shawinigan Integ. Inc., <u>op. cit.</u>, p. 7-5.

The depressed market for capital good and the emergence of low-cost capital goods suppliers tends to reduce bids below the full cost of production in the OECD countries. The change in currency values alters the competitive advantage of competing firms in different countries. The relative decline in the U.S. dollar should tend to raise bids measured in U.S. dollars since production costs measured in dollars have risen in many countries. To the degree that the U.S. or South Korean firms were previously the low cost bidders (and are willing to maintain their previous profit margins), however, the decline in the U.S. dollar will not affect the winning bid level as measured in dollars.

Gilbert Commonwealth International (GCI) and the John T. Boyd Company have developed their power plant and mining equipment capital cost estimates assuming that this equipment would be produced or at least supplied by companies in the OECD countries. Given the current state of the market, GCI believes that the cost of the power plant equipment would likely be 20 percent below the full cost estimates if bids were received today. By 1987 or 1988 when bids are finally received for all of the components in the Lakhra complex, costs may still be 20 percent below full OECD costs, or they may have increased. In any event, the capital cost estimates in the engineering feasibility studies are conservative and are likely to exceed the bids received for power plant equipment in the near-term.

The John T. Boyd Company estimates are based on U.S. equipment costs. Boyd believes that some discounts off their Base Case capital costs are possible, but Boyd does not think this possibility is sufficiently likely to affect the Base Case estimates.

As part of the project review meetings in Lahore in April 1986 the power plant capital cost estimates were analyzed and a reduced set of costs was developed for use in this feasiblity study's alternatives analysis:

- The capital cost of the first Lakhra generating unit was reduced by 20% and the second unit by 10%.
- The average capital cost for an imported coal generating unit in a four-unit complex was reduced by 6% to account for near-term price weakness.
- The capital cost of an oil-fired generating unit was reduced by 5% since most reviewers felt that the Base Case oil plant costs were already quite low.

ECONOMIC COST OF POWER

The levelized economic costs of generating power when the Lakhra, imported coal, and imported oil plants are operated in a baseload mode are shown in Table II-2. These costs were developed using a 10 percent real discount rate. As discussed at length in Chapter I, this rate is considered to be appropriate for evaluating power projects in developing countries.

Table II-2

Economic Cost[1] of Baseload Power from the Alternative Plants (1985 U.S. ¢ per kw-hr)

Alternative Projects	Base Case	Reduced Cost Case	Best Lakhra Case
Lakhra 500 MW Power Plant	5.42	5.07[2]	4.46[2][5]
Imported Coal Plant	4.09	4.00[3]	4.00[3]
Imported Oil Plant	4.59	4.53[4]	4.53[4]

[1] Local costs multiplied by .77 shadow factor.

[2] Capital costs reduced 20% on first unit and 10% on second unit.

[3] Capital costs reduced 6%.

[4] Capital costs reduced 5%.

[5] Coal supply costs reduced 20%.

The Base Case results correspond to the full engineering cost assumptions shown in Table II-1. Under the Base Case economic cost assumptions the Lakhra project cannot provide power as cheaply as either an imported oil or an imported coal plant. Baseload power from the Lakhra project is 33 percent more expensive than baseload power from an imported coal plant and 18 percent more expensive than baseload power from an imported oil plant.

The Reduced Cost Case shown in Table II-2 is based on the reduced set of costs for the power plants developed at the Lahore meetings in April 1986. The coal cost is the same as in the Base Case.

The cost of power generation is lower for all the generating alternatives in the Reduced Cost Case, but the Lakhra plant's power cost is reduced more than the power cost of the alternatives. Despite this relative improvement in the Lakhra project's generation cost, baseload power from the Lakhra project is still 12 percent more expensive than power from the imported oil plant and 27 percent more expensive than power from the imported coal plant.

The Best Lakhra Case shown in Table II-2 results correspond to reduced capital costs for the power plant based on current depressed market conditions <u>and</u> a 20% reduction in Lakhra Base Case coal costs due to outstanding management and/or possible reductions in the capital equipment costs for the mines. The Best Lakhra Case is designed to determine whether the Lakhra project is economically feasible under the most optimistic assumptions considered to be achievable by the engineering feasibility contractors.

As discussed in Chapter I, the Base Case coal cost is based on productivity assumptions which are considerably below the level of productivity normally achieved in the OECD countries. The John T. Boyd

Company is confident that any reasonably competent management team can produce coal at the cost estimated in the Base Case.

Nevertheless, Boyd believes that an outstanding management team with the full backing of the government of Pakistan could reduce the Base Case coal production cost by twenty percent. There are examples of this kind of management in coal mining operations in developing countries, but unfortunately they are not the norm.

Under the Best Lakhra Case assumptions the Lakhra project produces baseload power at an economic cost which is less than the cost of power from the imported oil plant. The economic cost of baseload power from the Lakhra plant is still 10 percent greater, however, than baseload power from the imported coal-fired plant.

The economic cost of power from the Lakhra power plant shown in Table II-2 is based on the 500 MW project costs. As discussed in Chapter I, the cost of power from a 250 MW plant supplied by coal from underground mines is potentially lower if additional attractive coal deposits can be proven and made available for power generation. If such a project could be implemented, then it might compare more favorably with the imported oil and coal alternatives. The results of a least-cost generation analysis using a low-cost 250 MW all-underground project is discussed below.

The estimates of baseload power costs show the Lakhra project to be less attractive than it appeared in January 1986. The change is due more to the revisions in the assumptions about the alternatives than to revisions in the Lakhra project assumptions. The Lakhra project cost per kw-hr has increased due to the reduction in the proposed size of the power plant (from 700 MW to 500 MW). The imported coal plant electricity costs have decreased much more due to a reduction in the capital costs and the fuel costs and a 3% increase in assumed capacity utilization. The imported oil plant baseload electricity costs have decreased due to a reduction in the fuel costs and a 10% increase in assumed capacity utilization. These revised assumptions were developed at the Lahore meetings in April 1986.

Effect of Rupee Depreciation

As mentioned earlier, Pakistan has a significant trade imbalance and its balance of payments has been heavily dependent on worker remittances. As shown in Appendix F, imports were twice exports in Fiscal Year 1984. As Middle East economic growth declines, Pakistan is vulnerable to a significant depreciation of the rupee. The Base Case economic assumptions include a 13.5 percent depreciation of the currency since mid-1985, but an additional decline is quite possible.

Table II-3 shows the effect of a further 35 percent decline in the value of the Pakistani currency on the Base Case power costs. The cost of baseload power from the Lakhra power plant would decline 15.6 percent as measured in mid-1985 dollars. The cost of baseload power from the plants using imported fuel would decline much less. The cost of power from the Lakhra plant (using the full engineering feasibility study costs) would still exceed the cost from

Table II-3

Effect of Rupee Depreciation on Baseload Power Economic Cost
(1985 Cents Per Kw-hr)

	Base Case	Additional 35% Depreciation	% Change
Lakhra Power Plant	5.42	4.63	-15.6
Imported Coal Plant	4.09	3.80	-7.1
Imported Oil Plant	4.59	4.39	-4.4

the imported coal plant by over 20 percent and the cost from a baseload imported oil plant by about 5 percent. This sensitivity analysis of a depreciation in the rupee indicates, however, that a 35 precent depreciation in the rupee reduces the cost of power from the Lakhra project relative to the alternatives by about 10 percent under Base Case project cost conditions.

The stand-alone project analysis provides some important insights into the relative economics of the Lakhra project. It shows that the Lakhra project is a relatively high-cost thermal power project. It also indicates that under more optimistic assumptions than employed in the Base Case engineering feasibility studies, Lakhra could potentially serve as part of an overall least-cost, diversified supply strategy for Pakistan. The stand-alone analysis is not sufficient, however, to provide a complete view of the Lakhra projects' economic feasibility because:

- An (incremental) imported coal plant is not available to substitute for the Lakhra project in the identical time period.

- An imported oil plant quite likely would not be operated as a baseload plant over its useful life.

As a result, a least-cost capacity expansion analysis must be performed to determine under what conditions the Lakhra project would be an attractive component of the power supply system in Pakistan over the relevant planning period.

LEAST COST CAPACITY EXPANSION ANALYSIS

It is clear from the stand-alone project analysis that under some sets of assumptions the Lakhra project may not form part of a least-cost generation supply strategy for Pakistan. For example, baseload oil-fired generating units would be lower cost than the Lakhra plant under Base oil price and Base Case plant cost assumptions, and such plants could be made available. Under these conditions unless the project's unquantified benefits are sufficient to overcome this economic cost difference, the project would not be economically feasible.

Accordingly, the principal issues to be resolved in the least-cost generation analysis were as follows:

- Would the Lakhra project be part of a least-cost generating plan (under Base oil price assumptions) if the Lakhra project costs could be reduced to the lowest level considered feasible by the engineering contractors?

- How high must oil prices rise before the Lakhra project (using full feasibility costs) forms part of a least-cost generating plan?

Due to the limited time available and the significant effort required (using the WASP III Model in Pakistan) to develop a least-cost generating plan for each new set of planning assumptions, a limited number of capacity expansion plans were developed from which these issues could be addressed. All of the assumptions used in the least-cost generation analyses were essentially the same as those presented in Table II-2.[5]

Least Cost Plans Prepared

WAPDA and Gilbert Commonwealth International staff prepared three series of least-cost capacity expansion plans during 1985 and 1986. Only the last series of plans prepared during the June-August 1986 period are based on the engineering cost and economic assumptions presented in the final feasibility studies. The last series includes ten plans:

- Four plans which permitted the selection of a 550 MW Lakhra power plant with a predominately surface-mined coal supply.

- Four plans which permitted the selection of a 250 MW Lakhra power plant with a low-cost coal supply.

- Two plans which did not permit the selection of a Lakhra power plant.

These plans were designed principally to evaluate whether the Lakhra project would be part of a least-cost capacity expansion plan under alternative oil price assumptions. Six plans were developed using the Base oil price assumptions ($17 per barrel in 1992, escalating at 3% per year) and four plans were developed using a 50 percent higher oil price path ($25 per barrel in 1992, escalating at 3% per year).

The plans which permitted the selection of a 550 MW power plant are the ones most relevant for the economic feasibility study. The 550 MW plant is a slightly larger version of the 500 MW project identified as the best available project in Chapter I of this report. The 550 MW plant was used in the capacity expansion plans because this size was thought to be consistent with

---

[5] ICF adjusted the results of the analyses for any inconsistencies between the assumptions in the plans and the assumptions in this study. The adjustments made are described in Appendix E.

the World Bank guidelines for maximum permissable SO2 emissions at the time the capacity planning study assumptions were specified.[6] From a planning perspective the 550 MW and 500 MW plants are virtually identical, but the 550 MW plant is estimated to produce power at a slightly lower cost per kw-hr than the 500 MW plant due to economies of scale in both the power plant and the surface mines.

Key Assumptions Used in the Plans

A key aspect of the underlying assumptions used in performing the capacity expansion plans is that the Lakhra power plant costs used are the reduced capital costs reflected in the Reduced Cost Case and Best Lakhra Case in Table II-2. These costs are deemed to be a more appropriate basis for estimating the actual anticipated capital costs for Lakhra at the present time than the cost of the equipment shown in the final power plant feasibility study.

Another important assumption employed in the system expansion planning analysis is that the coal supply costs used were assumed to be the most optimistic (i.e., the lowest) costs developed in the mining feasibility study. The coal supply costs used in conjunction with the 550 MW Lakhra plant were 20 percent below the Base Case costs, reflecting the expectation that the coal would be produced by an expatriate company with an outstanding management team. The net effect of all these changes was to reduce the cost of baseload power for the 550 MW plant incorporated into the expansion planning study by 18 percent relative to the same plant using Base Case cost assumptions. No capacity expansion plans were prepared using the full costs shown in the powerplant and mining feasibility studies, but ICF has used information from the plans to estimate whether the full cost Lakhra plant would be included in the High oil price plan. ICF's review and analysis of the capacity expansion plans which relate to the 550 MW Lakhra plant is presented in Appendix E.

The 250 MW Lakhra plant examined in the planning analysis was assumed to have a coal supply cost of $25 per tonne ($7.06 per million kcal). This cost is 37.5 percent below the Base Case underground coal supply cost ($40 per tonne) and is 13 percent below the Low Cost Infrastructure Case shown in Table I-10 in Chapter I. Accordingly, ICF has only used the findings from the capacity expansion plans which evaluated the 250 MW plant as sensitivity analyses which test the effect of very low coal prices on the Lakhra project's economic feasibility.

Results of the Base Oil Price Planning Analysis

The Base oil price (least-cost) capacity expansion plan for Pakistan without the Lakhra project is shown in Table II-4. A review of the table indicates that oil/gas steam units and hydroelectric units are added to meet generation requirements over the fiscal year 1991-93 period.

---

[6] ICF's Interim Economic Feasibility Study (May 27, 1986) evaluated the economic costs of a 550 MW project.

Over the fiscal year 1994-98 period the system adds imported coal, hydroelectric, and nuclear units to meet demand. As discussed above, the 550 MW Lakhra project with the full costs estimated in the engineering feasibility studies is not included in the Base oil price capacity expansion plan.

When the Base oil price capacity expansion plan was developed using the WASP model, the 550 MW Lakhra project was not included in the system even when the project was assumed to have the reduced costs in the Best Lakhra Case. As discussed in Appendix E, however, this failure to include the Lakhra project under these conditions appears to have been due to some inconsistencies between the assumptions in the plan and the assumptions developed for this economic feasibility study. ICF believes that the 550 MW project is part of the Base oil price least-cost capacity expansion plan when the project costs are as estimated in the Best Lakhra Case, even when the unquantified benefits of the Lakhra project are not taken into account.

Table II-5 shows how the Base oil price plan changes when the Lakhra project is included. A review of the table reveals that the 550 MW Lakhra project replaces 600 MW of new oil-fired capacity otherwise constructed in 1993. The other changes are basically a one-year delay in the construction of several hydroelectric units over the 1995-97 period and a one-year advance in the construction of an imported coal plant.

Table II-4

Base Oil Price Capacity Expansion Plan Without the Lakhra Project (MW of capacity added)

	Fiscal Year							
	1991	1992	1993	1994	1995	1996	1997	1998
Oil/Gas Steam	210	420	600					
Lakhra Coal								
Imported Coal				920	460	920		1380
Hydroelectric	1928	110	110		1764	300	1332	300
Nuclear							900	
Oil/Gas Turbine Combined Cycle	358							
Total	2496	530	710	920	2224	1220	2232	1680

Source: WASP run 13P, June 26, 1986

Table II-5

Changes to Base Oil Price Plan with Best Lakhra Case Project Costs (MW of capacity added)

	Fiscal Year							
	1991	1992	1993	1994	1995	1996	1997	1998
Oil/Gas Steam			[600]					
Lakhra Coal		275	275					
Imported Coal							[460]	[460]
Hydroelectric					[300]	300	[1032]	1032
Nuclear								
Oil/Gas Turbine				100				
Combined Cycle								
Changes	0	275	[325]	100	[300]	300	[572]	572

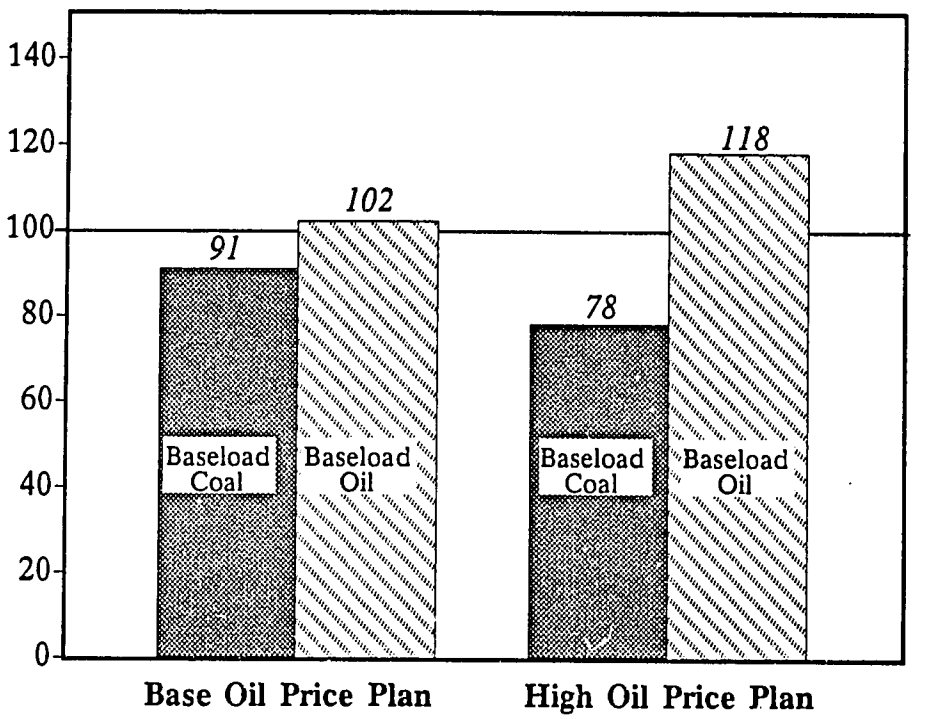
Figure II-1 shows how the levelized long-run system marginal cost compares to the levelized economic cost of baseload power from an oil-fired and imported coal-fired plant over the 30-year project period proposed for the Lakhra project (1992-2022). A review of the figure reveals that the long-run system marginal cost is between the cost of baseload power from an imported oil and imported coal plant in both the Base and the High oil price plans.

Over the fiscal year 1992-2022 period the system cost is closer to the baseload oil power cost principally because imported coal plants are not available early in the period. In the late 1990s the long-run system marginal cost moves much closer to the imported coal baseload power cost. Since the Lakhra plant produces power at a cost above the imported coal plant in all cases, this means that there is a potential "window" for the Lakhra coal plant in the early 1990s. Once imported coal plants become freely available, the Lakhra project is much less economically feasible.

Figure II-2 shows how the economic cost of power from the Lakhra project compares to the long-run marginal cost of power in the least-cost capacity expansion plan under Base oil price conditions. The economic cost of power from the Lakhra plant is shown as a percent of the long-run marginal cost of power in the least-cost plan. As noted in the figure, the Lakhra project economic costs shown do not take the project's unquantified benefits into account. A review of the figure reveals that the economic cost of power from the Lakhra plant exceeds the long-run marginal cost of power in the least-cost plan over almost the entire range of potential Lakhra project costs. Only with the project cost in the Best Lakhra Case is the project clearly part of a least-cost capacity expansion plan. Over the rest of the range of potential project costs, power from the Lakhra project is as much as 30 percent above the long-run marginal cost of power in the least-cost plan (with oil prices at the Base price level).

Figure II-1

Levelized Economic Cost of Baseload Power from Imported Coal and Oil Plants
(Percent of Long-Run System Marginal Cost Over 1992-2022 Period)

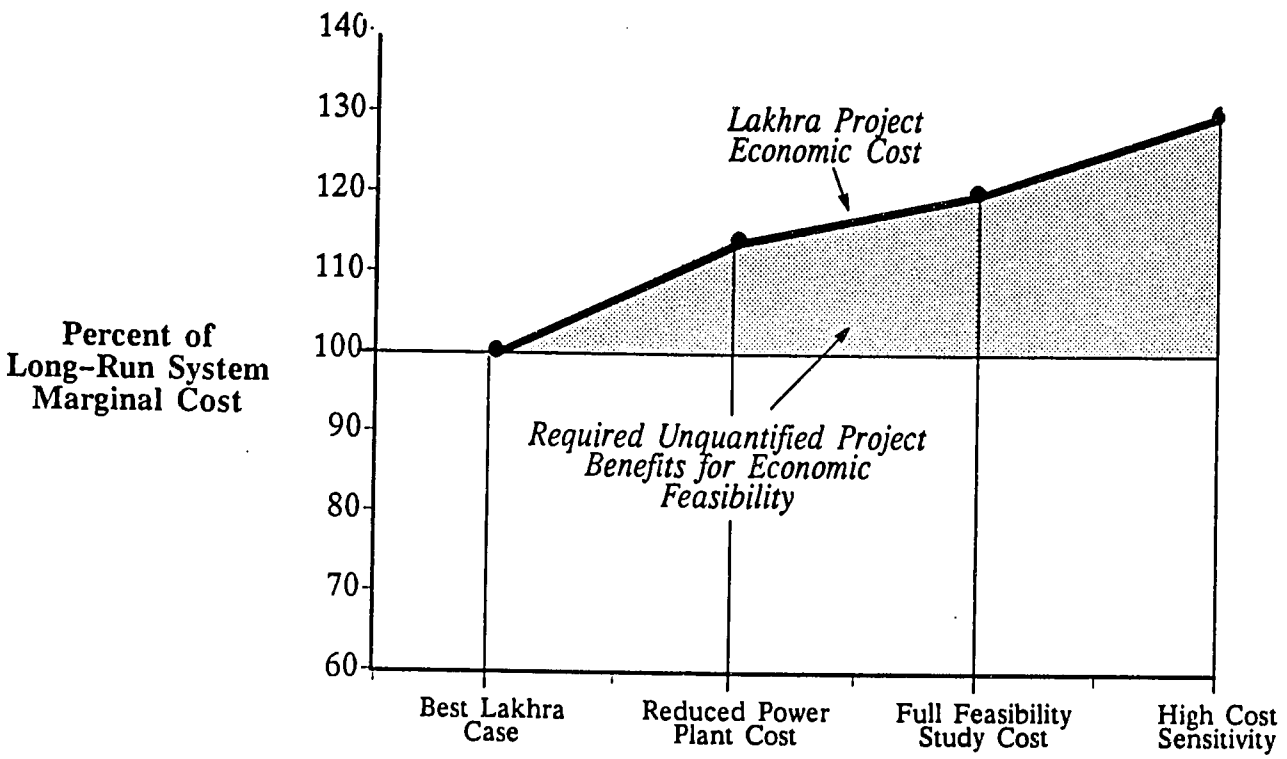


The High cost sensitivity case shown in Figure II-2 has not been mentioned previously. Although the focus in the study up to this point has been on the potential for reducing the Lakhra project's costs, the project's cost could be higher than estimated in the engineering feasibility study Base Case costs. For example, Boyd has indicated that mining costs could range from ten percent above Base Case costs to twenty percent below these costs. These cost estimates have been included in the figure to show the full range of potential project outcomes.

The reduced cost 250 MW Lakhra power plant using $25 per tonne coal from underground mines was accepted as part of the least-cost generation plan under Base Case conditions. Although this coal supply cost cannot be supported based on the proven reserves on the main PMDC track identified to date, this case does indicate that a generation project supplied by coal from underground mines could be an attractive addition to Pakistan's generating capacity even when oil prices are assumed to be $17 per barrel in 1992.

Figure II-2

Economic Cost of Power from Lakhra Project
Base Oil Price Plan



Results of the High Oil Price Planning Analysis

The world oil price has been highly unstable over the last 15 years, and forecasts of future oil prices have also evidenced unstable behavior. A review of forecasts over the last ten years indicates that forecasters have been heavily influenced by recent price trends when making their 30-year forecasts.

In the mid-1970s forecasters thought oil prices could not long remain at the level then supported by OPEC because available world oil supplies were too great. Subsequently though, when prices rose very drastically in the late 1970s, forecasts of future prices were greatly increased. Now that the oil market has been slack for five years and oil prices have essentially collapsed, future price forecasts have been drastically reduced.

The Base oil price forecast used in this study has the oil price at $17 per barrel (1985 dollars) in 1992, escalating at 3 percent annually. In this forecast the price does not return to the actual 1985 price (in 1985 dollars) until the next century and does not return to the actual 1981 price during the entire 30-year life of the Lakhra project. It is certainly possible that the Base oil price forecast is too low.

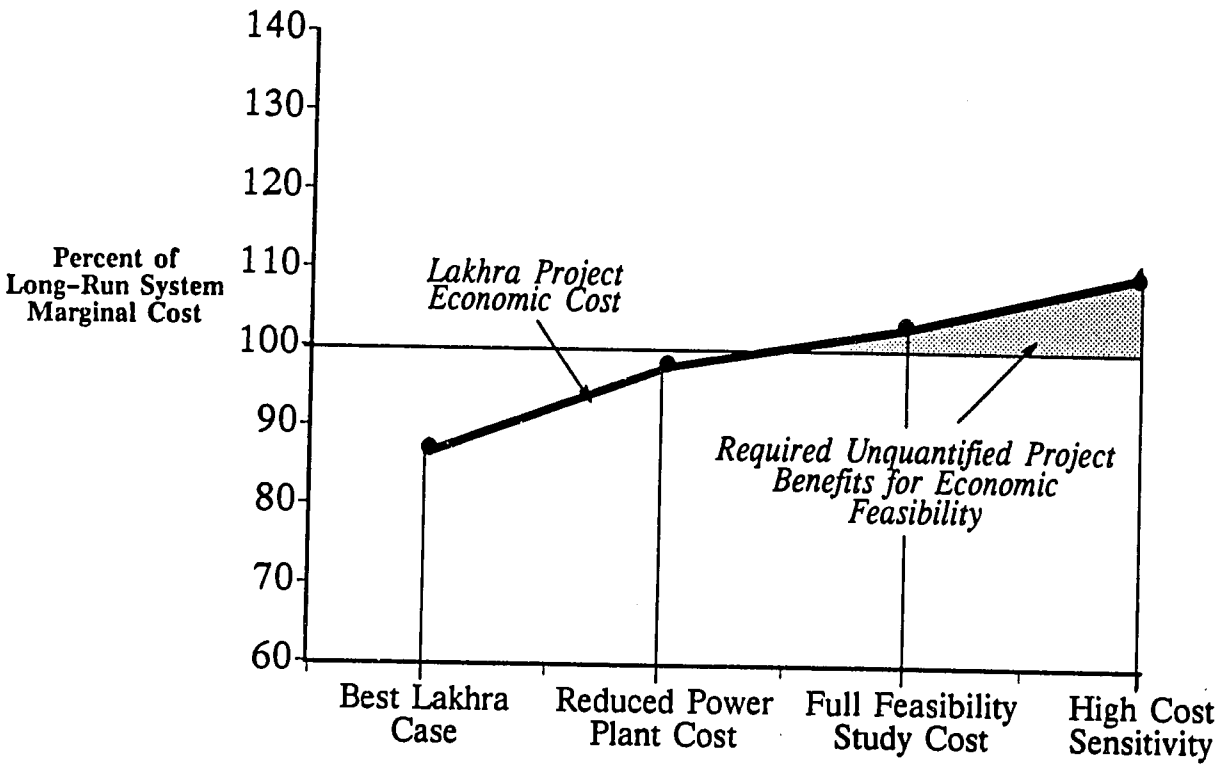
Figure II-3 shows how the economic cost of power from the Lakhra project compares to the long-run marginal cost of power in the least-cost capacity expansion plan under High oil price conditions. The "high" oil price used to create the plan is $25 per barrel (1985 dollars) is 1992, escalating at 3 percent annually. This price is 50 percent above the Base oil price. A review of the figure reveals that the economic cost of power from the Lakhra plant compares much more favorably to the long-run marginal cost of power in the least-cost plan when the oil price is high. Even without accounting for any of the Lakhra project's unquantified benefits, it is an economically feasible project about the lower 65 percent of the project's estimated potential range of costs.

The High price case is only interesting, of course, if it is likely to occur. In ICF's view oil prices are not likely to follow this oil price path. While prices could easily reach the level in this plan for short periods of time, ICF believes that over the long run prices will be more like the Base oil price forecast. ICF's oil price forecasts are presented and discussed in Appendix G.

Most other forecasters currently agree that future oil prices will be more similar to the prices in the Base than in the High oil price forecast. Table II-6 shows how the oil price forecasts used in the capacity expansion plans compare to the latest available oil price forecasts. The forecasts shown include forecasts from ICF, DRI, Wharton Econometrics, and the results from the latest California Energy Commission survey of "most likely" forecasts from 28 sources, including academics, consultants, oil companies, and financial institutions.

Figure II-3

Economic Cost of Power from Lakhra Project
High Oil Price Plan



The latest available forecasts are in 1986 dollars and are generally for oil delivered to end users. Since the forecasts in the plan were for oil in the Persian Gulf in 1985 dollars, the prices from the plans shown in Table II-6 were increased to make all the forecasts comparable.

A review of the price forecasts in the table reveals that most oil price forecasts today are consistent with the forecast used in the Base oil price plan. The High oil price plan is considerably above all of the forecasts in the table, particularly in the early 1990s when the Lakhra project would first begin operation. This review suggests that much more weight should be given to the Base oil price plan results than to the High oil price plan results. Nevertheless, oil price forecasters have been wrong before and could be wrong again.

Base Oil Plan Results with Additional Rupee Devaluation

While oil prices could go up above the level in the Base oil price plan, ICF believes that a more likely change to the assumptions in that plan is additional devaluation of the rupee. Figure II-4 shows how the economic cost

Table II-6

Comparison of Oil Prices In Plans to Recent Forecasts (1986 dollars per barrell)

	1990	1995	2000	2005
Base Oil Price Plan (to U.S.) [1]	20.40	23.65	27.52	31.92
High Oil Price Plan (to U.S.) [1]	29.85	34.72	40.53	47.13
Base Case ICF (to U.S.) [2]	17.80	23.60	27.40	31.80
Base Case DRI (to U.S.) [2]	17.43	21.68	32.14	--
Base Case DRI (to Big 7) [2]	16.09	20.47	31.14	--
Base Case Wharton (to U.S.) [2]	18.00	21.90	25.40	29.40
California Energy Commission Survey [3]				
Most Likely Case-Top 25%	19.48	26.04	33.63	42.36
Most Likely Case-Second 25%	18.48	22.53	27.38	32.10
Most Likely Case-Third 25%	16.79	18.78	22.10	26.63
Most Likely Case-Low 25%	14.86	15.99	17.20	18.62

[1] Adjusted from least-cost plans by adding tranportation costs and converting to 1986 dollars.

[2] Current forecasts in August 1986.

[3] 1986 Round II, June 1986.

of power from the Lakhra project compares to the long-run marginal cost of power in the least-cost capacity expansion plan under these conditions (The results shown are approximate because no least-cost plan was developed for these assumptions.) A review of the figure reveals that the Lakhra project is much more competitive if the rupee depreciates significantly. For example, the economic cost of power from the Lakhra project in the Reduced Power Plant Case is less than 5 percent above the long-run system marginal power cost.

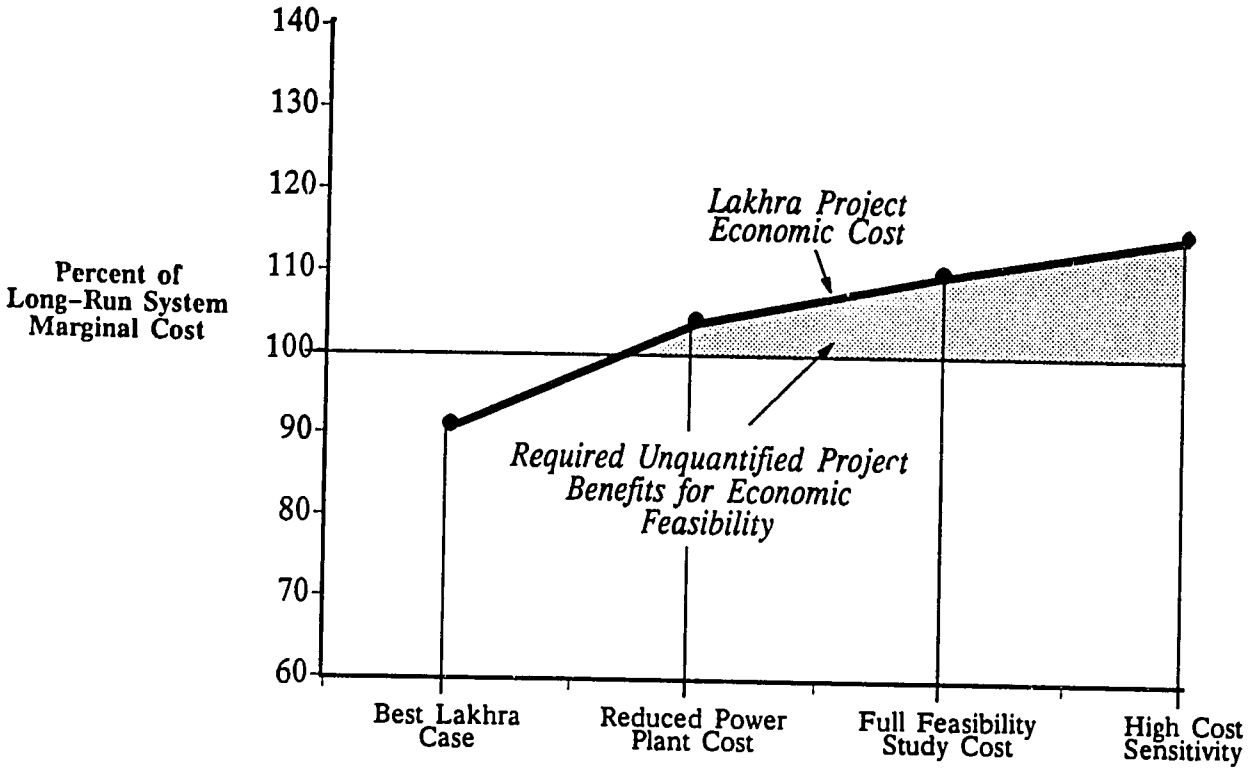
OTHER BENEFITS AND COSTS OF THE LAKHRA PROJECT

The Lakhra power project would provide Pakistan with certain benefits which would not be available if the other project alternatives were selected in lieu of the Lakhra project. These benefits include the transfer of technology to the Pakistani mining sector, the creation of skilled jobs for Pakistanis in the coal production sector, a reduction in foreign exchange requirements, reduced dependence on imported energy, and power system energy supply diversification. The only offsetting cost is associated with the higher environmental emissions associated with the Lakhra project than with either the imported oil or imported coal projects.

These unquantified benefits are important and have substantive value in assessing the economic feasibility of the Lakhra project. However, there is

Figure II-4

Economic Cost of Power from Lakhra Project
35 Percent Rupee Depreciation Plan



much debate over the proper valuation of these benefits. Different entities and organizations value such benefits quite differently. Figures II-2 through II-4 display how much economic value such benefits would have to be given in order to make the Lakhra project economically feasible under alternative economic assumptions.

Technological Advance in the Coal Sector

One of the most important benefits of the Lakhra power project is the exposure and training in modern coal mining methods that would be provided to local mining companies. The existing coal industry in Pakistan is characterized by primitive mining techniques and little knowledge about the extent and quality of its coal reserves. The implementation of a modern large-scale mining enterprise would have significant technology transfer benefits.

Most of the coal in the Lakhra project under the reference project design will be extracted using surface mining techniques, which may not have much transferibility to existing underground mining operations. However, the underground mine will be designed to advance existing Pakistani techniques, and it will provide a working demonstration of superior extraction techniques

and better working conditions, which could be adopted relatively quickly by the existing industry.

The stable and reliable year-round operation of the Lakhra mines organized around long-term contracts will also provide a beneficial model of the institutional arrangements between coal buyers and sellers required to supply a large power plant. The project is likely to provide a pool of year-round skilled workers that would permit the institution of more sophisticated mining practices in the existing Pakistani mines. The development of the new mines and the new institutional arrangements should improve the operation and the near-term potential of the existing coal industry. Although this benefit cannot be quantified, it is key to Pakistan's continued development of the coal sector.

Skilled Job Creation

All of the alternatives will lead to increased employment of skilled workers in the power supply sector. The Lakhra project is unique in that it will create jobs for skilled Pakistani workers in the Lakhra mines. The other projects all involve the continued import of oil and coal, which will have to be paid for by increasing exports of goods and services. While this activity would also create jobs, these jobs may not provide the same benefits in training workers to operate modern equipment. Accordingly, the Lakhra project will have some additional economic development benefits which have not been directly incorporated into the economic cost comparisons noted above.

Foreign Exchange Requirements

Since the alternatives to the Lakhra project require that oil or coal be imported for 30 years, they have higher foreign exchange requirements than the Lakhra project on a kw-hr basis. However, the Lakhra project is more capital-intensive than the alternative projects, so it requires more foreign exchange initially. The net foreign exchange benefits associated with the Lakhra project have been taken into account in the economic analysis. Foreign costs were penalized by increasing them by 30% relative to local costs in the comparison of the alternative power plants.

Energy Supply Diversification

The WAPDA power system has been principally dependent on hydropower and gas-fired thermal units for its power supply in the past. The limited availability of gas for incremental power generation (at least under the current regulatory system for gas) and the long construction time required for hydroelectric dams is forcing Pakistan to turn to other energy sources to produce power. Currently, additional power is being generated principally by increasing the system's use of imported oil.

The effect of extensive dependence on a single energy source can be perceived very graphically in Pakistan when water is not available for hydropower generation. Water shortages develop seasonally and may also occur in dry years. With the current dependence on hydropower, a water shortage generally also causes electricity shortfalls.

The financial risk associated with heavy reliance on imported oil is also quite evident from a review of recent history. Although oil prices are expected to remain low over the next few years, the world's supply of oil continues to be unreliable, and undue dependence on oil for power generation would place Pakistan in an undesirable situation from the standpoint of financial risk.

Because oil is a commodity, its price can rise dramatically when supply disruptions occur. As a result, while supplies are likely to be available even during such periods, they may only be available to those customers willing to pay a very high price. Needless to say, the payment of such prices imposes a potentially serious financial burden on any customer with extensive requirements for oil.

Imported coal appears to offer a potentially more stable alternative from the standpoint of financial risk. However, coal is less homogeneous than oil. In the event of a disruption from a major coal exporter, the alternative supply available to an importer may be relatively limited and would undoubtedly increase in price at such times.

The best way to avoid undesirable dependence on any one energy source is to develop a power system which has a diversified energy supply. Such a system has low risk of either power supply disruption or financial shock due to energy price movements. Pakistan currently uses virtually no domestic coal for power generation, so the construction of the Lakhra power project would contribute to energy supply diversification.

Figure II-5 shows the proportion of electric power generated by different energy sources in FY 1994 with and without the 500 MW Lakhra project (for a normal hydro availability case). If the capacity expansion plan is carried out without the 500 MW Lakhra project, Pakistan will depend on oil and gas-fired generation for about 45 percent of its electricity in that year. Hydroelectric and oil/gas units will together account for 88 percent of total generation.

Based on the capacity expansion plan in Table II-4, it is clear that Pakistan's dependence on oil and gas for power generation will drop steadily after FY 1993. Nevertheless, Pakistan will be quite dependent on oil for some time.

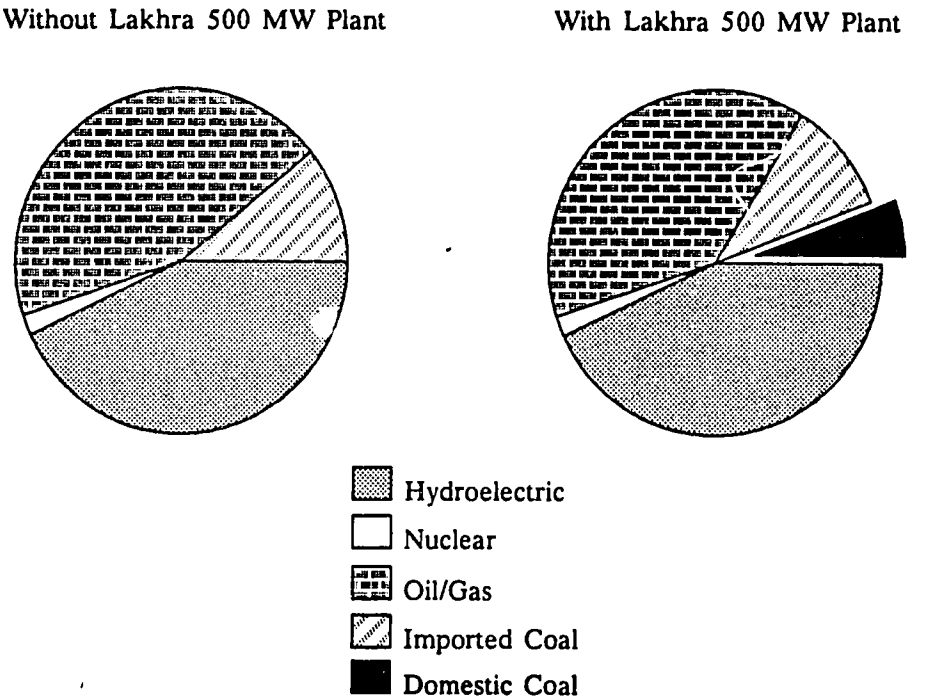
If the Lakhra project were constructed, dependence on oil/gas units would drop from 45 to 39 percent in FY 1994. This reduction would provide Pakistan with some additional system energy supply diversification and would reduce its exposure to oil price volatility.

PROJECT INTERNAL RATE OF RETURN

Electricity is currently priced below its long-run marginal production cost. Even with the commitments made to the World Bank to raise prices, future prices are projected to remain below long-run marginal production cost. As a result, project revenues are not expected to exceed project costs, and the project will not provide a positive (nominal) return on investment.

Figure II-5

Effect of Lakhra Plant on Energy Supply Diversification in Fiscal Year 1994



Appendix I contains a detailed analysis of the social internal rate of return of the Lakhra project. The benefits of the project are calculated by estimating the value of electricity to the nation, which exceeds the projected price. Based on this analysis the Lakhra project is projected to have a social IRR of 19.4 percent. Few non-power projects have a higher social IRR, which indicates that investment in the Lakhra project is an attractive use of investment capital in Pakistan. Of course, if an alternative power generation project provides power at a lower economic cost than the Lakhra project, then it would have a higher IRR than the Lakhra project and would be preferable to the nation.

CONCLUSIONS

As discussed earlier, the correct way to evaluate the economic feasibility of a power generation project is to examine it within the context of a least-cost capacity expansion analysis.

The results of this analysis suggest the following:

- Over the range of potential Lakhra project costs, the economic cost of power from the Lakhra project (unadjusted to account for unquantified benefits) varies from 0 to 30 percent above the long-run marginal cost of power in the Base oil price least-cost plan.

- Pakistan is vulnerable to a continuing depreciation of the rupee relative to the world's major currencies. If the rupee depreciates an additional 35 percent beyond the level on July 1, 1986, then the economic cost of power from the Lakhra project would improve significantly relative to the Base oil price plan. In this case over the range of potential project costs the economic cost of power would vary from 10 percent below the long-run marginal cost of power in the least-cost plan to about 15 percent above this cost.

- Most forecasters today do not consider the oil price path in the High oil price plan to be very likely. Nevertheless, if this price forecast (50 percent above the Base oil price) turned out to be correct, the Lakhra project (without accounting for unquantified benefits) would provide power at economic costs which are below the system's long-run marginal cost over the lower 65 percent of the potential range of Lakhra project costs.

- As shown in Figures II-2, II-3, and II-4, the unquantified economic benefits of the Lakhra project must be equal to or greater than the difference between the economic cost of power from the Lakhra project and the long-run marginal cost in the least-cost plan to make the project economically feasible. In the Base oil price plan, these benefits must be very significant unless the project is built for much less than estimated in the feasibility studies.

- Clearly the likely level of Lakhra project costs is key to determining whether the Lakhra project is economically feasible. If the Lakhra project's costs turn out to be similar to the Base Case estimates developed in the engineering feasibility studies, then the project will supply power at an economic cost which is about 20 percent greater than the long-run marginal cost of power in the Base oil price plan. Under these circumstances the Lakhra project can only be considered economically feasible if the addition of its unquantifiable benefits (noted above) raise the total benefits of the project by 20 percent. ICF believes that a large portion of the unquantifiable

benefits are likely to be available through other projects not yet evaluated at a cost which is less than 20 percent of the Base Case Lakhra project's costs. As such, ICF does not believe that the Lakhra project is economically feasible at the Base Case level of costs estimated in the engineering contractor feasibility reports.

- As discussed earlier in this chapter, the power plant equipment industry is currently depressed due to the low level of international demand for new large power plants. In addition, low-cost equipment producers outside the OECD countries are increasingly participating in the bidding for international projects and providing bids below the level estimated in engineering feasibility studies. As such, the probability of lowering the project costs to the level in the Reduced Power Plant Cost case is currently quite high.

- The critical issue is whether significant reductions can be obtained in the Base Case feasibility study mining costs. Boyd has indicated that an expatriate firm with outstanding management could reduce the Base Case estimated costs by up to 20 percent. If a significant reduction can be obtained, then the economic cost of power from the Lakhra project would be at least within 10 percent of the long-run marginal cost in the least-cost plan. At this level of project economic cost, donor agencies and the government of Pakistan may decide that the unquantified economic benefits are sufficient to proceed with the project.

- If the unquantified economic benefits are deemed of little value, then the project's economic feasibility is cast in doubt. Even if a contract could be obtained guaranteeing that coal would be delivered at a price consistent with the costs in the Best Lakhra Case, i.e., 20 percent below the Base Case costs, the contract could be renegotiated later and cause the coal costs to be higher. In such a case, the project would not be economically feasible.

- Given the likelihood that the rupee may decline in value, the significant possibility that bids will be significantly lower than the Base Case engineering feasibility study estimates, and the unquantified benefits of the project, ICF believes there is a reasonable chance that the Lakhra project is economically feasible. Nevertheless, given the current uncertainty about the likely final cost of the project, ICF cannot unilaterally state that the 500 MW project is economically feasible.

III. PROJECT FINANCIAL PLANS

The Lakhra 500 MW power project is a large project with a very large initial capital requirement. The final decisions on how to structure the project have not been made. Similarly, the actual project costs will not be known until bids are received for the mining and power plant components of the project. Nevertheless, illustrative financial plans for the project are required for planning purposes and to determine whether the project's financial requirements might affect the decision about how to proceed with it.

According to current plans, the project will be divided into two components for operation and financing. The mining component will be owned and managed by a private corporation which has expatriate participation. This corporation will sell the coal to the Pakistan Water and Power Development Corporation (WAPDA). WAPDA will own and manage the power plant. For this reason, separate financial plans must be developed for the mines and the power plant.

Pakistan's normal practice is to provide loans for foreign capital through the government at standard rates even if there is a donor agency loan to support the project. As a result, project financing plans may be developed two ways, either by assuming the project receives the foreign loans or by assuming that the project receives government loans of the same amount but with different terms. In this study, financial plans for the mines have been developed for both sets of assumptions.

There is also an outstanding issue related to the amount of import duty which will be paid by the private mining corporation and WAPDA for imported equipment. In the absence of a final decision, plans have been developed for low and high duty cases. The following three plans have been prepared for the mines:

- Base Case: Funds flow directly to the project from the respective donors. Import taxes and duties are 10 percent of imported capital equipment costs.

- Government Loan Case: Funds from foreign lenders are loaned to the Government of Pakistan, so the project loans all come from the government in the plan. Import taxes and duties are again 10 percent.

- High Duty Case: Funds flow to the project from the respective donors, but import taxes and duties are 45 percent of imported capital equipment costs. Loans from the development banks are limited to the Base Case level to reflect the banks unwillingness to provide loans to cover import duties.

The results of these three cases indicate the amount which WAPDA would have to pay for Lakhra coal over time, depending on the government decisions made on import tariffs and financing mechanisms for the coal mines.

Two financial plans have been developed for the power plant portion of the project, a Base Case and a High Duty Case. In the High Duty Case both the

coal and the power plant portions of the project are assumed to pay high duties on imported capital equipment.

FINANCING REQUIREMENTS/SOURCES/TERMS

Table III-1 shows the initial capital outlays which must be financed for the mine and power components of the project. Several key assumptions used to develop these plans should be noted.

- The capital outlays are based on the Base Case project engineering costs. They are not discounted for the potential savings, discussed extensively throughout the report, which may be obtained due to the current weakness in the worldwide power plant capital goods market.

- The amount of capital required is estimated by assuming that the projects begin full operation in 1992, so that interest during construction is kept to a minimum.

- Finally, the financing requirements are shown in nominal dollars, which are developed using a 4 percent inflation rate for the U.S. dollar and a 1986 exchange rate of 16.6 rupees per dollar. No adjustments have been made to account for the recent depreciation of the U.S. dollar.

The U.S. dollar has depreciated by 15 percent in real terms relative to the SDR since mid-1985 when the project costs were developed. This fall in the dollar could increase U.S. dollar denominated-nominal costs by up to 15 percent.[1] During the course of the study, however, Gilbert Commonwealth International determined that near-term bids for the power plant components could be less than engineering estimates by 10-20 percent. Since these changes tend to offset each other, financing requirements have not been increased to account for the fall in the value of the U.S. dollar.

As shown in Table III-1, under the Base (low duty) Case 539 million dollars is required to finance the initial capital requirements in the mines and 662 million dollars is required for the power plant. These amounts include the project's infrastructure requirements and operating and maintenance and interest during construction. The amount of capital required for the project might be less if the capital equipment market causes project bids to come in lower than projected.

---

[1] A 15% fall in the dollar's value relative to the SDR does not immediately affect the costs for U.S. equipment or for equipment from countries with currencies pegged to the U.S. dollar. However, it raises the costs of equipment from many other countries by more than 15%. Since the project cost estimates were not based solely on U.S. costs, a fall in the dollar could raise the project's costs measured in dollars.

TABLE III-1

INITIAL CAPITAL FINANCING REQUIREMENTS[1]
(U.S. Dollars)

	Base Case		High Duty	
	Capital (1985$)	Capital & IDC[2] (Nominal)	Capital (1985$)	Capital & IDC[2] (Nominal)
Mines				
Foreign	190	311	190	312
Local	99	228	169	324
Total	289	539	359	636
Power Plant				
Foreign	278	376	278	376
Local	166	286	263	429
Total	444	662	541	805

[1] Using Base Case engineering cost assumptions; i.e. no discounts for depressed capital equipment market conditions, but also not increasing costs to account for the decline in the U.S. dollar relative to the SDR.

[2] Includes interest and O&M during construction.

Table III-2 provides an illustrative set of sources to meet the 500 MW power project's capital requirements for the low duty case. These sources and amounts have been provided by the Bank of America Limited based on preliminary inquiries they have made. ICF emphasizes that these sources are strictly illustrative and that no financial commitments to the project have been made by any entity at this time.

A review of the amounts potentially available indicates that over half of the financing for the mines is expected to come from the development banks. Equity is expected to account for about 15 percent of funding requirements. Most of the funding for the power plant is expected to come from USAID, the development banks, and the government of Pakistan.

TABLE III-2

ILLUSTRATIVE SOURCES OF FUNDS TO MEET CAPITAL REQUIREMENTS[1]
(millions of U.S. dollars)

	Mines	Power Plant	Total
USAID	25	125	150
Arab Fund	--	50	50
Development Banks	319	200	519
Export Credits	75	75	150
Foreign Private Banks	--	--	--
Foreign Equity	50	--	50
Government of Pakistan[1]	--	189	189
Local Private Banks	24	23	47
Local Equity	46	--	46
Total	539	662	1201

[1] Assuming 10 percent taxes and duties on imported capital equipment. If taxes and duties are higher, more local financing would be required.

[2] Loans made to the project in addition to any foreign loans obtained specifically for the project.

Note: These figures are illustrative; no financial commitments to the project have been made at this time.

Source: Bank of America Limited

Table III-3, presents the loan/equity terms and conditions used to develop the plans. These terms are strictly illustrative based on other loans made in 1986.

A review of the terms reveals that there are significant differences between the various financing sources. USAID loans have by far the lowest interest rate and longest repayment period. The Arab Fund, the development banks, and the export credit agencies all provide funds at a similar rate (about 9% in nominal terms or 5% in real terms), but the Arab Fund permits a longer repayment schedule. Foreign private banks charge much more and require very rapid principal repayment, which is not consistent with the long-term nature of the Lakhra project investment.

The government of Pakistan and the local private banks charge a higher nominal and real interest rate than the development banks. The nominal rate (14 percent) is considerably higher due to the higher inflation rate associated with rupee-denominated costs. In real terms (i.e. adjusted for the different rates of inflation), local loans have interest rates which appear to be 1-2 percent higher than development bank loans, but the actual difference may turn out to be less, depending on the actual rates of U.S. dollar and rupee inflation which occur.

TABLE III-3

ILLUSTRATIVE LOAN/EQUITY TERMS USED IN THE PLANS

Source	Nominal Interest/ROR (%)	Interest Payment	Principal Repayment
USAID	3	Immediate	25 years ENP[1]
Arab Fund	9	Immediate	20 year ENP
Development Banks	9	Immediate	12 years ENP
Export Credits	8.8	Immediate	10 years ENP
Foreign Private Banks	15	Immediate	5 years ENP
Foreign Equity	20[2] [3]	Start-up[4]	30 years ENP
Government of Pakistan	14	Immediate	10 Years ENP
Local Private Banks	14	Immediate	10 years ENP
Local Equity	20[3]	Start-up[4]	30 years ENP

[1] "ENP" stands for Equal Nominal Payments.
[2] Does not include management fees.
[3] After tax.
[4] Interest capitalized during construction.

Source: Bank of America Limited

TAX AND GENERAL FINANCIAL ASSUMPTIONS

Numerous other tax and general financial assumptions were specified to develop the financial plans. A list of these assumptions follows.

- Project start date: 1992.
- Import taxes and duties: 10% (Base Case) or 45% (High Duty Case) of capital imports.
- U.S. dollar inflation: 4%.
- Rupee inflation: 7%.
- Rupee/dollar exchange rate: 2.9% (constant in real terms).
- Coal Mine tax and royalty assumptions
  - Income tax: 45% beginning in 1997.
  - Depletion rate: 25% with no carry-forward.

- Infrastructure depreciation: 25% initial; 10% declining balance on remaining capital with unlimited carry-forward.

- Equipment depreciation: 100% initial in first year of operation with unlimited carry-forward.

- Royalty payments: 15 rupees/tonne.

- Excise tax: 2 rupees/tonne.

- Workers participation fund: 5% of profits before tax.

- Workers welfare fund: 2% of profits before tax.

REVENUE REQUIREMENTS TO MEET CASH FLOW NEEDS

Figure III-1 shows the revenue required per tonne to cover the mine's operating costs and finance payments. The two low duty cases are shown: the Base Case, in which the loans flow directly to the project; and the Government Finance Case, in which all the foreign loans are replaced with government loans to the project.

The terms of the loans are such that the price of coal (in real terms) is highest in the first year and declines over time. In the Base Case (loans made to the project), the first year price is $57.60/tonne (1985 dollars), and the average price for the first five years is $53.20/tonne. This price compares to a levelized cost (at a 7% real discount rate) of $40.00/tonne over thirty years.

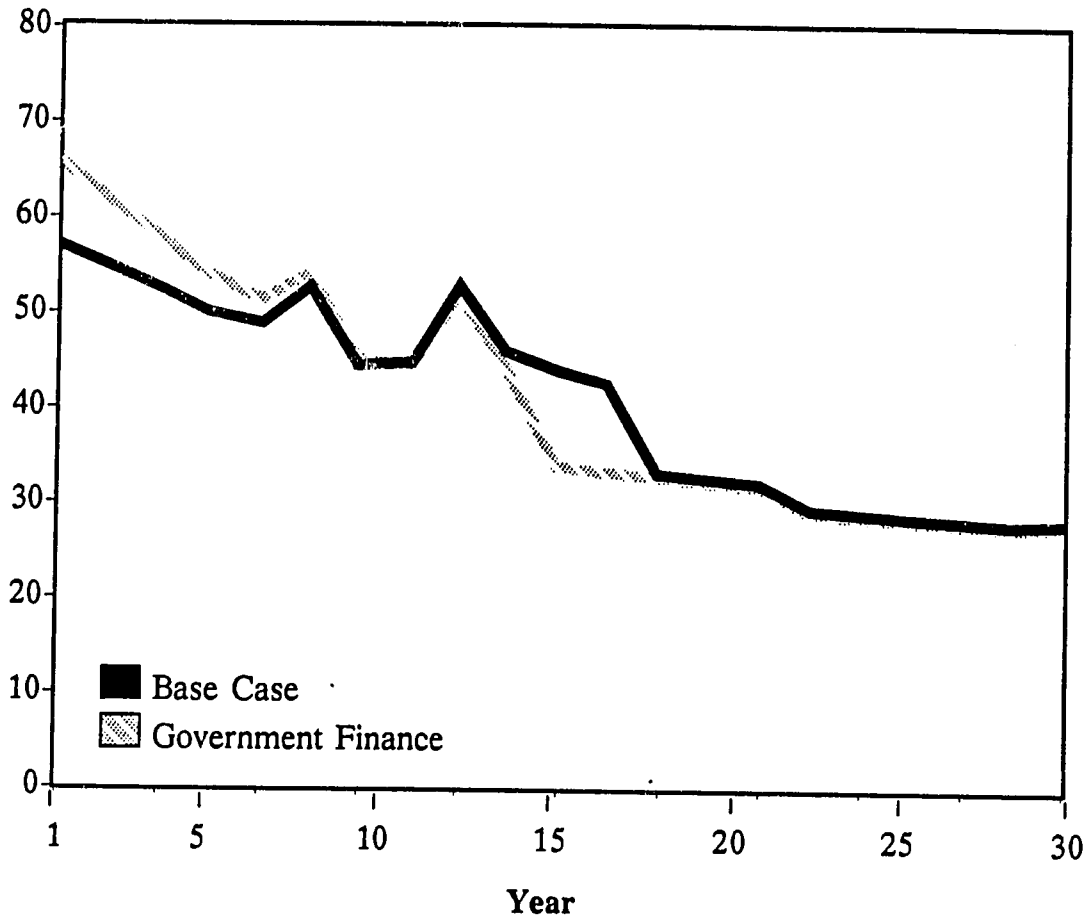
The price of the coal is somewhat higher initially in the Government Loan Case because the development bank loans have lower interest in real terms and a slightly longer repayment period than the government's loans. The price is considerably higher in the High Duty Case. The first year cost in the High Duty Case is $63.80/tonne (1985 dollars) and the average cost for the first five years is $58.60/tonne. Over the 30-year period the levelized cost of the coal is about $3/tonne (1985 dollars) higher in the high duty case chan in the Base Case (using a 7 percent discount rate). This cost is higher in the early years, however, because financing for this higher duty is not available for a 30-year period.

Review of Illustrative Power Plant Financial Plans

The financial plans for the power plant have been developed under the assumption that they are financed 100 percent through debt. Each power plant financial plan uses coal costs developed using consistent coal mine financial assumptions (i.e. the Base Case power plant is matched to the Base Case coal mine financial plan).

FIGURE III-1

REQUIRED COAL PRICES TO MATCH FINANCING CONDITIONS
(Mid-1985 Dollars Per Tonne)



The power plant financial plans show the required revenue per kw-hr over the life of the plant assuming that the project stands alone, i.e. that sales of electricity from the project in each year must cover all the project's costs in each year. The required price per kw-hr shown represents the price at the bus bar. The price to customers would have to be much higher to cover transmission and distribution costs and losses.

The electricity price at the bus bar required over time to meet project revenue needs is shown in Figure III-2. Two cases are shown, the Base (low-duty) Case and the High Duty Case. In the Base Case financial plan (loans made to the project and low import taxes and duties), the price per kw-hr (1985 dollars) is 8.3 cents in the first year and 7.5 cents on average over the first five years. These prices compare to a levelized cost (at a 7% real discount rate) of 5.5 cents per kw-hr. The price is quite high in the early years because the coal price is high in those years and many of the power plant project loans must be paid back relatively quickly.

The required electricity price in mid-1985 rupees and nominal rupees (for the Base Case) is shown in Figure III-3. The nominal price is 2.13 rupees per kw-hr in 1992 and averages 2.20 rupees over the first five years. The high level of this price is caused in part by the 7 percent rupee inflation rate used in the plans.

The detailed financial plans for the five cases are provided in Appendix J. Each plan includes four pages of summary assumptions and results and 16 pages of year-by-year cash flows.

FINANCIAL FEASIBILITY OF THE PROJECT

The availability of funds for the Lakhra project depends critically on the finding on the part of the donor agencies that the project is part of a least cost capacity expansion plan for Pakistan. USAID and the development banks tentatively have earmarked funds for the Lakhra project, but these funds will be made available only after each institution concludes that the project is economically feasible.

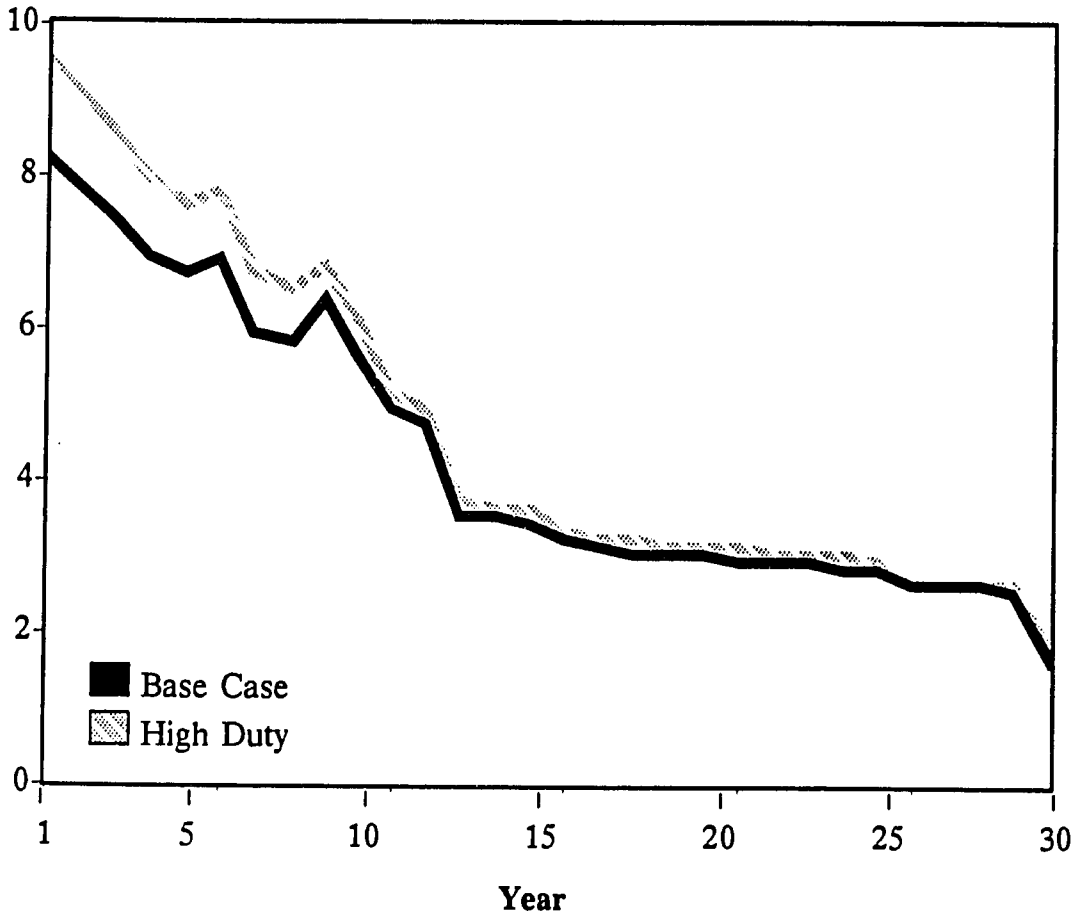
Of equal importance to the project's financial feasibility is WAPDA's capability to pay the Lakhra project's operating and financial costs over the project's useful life. As shown earlier, during the first five years of operation WAPDA will require 2.2 rupees per kw-hr at the bus bar in nominal terms (which is about 1.1 rupees per kw-hr in 1985 terms) to cover the costs of the project. As discussed in Appendix I, the average price of power to WAPDA customers was about .58 rupees per kw-hr on July 1, 1985. Transmission and distribution costs were about .26 rupees per kw-hr, leaving only .32 rupees per kw-hr at the bus bar.

Adjusting for the 29.3% loss rate[2] left only .23 rupees per kw-hr to cover generation costs out of current revenues in mid-1985. This amount is shown in Figure III-3. Since that time inflation has reduced these revenues

[2] The loss rate is the percentage of power generated for which no revenues are received. The failure to collect revenue may be due to technical losses, pilferage, or bad debts.

FIGURE III-2

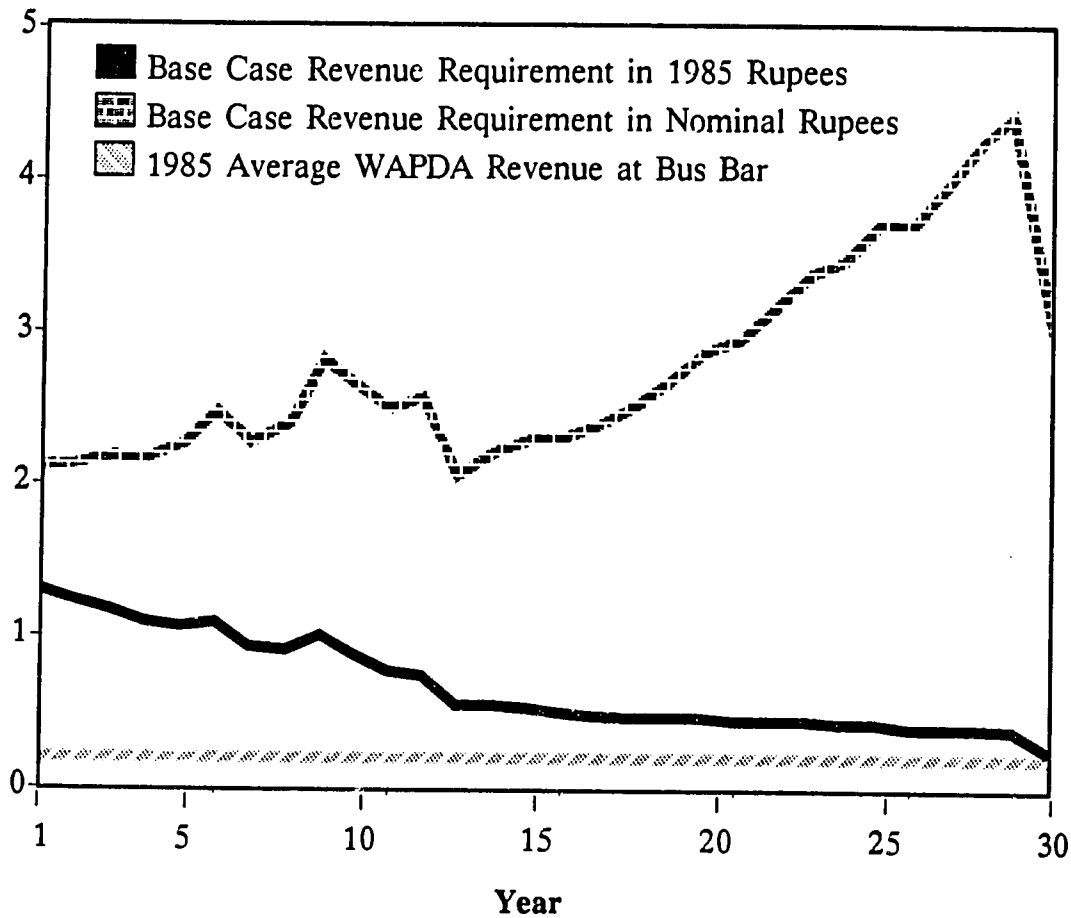
PROJECT REVENUES[1] REQUIRED UNDER ILLUSTRATIVE FINANCING CONDITIONS (Mid-1985 U.S. Cents Per Kw-hr)



[1] Prices measured at the bus bar. The price to customers would be significantly higher to account for transmission and distribution costs and losses.

FIGURE III-3

PROJECT REVENUE REQUIREMENTS VERSUS 1985 WAPDA REVENUES[1]
(Rupees per kw-hr)



[1] Prices and available revenues measured at the bus bar. The price to customers would be significantly higher to account for transmission and distribution costs and losses. The revenues shown are the revenues available net of transmission and distribution costs.

in constant rupees, and tariffs have not been increased. As a result, the current tariff contribution to generation is only 20 percent of the amount which will be required (in constant rupees) to cover the full costs of the Lakhra project in the initial years.[3] Per kw-hr revenues will decline further in real terms unless WAPDA increases tariffs in line with inflation.

WAPDA's ability to pay the Lakhra project's costs cannot be evaluated on a project-specific basis. Existing hydroelectric capacity has very low operating and financial costs, so WAPDA potentially can afford to pay the full cost of some new projects even if the revenues collected per kw-hr generated (net of transmission and distribution costs) are below the full cost of these plants.

Nevertheless, the number of new generating plants under construction and slated for construction over the next six years is quite high. In WAPDA's capacity expansion plan, total generating capacity in mid-1992 will be over double the capacity that was in place in mid-1984. Clearly tariffs will have to be raised very significantly in real terms to enable WAPDA to pay the costs of the Lakhra project and the costs of the other projects planned and under construction.[4] Satisfactory resolution of the tariff issue may be required before some donors will agree to provide financing for the Lakhra project.

---

[3] The required revenues to cover the full project costs will be lower in the later years when most of the projects loans have been repaid.

[4] WAPDA has estimated that tariffs must be increased by about 23 percent annually over the 1986-90 time period to cover financing requirements during that period. WAPDA, Power Development Plan for Elimination of Load Shedding by January 1990, March 1986, P. 18.

APPENDIX A

LAKHRA PROJECT POWER PLANT SITE SELECTION

APPENDIX A

Lakhra Project Power Plant Site Selection

Three sites were considered for siting the Lakhra project power plant:

- Jamshoro
- Khanot
- Lakhra

These sites are shown on the map in Figure A-1. Based on a comprehensive evaluation, Lakhra was selected as the best site for the power plant.

Jamshoro is currently the southern terminus of the principal North-South 500 Kv transmission line. Several oil-fired power plants are already under construction at that site, land is available there for constructing a power plant, water is available from the Indus River, the railroad passes by the site, and the site is readily accessible to the town of Hyderabad. Previous feasibility studies recommended that the power plant be constructed at Jamshoro in part because they assumed the cost of a workers' colony could be avoided at that site. Jamshoro is 13 kilometers from Hyderabad and about 35 kilometers from Lakhra (45 km via Khanot).

Khanot is a small town about 30 kilometers north of Jamshoro and 20 kilometers east of Lakhra. Its principal advantage is that it is located closer to Lakhra than Jamshoro, which would reduce the coal transport cost. Khanot is situated on the principal North-South highway, railroad line, and transmission line. In addition, water is readily available from the nearby Indus River.

Lakhra is the mine site. It is an arrid, almost unpopulated area located on a plateau 100 meters above the Indus River Valley. A power plant at Lakhra would not require any coal transportation system, but water would have to be transported to the plant. In addition, a transmission link would have to be constructed, and if rail transport were desired for back-up fuel capability, it also would have to be constructed from Khanot.

Criteria for Site Selection

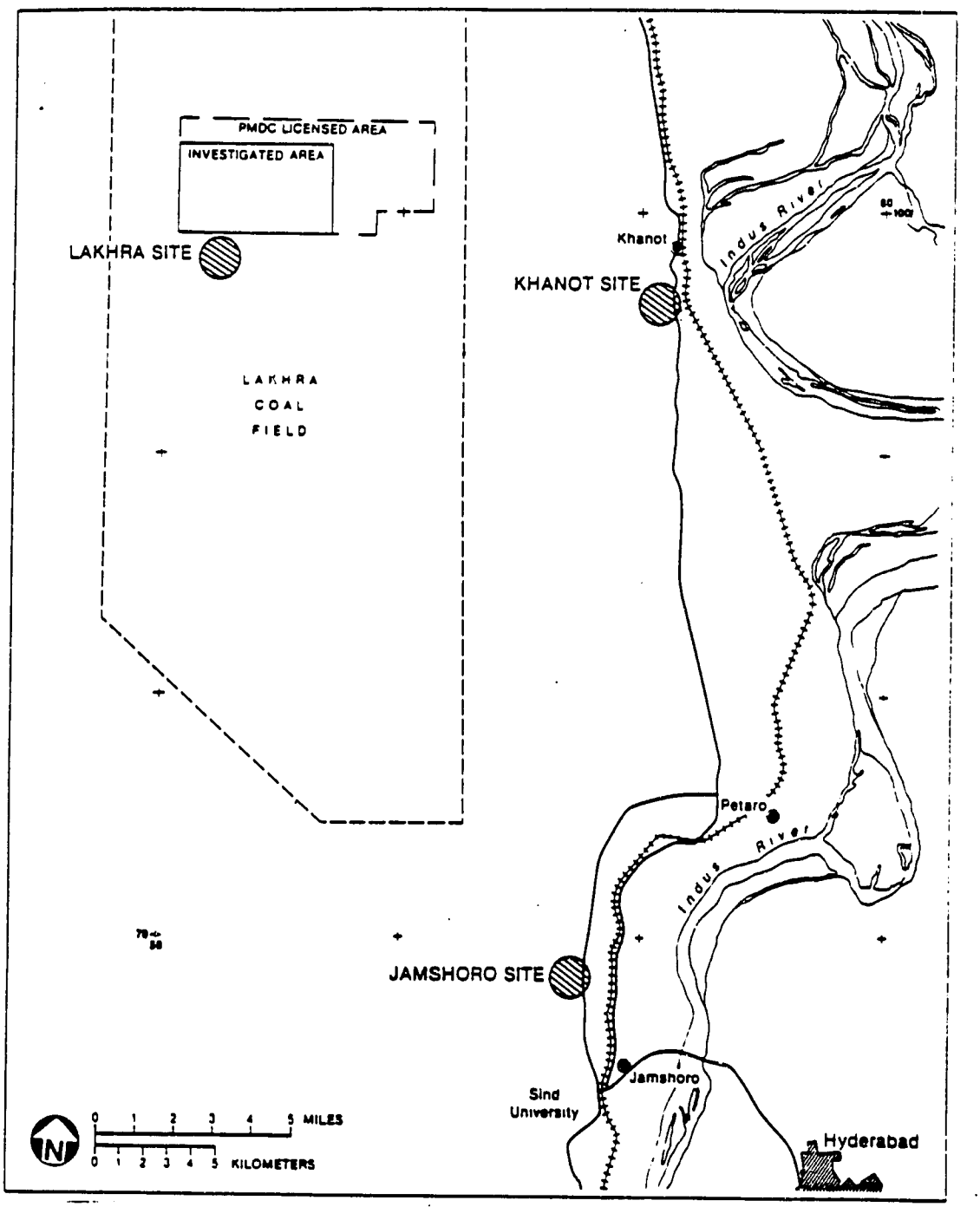
Four criteria were examined to select a site for the Lakhra project power plant.

- Environmental effects
- Total electricity cost
- Staff living conditions
- Reliability considerations

The environmental effects criterion turned out to be very important in the site selection process. Lakhra coal is very high in sulfur, and an uncontrolled plant would have very high SO2 emissions. These emissions were found to have potentially serious adverse impacts at the Khanot and Jamshoro sites.

Figure A-1

Potential Sites for the Power Plant



Source: ESE and KBN, Executive Summary; Lakhra Coal Mine and Power Generation Project Environmental and Social Soundness Agreement, June 1986, p. 19.

As noted above, each site has different infrastructure requirements and costs. Coal transport costs are lowest at the Lakhra site, but other infrastructure costs are higher.

Staff living conditions vary at the three sites. WAPDA staff clearly had a preference for the Jamshoro site due to its proximity to Hyderabad. Lakhra is clearly the least desirable site for habitation due to its isolation and the arridity of the Lakhra area.

Reliability is affected through the different fuel transport requirements at the different sites. These requirements relate to the Lakhra coal and potentially to a back-up furnace oil supply.

Environmental Effects

The construction and operation of the Lakhra project would have numerous environmental effects. Nevertheless, due to the particularly high sulfur content of Lakhra coal, the principal potential impact of the project is related to SO2 emissions. The analysis of these emissions and their dispersion was the key environmental determinant of site selection.

SO2 emissions are a potential local and long-range problem. In the vicinity of a power plant, high ambient SO2 concentrations may cause adverse health effects or adversely affect agriculture or the natural environment. Ambient SO2 quality standards have been developed to protect health and the environment.

SO2 emissions have also been implicated as a cause of acid raid deposition, particularly in North America and Northern Europe. In response, efforts have been undertaken in many areas to limit SO2 emissions even when local ambient conditions are not a problem.

Applicable SO2 Criteria

Pakistan does not currently regulate SO2 emissions, and there are no Pakistani ambient standards which limit emissions. Given the need for loans from the Development Banks to construct this project, however, the emission limits specified by these institutions for the projects they fund were adopted as a binding constraint on project design and siting. The potential donor agencies (USAID, the World Bank, and the Asian Development Bank) agreed to use the World Bank Guidelines as a common set of limits for an environmentally acceptable project. The World Bank's SO2 Guidelines as they pertain to this project are shown in Table A-1.

An analysis of the technical characteristics and economics of flue gas desulfurization indicated that the use of this technology was not a desirable option for the Lakhra project and that economies of scale were essential to make the project attractive. Accordingly, site selection was performed under the assumption that the power plant would have emissions at the maximum level permitted by the World Bank guidelines.

TABLE A-1

SO2 Emission and Ambient Air Quality Guidelines

	Maximum Emissions/Ambient Levels
Donor Agency SO2 Emissions[1] (Two-unit plant)	908 tonnes/day (1000 tons/day) at 85% capacity factor
World Bank SO2 Ambient Quality[1]	100 micrograms/cubic meter (annual average) 500 micrograms/cubic meter (24-hour period)

[1] Environmental Science and Engineering, Inc. and KBN Engineering and Applied Sciences, Inc. Executive Summary: Lakhra Coal Mine and Power Generation Project Environmental and Social Soundness Assessment, June 1986, P.12.

ESE performed an atmospheric dispersion analysis using meteorological data collected in the Lakhra field to determine the likely effect of plant SO2 emissions on ambient air quality in the vicinity of the plant. For the analysis ESE assumed the power plant would consist of two 250 MW units with a common stack, would have an annual capacity factor of 73 percent, and would combust 2.7 million tonnes of coal annually with a 5.14% sulfur content.[1]

Table A-2 presents the results of the air dispersion analysis. The proposed plant likely would not exceed the World Bank guidelines for 24-hour and annual ambient standards. The point of highest ambient concentration is located at a distance of 1.7 kilometers from the power plant. The concentration drops to about 50 percent of the maximum at a distance of 20 kilometers.[2]

The high concentrations of SO2 over the shorter periods are due to the persistence of the wind direction in the summer and in the winter. These findings indicate that the proposed power plant could seriously impact agriculture or human settlements located close to the power plant. Based on these findings and a review of the conditions around the three proposed sites for the power plant, ESE recommended against siting the plant at either Khanot or Jamshoro.

[1] Private correspondence from Kennard Kosky of KBN Engineering and Applied Sciences, Inc. to Theodore R. Breton of ICF Inc., July 29, 1986.

The Khanot site is located on the Indus River, directly north of Jamshoro. The air dispersion analysis indicated that summer emissions from a plant at that site could potentially cause agricultural damage in fields along the Indus River located northeast of that site. In addition, these emissions could potentially combine with emissions from the four Jamshoro oil plants in the winter to create undesirable ambient SO2 levels at the Liaquat Medical College and Hospital or in the city of Hyderabad.

The Jamshoro site is also undesirable for the power plant from an environmental standpoint. Although the likely damage to agricultural crops is lower and the city of Hyderabad is not likely to be in the plume, the Liaquat Medical College and Hospital likely would be affected by SO2 emissions from a plant at that site.

In contrast, a power plant sited at Lakhra is unlikely to affect any existing agricultural operations or settlements. The Lakhra site is twenty kilometers west of the Indus Valley, and ambient air pollution levels peak within two kilometers of the plant. ESE's February analysis indicates that SO2 concentration levels at ground level from a plant sited at Lakhra would not exceed 100 ug/m^3 (at worst) in the Indus Valley during a 24-hour period[3] KBN's more recent analysis indicates that concentrations will be lower than calculated earlier. In addition, the Lakhra site is located at a higher altitude than the other sites, which should cause ambient SO2 levels in the Indus Valley to be lower than estimated by the model.

Due in part to the potential for adverse pollution levels around the plant, ESE has recommended that the power plant be sited at Lakhra and that the workers colony be located at Khanot.

TABLE A-2

Impact of Lakhra Project Emissions on Air Quality (Maximum concentrations ug/m^3)

Averaging Time	Model Forecast	World Bank Guideline Limits
1 hour	4765	--
3 hours	1588	--
8 hours	596	--
24 hours	199	500
Annual	13	100

Source: Model results from private correspondence from Kennard Kosky of KBN Engineering and Applied Sciences, Inc. to Theodore R. Breton of ICF Inc., July 29, 1986.

[3] Environmental Science and Engineering, Inc. Environmental Assessment, (Draft), February 10, 1986, P. 4.4-53.

ESE also addressed the more general issue of long range transport problems associated with SO2 emissions in the South Asia region and determined that any acid rain effects are speculative and unlikely to create any near-term problems. Currently, there are virtually no emissions of SO2 in Pakistan, so there is currently no problem. Longer term the alkaline nature of the area's soils might provide substantial buffering capacity, which suggests that acid rain should not be a serious problem in the region.

Economic Costs

Siting the power plant in different locations affects the project's costs. Infrastructure costs are higher when the plant is moved away from the Indus River, but coal transport costs increase when the plant is moved away from the coal fields.

The Jamshoro site is most convenient from the utility's perspective because there is a major oil-fired power station there and a power substation. Jamshoro is also the termination point for the North-South 500 Kv transmisison line.

The John T. Boyd Company developed cost estimates for transporting coal from Lakhra to the Khanot and Jamshoro sites. Boyd recommended that an independent railroad be constructed to transport coal to either site. This approach was recommended by Boyd to ensure the reliability of the supply system.

The Khanot site was studied because it is the closest site to Lakhra which is located on the north-south road, rail, transmission, and river network. Some additional costs would be incurred in the transmission system, but these costs would be minor. The principal economic benefit associated with Khanot relative to Jamshoro is the reduced coal transport cost.

The Lakhra site creates higher transmission costs because a major line would have to be constructed to Khanot. Additionally, water would have to be brought in to provide cooling and make-up water to the plant. Nevertheless, these costs are less than might be anticipated because the mining operation will require electricity and water at Lakhra anyway. The principal economic benefit of the Lakhra location is the lack of coal transport costs. Particularly because Lakhra coal is low in energy content, the savings associated with reduced haulage requirements are significant.

Final costs for power plants and transport systems were not estimated for the 500 MW plant at all of the locations. During the course of the study the Jamshoro site was eliminated from consideration when the decision was made to site additional oil-fired units at that site. As a result, the more detailed transport cost estimates were only developed for the Khanot site.

For the purpose of this final report ICF has used the existing engineering costs for different size systems to provide estimates of the relative costs of coal and electricity for a 500 MW plant at Lakhra and Khanot. The economic cost of coal transport using a 10 percent discount rate and .77 shadow factor on local costs is shown in Table A-3.

TABLE A-3

Coal Transport Economic Costs[1]
(1985 dollars)

	Lakhra-Khanot		
Annual Volume (million tonnes)	1.8[1]	4.3[2]	2.7[3]
Capital Cost/tonne	2.25	1.10	1.85
Operating Cost/tonne	.70	0.50	.65
Total Cost/tonne	2.95	1.60	2.50

[1] Using a.77 shadow factor on local costs and a 10 percent discount rate.

[2] ICF analysis based on capital and operating costs provided by the John T. Boyd Company.

[3] ICF estimate based on Boyd estimates for other size systems cited in Boyd, Preliminary Transportation Study, Volume 3E, April 1985, P. 2-3.

The power plant costs for a 500 MW plant at each site are shown in Table A-4. These costs are used to estimate the cost of coal and electricity at each site, shown in Table A-5. A review of the electricity supply costs in Tables A-5 indicates that power can be generated most cheaply with a minemouth plant. A power plant sited at Khanot would generate power at a cost about 1.5 percent higher than a plant sited at Lakhra.

Staff Living Conditions

The principal socioeconomic differences between the sites relate to the living conditions for the power plant workers. WAPDA originally indicated a strong preference for the Jamshoro site due to its close proximity to urban amenities in Hyderabad. After Jamshoro, WAPDA staff would prefer Khanot. The Lakhra site is the least desirable location due to its isolation and arrid climate.

TABLE A-4

500 MW Power Plant Costs
(1985 dollars)

	Lakhra[1]	Khanot[1]
Capital (per kw)	970	928
Fixed Operating (per kw-yr)	7.68	7.68
Variable Operating (per kw-hr)	2.30	2.30

[1] Gilbert Commonwealth International.

TABLE A-5

Coal and Electricity Economic Costs for the 500 MW Project
(1985 dollars)

	Lakhra	Khanot
Coal (per tonne)[1]	37.80	40.00
Coal (per million kcal)[2]	11.90	12.60
Electricity (cents per kw-hr)[3]	5.42	5.50

[1] At 2.7 million tonnes per year.

[2] Assuming 3180 kcal/kg.

[3] At 70% annual capacity utilization, .77 shadow factor on local costs, and a 10 percent discount rate.

Even if the plant is sited at Lakhra, the power plant workers' colony could be sited at Khanot. This siting arrangement would have the advantage of ensuring that SO2 emissions from the plant would not adversely affect air quality at the colony.

Project Reliability

Prior to the commencement of the USAID-funded studies, donor agencies had questioned the reliability of a Lakhra coal-fired project. Staff from these agencies suggested that imported coal and furnace oil be evaluated as back-up fuels. The plant site selected for the project has implications for Lakhra coal supply reliability, the availability of a back-up fuels supply, and, in turn, the availability of the power plant.

All of the sites are located a considerable distance from the coast and are not ideal for back-up fuel delivery. Imported coal was eliminated from consideration as a back-up or blending fuel for this reason. The Jamshoro site is currently supplied with imported furnace oil by tank car from Karachi, and this supply system could be augmented; the Khanot site is also served by rail and would permit back-up furnace oil deliveries. The Lakhra site will not have rail access unless it is specifically built to provide a back-up fuel supply.

If dual-firing capability is not to be included in the plant, then reliability will be improved by siting the plant at Lakhra. A mine-mouth plant has a simpler coal supply system and is not dependent on the operation of a railroad to be able to generate power.

Conclusions

The environmental analysis clearly favors the Lakhra power plant site over the Khanot and Jamshoro sites. The high SO2 emissions could potentially cause environmental problems at Khanot and Jamshoro unless flue gas scrubbers are employed. As demonstrated elsewhere in this report, flue gas scrubbers are not desirable from a technical and economic perspective.

The economic cost analysis also shows Lakhra to be the best site. Reliability questions aside, the cost of generating power is lowest with a minemouth plant.

Staff living conditions appear to be better at the Jamshoro site, but if the plant were sited there high SO2 emissions could adversely impact living conditions. The staff is likely to prefer Khanot because of the pay increment available there for working in an isolated area. Given the same level of wages, the power plant staff would prefer the Khanot site to the Lakhra site.

Coal supply reliability is better at Lakhra, while back-up furnace oil fuel supply capability could be provided more readily at Khanot or Jamshoro.

All things considered, Lkhra is the best site for the power plant. Serious consideration should be given, however, to siting the powerplant workers' colony at Khanot and providing bus transportation to the Lakhra plant site.

APPENDIX B

COAL WASHING ECONOMICS

APPENDIX B

COAL WASHING ECONOMICS

This appendix provides a brief summary of ICF's analysis of the economics of washing (i.e., beneficiation of) Lakhra coal. This analysis was performed in late 1985 when the proposed Lakhra powerplant was 700 MW. As coal washing was found to be uneconomic at that time, the analysis has not been revised to reflect the reduced size of the project, revised economic assumptions, and revised coal quality.

Coal washing was included in the feasibility study of the Lakhra mine and power plant for several reasons. First, washing was considered as a possible method for reducing the relatively high sulfur and ash content of the Lakhra coal. It was hoped that washing could alter the characteristics of the coal sufficiently to permit improvements in boiler design and plant operation. This improvement, if significant, could reduce the overall costs of generating power by reducing coal transport costs, power plant capital requirements, and operating and maintenance costs. In addition, improved operating efficiency (due to less ash handling, less wear on the equipment, and smaller internal power requirements) and reliability (due to less slagging and fouling with a washed coal) could further reduce overall generation costs. Moreover, the use of washed coal might make it unnecessary to install flue gas desulfurization equipment to meet environmental guidelines.

After extensive analysis and burn testing of the Lakhra coals, and after reviewing the results of washing Lakhra coals in a commercial coal washing plant in the United States, Gilbert Commonwealth International (GCI), the power plant engineering firm, reached the following conclusions:

- The overall ash characteristics of the Lakhra coals are not changed appreciably by washing the coal. In fact, there are some indications that the washed product could cause greater slagging and fouling than the raw, run-of-mine coal. The result is that GCI anticipates very little cost reduction resulting from changes in the size of equipment and in the design of the power plant when using washed coal versus an unwashed product.

- GCI estimated that only $23.9 million (including escalation, interest during construction, and import duties) would be saved if a 700 MW Lakhra power plant were designed to burn washed coal as opposed to unwashed coal. This saving compares with a total initial capital cost of over $1,200 million for the combined two-unit plant constructed to burn unwashed coals, a saving of less than 2.0 percent.

- GCI and Boyd determined that the most likely improvement in the quality of the Lakhra coals by washing would be the reduced sulfur content and the improvement in the overall heat content of the delivered coal. Table B-1 shows the relative quality of the Lakhra coals on an unwashed and washed basis.

The value of coal washing, then, appears to be more related to the potential savings from avoiding expensive pollution control equipment rather than the savings that can be realized in power plant construction costs or in operating and maintenance costs. The most meaningful way of assessing the relative economics of this option is to compare the full bus bar costs of a Lakhra power plant using washed coal with that of a plant using unwashed coal (including the additional pollution control equipment costs necessary with unwashed coal) to achieve approximately the same level of reduction in sulfur dioxide emissions. This analysis is provided in the following sections.

In summary, this analysis shows that on a total bus bar cost, the cost savings and improvement in coal quality realized through washing are insufficient to overcome the increased costs due to washing. Even if scrubbing equipment were required to achieve the same level of emissions reduction that result with washing, the total bus bar costs would be lower with installation of this equipment than if the washing option were pursued.

DELIVERED COAL COSTS

In washing a raw coal, a cleaning or preparation facility is added to the production process prior to shipping. Washing removes much of the unwanted materials that are either collected in the mining process or which reside inherently with the in situ coal reserves. The improvement in the quality of the coal resulting from this additional process is offset by the additional capital and operating costs incurred. In addition, a substantial amount of the raw coal produced at the mine will be rejected at the washing plant in the process of removing the unwanted materials. Consequently, some of the coal with valuable energy content is rejected in the cleaning process. The cost estimates developed by Boyd in their analysis of the washing option for Lakhra coal are shown in Table B-2.

Combining these costs with the estimated mining costs for the 4.3 million tonne per year mining option developed by Boyd, the overall costs for mining and delivering coal to the 700 MW Lakhra power plant under the washed and unwashed options can be developed. These costs are shown in Table B-3. The run-of-mine production costs are those that have been developed by ICF for use in its economic analysis report. These costs were developed using a 10 percent and a .83 shadow factor on local costs.

Note that the costs of the washed product in Table B-3 were developed by dividing the run-of-mine, unwashed production costs by the anticipated weight yield of the washing process. To these costs were added the fixed and variable operating costs for the preparation facility. While the costs are significantly higher for the washed product, this coal is also a higher quality product, reflecting the better quality characteristics noted earlier in this appendix.

Table B-1

Comparison of the Quality of Unwashed and Washed Lakhra Coal

Coal Characteristics	Unwashed Coal	Washed Coal
Sulfur	5.0%	4.2%
Ash	24.7%	15.1%
Heat Content (Btu/lb)	5,100	6,200
Lbs. SO2/MMBtu	19.61	13.55
w/90% Retention	17.65	12.19

Note: These estimates were developed in 1985 and are not consistent with the assumptions used elsewhere in this report.

Table B-2

Illustrative Coal Washing Plant Characteristics for the Lakhra Coals (mid-1985 U.S. dollars)

Capital Cost.....	$.50 - 0.85/tonne
Variable Operating Costs.....	$2.16/tonne
Weight Yield from Washing.....	64%

Source: John T. Boyd Company.

Table B-3

Annualized Coal Supply Costs for 700 MW Plant
(mid 1985 U.S. $/tonne)

	10% Discount Rate
Unwashed Product	
Mining Costs w/ .83 Shadow Factor	$33.95
Mining Costs w/o Shadow Pricing	37.15
Washed Product	
Mining Costs w/ .83 Shadow Factor	56.05
Mining Costs w/o Shadow Pricing	61.05

Note: These estimates were developed in 1985 and are not consistent with the final Lakhra project size, cost, and economic assumptions used elsewhere in this report.

Table B-4 shows how the overall coal tonnage production and reserve requirements change under the two alternatives of delivering an unwashed and a washed product to a 700 MW Lakhra power plant. As indicated in this table, if the coal is washed there is an overall increase of about 29% in the run-of-mine (ROM) production and reserve requirements needed to support the Lakhra power plant over its full 30-year life. The required delivered quantity of washed coal is about 17% less than the required amount of unwashed product. The difference reflects the higher quality of the washed coal.[1]

ANNUALIZED BUS BAR COSTS

As noted above, coal washing must be evaluated by comparing it to alternative coal supply options. These options must be compared using the bus bar electricity cost annualized over the full lifetime of the Lakhra power plant. Such an analysis captures all of the relevant differences in both the plant costs, the plant operating performance, and the delivered coal costs and quality resulting from burning an unwashed coal without flue gas scrubbing, an unwashed coal with scrubbing, or a washed coal without scrubbing. The options compared are as follows:

---

[1] In the next section, in developing the annualized bus bar costs for the various options of interest, the improved efficiency of the power plant obtained by burning a higher quality fuel is also taken into account.

Table B-4

Coal Tonnage Requirements for a 700 MW Plant (10^3 tonnes)

	Annual Production	Total Reserve (30-Yr Plant Life)
Unwashed	4,300	129,000
Washed		
Run-of-Mine	5,550	166,500
Final Product	3,550	N/A

Note: These estimates were developed in 1985 and are not consistent with the final Lakhra project size, cost, and economic assumptions used elsewhere in this report.

- The first option is the Base Case power plant. This plant was an unscrubbed two-unit 700 MW power plant at the Lakhra site. The delivered coal costs and performance assumptions are those used in ICF's January 2, 1986 draft report.

- The scrubbed power plant option uses unwashed coal from the Lakhra field, but a 90% removal scrubber module was assumed to be included on the first unit of the Lakhra plant, scrubbing 50% of the flue gases from this plant. For the overall Lakhra plant, 22.5% of the sulfur dioxide emissions would be captured under this option by the scrubbing equipment. Less overall power is supplied to the WAPDA grid, and the plant is less efficient because of the increased power requirements at the plant for running the scrubber. In addition, higher O&M costs are incurred to handle the limestone scrubbing reagent used in the scrubbers and the scrubber sludge waste streams.

- The third option is a power plant designed to burn the washed Lakhra coal. The plant is slightly less expensive in terms of overall capital costs, and the plant is more efficient because of the higher quality product consumed in its boilers. GCI predicts that there would be no reduction in the overall O&M costs for the plant when using a washed coal product.

These differences are included in the specific assumptions used to estimate the relative economic costs associated with generating electricity in these three options. The resulting costs, shown as annualized bus bar costs in real, mid-1985 dollars per kw-hr are shown in Table B-5. The specific assumptions employed in this table are shown in Table B-6.

Table B-5

Annualized Costs for Power Generated with Washed and Unwashed Coal At Lakhra (mid-1985 U.S. cents/kw-hr)

Option	Bus Bar Cost
700 MW Plant with unwashed coal	5.35
700 MW Plant with washed coal	6.35
700 MW Plant with unwashed coal and w/scrubbers (22.5% overall removal)	5.66

Note: These estimates were developed in 1985 and are not consistent with the final Lakhra project size, cost, and economic assumptions used elsewhere in this report.

As can be seen in Table B-5, generating power with an unscrubbed Lakhra power plant is clearly preferred from an economic standpoint. However, if for environmental reasons it is necessary to reduce the emissions from the Lakhra plant, this can be done more economically by installing limited scrubbing systems and removing the sulfur from the flue gases at the plant rather than washing the Lakhra coal and burning a cleaner, higher quality coal.

This comparison does not address any problems caused by the total raw coal production and required 29 percent greater reserves under the washing option than with the unwashed option. Neither does the analysis account for any potential benefits that might be realized from producing a marketable sulfur by-product from the scrubber sludge produced by the flue gas desulfurization equipment. Clearly, coal washing is not an attractive option.

There are few places in the world where coals similar in quality and rank to the Lakhra coals are washed. In most cases, it is clear that the initial quality of the coal is of marginal economic value, and any approach, such as coal washing, which substantially increases the effective cost for producing these coals makes them less attractive. Moreover, after washing, lignite and sub-bituminous coals exhibit handling problems related to containment and spontaneous combustion that further reduce the attractiveness of washing these types of coals.

Table B-6

Assumptions Used in Coal Washing Analysis (mid-1985 U.S. dollars)

	Uncontrolled Plant	700 MW Plant w/ Scrubbers[1]	700 MW Plant w/ Washed Coal
Capital Costs ($/Kw) Unit #1/Unit #2	1,070/673	1,253/673	1,049/660
Plant Capacity (in MW)	700	340/350	700
Avg. Heat Rate (Kcal/Kw-hr)	2,821	2,902/2,821	2,777
Delivered Coal Costs[2] ($/Kcal)	11.98	11.98	16.27
O&M Costs			
Fixed ($/Kw-yr)	5.69	6.17/5.69	5.69
Variable ($/Mw-hr)	2.17	3.17/2.17	2.17
Emissions			
Rate (lbs SO2/MMBtu)	17.65	13.68	12.19
Avg. (TPD)	1,054	817	717

[1] Reflects GCI's 1000 TPD case in which a 90% efficient scrubber is installed on unit #1 scrubbing 50% of the flue gases - a 22.5% removal rate for the two-unit plant.

[2] Delivered coal costs reflect an assumed 10% discount rate and a .83 shadow factor applied to local costs.

Note: These estimates were developed in 1985 and are not consistent with the final project size, cost, and economic assumptions used elsewhere in this report.

APPENDIX C

COMPARISON OF BOYD MINING PLANS WITH PREVIOUS STUDIES

APPENDIX C

COMPARISON OF BOYD MINING PLANS WITH PREVIOUS STUDIES

The Lakhra coal mine and power plant project has been under study for almost twenty years. One of the principal obstacles to implementation of the project has been the relatively high projected cost of coal production, and the likely cost of coal production continues to be a controversial issue. For this reason in this appendix the results of the latest study prepared by the John T. Boyd Company[1] are compared with the results of earlier studies prepared by the Japanese International Cooperation Agency (JICA)[2] and the WAPDA/PMDC/SWEC team.[3].

There are many similarities but also many differences between these studies. All of the studies assumed that the coal for the power plant would be obtained from the main PMDC tract in the Lakhra coal fields. Also, heavy reliance on surface production was included in every plan which met minimum power plant size requirements.

An important difference between the studies is the level of documentation. The Boyd study is extensively documented, the JICA study has adequate documentation, while little documentation is provided in the WAPDA/PMDC/SWEC study.

One difficulty with comparing the studies is that Boyd prepared many mining plans and coal production cost estimates and Boyd's estimate of coal quality was revised during the course of the study. For this comparison we focus primarily on Boyd's cost estimate for its 3.0 million tonne per year mining plan and Boyd's final coal quality estimate.

Coal Production

Table C-1 summarizes the production rates in the mining plans developed in the different studies. The Boyd study considered many options, including (a) all surface mining from both the eastern and western areas of the PMDC tract; (b) all underground mining from the central and eastern areas; and (c) a combination of underground and surface mines. Two Boyd plans are shown: the first plan and the final recommended plan.

A review of the table shows that the JICA study assumed that surface production would supply approximately 80% of coal production requirements. The WAPDA/PMDC/SWEC study presumed that surface production would supply over 80% of production.

---

[1] John T. Boyd Company, Conceptual Alternative Mining Plans--Phase I; Lakhra Coal Project, Volume 9C, May 31, 1986.

[2] Japan International Cooperation Agency, Feasibility Study for Lakhra Coal Mining and Power Station Project, Volumes 1 and 2, February 1981.

[3] Water and Power Development Authority (WAPDA), Pakistan Mineral Development Corporation (PMDC), and Stone and Webster Engineering Corporation (SWEC), Lakhra Coal and Power Development Project Review, April 1983.

Table C-1

Planned Coal Production in the Feasibility Studies (Thousand Tonnes per Year)

	JICA		WAPDA/PMDC/SWEC		BOYD Initial Plan[1]		BOYD Final Plan	
	(TTPY)	(%)	(TTPY)	(%)	(TTPY)	(%)	TTPY)	(%)
Surface	973	79	1142	82	745	53	2700	90
Underground	258	21	250	18	655	47	300	10
Total	1231	100	1392	100	1400	100	4325	100

[1] This plan was found to be uneconomic and was not recommended.

Boyd's first plan (1.4 million tonnes per year) relied much more heavily on underground mining than the earlier studies, but the surface mine was found to be uneconomic in this plan due to its small size. Boyd's recommended mining plan utilizes surface production for 90% of total production. All of the recommended mining plans rely on strip mining to produce coal from the Eastern and Western pits and underground mining to produce 250 to 300 thousand tonnes of coal per year from the central part of the PMDC tract.

The JICA, WAPDA/PMDC/SWEC, and the first Boyd plan were all designed to fuel a 300 MW powerplant. Boyd's final plan was designed to fuel a larger plant to obtain the economies of scale associated with a larger surface mine and a two-unit powerplant.

Mining Techniques

Somewhat different mining techniques were used in the plans recommended by JICA, WAPDA/PMDC/SWEC, and Boyd. Boyd recommended that draglines be used for surface production in addition to the truck and shovel method recommended by JICA and the WAPDA/PMDC/SWEC team. Boyd's plan provides a greater reliability of supply by reducing the impact of breakdowns of any one piece of equipment.

The WAPDA/PMDC/SWEC team recommended greater use of domestic equipment than either JICA or Boyd. Donor agencies questioned the reliability and cost-effectiveness of this approach.

For underground production, the WAPDA/PMDC/SWEC team recommended a combination of hand and mechanized longwall, while both JICA and Boyd recommended a manual longwall mining technique. The WAPDA/PMDC/SWEC recommendations were also designed to take advantage of the surface pits as entries to the underground mines, thereby reducing capital expenditures and delaying the production of certain underground mines. Boyd's recommended mining plan consists of only one underground mine that cannot take advantage of the location of the surface facilities.

Productivity

Boyd assumes higher mining productivity for both surface and underground mines than the earlier studies, as shown in Table C-2. Part of the increased

surface productivity is due to economies of scale related to the larger surface operations in the Boyd plan.

Table C-2

Productivity
(Tonnes/Manshift)

	JICA (1.2 million tonnes/yr.)	WAPDA/PMDC/SWEC (1.4 million tonnes/yr.)	BOYD (3.0 million tonnes/yr.)
Surface	7.9	9	12.6
Underground	1.3	1.3	2.5

In both the underground and surface mines, Boyd uses western technology, while WAPDA/PMDC/SWEC, in particular, attempted to maximize the use of existing equipment. Boyd's use of pneumatic drills and underground conveyor systems increases underground mine productivity. In the surface mines, Boyd employs more productive draglines in addition to the truck and shovels used by JICA and WAPDA/PMOC/SWEC. Boyd also employs more experienced domestic workers who are used to handling heavy equipment in the construction industry. The Boyd plan also includes incentive bonuses for workers that are assumed to increase productivity.

Costs

Operating costs are compared in 1985 dollars per tonne (using the U.S. GNP deflator) in Table C-3. The costs shown are combined surface and underground mine costs for a typical full production year, including common facilities,

Table C-3

Operating Costs[1] [2] [3]
(Jan 1985 $/tonne)

	JICA (1.2 million tonnes/yr.)	WAPDA/PMDC/SWEC (1.4 million tonnes/yr.)	BOYD (3.0 million tonnes/yr.)
Salaries	1.58	2.12	2.21
Power & Supply	20.22	15.06	14.77
Other (G&A)	.37	.71	2.33
Total	22.17	17.89	19.32

[1]Reflects all production from surface and underground mines.

[2]Reflect average costs for a full production year. Development operating costs are shown in Table C-6.

[3]Replacement capital shown in Table C-5.

handling, hand picking and screening, but they do not include colony, infrastructure, import duties, taxes or transportation.

Boyd's "Other" category includes a 10 percent contingency factor on all costs plus G&A. Boyd also includes an incentive fee of approximately $1 on tonnage above a trigger production level and a $1 miscellaneous fee. The JICA and WAPDA/PMDC/SWEC studies do not have these costs. Differences in power and supply costs remain unresolved because detail was not provided in the JICA and WAPDA/PMDC/SWEC studies.

Initial and Replacement Capital

Initial capital per tonne of production (adjusted to 1985 dollars per tonne) is shown in Table C-4. JICA and Boyd provide the lower estimates of underground mining capital costs. The WAPDA/PMDC/SWEC plan reduces capital costs on shaft and slope design but offsets this reduction with the use of more

Table C-4

Initial and Replacement Capital[1] [2]
(mid $1985 per tonne)

	JICA (1.2 million tonnes/yr.)	WAPDA/PMDC/SWEC (1.4 million tonnes/yr.)	BOYD (3.0 million tonnes/yr.)
Initial			
Underground	5.85	11.00	5.53
Surface	15.35	9.80	10.19
Common[3]	4.65	3.65	0.60
Combined[1]	18.24	13.70	10.32
Replacement	6.32[4]	2.58[4]	3.18

[1] Includes contingency and administration fee, but not colony preparation.

[2] Expressed as a real annuity using a 10 percent real discount rate.

[3] Includes handling and other costs common to both mines.

[4] Expressed as an average per tonne for a typical year.

Sources: ICF calculations from data in the JICA and SWEC final reports and Boyd.

mechanized mining equipment. Boyd uses a number of upgrades in the mining plan to reflect Western practices, and they also assume that all purchased equipment is new.

The Boyd plan has the lowest estimate of surface mine initial capital. The WAPDA/PMDC/SWEC team reduced JICA's capital cost estimates by using smaller and locally manufactured equipment. Many items were eliminated entirely. In spite of this change, productivity is assumed to be higher in the WAPDA/PMDC/SWEC plan than in the JICA study. No explanation for this change was provided in the WAPDA/PMDC/SWEC report. Boyd uses draglines which have high capital costs (but also high productivity). The larger scale of the surface mines in Boyd's plan permits a significant reduction in initial capital (per tonne of production).

Capital expenditures for screening and crushing are significantly higher in the JICA study than in the Boyd study. This reflects a higher level of manual screening in the JICA plan than in the Boyd plan.

Total Costs Excluding Infrastructure

The total costs excluding infrastructure for each study are summarized in Table C-5. As shown, Boyd's costs are closer to those developed by the WAPDA/PMDC/SWEC team and much lower than the JICA costs on a dollar-per-tonne basis. However, Boyd's estimate of coal energy content is much lower than the earlier studies.

Table C-5

Mining Costs Excluding Infrastructure[1]
($ 1985/tonnes)

	JICA (1.4 million tonnes/yr.)	WAPDA/PMDC/SWEC (1.4 million tonnes/yr.)	BOYD (3.0 million tonnes/yr.)
Capital: Initial	18.24	13.70	10.32
Replacement	6.32	2.58	3.18
Operating - Full Production	22.17	17.89	19.38
- Development	7.57	N.A.[2]	4.07
Total[3]	54.30	34.17	36.95
Quality (kcal/kg)	3823	3764	3180
$/million kcal	14.20	9.08	11.62

[1] Expressed as real capital annuities using a 10 percent discount rate.

[2] Unknown. May be included in capital costs or operating costs.

[3] Does not include infrastructure.

Sources: ICF calculations based on data in the JICA and WAPDA/PMDC/SWEC final reports and Volume 9C of the Boyd report.

Boyd's lower estimate of coal quality has a dramatic effect on mining costs as measured on a per million kcal basis. Boyd's cost per million kcal are only slightly below the JICA estimate. The WAPDA/PMDC/SWEC cost estimates are significantly lower, but most of the savings have not been documented. Further, the WAPDA/PMDC/SWEC report does not have sufficient detail to determine whether development costs are included in the cost estimate. Development costs are significant costs for Boyd and JICA.

Discussion and Conclusions

Although there are three studies of mining costs for coal produced from the PMDC tract, these studies represent very different levels of effort and are based on very different levels of information. The JICA study was based on a very limited drilling program, but it was a thorough, documented study. The WAPDA/PMDC/SWEC study was primarily an effort to reduce the JICA cost estimates, and it was not based on any additional field studies. The WAPDA/PMDC/SWEC costs are lower, but the basis for the reductions are not well documented.

The Boyd study is by far the most extensive and is based on far more information. The Boyd analysis tends to corroborate the mining cost estimates in the WAPDA/PMDC/SWEC study. Boyd's costs in the recommended plan are much lower than the JICA costs, and the cost reduction is due only in part to the economies of scale associated with a larger surface mine. Boyd's cost estimate for its 1.65 million tonne per year mining plan is 38.20 per tonne (excluding management fee and excluding infrastructure costs). This cost estimate is similar to the Boyd costs for the higher production plan.

The most striking difference between the Boyd study and the previous studies is the estimated quality of the coal likely to be available from the mines. Boyd performed very careful studies of the coal quality and attempted to replicate the JICA estimates by taking samples from the same area. Boyd found that the moisture content of the run-of-mine coal was significantly higher than measured in the JICA study.

Since the WAPDA/PMDC/SWEC study assumptions were based on the JICA test results, the Boyd results must be accepted as better information. ICF has concluded that the Boyd feasibility study and mining cost estimates are superior to the earlier efforts and provide a good basis for determining the economic feasibility of the proposed Lakhra project.

APPENDIX D

LOAD FORECASTS

APPENDIX D
LOAD FORECASTS

The need for incremental generating capacity and the timing of the need for a particular power plant can only be assessed within the context of the developing power system. The load forecast is a critical factor in determining whether new capacity is needed and what type of capacity should be installed. This appendix focuses on the likely growth in power demand over the supply planning period.

Available Methods for Developing Load Forecasts

Load forecasts are a critical element of electricity supply planning. They can be developed using a variety of methodologies:

- Trend Projection: Recent trends in electricity consumption or demand may be projected out through time. Generally, the historical period selected for trend evaluation will affect the projection.

- Forecasts for Other Areas: A load forecast for one or more similar geographic areas may be used as a proxy for the likely development of demand in an area where rigorous load demand analysis has not been performed.

- Modified Trend Projection: Recent trends may be used as a basis for future projections, but they may be modified due to expected changes in underlying factors relative to the historical period. Econometric analysis may be used to do this in a rigorous fashion.

- Structural Analysis: An extensive analysis of the economy, its likely changes over time, electric power connection rates over time, and the likely development and use of new energy-using technology may be performed as a basis for projecting electricity demand.

The official load forecasts developed to date for Pakistan appear to be consensus forecasts based in large part on recent trends and implicit assumptions about future customer hook-up and conservation rates. Prices apparently have not been explicitly taken into account in the development of these load forecasts. In the remainder of this appendix a variety of forecasts of Pakistani load growth are presented and discussed.

Projections of Recent Load Growth Trends

The most simplistic forecast is an extension of recent trends. Implicitly such a forecast assumes that all the factors determining load growth during a historical period will behave similarly in the future. The dilemma is that

different historical periods have different electricity growth rates and in the absence of sophisticated analysis it is not clear which period may be more representative of the future.

Over the 1972-84 period electricity supply growth in the combined Karachi Electric Supply Corporation (KESC) and Water and Power Development Authority (WAPDA) systems was 9.2% on an annual basis. However, over the 1980-84 period electricity supply growth was 11.8% on an annual basis. The higher growth in recent years was associated with (among other things) higher GDP growth, a concentrated effort to supply power to rural areas, and the return of expatriates from the Middle East with disposable income and electric appliances. Analysis of factors such as GDP growth and the likely changes in these factors can be used to modify the historical trends.

Modified Trend Projections

Studies of electricity demand have shown that (real) income or GDP growth is one of the most important determinants of electricity demand growth. Accordingly, it may be appropriate to adjust historical trends in Pakistani electricity load growth based on differences between historical and projected future income or GDP growth.

Table D-1 shows the relationship between Pakistan GDP growth and electricity growth over the 1972-84 and 1980-84 periods. Over the 12 year period the elasticity of electricity demand with respect to GDP was about 1.7. More recently, however, the elasticity has been close to 2.0.

As mentioned above, a forecast for another geographical area may also be used as a proxy for the area under examination. Table D-1 also shows a World Bank 1983 forecast of GDP and electricity growth for the 1980-95 period for all developing countries. The projected GDP growth is lower than Pakistan's historical growth, and the elasticity of load growth to GDP for all developing countries is 1.6.

The elasticity of electricity demand with respect to GDP usually is lower in the more developed countries, because power systems in developed countries already extend to the entire population and appliance market penetration is much higher. As shown in Table II-1, the elasticity of load demand with respect to GDP in Japan over the 1965-81 period was 1.1, but it was only 0.7 over the more recent 1973-81 period when oil and electricity prices were rising. In the U.S. the income elasticity was 1.6 over the 1965-81 period, but it was only 1.1 over the 1973-81 period.

The considerable differences in the elasticity of electricity demand relative to GDP between countries and over time highlight the risk associated with simple trend projections. The information presented in Table D-1 suggests that the level of electricity demand growth in Pakistan in recent years has been unusually high and is unlikely to continue at the same rate over the next twenty years.

Economic growth is not the only factor determining electricity load growth. Customer hook-up rates and electricity prices are also very important. In Pakistan the rate of new customer connections appears to have

Table D-1

Relationship of Electricity Growth to GDP Growth

	Load Growth	GDP Growth	Load to GDP Elasticity
Pakistan FY73 to FY84	9.2%[1]	5.5%[2]	1.67
Pakistan FY80 to FY84	11.8%[1]	6.0%[2]	1.96
All Developing Countries 1980-95	7.7%[3]	4.8%[3]	1.60
Japan 1965-81	7.4%[4]	6.7%[4]	1.10
Japan 1973-81	4.0%[4]	2.9%[4]	0.73
U.S. 1965-81	5.2%[5]	3.2%[6]	1.63
U.S. 1973-81	2.9%[5]	2.6%[6]	1.12

---

[1] Pakistan Water and Power Development Authority, Power System Statistics Ninth Issue, November 1984, p. 43.

[2] World Bank publications.

[3] World Bank, The Energy Transition in Developing Countries, 1983, pp. 4-5.

[4] Kenichi Matsui and Kokichi Itoh, "Electrification and Economic Growth in Japan," IAEE Proceedings, Seventh Annual International Conference, June 3-5, 1985, Volume 6, P. 138.

[5] U.S. Energy Information Administration, State Energy Data Report 1960-83, May 1985, p. 15.

[6] Council of Economic Advisors, Economic Report of the President, 1984, p. 222.

been the most important determinant of load growth over the last twenty years. Over the 1973-84 period WAPDA's customer base (The WAPDA system includes 94% of the country's population) grew at an annual rate of 9.8%, and over the 1980-84 period customer growth was 10.8% annually. Electricity consumption per customer was approximately constant over this period.[1]

Electricity prices in Pakistan have been and remain (on average) significantly below long-run marginal generation and distribution costs. Currently average electricity prices on the WAPDA system are on average about 50% of long run marginal costs (KESC prices are much higher and are closer to marginal costs). The government of Pakistan has made a commitment to the World Bank to raise WAPDA's prices in real terms over the next five years to provide the additional revenues required to finance capacity additions. These price increases can be expected to have a negative effect on load growth.

Econometric Analysis

Dr. Tariq Riaz has estimated statistical demand models for electricity in Pakistan for three customer classes; residential/commercial, industry, and agriculture.[2] These models provide an estimate of annual electricity demand as a function of:

- electricity price,
- oil and natural gas prices,
- real income/capita or sectoral GDP,
- number of customers, and
- lagged consumption.

These models were developed using data covering fiscal years 1960-77. The coefficients in the models are somewhat difficult to evaluate because the model includes some variables in logarithmic form and others in linear form. Nevertheless, the models appear to have an average short-run electricity price elasticity of about -0.1 and a long-run price elasticity of about -0.3. The associated short-run GDP output elasticity is about 0.5 and the long-run GDP output elasticity is about 1.4.

Using a 5.6% GDP growth rate, electricity prices equal to long-run marginal cost (based on thermal plants and 1980 Pakistani fossil fuel prices), population projections, and an electricity customer growth projection of about 7 percent, Dr. Riaz projected an electricity growth rate of 6.2% over the 1980-2005 period.[3]

---

[1] Pakistan Water and Power Development Authority, Power System Statistics Ninth Issue, November 1984, pp. 41-42.

[2] Dr. Tariq Riaz, Pakistan: The Energy Sector, 1984, pp. 64-65.

[3] Ibid, pp. 70-71 and 216-17.

Structural Analysis

Ebasco Services is currently completing an analysis of alternative expansion and rehabilitation options for the WAPDA power system under contract to USAID. As part of this analysis Ebasco has developed projections of load requirements for several alternative future connection plans.

Ebasco's approach for projecting load requirements was to develop electricity growth rates per customer based principally on growth rates over the FY 1980-84 period and then to develop total electricity growth requirements based on alternative customer connection plans. Assuming WAPDA customer growth rates of 8.7 to 11.9% annually over the FY 1984 to FY 1993 period, Ebasco projected total Pakistan electricity growth rates of 10.7 to 13.1% annually.[4] Ebasco did not specifically address GDP growth and electricity prices in their analysis, but implicitly they assume that FY 1980-84 conditions will prevail.

Alternative Load Growth Projections for Pakistan

These analyses can be used to develop some alternative load growth projections for Pakistan. Except for the simple trend extrapolation, which implicitly assumes all factors affecting electricity demand will be the same in the future as in the past, projections of several key factors are required in order to forecast electricity demand. These key factors include GDP growth, electricity prices, and customer hook-up rates. Table D-2 presents sixteen alternative forecasts, including trends from two historical periods in Pakistan and a variety of projections using a range of GDP and electricity price growth assumptions and modifications of the World Bank, Riaz, and Ebasco projections.

In recent years Pakistan's GDP growth has been quite high relative to other developing countries. GDP growth averaged 5.5% over the FY73 to FY84 period and 6.0% over the FY 1980-FY84 period. These periods coincided with the economic boom in the Middle East, which provided Pakistan considerable economic stimulus through foreign aid from Islamic countries and worker remittances. Since this boom is ending, Pakistan's growth rate may be adversely affected. Pakistan's official GDP target is 6.5% annual growth, but this target will be difficult to achieve. Accordingly, electricity growth rates were projected using a GDP growth range of 5.0 to 6.5%.

In recent years electricity prices have not kept up with inflation. As discussed earlier, prices are likely to increase in real terms in the future. Dr. Riaz implicitly assumed a 5.6% real annual price increase for electricity (from 1980 prices). An alternative forecast using his methodology was developed in which there was no increase in real electricity prices.

---

[4] The Ebasco analyses made available to us provide total generation requirements for Pakistan, but customer growth rates have only been worked out by Ebasco for the WAPDA system.

A review of the forecasts in Table D-2 below indicates that the growth trend over the FY 1980-84 period has a very high growth rate (11.8% annual). This rate seems unsustainable over the long run because it was associated with 6.0% GDP growth, 10.8% customer growth (on the WAPDA system), declining real electricity prices, and the return of many workers from the Middle East with significant disposable income (which enabled them to acquire air-conditioners and other electrical appliances). The 10.8% rate of customer growth could be sustained for some years, but not until 2005. [WAPDA's customer hook-up goal for FY85 was only 310,000, which is only 7.3% of its FY84 customer base.[5]]

---

[5] Pakistan WAPDA, op. cit. pp. 42 and 48.

Table D-2

Alternative Electricity Growth Projections

Basis	GDP Growth	(Real) Electricity Price Growth	Customer Growth	Electricity Growth
FY73 to FY84 trend	5.5%	1.7%	9.8%[1]	9.2%
FY80 to FY84 trend	6.0	(0.9)	10.8[1]	11.8
Ebasco	6.0	(0.9)	8.1[1]	10.7
Structural Analysis	6.0	(0.9)	11.9[1]	13.1
World Bank All LDCs 80-95 Projection	5.0	N/A	N/A	8.0
	5.5	N/A	N/A	8.8
	6.0	N/A	N/A	9.6
	6.5	N/A	N/A	10.4
Riaz Econometric Model	5.0	5.6%[2]	7.0	5.4
	5.5	5.6%	7.0	6.1
	6.0	5.6%	7.0	6.8
	6.5	5.6%	7.0	7.5
	5.0	0	7.0	6.6
	5.5	0	7.0	7.3
	6.0	0	7.0	8.0
	6.5	0	7.0	8.7

---

[1] WAPDA System Only.

[2] Price growth calculated over 15 years based on apparent Riaz long-run marginal cost of 10.0¢/kw-hr (1980 dollars) and the 1980 actual price of 4.4¢/kw-hr.

The Ebasco electricity growth projections are also very high relative to historical levels. EBASCO's forecasts are very similar to the FY 1980-84 trends because they are based on FY 1980-84 growth in electricity demand per customer and assume high connection rates.

The government of Pakistan has agreed to finance 40% of new electricity system investment out of system revenues as part of its World Bank energy sector loan agreement. WAPDA has agreed to increase its electricity tariff by 32% between July 1985 and July 1987. If inflation averages 7%, these price increases will average 8% per year in real terms over the two-year period. This price increase (8.9% per year greater than the recent period) should lower recent growth rates by at least 1.0% annually. This analysis would suggest that 10% is a likely upper bound for load growth in Pakistan over the near term and that average annual growth over the 1985-2005 period will be significantly lower.

The FY73 to FY84 trend appears to be a more realistic forecast for near-term electricity growth. During this period GDP growth was 5.5%, real electricity prices increased by 1.7%, and customer growth was 9.8% per annum. These factor growth rates led to a 9.2% annual growth in electricity demand. This level of growth is also consistent with the World Bank's forecast of the 1980-95 income elasticity of demand for all developing countries and a GDP growth rate of 5.75%.

The forecasts of electricity growth based on the work of Riaz all have lower rates. A 6.0% GDP growth assumption, no real electricity price increase, and a 7.0% growth in customer hook-ups leads to an annual electricity growth rate of 8.0%. Lower GDP growth or higher real price growth leads to lower growth of electricity demand. The key difference between the low price Riaz projections and the historical trends is the customer growth rate. The Riaz customer growth assumption seems reasonable for the twenty-year period, but it may be too low in the near term.

Clearly there is considerable room for error in projecting Pakistan's future rate of electricity demand growth. However, this analysis suggests that 9% growth is likely in the near-term with up to 7.5% average growth over the 1985-2010 period if economic growth and customer hook-up rates are high and prices are kept low. If economic and customer growth rates are more similar to historic levels and prices are increased, then load growth is more likely to average about 6% per year over the period.

The current WAPDA load forecast was provided to GCI for use in the least cost generation (WASP III) modeling effort. This forecast is shown in Table D-3. The forecast has an average load growth of 9.6% over the fiscal years 1984-95 and an 8.5% average annual growth over the entire FY 1984-20105 period. Based on our earlier review of several alternative forecasts, this forecast seems to be too high.

The WAPDA forecast is based on the assumption that an accelerated village electrification program will be undertaken and achieved by 1990. For this reason load growth over the 1987-90 period is projected to be 10.3 percent annually. According to WAPDA, the growth rate would be higher, but load management programs are also to be undertaken to reduce demand. After village

Table D-3

Water and Power Development Authority 1986-2010 Load Forecast Used In The Generation Planning Studies

Fiscal Year	Peakload MW	Energy GWH	Growth Rate (%)	Load Factor (%)
1984	N/A	21,986.0[1]	--	61
1987	5,361	28,645.5	9.2[2]	61
1988	5,920	31,632.5	10.4	61
1989	6,531	34,897.2	10.3	61
1990	7,205	38,498.6	10.3	61
1991	7,909	42,260.3	9.8	61
1992	8,625	46,086.2	9.1	61
1993	9,404	50,248.6	9.0	61
1994	10,285	54,956.1	9.4	61
1995	11,258	60,155.1	9.5	61
1996	12,318	65,819.0	9.4	61
1997	13,477	70,011.9	9.4	61
1998	14,747	78,797.9	9.4	61
1999	15,903	84,974.8	7.8	61
2000	17,150	91,637.9	7.8	61
2005	24,551	131,183.9	7.4[3]	61
2010	34,191	182,693.4	6.8[4]	61

[1] 1984 KESC Supply 3586 GWH
1984 WAPDA Supply 18052
Estimated 1984 WAPDA load shedding 348
Total 1984 Load Demand 21986 GWH

[2] 1984-87 annual growth rate.

[3] 2000-2005 annual growth rate

[4] 2005-2010 annual growth rate

Sources: 1984 supply figures obtained from WAPDA staff. Load forecast taken from Pakistan Water and Power Development Authority, Power Development Plan for Elimination of Load Shedding by January 1990, March 1986, Table 5.

electrification is largely completed, load growth falls to 9.0 percent in fiscal year 1993.

The projected effect of load management on demand growth is visible in the forecast through 1993. After 1993 load growth is projected to increase to 9.4 percent through 1998, after which it drops significantly and averages about 7.2% through 2010.

A review of the forecast and the basis for it indicates a potential anomaly. On the one hand, achievement of an accelerated construction program to meet forecast demand will require considerable investment. WAPDA has estimated that tariffs would have to be increased by about 23 percent annually to permit self-financing of the incremental capacity required to meet demand.[6] On the other hand, the load forecast does not appear to take the effect of any tariff increases into account. Over the near term the installation of new generation capacity is not likely to keep up with demand, so the high load forecast should not cause any problems. Longer term the effect of rising tariffs must be incorporated into the supply planning process.

---

[6] Pakistan WAPDA, Power Development Plan for Elimination of Load Shedding by January 1990, March 1986, p. 18.

APPENDIX E

LEAST COST CAPACITY EXPANSION ANALYSIS

APPENDIX E

LEAST COST CAPACITY EXPANSION ANALYSIS

A series of least cost capacity expansion plans for the Pakistan power supply system were developed during the course of the Lakhra project feasibility studies to determine whether the Lakhra project would form part of such a plan. The WASP III capacity planning model was installed at WAPDA headquarters in 1985, and this model was used to perform all the capacity planning analyses available for use in this study.

Description of the WASP III Model

The Wien Automatic System Planning Package (WASP) is a non-linear dynamic program which can determine the least cost capacity expansion plan for a utility service area for a period of up to 30 years. WASP can simulate alternative hydro conditions and numerous load and supply availability periods in each year. When used correctly, WASP is a useful planning tool.

WASP determines the optimal expansion plan by creating many alternative dispatch and new-build alternatives and then selecting the lowest (discounted) cost plan over the planning period selected. This "create and sort" process is necessary because the non-linear equations used in WASP prevent the use of a simple solution technique.

The number of potential new generating units which WASP is given to evaluate in each year must be quite limited. Otherwise so many build and dispatch alternatives would be created in each year that finding the least cost solution would take too long. As a result, WASP is not set up to take input data and provide a solution. Rather it operates through a series of steps in which the user of the model screens alternatives based on year-by-year cost analysis and in this way determines which new power plant alternatives should be included in the final solution in each year.

Obtaining a truly optimal solution requires that the user correctly identify the least cost alternatives which the model is permitted to construct in each year. The user must also enter the dispatch order of the available plants based on each unit's variable costs. The model is cumbersome and time-consuming to operate, particularly if fuel prices change over time and if it is operated on a mini-computer rather than a mainframe. The model can include shadow price factors in an analysis, but it is not set up to facilitate this type of analysis. In short, WASP is not designed to perform quick planning or sensitivity studies. It is appropriate for routine planning studies in which time is not in short supply.

Planning Studies Carried out Relevant to this Analysis

Numerous least cost capacity expansion plans were developed by Gilbert Commonwealth International and WAPDA staff for a wide range of assumptions. Plans were developed with a 550 MW Lakhra project and a 250 MW Lakhra project. The 550 MW Lakhra project was identical to the project identified as the best Lakhra project, except that it was 10 percent larger. The plans with

the 550 MW project are the ones which are most applicable for evaluating the 500 MW Lakhra project. The following four plans were designed to analyze the 550 MW power plant:

- Base oil price capacity expansion plan ($17 per barrel oil in 1992, rising at 3% annually);
- Base oil price plan with a (reduced cost) Lakhra project forced into the plan;
- High oil price capacity expansion plan ($25 per barrel oil in 1992, rising at 3% annually); and
- High oil price plan with the Lakhra project kept out of the plan.

All of these plans were designed to analyze the attractiveness of the Lakhra project using the Best Lakhra Case costs. Relative to the Base Case engineering costs, the first 275 MW unit's capital costs were reduced by 20%, the second unit's capital costs were reduced by 10%, and the coal supply costs were reduced by 20%. No plans were developed using the full feasibility study engineering costs. It was clear the project would not be taken with these costs in the Base oil price plan. The Base Case project costs were not evaluated in the High oil price plan due to a lack of time.

Numerous other plans could have been developed to test the effect of changes in other assumptions. Given the interest in finishing this study and the considerable effort and time required to develop each plan using WASP in Pakistan, the number of plans prepared and reviewed for the 550 MW project was limited to the four most important ones.[1]

Assumptions used in the Planning Studies

The key assumptions in the planning studies are the load growth forecast, the generation projects made available for inclusion in the least cost plan, the operating and cost characteristics of the these projects, the fuel price forecasts for the relevant fuels, and the shadow price factors adopted.

The generating projects made available include oil/gas-steam, oil/gas turbines, nuclear, imported coal, hydroelectric and domestic coal plants. The operating and cost characteristics of these units were agreed to by representatives of ICF, Gilbert Commonwealth International (GCI), John T. Boyd, the Asian Development Bank, the Bank of America, WAPDA, and USAID at meetings held in Lahore in April 1986. These assumptions will be documented by GCI when the least cost planning studies have been completed.

---

[1] One additional plan was developed to test the effect of including more imported coal plants in the plan during the post-1998 period.

The fuel price forecasts used in this study are discussed in Appendices B (oil prices) and Appendix H (imported coal prices). Shadow prices factors are discussed in Appendix F. The load growth forecast is analyzed in Appendix D.

Results of the Least Cost Planning Analysis

The most important result of the planning studies initially appeared to be that the 550 MW Lakhra project using the Best Lakhra Case costs was not included in the Base oil price capacity expansion plan. The 550 MW project with the Best Lakhra Case costs was included in the least cost capacity expansion plan when the oil price was increased by 50 percent.

The Base oil price capacity expansion plan is shown in Table E-1. A review of the plan indicates that hydroelectric and oil/gas plants are added during fiscal years 1991-93 and imported coal, hydroelectric, and nuclear plants are added thereafter. Table E-2 shows the changes to the Base oil price plan which occur when the 550 MW Lakhra project is forced into the plan. A review of Table E-2 reveals that the 550 MW Lakhra project essentially replaced 600 MW of new oil-fired capacity otherwise constructed in 1993. The other changes were basically a one-year delay in the construction of several hydroelectric units over the 1995-97 period. Forcing in the Lakhra project raised fiscal year 1992-94 capital outlays, but fiscal year 1995-97 capital outlays were lower.

As is discussed below, there are some inconsistencies between the assumptions used in the plans and the assumptions used in the economic feasibility study which cause the costs of including the Lakhra project to be overestimated in the least cost capacity expansion plan. Nevertheless, a review of the results of the planning analysis is useful as a beginning point for estimating the likely results if the assumptions in the plans were fully consistent with the assumptions in the economic feasibility study.

TABLE E-1

Base Oil Price Least Cost Capacity Expansion Plan for Pakistan (MW of capacity added)

	Fiscal Year							
	1991	1992	1993	1994	1995	1996	1997	1998
Oil/Gas Steam	210	420	600					
Lakhra Coal								
Imported Coal				920	460	920		1380
Hydroelectric	1928	110	110		1764	300	1332	300
Nuclear							900	
Oil/Gas Turbine								
Combined Cycle	358							
Total	2496	530	710	920	2224	1220	2232	1680

Source: WASP run 13P dated June 26, 1986

TABLE E-2

Changes to Base Oil Price Plan When Lakhra Project is Forced In (MW of capacity added)

	Fiscal Year							
	1991	1992	1993	1994	1995	1996	1997	1998
Oil/Gas Steam			[600]					
Lakhra Coal		275	275					
Imported Coal							460	[460]
Hydroelectric					[300]	300	[1032]	1032
Nuclear								
Oil/Gas Turbine				100				
Combined Cycle								
Change	0	275	[325]	100	[300]	300	[572]	572

Note: The numbers in brackets represent a reduction in the capacity added in the Base oil price plan.

The present discounted value of total generation costs for the four plans is shown in Table E-3. These results show that imposing the Best Lakhra Cost Case into the Base oil price capacity expansion plan raised total discounted costs by $93 million.[2]

For comparison purposes, the total present discounted (mid-1992) value of the Best Lakhra Case generation costs for the 500 MW Lakhra project are $2.2 billion (1985 dollars). The analogous costs for the 550 MW Lakhra project are $2.4 billion. The results in the Base oil price forced Lakhra plan suggest that the Best Lakhra Case project costs would have to be reduced by about 4 percent for the Lakhra project to be included in the Base oil price plan. Since the Lakhra project tested was already one with costs reduced about 18.5 percent below the Base Case engineering feasibility study estimates, this finding is not very encouraging.

Problems with the Plans

ICF received full documentation for the capacity expansion plans for review in August and early September. In reviewing these plans ICF discovered

[2] These costs can also be used to estimate what oil price would be needed to cause the Lakhra project to be included in a least cost generation plan. Raising oil prices by $1.00 per barrel over the life of the project would increase total generation costs for a 500 MW baseload oil-fired plant by about $90 million. This information suggests that if the oil price in 1992 were $19/barrel, escalating at 3 percent per year (i.e. $2.00 higher than in the Base Case), the Lakhra project with the costs in the Best Lakhra Case would be taken instead of the oil-fired units taken in the Base oil price plan. It does not follow that the project would necessarily be taken four years later when the oil price has risen $2.00 per barrel in the Base oil price plan. By that time other lower cost alternatives are available.

four inconsistencies between the assumptions used in the plan and the final assumptions used in the economic feasibility analysis:

- The Lakhra project evaluated in the plans was a 550 MW power plant fueled by coal produced in a 3.0 million tonne per year mining complex. The final project identified for evaluation in this study was ten percent smaller.

- The full load heat rate used for the Lakhra power plant in the plans was 2972 kcal per kw-hr instead of 2786 kcal per kw-hr.

- The oil price in the plans is about 2 percent lower than in this study.

- Power plant dispatching in the plans was performed without taking shadow price factors into account.

The change in project scale occurred after the runs began and is only a minor problem. The larger scale caused project costs per kw-hr in the plans to be about 3 percent below the costs of the 500 MW project evaluated in this study.

The heat rate difference offsets the scale difference. The higher heat rate in the plans increased project costs about 4 percent above the project evaluated in this study. The net effect of these two inconsistencies made the Lakhra project evaluated in the plans about 1 percent higher in cost than the project evaluated in this study.

The oil price specified for calendar year 1992 is implemented in the plans in fiscal year 1993. Since the price escalates at 3 percent annually, this change reduces the oil price by about 2 percent. This change makes the oil plant evaluated in the plans about 1 percent cheaper than the oil plant evaluated in this study.

The failure to use shadow price factors in the dispatching decisions in developing the plans is more troubling because the effects are more difficult to evaluate. Although shadow price factors were not used in dispatching, they were used to estimate the final discounted costs of a plant after the dispatching was performed.

TABLE E-3

Present Discounted (Mid-1992) Value of Generation Costs[1] (1985 dollars)

Base Case ($17 oil in 1992)	$26,790 million
550 MW Lakhra Plant Imposed in 1992/93	26,883
Change	$93 million[2]
High Oil Price Case ($25 oil in 1992)	$30,900 million
No Lakhra Plant Permitted	31,285
Change	$385 million[2]

[1] Costs reported in the plans were adjusted in two ways. First, they were divided by 1.30 to convert WASP model cost estimates to appropriate costs for this study. (The WASP model multiplies foreign costs by 1.3 instead of dividing local costs by 1.3.) Second, they were multiplied by 1.95 to change the Base Year used for discounting from mid-1985 to mid-1992 to be consistent with the discounting practice used in this study.

[2] These plans contain assumptions which in the aggregate cause the Lakhra project costs to be overestimated relative to the assumptions in this study.

Generating units are dispatched based on their variable generation costs. These costs are principally fuel costs. Relative fuel costs are heavily affected by shadow price factors in the analysis because most the fuels used by the principle alternatives to the Lakhra project are imported or are valued based on imported fuel prices. Oil, gas, imported coal, and uranium are treated as imported fuels in the analysis. As described in Appendix F, local costs are multiplied by .77 in the study to account for the overvaluation of the rupee in mid-1985. Lakhra coal costs should be multiplied by .885 because about half of the Lakhra coal production costs are local costs. The net effect of not using shadow price factors in the dispatching decision is that the Lakhra plant's variable costs are about 14 percent too high relative to the imported fuel project alternatives when the dispatching decision is made.

The net effect of these four inconsistencies is that the Lakhra project costs in the plans are higher than in this study. These high costs discourage inclusion of the Lakhra project in the least cost capacity expansion plan and cause the cost of including the Lakhra project in the capacity expansion plant to be overestimated when it is forced in.

Other Potential Problems with the Plans

A very large number of assumptions were made in the course of preparing the capacity expansion plans. The need for consensus on these assumptions meant that the assumptions used were not in all cases totally consistent with ICF's views. Despite these potential problems, ICF believes that the plans would provide a reasonable test of whether the Lakhra project forms part of a least cost capacity expansion plan if the four inconsistencies identified above had not occurred.

Attractiveness of Lakhra Project with Adjusted Plans

Given the considerable time required to develop a capacity expansion plan with WASP, the plans could not be redone to eliminate the inconsistencies within the time available to complete this study. Accordingly, ICF has reviewed the details of the four plans and has developed rough estimates of the changes which would occur if the plans were redone.

As noted above, the plant size and heat rate inconsistencies are approximately offsetting in their effect on the Lakhra project's full costs. Even with the oil price inconsistency the 500 MW Lakhra project is only disadvantaged relative to the oil plant by about 2 percent on a full-cost basis. The principal problem with the plans is that the Lakhra project's variable costs are significantly overestimated at the dispatching stage of the analysis. Table E-4 shows that the variable costs of the Lakhra plant are overestimated (relative to an oil-fired plant) by approximately 20 percent.

TABLE E-4

Overestimate of 500 MW Lakhra Plant Variable Costs During Dispatching Relative to Oil-Fired Plant

Inconsistency	Effect on Relative Variable Costs
Plant assumed to be 550 MW	-3 percent
Heat rate assumed to be 2972 Kcal/kw-hr	+7
Oil price too low	+2
Shadow prices not used	+14
Net effect	+20 percent

The effect of the overestimation of Lakhra plant variable costs is to (1) discourage the addition of the Lakhra plant in the least cost capacity expansion plan and (2) dispatch the plant less than optimally once it is built. As shown in Table E-2, the chief competitors of the Lakhra plant in the WASP runs are the oil/gas plants. The hydroelectric, nuclear, and imported coal plants are so much cheaper to operate that the overestimate of the Lakhra project costs does not affect their construction or utilization. Accordingly, to correct the costs in the plans adjustments are only required for the Lakhra plant and the oil/gas plants, particularly the oil/gas steam plants.

Once the variable costs of operating the oil/gas steam plants exceed the (true) Lakhra costs by 20 percent in the plans, the Lakhra plant is dispatched correctly. The Lakhra plant is also dispatched correctly when the (true) Lakhra variable costs are greater than the oil/gas plant variable costs.

The Base oil price plan with the Lakhra plant forced into the solution can be examined to determine whether the Lakhra plant would be included in the Base oil price plan if the Lakhra project costs were specified correctly. Similarly, the High oil price plan can be examined because the Lakhra project

is that plan. The other plans cannot be evaluated because the Lakhra project is not included in them.

A review of the Lakhra plant's capacity utilization reveals that it is run relatively little in the Base oil price forced Lakhra plan. Table E-5 shows the utilization of the Lakhra plant in that plan. The plant essentially is used as a peaking unit until fiscal year 2002. A review of the High oil price plan (not shown) reveals that the Lakhra plant runs at high capacity utilization in that plan. Accordingly, the results of the Base oil price forced Lakhra plan must be adjusted. The results of the High oil price case, while undoubtedly not quite right, are likely to be relatively similar to a plan using assumptions consistent with those in this study.

Adjustment of the Base Case Forced Lakhra Plan

The relative dispatch order is only input into WASP every five years to reduce the number of required calculations. Accordingly, the adjustments in the model's operation similarly are only required every five years. Table E-6 shows the fuel price adjustments required, the likely effect on the Lakhra project capacity utilization which would be calculated by the model, and the approximate generation savings which would be achieved in each year.

A review of Table E-5 shows that even with the adjusted costs the Lakhra plant is about 2 percent more expensive to operate than the oil plant in fiscal year 1992. After that time the Lakhra plant would be cheaper to operate, but the WASP model would not discover this until 1997. At that point it would begin to operate the Lakhra plant. In 2002 the Lakhra plant operates at 54% capacity utilization in the existing plan. With the correct costs it might operate more, but probably not a great deal more since other lower cost generating units have been constructed by that time. Accordingly, the principal change in power system generation costs with the correct Lakhra plant variable costs would occur during fiscal years 1997-2002. As shown in Table E-6, this change would be $9.2 million (1985 dollars) in FY 1997, which is $5.7 million when discounted back at 10 percent to FY 1992. The five-year change is $38 million.

TABLE E-5

Capacity Utilization of Lakhra Plant When Forced Into Base Case (percent)

Fiscal Year	Period 1	2	3	4	5	6	Annual Average
1992	0.0	0.1	0.2	0.7	1.6	4.9	1.3 [1]
1997	0.6	0.0	0.6	1.1	2.7	9.0	2.3
2002	3.4	63.9	66.6	67.2	65.2	54.6	53.5
2007	7.8	61.1	68.6	68.5	60.6	58.6	54.2

[1] One unit only

Source: Base Case WASP run (July 3, 1986) with Lakhra 550 MW plant forced into the solution in 1992/93.

TABLE E-6

Adjustments for Dispatching in Base Oil Price Forced Lakhra Plan (1985 dollars)

Year	Lakhra Variable Cost In Plan (¢/kwhr)	Lakhra Variable Cost Adjusted (¢/kw-hr)	Oil Variable Cost In Plan (¢/kw-hr)	Lakhra Capacity Utilization In Plan (%)	Lakhra Capacity Utilization Adjusted (%)	Change in Cost [1]
1992	3.31	2.76	2.70	1	1	-
1997	3.31	2.76	3.09	2	60	$9.2 million
2002	3.31	2.76	3.55	54	54	-
2007	3.31	2.76	4.07	54	54	-

Table E-7 shows the total adjustments required to make the Base oil price forced-Lakhra plan consistent with the assumptions in the economic feasibility study. As shown, the $93 million estimated additional discounted cost incurred when the Lakhra project is forced into the plan is reduced to $9 million. For a project with $2.2 billion of lifetime discounted costs, this difference is trivial. ICF concludes that the Lakhra project with the Best Lakhra Case costs is part of the Base oil price least cost capacity expansion plan.

TABLE E-7

Total Adjustments Required in Base Oil Price Forced Lakhra Plan (1985 dollars)

Estimated Cost of Forcing in 550 MW Lakhra Plant	$93 million
Reduction Due to Adjusted Dispatching	-38 million
Reduction Due to Other Inconsistencies [1]	-48 million
Adjusted Cost of Forcing in 500 MW Lakhra Plant	$ 9 million

[1] 2 percent of $2.4 billion 550 MW lifetime project costs.

Evaluation of Base Case (Full Cost) Lakhra Project

As noted previously, no plan was developed using the Base Case engineering feasibility study costs for the 500 MW Lakhra project. It was clear from the outset that such a project would not form part of the Base oil price least cost plan. At issue is only whether such a project would form part of the High oil price least cost plan.

The information obtained from the two High oil price plans can shed light on this issue. Table E-8 shows that the increase in project costs for the 500 MW plant between the Best Lakhra Case and the Base Case is $477 million (1985 dollars). This amount exceeds the $394 million cost of excluding the project with the Best Lakhra Case costs from the High oil price plan by $78 million. Accordingly, it appears that the Base Case (full engineering feasibility cost) 500 MW Lakhra project is not part of a High oil price capacity expansion plan.

TABLE E-8

Cost of Excluding Base Case 500 MW Lakhra Project From High Oil Price Plan

Cost of Excluding Best Lakhra Case 550 MW Plant	$ 385 million [1]	
Adjusted Cost of Excluding 550 MW Plant	433 million [2]	
Cost of Excluding 500 MW plant		$ 394 million [3]
Base Case 500 MW Lifetime Project Costs	$2677 million	
Best Lakhra Case 500 MW Costs	2202 million	
Increased Costs in Base Case		$ 477 million
Estimated Costs of Excluding Base Case Plant from High Oil Price Plan		- $78 million

[1] From WASP High oil price plans.

[2] Increased by 2 percent of $2.4 billion 550 MW lifetime project costs.

[3] Reduced by 9 percent to account for smaller project size.

Appendix F

SHADOW PRICES/FOREIGN EXCHANGE RATES

Appendix F
SHADOW PRICES/FOREIGN EXCHANGE RATES

An economic feasibility analysis is performed to assess whether a proposed investment project is of benefit to the nation. This analysis requires that the true social costs of the project be compared to the true social benefits. The relevant costs of the project are the social marginal opportunity costs, i.e., the output that the nation must sacrifice. The relevant benefits are the additional consumption the nation can achieve. Often observed prices or official prices must be adjusted for distortions caused by government controls and tariffs and any aspects of current economic conditions which may not remain constant over the life of the project. In this appendix the issue of comparability between domestic and foreign costs is addressed.

For a variety of reasons, market prices or the official exchange rate may not accurately represent the true cost of a project to a nation, as measured in foreign exchange. When some components of a project will be imported or when financing will involve lending from abroad, the true relationship between foreign and local costs must be ascertained before projects with different foreign and local components can be compared.

Three relationships are examined in this appendix. First, how do true social costs differ from market prices due to tariffs and other structural characteristics in Pakistan? Second, how did the official exchange rate compare to the July 1, 1985 free market rate? Third, how is the rupee (in real terms) likely to change relative to all other currencies in the future? The July 1, 1985 is used as a benchmark because all of the engineering costs and economic analysis in the feasibility studies are based on costs measured in mid-1985.

Structural Distortions in the Economy

Market prices for domestic goods and domestic labor may differ from true social costs (as measured in foreign exchange) for several reasons:

- Taxes or subsidies (or quotas) may be applied to imports or exports in a way which distorts the exchange rate and permits domestic market prices for goods to differ from their world market value.

- Minimum wage laws and government or union wage agreements may cause wages to exceed the social opportunity cost of labor.

- Poor labor market mobility may cause workers to be unemployed or underemployed in some geographic areas or in some labor categories. If so, the true economic cost of using these workers in a project may be less than the wage paid in that area.

If adjustments to nominal prices for domestic goods and labor are not made in an economic feasibility study, a proposed project could appear uneconomic at those prices even when unemployed or underemployed resources are available.

In Pakistan, the key cause of distortion between nominal prices and social costs is the import tariff structure. Imported goods, particularly capital goods, are subject to significant tariffs, which permit domestic prices for similar goods to exceed the world market value of these goods. Concurrently, domestic wage rates are higher (as measured in foreign currencies) than they would be if domestic prices for these goods were equal to world market prices.

The latest available documented study of shadow prices for Pakistan is a recently completed report funded by the World Bank for use in the Kalabagh Dam feasibility study.[1] An earlier study was completed by World Bank staff in draft form in June 1981.[2] This study made use of an earlier World Bank study by Squire, Little, and Durdag for its methodology and for some of its parameters.[3] ICF has reviewed all of these studies.

ICF also performed a brief review of data on imports, exports, duties, and taxes for the Fiscal Year 1974-1984 period. This review indicated that the pattern of imports, exports, and associated duties and taxes in Pakistan has remained relatively constant over the FY 1977-1984 period.

Table F-1 presents data on imports and exports and customs duties and sales taxes for the fiscal year 1974-1984 period. The statistics show that import taxes have averaged about 32 percent of import values over the FY 1977-1984 period. Prior to FY 1977, import taxes were much lower. Taxes have been slightly lower since FY 1980 then in the FY 1977-1980 period. The standard conversion factor has also remained vary stable over the FY 1977-1984 period.[4]

Import value and tax data for capital goods indicate that capital goods have maintained a very stable 32 percent share of total imports. The average rate of capital goods duty has also been very stable, but this rate was higher in 1978 and 1979 than in the rest of the 1976-84 period. Accordingly, we conclude that the results and conclusions of the 1979 and 1981 studies of conversion factors in Pakistan for all goods and for capital goods continue to be relevant.

---

[1] A. Markandya, D. Pearce, A. Parker, Shadow Prices in Pakistan, January 1986.

[2] I. Tsakok, Shadow Prices for Project Appraisal in Pakistan, Draft, June 26, 1981.

[3] Lyn Squire, I.M.D. Little, Mele Durdag, Application of Shadow Pricing to Country Economic Analysis with an Illustration from Pakistan, World Bank Staff Working Paper No. 330, June 1979.

[4] The standard conversion factor calculation should take export taxes and import and export subsidies into account. A review of these fiscal elements indicated that they were small and reasonably stable over the period under review.

TABLE F-1

PAKISTAN TRADE AND IMPORT TAX DATA

Fiscal Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total Imports (MM rupees)	13,479	20,925	20,465	23,012	27,815	36,388	46,929	53,544	59,482	68,151	76,707
Capital Goods	3,975	6,152	7,158	8,750	9,316	10,970	N/A	14,882	17,503	21,135	24,419
Percent of Total	29.5	29.4	35.0	38.0	33.5	30.1	--	27.8	29.4	31.0	31.8
Import Taxes (MM rupees)	N/A	4,615	5,234	7,124	9,233	11,465	14,140	16,106	17,295	20,901	24,773
Percent of Import Value	--	22.1	25.6	31.0	33.2	31.5	38.9	30.1	29.1	30.7	32.3
Capital Goods Duty	N/A	N/A	2,141	2,531	3,325	4,373	3,681 1/	4,784	5,531	6,300	7,244
Percent of Capital Goods/Value	--	--	29.9	28.9	35.7	39.9	22.1 1/	29.7	31.6	29.8	29.7
Total Exports	10,161	10,286	11,254	11,294	12,981	16,925	23,410	29,280	26,270	34,442	37,037
Ratio Imports/Exports	1.33	2.03	1.82	2.04	2.14	2.15	2.00	1.83	2.26	1.98	2.07
Exports + Imports	23,640	31,211	31,719	34,306	40,796	53,313	70,339	82,824	85,752	102,593	113,744
Standard Conversion Factor 2/	N/A	.87	.86	.83	.82	.82	.83	.84	.83	.83	.82
Capital Goods Factor 2/	N/A	N/A	.77	.78	.74	.71	.82 1/	.77	.76	.77	.77

1/ The reported data may not include the entire year.

2/ The standard conversion factor (SCF) and (capital goods factor) is calculated as follows:

SCF = (Imports + Exports) divided by (Imports + Import Taxes + Exports - Export Taxes)

This factor shows the relationship between the value of internationally-traded goods and the prices paid (or received) for these goods in Pakistan. The factor estimates calculated in this table here do not account for export taxes (or subsidies) or capital goods exports, but these elements have not been very significant.

Sources: Pakistan Federal Bureau of Statistics and Pakistan Planning and Development Division as cited in various publications.

ICF INCORPORATED

Shadow Price Estimates

Figure F-2 presents the shadow price conversion factors estimated in the available studies. All of the studies provide similar estimates of the various conversion factors. Since FY 1977 the standard conversion factor has been in the .80 - to .83 range. The capital goods factor is significantly lower due to the high tariffs placed on capital goods. Since FY 1977 the estimates of this factor are in the .75 to .77 range.

The shadow price of labor is far more uncertain. Squire, Little, and Durdag acknowledge that their estimates were conjectural to a considerable degree, as they were based on surveys made in the early 1970s. Tsakok did not develop any estimates for the FY 1977-1980 period due to the lack of data. Markandya Pearce, and Parker estimated shadow prices for labor indirectly by calculating the input factor prices required for consistency with the conversion rates for goods. Their shadow wage rates of .96 for skilled labor and .88 for unskilled labor show the Pakistani labor market to be quite efficient and relatively well integrated into the world market. Their shadow wage rate for unskilled labor is much higher than the earlier estimates.

Foreign Exchange Rate

Additional distortions in foreign/domestic price relationships may occur if governments peg official exchange rates at unrealistic levels relative to foreign exchange supply and demand. In some countries, multiple exchange rates are used to provide implicit subsidies or to impose implicit taxes on the import or export of certain types of goods. In these situations adjustments to nominal prices are normally made by comparing the official rate for the project to the free market exchange rate, if a free market exists for the currency.

Pakistan has only one official exchange rate, and it has been quite similar to the free market rate for the rupee in recent years. In mid-1985 when the costs were developed for the power project, the official buying rate for rupees was 16.0 rupees/U.S. dollar.[5] The free market rate in the Persian Gulf for worker remittances was reported to be very similar to the official rate. Accordingly, the official rate is the appropriate rate to use for the 1985 exchange rate.

Future exchange rates are impossible to predict with any degree of precision. It is generally true that rates will adjust to account for differing inflation rates between countries, or trade imbalances. For example, the inflation-adjusted Pakistan rupee/ U.S. dollar exchange rate normally would be expected to be relatively stable. In mid-1985, however, the U.S. dollar was widely believed to be overvalued relative to the currencies of the other major industrialized countries, so a priori the mid-1985 rupee (in constant rupees) was expected to appreciate (i.e., the rate would fall) relative to the U.S. dollar (in constant dollars). As measured in constant rupees and dollars, the rupee has since appreciated.

---

[5] IMF, International Financial Statistics, October 1985, p. 363.

FIGURE F-2

SHADOW PRICE CONVERSION FACTORS

Source of Estimates Basis for Estimate	SLD[1] FY 74-76	Tsakok[2] FY 77-80	ICF FY 84	MPP[3] FY81/FY84[4]
Standard Conversion Factor	.85	.80-.83	.82	.81
Capital Goods Factor	.78	.75	.77	.75
Intermediate Goods Factor	.92	.90	N/A	.91
Shadow Wage Rates				
Urban				
Private Skilled	1.05 (.45)	N/A	N/A	.96[5]
Public Skilled	N/A	N/A	N/A	.96[5]
Public Unskilled	.55-.65	N/A	N/A	.88[5]
Private Unskilled	.75-.80	N/A	N/A	.88[5]
Rural				
Unskilled	.65-.75	N/A	N/A	.88

[1] Lyn Squire, I.M.D. Little, Mele Durdag, Application of Shadow Pricing to Country Economic Analysis with an Illustration from Pakistan, World Bank Staff Working Paper No. 330, June 1979.

[2] I. Tsakok, Shadow Prices for Project Appraisal in Pakistan, Draft, June 26, 1981.

[3] A. Markandya, D. Pearce, A. Parker, Shadow Prices in Pakistan, January 1986, pp. 13-14.

[4] These prices were developed using a FY 1981 Input-Output matrix and the FY 1984 tax structure.

[5] No distinction was made between the public and private sectors.

The non-fuel foreign costs in the power project estimates, however, are not related to the currency of any particular country. Gilbert Commonwealth International and the John T. Boyd Company developed their power plant and mine cost estimates using bids from various countries. Therefore, as exchange rates change, the comparative advantage of different countries to supply components will change, but the overall cost of all the components as measured in constant rupees will not, unless the rupee declines or appreciates relative to all other currencies. A useful measure of the rupee's value in this respect is the rupee to SDR (Special Drawing Right) rate.

The imported coal price situation is similar. Coal prices are largely cost-determined, so changing currency values should affect the competitive position of the various exporters, but should not affect the delivered price very much as measured in mid-1985 dollars, unless the currencies of the low-cost coal exporters depreciate (in real terms) relative to the SDR.

The imported oil price situation is very different. The imported oil price is not primarily cost-determined, so prices are considerably affected by oil production and price policies in the exporting countries. Currently, oil prices are specified in U.S. dollars, so when the value of the dollar changes relative to all other currencies, the oil price measured in constant rupees does change. Since the U.S. dollar has depreciated from its mid-1985 value relative to all other currencies, this change has reduced the cost of oil to Pakistan. This effect is quantified in the ICF forecast of oil prices used in the analysis of the imported oil project.

Depreciation of the Rupee

Pakistan is quite vulnerable to a potential decline in the real value of the rupee relative to foreign currencies. As shown in Table F-1, Pakistan's imports in recent years have generally been double its exports in value. The difference has been made up principally by worker remittances, which in recent years have been roughly comparable to exports as a source of foreign exchange.[6] If the decline in Middle East economic growth leads to a decline in worker remittances (in real terms), then the Pakistani rupee could depreciate in real terms relative to other foreign currencies. A review of currency exchange rates and inflation rates shows that the rupee has declined significantly relative to the SDR since mid-1985, even though it has appreciated relative to the declining U.S. dollar.[7]

The data and calculations shown in Figure F-3 indicate that the rupee has declined in real turns relative to the SDR by about 13% since mid-1985. Given the continuing Pakistani trade imbalance, the current rate is likely to be more representative of the rupee's future value than the mid-1985 rate. Accordingly, it seems appropriate to reduce local costs (measured in 1985 rupees) in the economic feasibility study to account for the overvaluation of the rupee in mid-1985.

---

[6] Based on statistics from Pakistan's Planning and Development Division.

[7] While the rupee has depreciated by 4.6% relative to the U.S. dollar in nominal terms, an adjustment for inflation in Pakistan and in the U.S. indicates that in real terms the rupee has appreciated by about 4.7% relative to the dollar between mid-1985 and June 1, 1986.

Figure F-3

Exchange Rate and Price Changes Since Mid-1985

	July 1, 1985	April 1, 1986	June 1, 1986	11-month Change
Rupee/SDR (Nominal)	15.97	N/A	19.14	19.9%
Rupee/US Dollar (Nominal)	16.00	N/A	16.74	4.6%
Rupee (wholesale) Price Index	137.7	144.5	146.0 (est.)	6.0%
SDR (wholesale) Price Index	100.0		100.0 (est.)	0.0%
US Dollar (wholesale) Price Index	115.1		111.3 (est.)	(3.4%)
1985 Rupee/SDR	15.97		18.06 (est.)	13.1%
1985 Rupee/US Dollar	16.00		15.26	(4.7%)

Source: IMF, International Financial Statistics, July 1986 and ICF estimates.

Application of Shadow Rates in this Study

The economic feasibility of the Lakhra project is being evaluated in the context of a least cost capacity expansion plan. As such, the relationship between local and foreign costs must be determined for general application to all of the power plant alternatives under consideration. In addition, this relationship must be determined for the assessment of Lakhra coal prices.

Table F-4 shows the recent estimates of shadow factors for activities included in or similar to those which are being evaluated in this study. The shadow factors for skilled and unskilled labor are also shown. A review of the shadow prices in Table F-4 indicates that the private sector activities are estimated to be more efficient than the public sector activities. Private sector construction has a shadow factor of .88, while public sector infrastructure development has a factor of .82 and public sector road construction has a factor of .64.

While there will be some public sector activity in the proposed project, the current plans are to make the mining operation a private sector operation. The power plant will be managed by WAPDA, a public sector organization, but the power plant, roads, and colony for the project will likely be constructed by the private sector as a turn-key operation.

Table F-4

Shadow Factors for Industrial and Construction Activities

Activity	Sectors	Shadow Factor
Low Cost Residential Construction	Private	.88
Factory Buildings	Private	.88
Road Transportation	Private	.90
Banking and Insurance	Private	.86
Cement Production	Public/Private	.81
Road Construction	Public	.64
Infrastructure Development	Public	.82
Government Operations	Public	.81
Labor		
Skilled	Public/Private	.96
Unskilled	Private	.88

Source: A. Markandya, D. Pearce, and A. Parker, Shadow Prices in Pakistan January 1986, pp. 13 and 14.

A review of the John T. Boyd mining plans and the Gilbert Commonwealth International power plant plans reveals that most of the capital equipment for the project will be imported. The local costs are predominately labor costs, outside of the materials used in construction, such as cement. Some local banking and insurance and WAPDA (government) administration will be required, but this expense is a small part of the total.

This review suggests that the shadow factor appropriate for the local portion of the mining and power plant project is relatively high. The .88 factor estimated for private sector construction seams reasonable as a lower bound estimate for the local share of this project. While some less efficient activities will be included in the project, the local portion of these projects has much in common with private sector construction work. The project's labor mix, however, will be more skilled than that commonly found in private sector construction projects. As shown in Table F-4, the Pakistani skilled labor shadow factor is much higher than the unskilled labor factor (.96 as opposed to .88). The shadow rate appropriate for this project, therefore, to account for structural distortions in the economy is in the .88 to .90 range.

Effect of Currency Devaluation

As described above, the rupee (in constant terms) declined by about 11.5 percent relative to the SDR between mid-1985 and mid-1986. Additional depreciation is quite possible. Accordingly, the shadow rate for project local

costs in this study was reduced further to account for the overvaluation of the Pakistani rupee in mid-1985.

An overall shadow factor of .77 was used to adjust mid-1985 local costs in this study. This estimate is based on a mid-1985 structural factor of .89 and a projected currency depreciation factor of .865 relative to the 1985 currency exchange rate. (.89 x .865 = .77).

The adjustment of the relationship between local and foreign costs can also be made by placing a penalty on foreign costs. The appropriate penalty on foreign costs consistent with a .77 shadow factor is 30 percent (1/.77).

APPENDIX G

OIL PRICE FORECASTS

APPENDIX G
OIL PRICE FORECASTS

Crude oil and petroleum products are commodities. The stability of oil prices over the 1950-72 period disguised the fact that petroleum products are potentially subject to the same price swings that normally characterize commodities such as copper and grain. Pakistan is dependent on imports of both crude oil and petroleum products to meet its feedstock and fuel requirements. Petroleum prices in Pakistan, therefore, depend very much on world market developments.

The price of fuel oils in Pakistan over time will be determined by three key factors:

- The world crude oil price, as measured in U.S. dollars
- The world crude oil/petroleum product price relationship
- The transport cost to and in Pakistan to deliver fuel oils

In this appendix we examine each of these factors and generate several fuel oil price forecasts for use in the least cost generation analyses and the power benefits analysis.

BACKGROUND ON OIL MARKETS

Due to the nature of the petroleum industry cost structure, a competitive market could be expected to cause very significant commodity price cycles over time. Fixed production costs are high and variable production costs are low. When this cost structure is combined with the long period required to get a well in production and the long period it will produce, world oil production responds very slowly to price changes. On the demand side the response to price changes is also very slow. The largest changes occur in conjunction with technological developments and investment in new capital equipment. Consequently, the near-term "equilibrium" price of crude oil in a slack market is very low and in a tight market is very high.

If there is a short-run economic floor on oil prices, it could be as low as $5 per barrel. At that price variable costs are not covered in a significant portion of the world's non-OPEC oil wells, and production from these wells would likely stop for that reason.

Somewhat above $5 per barrel speculative withholding is likely to be important in determining production behavior. Producers will not sell oil for $8 per barrel if they think it will bring $13 per barrel a year later. However, supplies will be withheld only if prices are expected to be significantly higher within a few years. The uncertainty related to prices in the late 1980s makes decision-making on speculative withholding difficult for producers, which in turn makes the crude oil price over time difficult to forecast.

Precisely to counteract the inherent price instability in the petroleum market, governments and oil producers historically have attempted to control the total oil supply to meet demand at a target price. Over the 1950-72 period

these efforts were quite successful. As such, OPEC's attempt to control the oil market is a normal phenomenon. The problem is that OPEC's management of oil production over the 1973-86 period reduced rather than increased oil price stability.

RECENT EVENTS

As shown in Figure G-1, world crude oil prices peaked in 1981 and have been declining since that time. The price increase over the 1978-81 period was instigated by the abrupt decline in sustainable world production capacity due to the political and military turmoil in the Middle East. The extreme cold in Northern Europe and the Soviet Union in early 1979 combined with the reduction in Iranian output to strain world capability to meet petroleum requirements. When spare world production capacity virtually disappeared in the first quarter of 1979 (and many purchasers were subject to force majeure supply cut-offs), OPEC took advantage of the ensuing consumer panic and increased prices by about $20/barrel (in mid-1985 dollars).

OPEC has not regained the production capacity it lost in 1979 and 1980, but since 1981 the non-OPEC nations have increased their own production capacity sufficiently (by about 5 million barrels per day) to offset completely the loss in OPEC capacity. Additionally, the centrally-planned economies, chiefly the Soviet Union, have increased oil exports to the West during this period.

The tremendous 1978-81 oil price increase caused a very significant decline in consumption over the 1979-83 period. As shown in Figure G-2, the net effect of increasing non-OPEC production capacity and falling consumption has been a very large increase in Free World surplus production capacity. Surplus capacity began increasing after 1979, but the increase has been particularly large since 1981.

OPEC has taken upon itself the task of managing the world oil price level. In a slack oil market production must be reduced to support a price level. Few non-OPEC producers have been willing to assist OPEC in this task, even though OPEC's efforts greatly augment the non-OPEC producers' economic returns. The result at the end of 1985 was that OPEC members had virtually all of the world's spare production capacity. As shown in Figure G-3, OPEC had about 29 million barrels per day of production capacity in 1985, but average OPEC production was only about 16 million barrels per day.

RECENT CRUDE OIL MARKET DEVELOPMENTS

Petroleum price reductions do not lead to large short-run increases in world demand for oil. Much of the effort underway to reduce petroleum consumption through efficiency improvements and substitution of other energy sources for petroleum will continue independent of the near-term price changes. Similarly, non-OPEC oil production will continue at about current levels over the next few years even if oil prices remain at the current relatively low level. Consequently, the imbalance between world crude oil production capacity and demand will continue for the rest of the 1980s unless the price falls considerably below $13 per barrel.

FIGURE G-1

WORLD CRUDE OIL PRICES (1960-86)

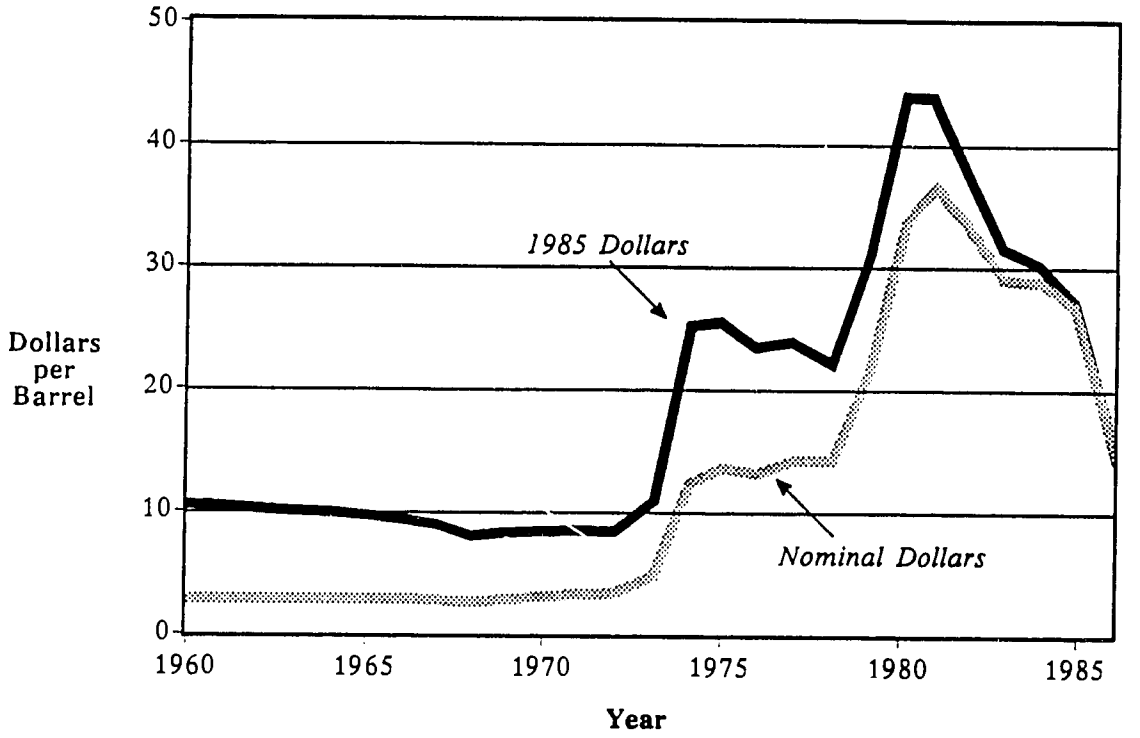


FIGURE G-2

WORLD OIL PRODUCTION CAPACITY AND PRODUCTION

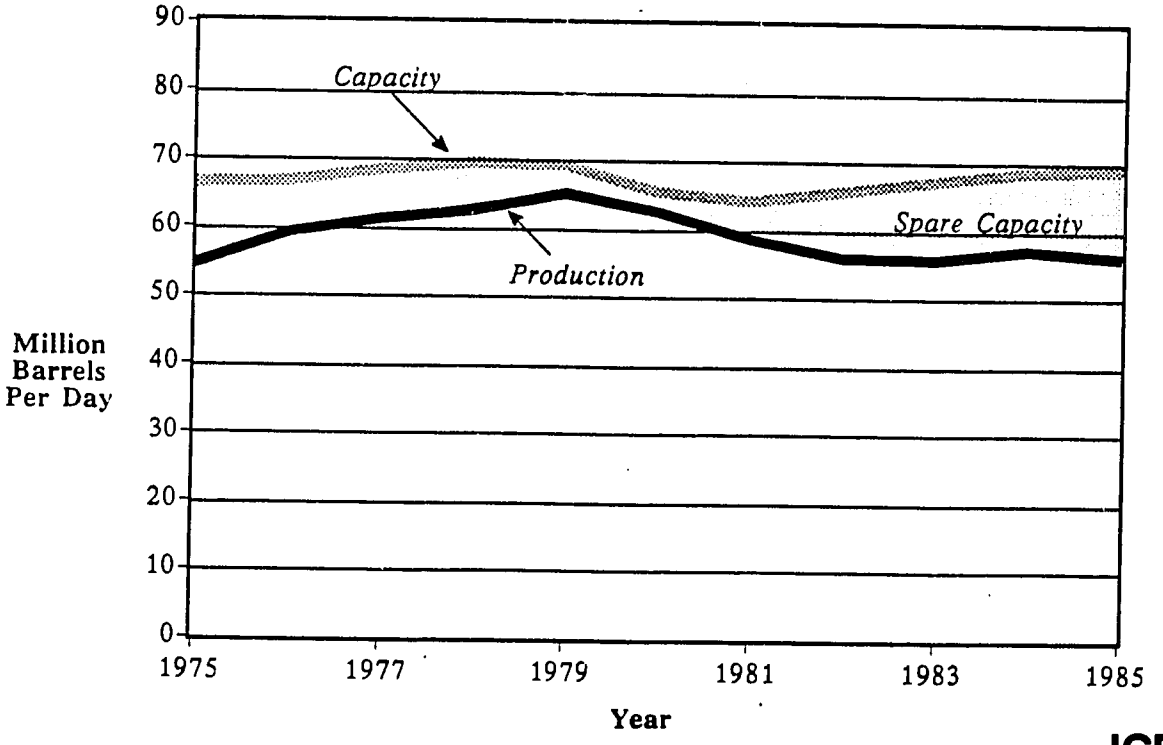
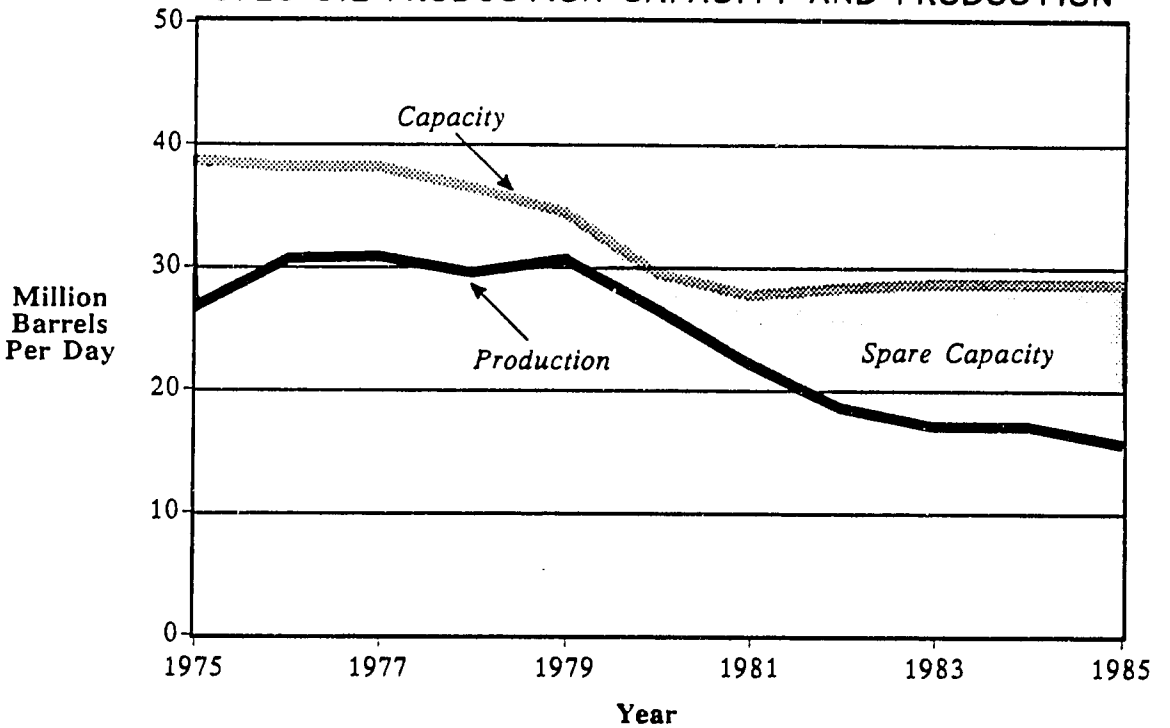


FIGURE G-3

OPEC OIL PRODUCTION CAPACITY AND PRODUCTION



Given this situation, Saudi Arabia cannot greatly increase its market share unless it can displace other world producers and/or greatly reduce the oil price. Since other producers have been unwilling to cut back voluntarily, Saudi Arabia has instituted a new contract vehicle to undercut everyone else.

Under the new netback pricing contracts, refiners make a firm commitment to buy Saudi crude oil at a price equal to the value of the crude oil at the time products made from the crude oil will be sold. The illustrative terms in a netback pricing contract are shown in Figure G-4. Under this type of agreement, the purchaser incurs no price risks. In fact, since the terms of the agreement are based on refiner margins in excess of what refiners have recently been able to earn, refiners can lock in above-average processing margins by signing these agreements. Further, since a large portion of their crude oil requirements was obtained through spot purchases in 1985, many world refiners are not constrained by pre-existing contracts in the amount of oil they can buy.

As a result, Saudi Arabia has reportedly signed netback crude oil pricing contracts for 3 million barrels per day of production. Other producers have responded by signing contracts for a further 5 million barrels per day.[1] The process has worked like a game of musical chairs. Those producers signing

[1] "Netback Pricing Concerns Mask Oil Market's More Serious Problems," Oil and Gas Journal, March 3, 1986, p. 23.

FIGURE G-4

ILLUSTRATIVE TERMS IN NETBACK PRICING CONTRACT

The new netback pricing contracts instituted by Saudi Arabia guarantee a profit to refiners by relating the price paid for crude oil to the prices of the products made from the crude oil. In essence these contracts lock in a fixed margin for refiners between product revenues and crude oil costs. The following terms illustrate how the netback pricing provision operates:

- Arab Light Price equals the revenues obtained by selling a mix of products minus $2.35 per barrel in processing, freight, and insurance costs.

- The product mix used to estimate product revenues is:

Propane	1.9 wt%
Butane	0.8
Premium Gasoline	3.5
Regular Gasoline	18.0
Naphtha	5.2
Kerosene/Jet	16.5
Gas Oil	24.0
Residual Fuel Oil	26.1
Processing Loss	4.0

- The product prices used to estimate revenues are the prices reported by Platt's Oilgram Price Report 20 days after crude oil is shipped from the Persian Gulf.

Source: Platt's Oilgram Price Report, February 18, 1986. p. 1-A.

contracts have ensured themselves of future sales. The remaining producers (OPEC and non-OPEC) are left without purchasers for some of the crude oil they previously were selling.

Nothing in these contracts serves to hold up existing crude oil prices. The opposite is the case. Apparently there are no minimum prices in these contracts. Prices can fall as far as necessary as rapidly as necessary to clear the market. Those producers who do not lower prices fast enough are those who end up with reduced sales. As producers compete with each other to gain market share, the price sinks lower and lower.

SAUDI ARABIA

Until Saudi Arabia instituted its new program, it had sustained the greatest production curtailment of the OPEC members (in both absolute and percentage terms). Saudi production dropped from about 10 million barrels per day in 1980 to a rate below 2 million barrels per day during 1985, and it appeared that Saudi production might have to decline further to support the 1985 oil price. Saudi Arabia had been willing to produce less than its production quotas to offset cheating by other OPEC members. Why then did Saudi Arabia stop playing this role and increase production by more than two million barrels per day, causing world oil prices to plummet?

One reason is that the Saudi's needed the money. They had been obliged to cut production so far that their revenues did not meet their requirements. Even though the Saudi's have accumulated enormous financial wealth, this wealth has been drawn down substantially in the last few years, and much of it is relatively illiquid.

Another reason is that the Saudi action to increase production and reduce oil prices works against Iran in its war with Iraq. Saudi revenues have increased slightly (some of which can be used to support Iraq), and Iranian revenues have been reduced, thereby inhibiting Iran's capability to finance the war.

Longer-Term Effects

Apparently Saudi Arabia believed that the $28 per barrel oil price was not in their long-run best interests, stimulating too much non-OPEC oil and gas production and long-term investments in conservation (e.g., auto efficiency) and alternate fuels (e.g., coal, nuclear, hydro).

The recent price decrease (even if prices rebound) will inhibit the development of marginal oil and gas production and the conversion to alternative fuels. This is because some long-term decisions are based on short-term prices and because the risks associated with the investments in high-cost oil production and capital-intensive non-oil technologies have become more evident.

Saudi Arabia's increase in production is consistent with the establishment of a long-run price below $28 per barrel, which (given the Saudis' tremendous oil reserves) is in their long-term interest.

ICF CRUDE OIL MARKET OUTLOOK

ICF emphasizes that near-term prices will be highly unstable. Prices could fall further or they could increase depending on what political and commercial decisions are reached individually and collectively to reduce oil production. The world oil price will depend on Saudi perceptions of Iran's war with Iraq and on the ability of other OPEC (and non-OPEC) members to agree with Saudi Arabia on production quotas.

The outlook for oil prices in the 1990s is also uncertain. With relatively stable OPEC production capacity, declining non-OPEC production, and growth in oil demand, oil prices are likely to increase over the 1990-2010 period. ICF's free world oil market forecast consistent with the latest Wharton Econometrics world economic growth projections is shown in Table G-2.

The world crude oil price in the ICF Base Case declines to $10.50 per barrel (mid-1985 dollars) in 1987. [Equivalent to $12 per barrel in 1986 dollars for non-U.S. purchasers due to the significant depreciation of the dollar over the 1985-86 period.] After 1987 the Base Case price rises at 10% per year over the 1987-92 period until it reaches the long-run equilibrium path which is based on 3% per year price growth. The ICF 1986 Summer/Fall Base Case forecast and the World Bank Spring 1986 forecast are shown in Table G-1. These forecasts are essentially the same over the 1992-95 period.

TABLE G-1

CRUDE OIL PRICE FORECASTS
(Mid-1985 dollars)

	1985	1987	1990	1992	1995	2000	2010
ICF Base Case[1]	23.10	10.50	14.00	16.90	18.50	21.40	28.80
World Bank[2]	---	---	16.20	17.20	18.80	---	---

[1] Saudi light F.O.B. Persian Gulf.
[2] Spring 1986 forecast.

The rationale for ICF's Base Case forecast is that it will take a while for non-OPEC production to diminish and demand to increase in response to the low prices, so that OPEC production can return to levels that are workable for the cartel. Then OPEC will adopt a lower-than-recent price ($15-20 per barrel) and increase that price (with fits and starts associated with short-run market and political perturbations) at about 3% per year (in real terms) through 2010.

TABLE G-2

ICF BASE CASE CRUDE OIL MARKET FORECAST
(million barrels/day)

	1985	1990	1995	2000	2010
Price (1985 dollars/ barrel)[1]	23.10	14.00	18.50	21.40	28.80
Free World Consumption					
U.S.	14.8	15.7	15.6	17.0	18.0
Other OECD	17.6	18.2	18.6	20.0	21.0
OPEC	3.2	4.0	4.4	4.9	6.0
OIDC	8.5	9.8	10.8	11.6	14.4
Total	44.1	47.7	49.4	53.5	59.4
Free World Supply					
U.S. Crude	8.9	7.8	6.7	6.1	5.6
OPEC Crude	16.0	21.1	24.6	28.9	31.0
CPE Crude	1.7	1.3	0.8	0.5	0.0
Other Crude	13.7	13.7	13.2	13.4	18.0
World NGLs	3.6	4.0	4.3	4.8	5.0
Stock Change	0.2	(0.2)	(0.2)	(0.2)	(0.2)
Total	44.1	47.7	49.4	53.5	59.4

[1] Saudi light crude oil FOB Persian Gulf.

Source: ICF Summer/Fall 1986 Energy Service.

UNCERTAINTY IN THE OUTLOOK

The Base Case forecast is ICF's July 1986 estimate of the most likely crude oil price path over the forecast period. Nevertheless, the variance around this forecast is considerable. The reasons for the high level of uncertainty are as follows:

- World demand for crude oil over time is relatively unstable:
  - Economic growth causes increased demand for energy, but technological change and investment levels affect this relationship. Future rates of economic growth, technological change, and investment are all uncertain and may vary over time.
  - Energy users have some ability to modify the amount of different energy types they use when the total demand for primary energy changes or when the relative availability of different types of energy changes. Since crude oil is one of the most expensive types of energy used, its use tends to be

reduced first and increased last, which makes it subject to greater demand variation than other types of energy.

- The world crude oil supply relationship is fundamentally unstable.

  - The world crude oil market is extremely unrepresentative of normal markets in that the marginal producers (OPEC members) are the lowest cost producers. New production in the OECD countries costs up to $20/barrel, while incremental OPEC production costs less than $2/barrel. Further, the level of oil produced by the OPEC countries has been quite arbitrary. Although current OPEC production is 16-18 million barrels per day (and current production capacity is about 29 million barrels per day), these countries could produce up to 40 million barrels per day.

  - The largest sources of crude oil are found in one of the least politically stable regions of the world. Saudi Arabia is heavily influenced by political considerations in using its considerable influence on the world oil market.

- Changes in world oil prices affect the level of supply and demand very little in the short-run. In contrast, the long-run level of supply and demand are very significantly affected by price changes.

Given the number of factors which affect world oil prices and the tremendous short-run price changes which can accompany relatively small changes in oil supply or demand, "reasonable" forecasts can differ to a considerable degree and may change fairly significantly and fairly quickly in response to unforeseen political, technological, or macroeconomic events.

ICF's (July 1986) Base Case, Low Case, and High Case world oil price forecasts are shown in Table G-3. The Low Case represents a scenario in which low demand combines with high production throughout the 1986-2010 period.

The High Case represents a scenario in which the cartel members reestablish effective production controls in the latter half of 1986 and high demand combines with a worsening OPEC capacity situation (due to political or military turmoil) in the 1990s. Although a rapid increase in prices seems very unlikely at the moment, the potential for unexpected political cooperation or instability and the potential for military conflict in the Middle East should not be overlooked. Particularly after a period of low prices, the events of 1978-80 could be repeated.

Figure G-5 places the Base Case, Low Case, and High Case crude oil price forecasts in the context of 1960-85 historical experience. Although the oil price forecasts shown are smooth, the actual path is likely to be characterized by commodity price cycles.

TABLE G-3[1]

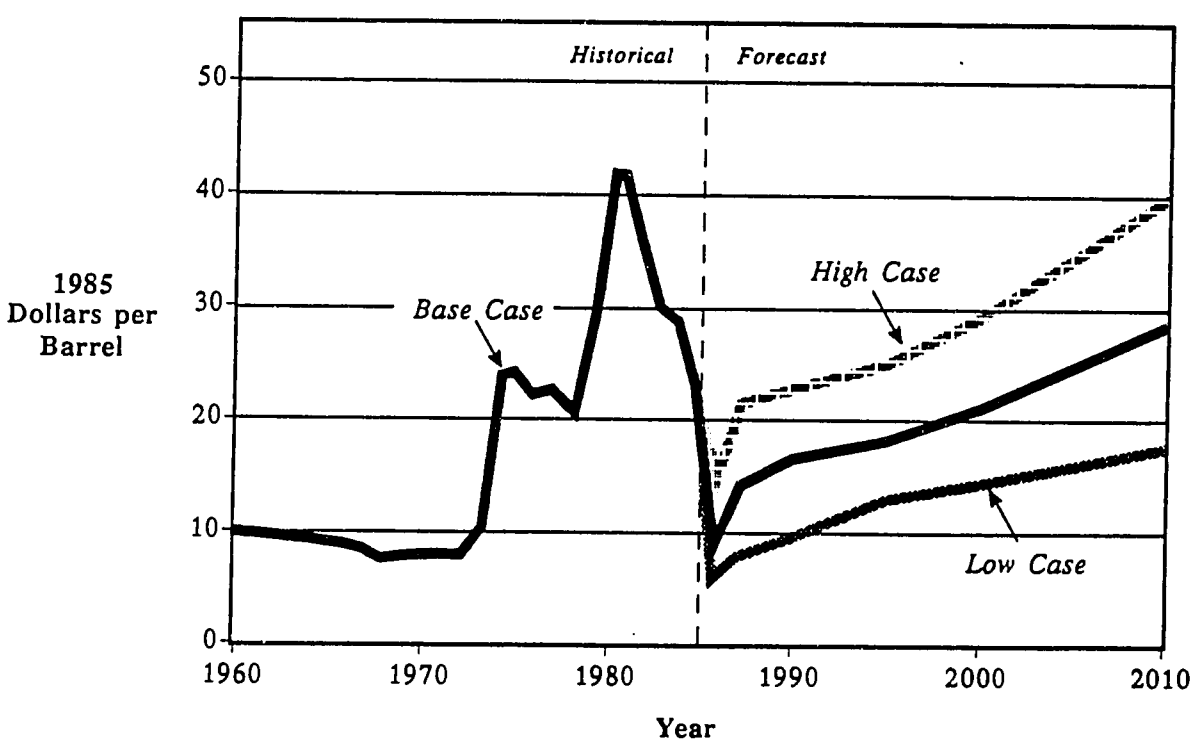
ALTERNATIVE WORLD CRUDE OIL PRICE FORECASTS
(Mid-1985 dollars/barrel)

	1985	1987	1990	1992	1995	2000	2010
Base Case	23.10	10.50	14.40	16.90	18.50	21.40	28.80
Low Case	23.10	6.80	8.20	9.90	13.30	14.70	17.90
High Case	23.10	16.30	21.70	23.10	25.30	29.50	40.20

[1] Saudi light crude oil F.O.B. Persian Gulf.

Source: ICF Summer/Fall 1986 Energy Service.

Figure G-5
WORLD CRUDE OIL PRICES (1960-2010)



PETROLEUM PRODUCT MARKET OUTLOOK

Over the long run, petroleum products are priced to recover refiners' crude oil and processing costs. The price of any single product generally is not directly related to its own identifiable production cost because products are produced jointly by the refinery and the production costs are joint costs. Nevertheless, the cost of upgrading furnace oil to light products and the total cost of refining does determine the approximate price difference between crude oil, furnace oil, and light products. ICF's estimates of these long-run relationships are used to estimate long-run petroleum product costs.

The world furnace oil market has evidenced commodity price cycle behavior in recent years. High-sulfur furnace oil prices declined relative to crude oil prices over the 1977 to 1981 period, increased over the 1981 to 1984 period, and then began to decline again.

Furnace oil commodity price cycles are directly related to the fluctuating levels of supply and demand for furnace oil. World demand for furnace oil was declining prior to the recent collapse in world oil prices, and world refiners are installing conversion capacity to make lighter products from furnace oil. Imbalances between the changing supply and demand lead directly to the fluctuations in furnace oil/crude oil price differentials.

ICF forecasts a slow increase in high-sulfur furnace oil prices relative to crude oil prices over the 1987-95 period. ICF forecasts a more stable crude oil/product price relationship for diesel fuel.

Petroleum Product Prices in Pakistan

World prices of petroleum products as measured in mid-1985 U.S. dollars must be adjusted in two ways to yield prices for Pakistan. First, the price must be adjusted to account for the projected decline in value of the U.S. dollar relative to other currencies. Second, the cost of transporting petroleum products to power plants in Pakistan must be added to the imported product price.

World oil prices are denominated in U.S. dollars. Therefore, the real cost of oil measured in constant 1985 U.S. dollars must take into account the fall in the U.S. dollar relative to other currencies. This depreciation causes the price in 1985 dollars to be significantly lower than the price in 1986 dollars (outside the U.S.). The decline in the value of the Pakistani rupee relative to all other currencies is dealt with separately as a shadow price issue.

Table G-4 presents ICF's Base Case price forecasts for furnace oil and diesel fuel in Pakistan. An estimated Karachi-Jamshoro transport cost of $1.00/barrel (1985 dollars) has been added to calculate the Jamshoro prices. This cost estimate was developed by Bechtel as part of its Jamshoro power plant pre-feasibility study.[2] A reasonable range for high and low bounds on this forecast is 35 percent.

---

[2] Bechtel National, Inc. Pre-feasibility Study of the Jamshoro Power Generation Complex, Final Report (Revision 1), February 1986, p. 9-5.

Table G-4

Base Case Petroleum Prices in Pakistan
(Mid-1985 dollars)

	Saudi Light Crude FOB ($/bbl)	Karachi 3.5% Sulfur Furnace Oil ($/Mill kcal)	Karachi Diesel Fuel ($/Mill kcal)	Jamshoro 3.5% Sulfur Furnace Oil ($/Mill kcal)	Jamshoro Diesel Fuel ($/Mill kcal)
1990	14.00	7.73	12.60	8.36	13.28
1995	18.50	10.57	15.77	11.20	16.45
2000	21.40	12.43	17.81	13.06	18.49
2010	28.80	17.12	23.03	17.75	23.71

APPENDIX H

WORLD COAL MARKETS AND IMPORTED COAL PRICES

APPENDIX H

WORLD COAL MARKETS AND IMPORTED COAL PRICES

The purpose of this appendix is to review briefly the major forces influencing the future markets for world steam coal trade. We first provide a historical overview of the world coal trade. Next we dicuss this trade 1) from the perspective of the major consuming countries and 2) from the view of the major coal exporting countries. Given this background, we review the implications for potential steam coal imports into Pakistan and the likely delivered prices for these imports. The intent of this discussion is to provide the basis for the assumptions regarding future imported steam coal prices for use in comparing the relative economics of the Lakhra power plant compared to a power plant sited near Karachi designed to burn imported bituminous coal.

HISTORICAL OVERVIEW

Prior to the early 1970's, the overseas world trade in coal was dominated by metallurgical coal. "Local" export markets for steam coal developed in Europe and in North America, but these markets were primarily an extension of domestic markets which happened to cross geo-political boundaries. Poland's exports to other European countries and the U.S. exports to Canada are primary examples of this situation. During this period, the U.S. and later Western Canada and Australia developed substantial markets for the export of various grades of metallurgical coals, principally to the steel industries in Europe, Japan, and more recently, Korea and Taiwan.

In the post-1980 period, the world trade in metallurgical coals declined and then entered a period of sluggish to stagnant growth. Several factors contributed to these trends which are likely to continue for some time in the future. The series of oil price-shocks which quadrupled the price of imported crude oil brought severe world-wide economic recession and a restructuring of the industrial activities in the major coal consuming countries of the world. Technological changes, rationalization of existing steel-making capacity, substitution of new, energy-efficient products for steel, and the re-industrialization of the major steel producing countries (e.g., the U.S., Europe, and Japan) all will serve to reduce substantially the world-wide demand for steel and metallurgical coal.

The world trade in steam coal has experienced a very different set of circumstances. Following the doubling of world oil prices in 1973-74 and again in 1979-80, the relative economics for burning coal for steam purposes in lieu of oil and natural gas changed dramatically. Beginning in 1974 and continuing to the present, substantial efforts have been made by major energy-consuming countries to replace oil and gas with coal. This was particularly true in the cement and lime industry, the steel industry (supplemental firing in blast furnaces), and for utility powerplants that at one time had been designed to burn coal. These economic and relatively easy conversions greatly increased the demand for steam coal during the latter part of the 1970's and into the 1980's. Further, the first oil shock (accentuated by the second) changed the underlying economics for large, new fossil fuel fired boilers in favor of coal.

The result has been a significant increase in absolute and percentage terms in the amount of steam coal traded in the international, overseas markets. In particular, the emergence of South Africa as a major exporting country was directly tied to the increasing attractiveness of coal as a substitute for oil and gas for steam purposes. Moreover, the continuing development of Australia and Western Canada has been maintained primarily as a result of the increased interest in steam coal exports from these countries, which heretofore had exported almost exclusively metallurgical coals. New entrants into the world coal trade such as Colombia have been drawn into the trade because of the expectations of an ever-expanding demand for steam coal.

Current conditions in the international coal markets do not represent the expected long-term relationship of supply and demand. In response to the anticipated increases in both steam and metallurgical coal requirements, numerous efforts were undertaken to expand the available mining capacity serving the export markets. As a result, the current world coal markets have experienced intense competition and price pressures due to the large amount of supply available compared to the depressed levels of demand now evident in Europe and the Pacific Rim. While this situation is expected to continue into the first part of the 1990's, it cannot and will not continue indefinitely. The implications of this assured improvement in the future coal supply and demand balance on future steam coal exports and pricing is discussed later in this appendix.

DEMAND FOR STEAM COAL IMPORTS

As recent history attests, forecasting future demand for coal imports, whether for metallurgical or steam coal purposes, is a difficult and uncertain process. This is because those factors likely to have a positive influence on the demand for steam coal, such as high world crude oil prices, also tend to have a counterbalancing effect on economic activity reducing the overall demand for energy. Also, as the World's major energy-consuming countries have adjusted to recent trends in energy prices (both increasing and more recently declining world oil and gas prices), it has been difficult for analysts to separate short-term perturbations and trends from longer-term readjustments in the world energy markets. More often than not, the result has been a significant overestimation of the likely demand for imported steam coals. An illustration of this can be seen in Table H-1 in which two separate forecasts by the Energy Information Agency (EIA) of the U.S. Department of Energy are compared. The mid-demand estimate for 1995 world coal imports in 1982 is 140 million tonnes higher than the more recent estimate made in 1985.

The very significant recent declines in oil prices have not yet been factored into world coal import demand forecasts. If oil prices rebound relatively soon, then these price declines are likely to have little effect on long term coal demand. On the other had, if fuel users decide that oil prices are likely to remain low, then investments in coal-burning boilers may be delayed and estimates of future coal demand will be reduced.

Table H-1

Comparison of EIA Steam Coal Import Demand Forecasts: December 1982 versus May 1985 (millions of metric tons)

Region	Forecast	1990 L	1990 M	1990 H	1995 L	1995 M	1995 H
Western Europe	Dec. 1982	123	150	170	180	200	240
	May 1985	80	95	105	90	115	137
TOTAL	Dec. 1982	235	272	300	350	380	430
	May 1985	165	188	210	190	240	275
DIFFERENCE BETWEEN FORECASTS		70	84	90	160	140	155

Table H-2 presents late 1985 concensus forecasts of potential import coal demand for both steam and metallurgical coal by major consuming regions. The estimates for metallurgical coal are provided for perspective to show the limited growth through the forecast period compared to the forecasts for steam coal import requirements.

Table H-2

Coal Imports (millions of metric tons)

Steam Coal

Region	Historical 1973	Historical 1980	Historical 1983	Historical 1984	Forecasts 1985	Forecasts 1990	Forecasts 1995
Pacific Rim	2.0	12.9	29.3	34.6	42-45	54-65	75-95
Western Europe	17.8	67.5	62.2	72.1	77-82	95-110	115-140
Others[1]	7.9[2]	32.8	39.2	42.2	43-48	48-55	50-60
Total	27.7	113.2	130.7	148.9	162-175	200-225	245-290

[1] Others include Eastern Canada, South America, and Eastern Europe.

[2] Only includes Canada.

Metallurgical Coal

Region	Historical 1973	1980	1983	1984	Forecasts 1985	1990	1995
Pacific Rim	56.0	67.8	70.0	80.2	74-81	81-90	90-100
Western Europe	23.5	47.9	37.3	44.5	40-45	45-48	48-52
Others[1]	7.02	22.1	28.0	31.1	30-33	33-35	35-40
Total	86.5	137.8	135.3	155.8	144-159	159-173	173-192

[1] Others include Eastern Canada, South America, and Eastern Europe.

[2] Only includes Canada.

Steam coal imports rose at an average annual rate of over 20% between 1973 and 1980. Higher oil prices after 1973 encouraged both utility and industrial users to substitute coal for expensive oil imports in large boilers and process applications. After the second oil price increase in 1979-1980, world import demand increased a further 15% over the three-year period ending in 1983. This increase occurred despite the recession in Western Europe which caused an 8% decline in European steam coal import demand during these years. With the recovery in the world economy, steam coal import demand has increased steadily, rising 14% in 1984 and an expected 13% in 1985.

Over the next ten years, import demand is expected to rise significantly, growing at an annual average rate of about 5% between 1985 and 1995. Increased steam coal use by the electric utility and industrial sectors in Western Europe and in the Pacific Rim countries is expected to account for most of the rise in total import demand for steam coal. At the same time, indigenous coal production in many of the major importing nations is likely to decline, although slowly. Hence, most of the incremental steam coal demand in these countries will be met by imports.

Western Europe

In Western Europe, steam coal imports are expected to increase at an annual rate of about 5.0 percent between 1985 and 1995. This increase reflects some slight displacement of expensive subsidized domestic coal production with imports and new demand spurred by growth in economic activity. Italy is projected to have the largest increase in imported steam coal, with levels rising from the 10.8 million tonnes imported in 1984 to about 25 million tonnes in 1995. Lower oil prices, however, could greatly reduce the size of this increase. Denmark, another country with limited energy reserves and a national policy designed to reduce its reliance on oil, should also boost steam coal import demand. By 1995 coal imports are expected to climb to around 15 million tonnes from their current level of about 11 million. France, meeting most of its future electricity needs with nuclear power, is likely to reduce coal imports, despite falling domestic production.

The United Kingdom and West Germany are not expected to be major contributors to the increased demand for coal imports as they have large domestic coal industry interests to protect. The U.K. has fluctuated between being a net importer and exporter of coal depending upon the condition of its domestic coal industry and economic activity. West Germany has continued to import coals but has limited the degree to which coal imports can capture existing markets from domestic producers.

Pacific Rim Countries

Although overall import levels are lower than those in Western Europe, the growth rates of Pacific Rim steam coal demand will be higher. Steam coal imports are forecast to rise from 29.3 million m.t. in 1983 to 75-95 million m.t. by 1995. Japan, the leading coal importer in Asia, is forecast to increase steam coal imports from 17 million m.t. in 1984 to 25 million m.t. by 1990. South Korea, which must import all of its steam coal needs, is expected to increase imports from about 6 million m.t. in 1984 to about 10 million m.t. by 1990. Similarly, Taiwan's steam coal imports are also expected to rise substantially, increasing from over 5 million m.t. in 1983 to near 10 million m.t. by 1990. Other important actors in the Pacific Rim include Hong Kong with major coal-fired power plant additions to satisfy a steady growth in electricity demand, and the Philippines.

Other Countries

As developing countries in South America, Asia, and Africa begin to expand their economic activities, steam coal imports will prove to be an economically attractive source of energy for power generation. Mediterranean countries, such as Israel, Turkey and possibly Egypt are also expanding their use of coal imports.

WORLD SUPPLY OF STEAM COAL

The major world steam coal exporters are shown in Table H-3 with estimates of their recent levels of exports. These countries are shown in their likely relative importance to Pakistan.

Perhaps more important to the current state of the world coal trade markets than current export levels, is the productive capacity each country has available to satisfy increased demands for exports. Among all the suppliers listed in Table H-3 between 50 to 100 million tonnes of excess productive capacity currently is available. This excess capacity can be utilized to satisfy any increased demand for coal imports without any appreciable change in the current market price levels and is a major reason for the depressed prices and intense supplier competition existing in the current world coal market. How and when this excess capacity will decline is a major consideration in estimating near-term and spot market prices for coal exports.

The following discussion summarizes the trends affecting export capacity, export levels, and mining, transportation, and shipping costs for each of the major supply countries of interest to Pakistan.

Table H-3

Exports from Major Coal Exporting Countries in 1984
(in millions of metric tons)

Countries	Steam	Metallurgical	Total
Australia	29	47	76
South Africa	32	5	37
Colombia	1	0	1
Western Canada	3	22	25
U.S.	22	52	74
China	4	3	7
Poland	33	10	43
Others[1]	25	17	42
Total	149	156	305

[1] Others primarily include the United Kingdom, West Germany, and the U.S.S.R.

Australia

Australia is potentially capable of producing low-cost steam coal for world markets, particularly for the Pacific Rim countries. However, the historical contentious bickering between the traditional coal industry, federal and state governments, Australia's fragmented labor unions, Japanese coal importers, and international energy companies has tended to raise delivery costs and disrupt production.

Production Costs

Australia has around 110 billion tons of recoverable reserves. Australian coal is generally low in sulfur content (1% sulfur or less) and has a high Btu value comparable to bituminous coals in the Eastern part of the U.S. Lower grade sub-bituminous and lignite coals exist but are produced primarily for domestic electricity generation. Australian export mines have thick seams and excellent geologic conditions that permit relatively low-cost extraction. The mining industry is sophisticated, technologically advanced, and is continuing to improve. At the present time, about 55 percent of the reserves are surface-mined. The shift from underground to open-cut mines, which began in the late 1960s, is expected to continue into the future. It is anticipated that by 1990 approximately 75% of Australian coal will be surface-mined.

Australian labor costs are relatively high by international standards. Labor unions are fragmented and strongly competitive. Approximately 30 unions are involved with the mining, transporting, and loading of coals destined for the export market. Any one of these unions can break this export chain, and thereby delay export shipments. This tactic is especially effective in Australia where limited stockpiling facilities and high demurrage costs can substantially increase the delivered costs.

Recent disputes affecting Australia's export coal trade largely have involved personnel in industries servicing the coal industry, such as railway, utility, and maritime workers. However, there is some evidence that labor relations in Australia's coal industry have improved in the past few years.

Industry Structure

Australian mining companies, who traditionally handled metallurgical coal but are currently producing steam coal for exports, tend to secure long-term contracts before expanding capacity. The publicly-owned Electricity Commission also conducts extensive coal mining operations to supply power stations and has tried to establish joint ventures to produce steam coal for exports.

Foreign interests control a significant portion of Australia's export production. Large international energy and mining companies have become involved in the Australian coal industry during the last decade. These companies tend to respond quickly to market incentives, concentrating largely on spot market sales. Japanese utilities and other industrial users have equity participation in the capital-intensive surface mines in Queensland. Japanese involvement provides Australia with scarce risk capital and ensures Japanese coal users reliable access to reasonably priced coal supplies.

Transport Costs

Major coal reserves and current mining operations are located relatively close to the ports, generally within 250 miles. Australia has seven major ports capable of handling a total of over 100 million m.t. of coal per year and accommodating vessels up to 120,000 DWT. Australian ports have little stockpiling capacity, and demurrage charges can significantly affect the cost of coal. Because Australia's coal reserves have very favorable geological characteristics and are located close to the ports, both mining and transportation costs for exported coals are relatively low.

Given this situation, the Australian government has instituted policies to ensure that its coal exports garner the most favorable contract terms in both quantity and price. As such, wherever market conditions permit, Australia has sought to price its coals above its marginal mining costs and to price it as high as the market will bear. In many cases, the "excess profits" (economic rents in economist's terms) are captured by the Australian government through high rail charges, port fees, export tax levies and royalty payments.

Exports

In fiscal year 1985 (7/1/84 to 6/30/85), Australia's total coal exports were 82.5 million m.t., up 24% over fiscal 1984. Steam coal exports were 29.4 million m.t. or 36% of the total. However, at these high export levels, many companies are operating at extremely narrow profit margins, and little investment in export capacity is planned in the near future.

When world steam coal markets are depressed, as is the case in the current markets, Australia's exports are demand-limited. Although Australia's underlying marginal costs of steam coal production are below current market prices, inflated wage and transportation rates -- as well as export tax levies and royalty payments -- all raise actual production costs. Hence, current low

steam coal prices do not always cover these inflated costs, often leaving the producer with minimum returns on his invested capital.

Over the next few years, Australia will be the swing supplier for international steam coal markets, and as such, spot market prices and new contracts will reflect Australia's incremental production costs. Incremental increases in world import demand will be met by increases in Australian exports. Higher cost producers, such as the U.S. and Canada, can still retain some market share as a result of previous contracts and the willingness of importers to pay a premium in order to diversify their supplies, but in the face of significant excess capacity, the pressure to diversify suppliers will be minimal.

Australian export capacity is thus likely to exceed actual export levels in the short-term. By one estimate, current Australian steam coal export capacity as determined by mining and infrastructure capability is as high as 75 million m.t., or 2.5 times greater than 1985 fiscal year export levels. However, labor disruptions and expanding metallurgical coal exports have the potential to reduce actual steam coal export capacity substantially.

The preceeding analysis suggests that export levels will not reach export capacity until markets improve sometime in the early 1990s. Exports and export capacity appear in Table H-4. A fairly wide range is reported in the forecast tables, reflecting the uncertainties arising due to the complex ownership and decision-making structure involved with Australia's coal exports.

Table H-4

Australian Coal Exports
(million of metric tons)

Year	Total Export Capacity	Metallurgical Coal Exports	Steam Coal[1] Export Capacity	Steam Coal Exports
1985	100-130	45-47	50-75	35-40
1990	100-130	46-49	50-75	40-50
1995	100-130	48-51	50-75	50-65

[1] Steam coal export capacity, given that actual metallurgical export levels are equal to those forecasted above.

South Africa

South Africa tends to be the low-cost producer of steam coal for the world's two largest import markets, Western Europe and the Pacific Rim. The South African government has a large degree of control in determining export levels and in keeping its coal exports competitively priced.

Production Costs

South Africa is estimated to have between 70 to 120 billion metric tons of recoverable coal resources, most of which is steam coal. About half the coal reserves are lower grade sub-bituminous coals, which have been developed primarily for conversion to oil at the Sasol facilities.

Nearly half of the coal reserves are mineable by less-expensive surface methods. Most of the reserves to be developed by underground mining techniques are at depths of less than 700 ft. with very thick seams. The sulfur content of these reserves ranges between 1% and 1.5%.

Labor costs in South Africa are low relative to other major coal suppliers. Although wages are expected to rise significantly over the next decade -- particularly among black mineworkers -- productivity gains resulting from the increased use of mechanized loading in underground mines and the spread of open cast mining should keep unit production costs down.

Industry Structure

In 1984, South Africa exported about 32 million metric tons of steam coal, a 22% increase over 1983 levels. Given South Africa's low costs of production and the extensive role of the government in the important decision making processes, future export levels are likely to be determined by rail and port constraints, rather than the overall foreign import demand for steam coal.

The South African government controls steam coal production and exports to a considerable degree. Domestic steam coal prices are controlled at relatively low levels in order to provide a cheap source of energy for the domestic generation of electricity. Transportation rates for both rail and port facilities are set by the South African government. Further infrastructure investment is also at the government's discretion. Export limits have been enforced to ensure that enough coal is available to meet domestic needs at the artifically low prices and to allocate limited port and rail capacity among coal-exporting companies.

The marginal cost of South African coal production is below international market prices in Western Europe and the Pacific Rim. Although these prices may not provide producers their full, expected rate of return on investments in current mining operations, most can provide some contribution to these fixed, sunk capital costs. Thus, South Africa will export as much coal as existing infrastructure can handle. However, when coal markets are depressed and interest rates are high, international coal prices may not ensure an adequate return on new infrastructure investment.

Infrastructure Capability

South Africa currently has 3 rail-to-port facilities capable of handling a combined 42 million m.t./year of coal exports. The major port facilities are located in Richards Bay, where recent development has raised export levels from 22 million m.t. a year to over 40 million m.t.

Plans to further expand exports at the Richards Bay facilities have been delayed due to depressed international coal prices and high interest rates. If coal markets begin to tighten, expectations of future price increases may

encourage further expansion at Richards Bay. Current facilities could be expanded to 60-65 million m.t./yr relatively easily. To expand the Richards Bay's facility beyond 65 million m.t., to 80 million m.t., would require a much greater expenditure.

Additional Considerations

Labor disruptions solely within the mining industry are not likely to reduce coal exports significantly. The wages of black mine workers increased almost eightfold -- albeit from extremely low levels -- during the seventies and early eighties, creating a privileged group with more to lose from labor disruptions. Strikes in the mining industry are usually ended quickly and can result in large-scale firings.

Large stockpiles of coal further increase the reliability of South African producers. Isolated import sanctions on South African coal by Denmark, France, and Sweden are not likely to have much of an effect. As a low cost producer, South Africa can undercut Australian prices to the Pacific Rim countries, although its preferred market is Western Europe where it has a transportation advantage over most other world coal suppliers.

Increasing violence and political instability in the society as a whole, however, could potentially have a large impact on South African coal exports. Infrastructure capacity may be destroyed if the violence escalates. Alternatively, worldwide general sanctions could limit the demand for South African coal. Therefore, future levels of South African coal exports remain unsure. If social unrest intensifies, steam coal exports could be as low as 35 million metric tons in 1990 and 25 million metric tons in 1995 as is shown in Table H-5.

Table H-5

South African Coal Exports (millions of metric tons)

Year	Steam Coal	Met Coal	Total
1985	37-38	4-5	41-43
1990	35-50	4-5	39-55
1995	25-60	5-6	30-66

Colombia

By 1990, Colombia will be a significant player in international steam coal markets. Colombia is a low-cost producer and exports are likely to expand as rapidly as export capability can be built and purchasers can be found.

Production Costs

Colombia's potential reserves are estimated to be 22 billion metric tons, most of which is comprised of steam coal. Colombia's coal is very high

quality with a high Btu content (as high as 14,400 Btu/lb.), a sulfur content of 0.4%, and ash content of around 4-7%. It requires no preparation other than crushing and sizing. The coal lies close to the surface, in very thick seams making it easy to strip mine. The mines in the El Cerrejon district are located within 100 miles of the export port now being developed as part of the Exxon/Carbocol project.

Export Capacity

Currently Colombia is engaged in extensive exploration activities and is seeking partners to help finance and develop its coal reserves. Exxon has joined Carbocol, the government-owned coal company, to develop the first large, export-oriented mine -- the El Cerrejon mine, in the northern zone of the El Cerrejon reserves -- and supporting rail and port facilities. At its design capacity this project will produce over 17 million tons per year of coal by 1989, starting from about 2.8 million tons in 1985. Most of the infrastructure development is ahead of schedule, making these targets achievable provided world market conditions warrant such an expansion.

Given current world import demand forecasts, Colombia is likely to be able to export no more than 17 million m.t. by 1990. However, exports could reach close to 30 million m.t. by 1995 as international steam coal markets tighten. Export forecasts for Colombia appear in Table H-6.

Table H-6

Colombian Steam Coal Exports
(millions of metric tons)

Year	Steam Coal Exports
1985	2-4
1990	12-17
1995	25-30

Western Canada

Canada is a relatively high-cost producer. Like the U.S., Canada can act as a swing supplier when import demand is high.

Production Costs

Recoverable reserves are estimated to be between 60 and 70 billion tons, most of which are in Western Canada and are low in sulfur content (less than 1%). About half of Canada's recoverable reserves are lower-grade sub-bituminous and lignite coals located in the plains areas of Alberta and Saskatchewan.

Mining costs for the higher-rank bituminous coals in Western Canada are high compared to those in Australia and South Africa. Most of the Canadian reserves can be surface mined. However, the reserves have multiple seams and are steeply inclined, folded, and faulted, which makes mining expensive. Labor costs are high, especially in remote areas with harsh weather conditions.

Transport Costs

The Canadian infrastructure is well developed. The railway system is one of the most efficient in the world and was developed in large measure for the export trade. Large unit trains of 100 cars or more are used. However, in many instances Canadian coal exports must be transported over 700 miles through some of the most mountainous terrain in the world. To increase exports significantly, Canada will have to finance new facilities. Canada is considering the alternative of slurry pipelines and may develop a coal-water slurry for some of its Japanese exports. Such developments, however, are not likely to materialize before the mid-1990's.

Exports

Canada's biggest constraint in expanding its coal exports will probably be its high costs. Furthermore, in the long-run mining costs are likely to rise faster in Canada than in other producing countries given the difficult geologic conditions of many of its bituminous reserves.

Canada has undertaken several new export-oriented projects. It has received significant investments from the Japanese both in the form of equity and loan agreements. Estimates of Canada's export capacity through 1995 appear in Table H-7.

Table H-7

Canadian Coal Exports
(millions of metric tons)

Year	Steam Coal Export Capacity	Metallurgical Coal Export Capacity	Steam Coal Exports
1985	5-10	20-25	3-4
1990	10-15	20-25	8-10
1995	15-20	20-25	15-20

United States

The United States has the highest annual coal production rate in the world with significant excess productive capacity estimated to be on the order of 100 million tonnes. Exports account for only a small fraction of total U.S. coal production. The U.S. is also a high-cost producer of coal for export, given the relative high transportation costs to move the coal from its operating mines to the importing country's consumers. Hence, the U.S. will

tend to serve most significantly as a swing supplier in international steam coal markets, particularly when import demand is high relative to the productive capacity of the low-cost suppliers.

Production Costs

The United States has estimated total recoverable coal reserves of about 525 billion metric tons. Coal quality, seam thickness, and mining methods vary greatly throughout the U.S.

Labor costs in the U.S. are quite high relative to those in other countries. Strikes are fairly predictable. They are more common in the Eastern U.S. than they are in the West, where union representation and activism are not as great.

Transportation Costs

Transportation costs from the mine to the port are high and reduce U.S. competitiveness considerably. Since steam coal exports have emerged as a potential market, railroads in the U.S. have taken steps to increase their efficiency and lower costs. By world standards transport costs are still relatively high, on the order of $15 per metric ton in the East and $20-25 per metric ton in the West.

Port facilities in the U.S. have been expanded dramatically since the congestion of 1980 and 1981. New, improved facilities with ground storage have been added at East coast ports, most notably in Baltimore, Newport News, Philadelphia, and Charleston. Expansion plans at the Gulf Coast ports of Mobile and New Orleans have been completed.

Export Capacity

The U.S. currently has a substantial amount of excess export capacity available. In 1985, the U.S. coal industry is likely to have on the order of 100 million m.t. of excess productive capacity, due to relatively weak domestic demand. If international prices rise, additional domestic coal production and transport capability could be diverted towards the export markets. In 1985, total exports are expected to be close to 90 million m.t. -- well below the peak export levels of 110-115 million m.t. recorded in 1981. Substantial infrastructure investment has subsequently reduced the transportation constraints which limited exports in 1981. Hence, total export capacity should be over 130 million m.t.

Actual Exports

The United States is a high-cost producer of steam coal. Since total domestic consumption requirements are far greater than exports, and rail and port facilities have not been developed primarily for coal exports, the U.S. will tend to act as a swing supplier of steam coal. High international prices justify directing existing resources to coal exports, while low prices do not. Additional U.S. exports, then, will roughly be the difference between international import demand and the total supply available from lower cost producers. Export levels and capacity forecasts appear in Table H-8.

Table H-8

U.S. Coal Exports
(millions of metric tons)

Capacity Year	Total Coal Export Capacity	Met Coal Exports	Steam Coal Export[1] Capacity	Steam Coal Exports
1985	130	55-60	70	25-30
1990	130	50-60	70	20-25
1995	130	50-60	70	25-45

[1] Steam coal export capacity, given that actual metallurgical export levels are equal to those forecasted above.

China

Despite the enormous size of the domestic mining industry, Chinese steam coal exports are expected to be constrained by rising domestic demand and inadequate infrastructure facilities.

Production Costs

China has about 100 billion tons of recoverable reserves. At the present time, most of the reserves in China are deep mined. Many of the seams are deep and thick. The coal generally has a low sulfur content and a high ash content. The majority of the coal is bituminous, while the rest is anthracite. Mining is inefficient compared to other suppliers. Wages are high for China (though very low relative to other suppliers), and equipment is outdated.

Export Capacity

To become a major exporter, China needs to modernize its coal industry. The Chinese government has given coal industry development a top priority, seeking foreign participation in the expansion of its coal industry.

The biggest constraint on China's exports is its limited and outdated infrastructure. Although the rail system is being improved, it will be many years before it adequately serves the most desirable deposits. The number of ports that have coal export facilities is very small, only 6 out of an approximate total of 200.

In 1982, China produced about 700 million metric tons of coal, of which only 9 million metric tons were exported. Due to the enormous size of China's coal industry and its proximity to the Pacific Rim Countries, this country is a potential force in the Asian and Pacific Rim markets.

Chinese officials have stated they hope to reach an annual export level of 15 million metric tons by 1995 and 20 million metric tons by 2000. However, many analysts feel that this will not be possible given the timing and scope of current development and production plans.

WORLD STEAM COAL PRICING

As noted briefly in the introduction, there are a number of elements which determine the pricing of steam coal, whether from domestic production or from coal imports. Just as coal is not a homogeneous product neither is the price for coal one unambiguous figure. The price will vary depending upon the type of coal being purchased, when it is purchased, how it is purchased, and the terms and conditions of the contract specifying the purchase. Coal contracts can be divided into three different types:

- Spot market purchases where there is a single amount purchased within a short period of time.
- Short-term contract purchase in which a specific amount is purchased to be delivered over a period of one to three years.
- Long-term contract purchase in which a specified annual amount of coal with specific quality characteristics is purchased to be delivered over a period of five years or longer (generally on the order of 10 to 20 years).

The type of contract purchase that is most relevant to coal imports into Pakistan for purposes of electricity generation is the long-term contract purchase. Reliability of supply, consistent quality, reasonable control on expected delivered coal costs, and established supply relationships are important considerations when purchasing coal for power generation. These considerations are best addressed under a long-term contract purchase which also, over the long run, will yield the lowest possible average delivered price for imported stream coal. For example, utilities in the U.S. will typically buy about 80% of their coal requirements on long-term contract with the remainder split between short-term contract and spot market purchases. Those factors causing U.S. utilities to pursue this type of contracting strategy are even more dominant in the international coal trade (long transportation linkages, distant supplies, limited ability to quickly change suppliers and the type of coal being purchased, etc.).

Therefore, the delivered coal price most relevant to providing an imported coal option to Pakistan is that for a long-term contract purchase, beginning sometime between 1992 and 1995. In general, under this type of contract the delivered price for coal will reflect the underlying full costs for mining, transporting, and shipping the coal to Pakistan.

Review of Historic Imported Coal Prices

In developing an estimate for the future price of imported coal it is natural that any forecast that is developed will be compared with current and recent historic steam coal prices. While these prices do provide some

perspective, they do not provide a good measure of the relative "soundness" of future price forecasts for long-term coal contract purchases.

Table H-9 presents steam coal prices for the period 1977 to 1984 for Australia, South Africa, and the U.S. In general, these prices represent spot market and short-term contract prices rather than long-term contract prices.

Between 1979 and 1982, the average F.O.B. price of South African steam coal rose 60%, that of American East Coast steam coal rose over 80%, while Australian steam coal prices rose by about 40%. These price increases were the result of an unusual combination of events. During this period, world oil prices doubled from about $15 to $30 per barrel. Consequently, steam coal became a more economical fuel for many facilities. Conversions to coal from oil and gas occurred in many utility boilers and cement kilns where these conversions were economical and could be accomplished easily. This resulted in an unanticipated increase in the demand for imported steam coal.

At the same time that demand increased, conditions changed in a number of the major exporting countries which restricted coal supply. For example, there were severe labor problems in the coal mining and transportation sectors of the Polish and Australian economies, production capacity and port limitations in Australia and other major supplying countries, and port constraints and controls on the amount of exports from South Africa.

Table H-9

Average F.O.B. Steam Coal Prices (US $/Ton)

Year	New Castle Australia	East Coast United States	South Africa
1977	24-29	25	21
1978	25-31	26	22
1979	26-32	28	22
1980	28-30	40	28
1981	34-39	49	34
1982	37-43	51	35
1983	35-41	43	31
1984	33-40	44	28

Source: International Coal.

Therefore, much of the increase in import demand had to be satisfied by U.S. producers. With demand exceeding the available low-cost supply, spot market and short-term contract prices began to rise. The U.S. share of world steam coal trade rose from 14.0% in 1979 to 37.0% in 1981 (See Table H-10). Since international prices rose, higher cost domestic mining and rail capacity in the U.S. was brought on-line to produce steam coal for export.

Table H-10

U.S. Share of World Steam Coal Exports
(millions of metric tons)

Year	U.S. Exports	Total Trade	Market Share (%)
1977	11.3	80	14.1
1978	9.5	88	10.8
1979	13.9	99	14.0
1980	25.9	107	24.2
1981	42.9	116	37.0
1982	37.9	122	31.1
1983	25.2	117	21.5
1984	22.3	128	17.4

Source: Weekly Coal Production, November 9, 1985

However, international coal markets again changed dramatically in 1982 and 1983. Major economies of the world suffered recessions which reduced the overall demand for steam coal. Also, the labor problems in Australia and Poland were resolved and these countries returned to their original export levels.

Steam coal prices temporarily firmed in late 1984, as the British coal strike continued and the world economy began to recover. However, once the miners' strike ended, the fundamental underlying demand/supply structure was reasserted and world steam coal prices began to fall (See Table H-11).

Table H-11

Steam Coal Spot Market Price for 1984/86[1]
(F.O.B. U.S. $/Ton)

Date	Australia	Gulf Coast United States	Richards Bay South Africa
5/2/84	30-33	35-37	29-30
11/7/84	32-43	43-44	35-37
5/8/85	35-36	36	35-36
11/6/85	32-34	33-34	31-33
7/30/86	30-35	32-40	24-27

[1] Source: Coal Week International.

Current prices reflect the fact that the world steam coal supply currently exceeds world import demand as demonstrated earlier in this appendix. Current prices do not allow the marginal producer -- in the current market environment, Australia-- to recover full costs of production. A 1985 survey (CWI, 5/15/85)

of Australian producers found that 30 out of 39 responding companies were recording little or no profits. This is due in part to high taxes and tariffs imposed by the Australian government to capture economic rents. Nevertheless, Australia is limited in its ability to garner higher prices when supply greatly exceeds demand and there is intense competition among the major world suppliers.

Again it should be recognized that these coal prices do not reflect those appropriate for long-term coal contracts. While some term contract prices are reported by various organizations, these prices are closer to reflecting short-term contracts of 2-5 years rather than long-term contracts of 10 or more years. Moreover, as noted previously, the world steam coal trade is still emerging and the established pricing and contracting practices have yet to be fully established. Given the current oversupply and depressed spot market prices, few long-term contracts are being negotiated and those have not been made public.

Moreover, the current condition of depressed steam coal prices as a result of world supply exceeding demand by a substantial amount will not continue forever. Based on current projections of world coal import demand and the expansion plans of the major world coal exporting countries, world steam coal markets are likely to move into a balance (supply equilibrating with demand) sometime during the mid 1990's. At this point international steam coal prices will firm and the spot, short-term, and long-term coal contract prices will reflect those necessary to recover the full mining and transportation costs, including a fair return on any invested capital.

Therefore, it is the long-run full costs of mining and transportation that are most relevant for estimating the future long-term contract prices for imported coal into Pakistan. As discussed in the next section, the major uncertainty in estimating this price is whether future international steam coal prices are likely to be established by the new mining and transportation developments in the U.S. or by those in the lower cost exporting countries of Australia and Colombia.

Long-Term Imported Coal Costs to Pakistan

The major coal exporting countries of primary interest to Pakistan as potential suppliers of imported coal are the U.S. (both East and West Coast ports), Australia, and South Africa. Others such as Colombia, China, and Western Canada and possibly Indonesia (in the future) also have supply potential. However, it will be the cost structure of the three major world suppliers that will most likely determine the market clearing prices for imported coal to Pakistan. In the mid 1990 period and beyond, it is the estimated long-run marginal costs for new mining developments and the full transportation and shipping costs of delivering coal to Pakistan from these countries that offer the best estimates of long-term contract costs of imported coal.

Table H-12 provides an assessment of the long-run cost for each exporting country of delivering steam coal to Pakistan. The total costs reflected in this table are the sum of the long-run marginal mine-mouth production, domestic transportation, and ocean freight costs from newly developed mines and ports. These costs represent the costs associated with opening the last

Table H-12

Long-run Delivered Costs of Steam Coal to Pakistan
Bituminous Steam Coals, 1% Sulfur or Less
(1985 $/metric ton a/)

Exporters	Mine	Inland Rail and Port-Domestic	FOB Supplier	Ocean Transport (1000 DWT) 50	Ocean Transport (1000 DWT) 75	Delivered Costs in Karachi by Ship Size (1000 DWT) 50	Delivered Costs in Karachi by Ship Size (1000 DWT) 75
United States							
Appalachia	40	15	55	25	23	80	78
Utah Central	28	22	50	28	24	78	74
Australia							
New South Wales	30	10	40	18	15	58	55
Queensland	32	12	44	17	15	61	59
South Africa	28	10	38	11	10	49	48
Western Canada	35	15	50	26	22	76	72

a/ All costs are adjusted for Btu differences from the various supply regions to reflect costs for a metric ton, (m.t.), based on a standarized heating value of 12,000 Btu/lb.

Note: The estimated costs shown above are not meant to reflect estimates of future or even current market prices which can be significantly higher due to the ability of transportation entities to capture economic rents.

Sources: ICF estimates from: International Steam Coal Trade Analysis, ICF Incorporated for the Appalachian Regional Commission, November 1981 and Shawinigan Integ Inc.: Prefeasibility Study for an Imported Coal Fired Thermal Power Station Near Karachi in Pakistan, August 1985.

new mine to satisfy the last increment of demand and include a fair return on all invested capital required to bring this supply on line and to transport it to Pakistan.

It is important to realize that these are estimated costs, not price forecasts. The critical distinction is that these costs do not include possible economic rents, or profits beyond a fair return on the capital invested in production or transportation ventures. Such economic rents may be captured by the government, as is the case in Australia and South Africa (in the form of export levies or unusually high transportation tariffs), or by the producers as a result of various market strategies, or conceivably by labor unions.

Therefore, the actual steam coal market price which prevails after the early 1990's may be based on Australian or American marginal production costs, depending on import demand and the market strategies of the low-cost suppliers. If in the longer run, the low-cost suppliers limit their exports and thereby allow the U.S. to capture a reasonable share of the world market, then world prices will be higher, reflecting the marginal costs of U.S. production. If South Africa and Australia decide to maximize their market shares throughout the 1990s, or if Colombia expands its steam coal export capability particularly rapidly, then world prices are likely to be lower, as based on Australian or perhaps Colombian production costs. Although it is difficult to forecast the market strategies of the low-cost producers after 1995, they may limit their exports and permit the U.S. to influence the market clearing price.

Given South Africa's concern about its limited domestic supplies of energy, the government may be interested in limiting coal exports. Its market share would be sacrificed for a higher selling price, but coal resources would be conserved. The higher export profits could be used to subsidize indigenous coal production for domestic use. Given the current political instability in South Africa, however, future government policy is highly uncertain.

Australia potentially could implement a market strategy that allows the U.S. to set the market-clearing price, particularly in Pacific Rim markets. Australia may or may not be able to control its level of exports or reduce competition among its own suppliers. The arguments that support the view that Australia could coordinate such a market strategy are provided below:

- The Australian government must review and approve all export contracts. The purpose of this review process is to ensure that Australian producers receive a fair market price. The process does offer some potential control over price and volumes; more importantly, it has made available better information about existing and potential export contract prices.

- Exchange of information among Australian producers is further facilitated by the numerous joint investments, the weak antitrust laws, and the limited number of producers (relative to the U.S. industry).

> Federal and State governments can control the rate of new mine development through the leasing and permitting of new mines. They may choose to restrain the growth of the coal mining industry due to concerns that rapid development will strain the availability of labor, water, and capital.

Long-term contract prices are thus likely to fluctuate somewhere between the long-run marginal costs of Australian and U.S. production. Given the cost estimates in Table H-12, a metric ton of steam coal delivered to Karachi is likely to cost between $48 and $78. The lower estimate reflects the minimum fully allocated long-term marginal cost of production and transportation from South Africa. Because of the limited capacity for exports from South Africa and the unstable domestic political situation, the lower estimate was considered reasonable for a sensitivity analysis. Moreover, South Africa is most likely to direct its exports to Western Europe where it has a competitive advantage. It was judged not to reflect a reasonable Base Case estimate of imported coal costs to Pakistan.

ICF's Base Case forecast reflects the delivered cost of coal from Australia. This price is $52.50 (mid-1985 dollars) per metric ton in 1990, rising at 1 percent annually in real terms. This forecasts implicitly assumes that Australia is unable to coordinate a market strategy that allows the U.S. to set the world market-clearing price. Hence, prices would reflect direct competition among suppliers and new mine development costs in Australia in the mid-1990s.

The high price bound of $70-80/tonne is based on the U.S. or Canadian long-run marginal production and transportation costs. This price would result if import demand grew particularly rapidly and low-cost producers were able to restrict export growth over the long term, thereby allowing the marginal producers in the U.S. to set the world market clearing price. ICF believes this scenario is highly unlikely during the 1990s.

APPENDIX I

LAKHRA PROJECT INTERNAL RATE OF RETURN

APPENDIX I
LAKHRA PROJECT INTERNAL RATE OF RETURN

The normal way to assess the social return on an investment project is to use the project's revenues and costs to calculate its internal rate of return. The revenues and costs are adjusted using the appropriate conversion factors to make the result a social rather than a nominal rate of return estimate.

In the case of a power project, the revenues from the project are often not representative of the project's value. Electricity tariffs are generally set to meet the utility's financial requirements or to meet social income distribution objectives. If tariffs are purposely set low to meet social or other goals, then a power project's return on investment does not indicate whether it is part of a country's optimal investment program. In this situation an alternative approach must be used to evaluate the desirability of the project from a national perspective. In this appendix the social return on the Lakhra project is estimated to confirm that it is desirable relative to non-power plant investments.

Calculating the Value of Electricity

The social value of the power generated by a new power plant depends on whether the new plant replaces an existing, higher cost plant or whether it provides power to customers who otherwise would not receive power. When the plant essentially "backs out" an existing plant, the value of the power is the cost saved by not running the existing plant. The cost saved, or the avoided cost, is the variable cost of operating the existing plant.

If the new plant provides incremental power to customers, then the value of this power is the value it has to each customer who receives it. This value is often estimated based on "willingness to pay"; i.e. the most the customer would pay to receive it. The tariff charged represents a lower bound estimate of the customer's willingness to pay; the customer clearly will pay the tariff and potentially much more. For example, an industrial customer would likely be willing to pay an amount equal to the economic loss associated with a loss of power or the cost of a back-up generator, whichever is less.

In this appendix the internal (social) rate of return of the Lakhra project is first estimated using the projected revenues (net of transmission and distribution costs) from power sales at the time the project is expected to come on line as a proxy for the project's value. Since this IRR estimate is low, the IRR of the project is subsequently estimated using an avoided cost and willingness to pay approach to value the power produced.

IRR Associated with Projected Electricity Tariffs

The cost of power generation varies depending on which generating units are being used to generate power. Baseload generating costs are less than peak load costs. If marginal cost pricing is used, customers are charged more for peak than for off-peak or baseload power.

The current WAPDA tariff structure varies by customer class, but not by time of year or by time of day. WAPDA does not attempt to manage loads using peak load pricing methods. Nevertheless, to determine the rate of return on individual generating units from sales of power, the average revenues received by the utility should be allocated to generating units based on their relative generation cost.

The Lakhra power project will generate baseload power, which is generally a relatively low cost category of power because it is generated by plants with high capacity utilization. In this initial analysis of the project's IRR based on WAPDA's projected revenues from power sales, the project is credited with revenues equal to the average revenues received by the utility minus the average cost of transmission and distribution. This method of revenue allocation may overestimate the IRR of the Lakhra project because it is a baseload plant, but it is the simplest revenue allocation method and it will reveal whether revenues can be used at all to estimate social IRR on the WAPDA system.

The Lakhra power project will generate electricity over the fiscal year 1992-2022 period. The (constant rupee) tariff structure likely to be in place over this period is unknown. The only tariff structure which is known is the existing structure and the commitments relating to future tariffs which Pakistan has made to the World Bank.

The two largest power systems in Pakistan, KESC and WAPDA, currently operate quite independently and have different tariff structures. There are plans to unite the systems, but the details have yet to be worked out. The Lakhra power project initially will be part of the WAPDA system, so the tariffs we have used for this analysis are the projected WAPDA tariffs.

WAPDA Tariff Structure

The tariff structure and the average price paid for power on the WAPDA system vary considerably by customer class. WAPDA's fiscal year 1986 rates (effective on July 1, 1985) are summarized in Table I-1. The price per unit of electricity varied from a low of .18 rupees per kw-hr (1.1¢ in 1985 dollars) for tubewells in the Northwest and Western provinces (excluding demand charges) to 1.22 rupees per kw-hr (7.6¢ in 1985 dollars) for government institutions. However, since there are considerable transmission and distribution losses and pilferage, a significant amount of electricity (29.3% in fiscal year 1984) provides no revenues at all[1].

A review of WAPDA statistics reveals that the average revenue received in fiscal year 1984 was .53 rupees per kw-hr sold[2]. Tariffs were raised by ten percent on July 1, 1985. Accordingly, the average price on July 1, 1985 was about .58 rupees.

---

[1] Pakistan Water and Power Development Authority, WAPDA Annual Report 1983-84, p. 110.

[2] Ibid, p. 107.

Table I-1

WAPDA Electricity Rates
(Effective July 1, 1985)

Category	Descriptions	Tariff (Rupees per month or per kw-hr)		
A-1	Residential, Religious and Charitable Institutions, and government schools	Demand	(Minimum)	6.0 rupees
		Unit	0-50	.37/kw-hr
			51-250	.44
			251-600	.55
			600+	.77
A-2	a) Government Institutions, Commercial Organizations, and Private Schools	Demand	(Minimum)	19.0/month
		Unit	0-100	1.10
			100+	1.22
B-1	Industrial Customers (excludes commercial load at industrial sites)	Demand	0-20 kw	24/kw/month
			20-70 kw	31/kw/month
		+ Unit		.69
B-2	Industrial Customers 400 volts	Demand	70-500 kw	88/kw/month
		+ Unit		.40
B-3	11/33 kv	Demand	500-5000 kw	85/kw/month
	+ Unit .39			
B-4	66/132 kv	Demand	5000+ kw	83/kw/month
	+ Unit .35			
C-1	a) Power Distributors 400 volts	Demand		--
		+ Unit		.48
	b) Railways & other Distributors	Demand		64/kw/month
		+ Unit		.39
C-2	11/63 kv suppliers			
	a)	Demand		--
		Unit		.40
	b)	Demand		--
		Unit		.37
C-3	66/132	Demand		61/kw/month
	Unit .36			
D	Tubewells (SCARP)	Demand		N/A
		Unit		.44
	Private Sind/Punjab	Demand		21/kw/month
	Unit .25			
	Private NWFP/Baluchistan	Demand		19/kw/month
	Unit .18			

Table I-1
(Continued)

WAPDA Electricity Rates (Effective July 1, 1985)

Category	Descriptions		Tariff (Rupees per month or per kw-hr)
E-1	Temporary		
	Residential	Unit	.92
	Commercial	Unit	1.62
E-2	Temporary		
	Industrial	Unit	1.01
	Bulk Dist. 400 v	Unit	.78
	11 kv	Unit	.71
	Bulk-RR	Unit	.83
F	Seasonal Industrial	Demand	125% of Normal for at least 5 mos.
G	Public lighting		
		Unit	.86
	Authority Line charges		144.36/mile
	Local Line charges		12.89/mile
H	Residential Colonies with own distribution		
		Demand	--
	w/o transformer	Unit	.57
	w transformer	Unit	.58
I	Railway Traction - Lahore		
		Unit	.36

Source: WAPDA NEWS, Vol. 6, No. 17 (Special Tariff Issue), July 1, 1985.

Note: 16.0 Rupees/1.0 U.S. Dollar.

The government of Pakistan's commitment to the World Bank is that 40 percent of the revenues required for WAPDA's investment in the power supply system will be provided through internal cash generation. The revenues required and the tariff increases required to meet this commitment depend on the size of the capital investment program and other factors, such as the inflation rate. An illustrative set of tariff increases developed by the World Bank for a 30 billion dollar investment program yields an average tariff of 1.21 rupees/kw-hr on July 1, 1991 in mid-1991 rupees[3]. If inflation averages seven percent, then this tariff will equal .81 rupees in mid-1985 rupees or 5.0¢/kw-hr in 1985 dollars. Lacking any additional tariff assumptions, this rate (in constant dollars) is assumed to remain in effect during the life of the plant.

The Lakhra power generation costs estimated earlier were measured at the bus bar and included a ten percent return on investment. Accordingly, to estimate the IRR of the project, the revenue per kw-hr must be estimated net of transmission and distribution costs and then the IRR this provides must be estimated using the Lakhra project's undiscounted costs.

WAPDA's statistics indicate that the average transmission and distribution cost was .23 rupees per kw-hr sold during fiscal year 1984.[4] Assuming this cost has remained constant in real terms, it would be about .26 rupees/kw-hr in mid-1985 rupees or 1.4¢ per kw-hr (1985 dollars) and the net revenues per kw-hr at the bus bar in mid-1991 would be 3.6¢ per kw-hr sold. Given the 29.3% loss rate cited earlier, the net revenue per kw-hr generated would be 2.5¢ per kw-hr. [Applying a shadow conversion factor to this estimate might further reduce the net social revenue received.]

Using this revenue estimate and the Lakhra coal and power plant economic costs, the social IRR of the project is negative. This estimate in itself would suggest that the Lakhra power project should not be built, since other non-power projects are available with higher projected IRRs. However, this low estimate of social IRR more likely suggests that electric power in Pakistan is underpriced. In the next section the value of this power to Pakistan is estimated on an avoided cost and willingness-to-pay basis.

IRR Associated with Economic Value of Electricity

As discussed earlier, the social benefit of power from a new power plant is the avoided cost for any existing plant output replaced plus the value of electricity to customers for any incremental power supplied. To estimate this benefit the amount of incremental power which would replace existing output and the amount which is incremental supply must be projected in each year of the plant's operation. Subsequently, the value of the avoided costs and the value of the incremental power supplied must be calculated. Finally, the

---

[3] World Bank, Aide-Memoire prepared by the Appraisal Mission for the Energy Sector Loan, November 29, 1984, Annex 2, p. 1.

[4] Pakistan Water and Power Development Authority, Power System Statistics, Ninth Issue, November 1984, p. 53.

internal rate of return which these benefits provide must be estimated using the undiscounted social costs.

Use of Power Generated by the Lakhra Project

An accepted method for evaluating a new power plant's contribution to the nation's power supply system is to assume that all existing plants are available to operate at their variable generating cost and that no new plants will be constructed after the new plant is built.[5] This methodology implicitly evaluates all expenditures on an incremental basis, taking as given any previous investments. With this methodology a new plant primarily replaces existing higher cost plants in the first year, but with continuing load growth, more of the plant's output is required to prevent load shedding (or to permit new customer connections) in each succeeding year.

There is considerable uncertainty about the future rate of load growth in Pakistan and the amount and rate of new capacity additions over the 1986-91 time period. Accordingly, it is difficult to project whether significant load shedding or delay of new customer connections will be occurring when the Lakhra power plants come on line. If WAPDA's investment program is limited by financial or national budget considerations, then shortages are quite likely.

The WASP model itself could be utilized to estimate the benefits of adding the Lakhra plants (by operating the model with and without the Lakhra plants, adding no new capacity after the plants come on-line and specifying a value for outage costs equal to the social value of power supplied). As this has not been done, the operating cost data used in the WASP runs and an estimate of outage costs are used to assess what would happen if such an analysis were performed.

Avoided Cost of Power Generation

The value of power backed out of existing units depends on the operating cost of existing units. This cost depends on the mix of units, their non-fuel operating costs, and the fuel cost. A review of the June 1986 WASP runs indicates that the marginal generating plants are furnace oil-fired steam units, gas turbines and high-speed diesel units. The operating characteristics and costs of these units vary, but a set of typical characteristics and the variable costs of operating these units over the 1990-2010 period are shown in Table I-2. The fuel cost projections are the Base Case Jamshoro fuel costs.

A review of the table indicates that the variable costs of operating these units ranges from 3 to 5.5¢/kw-hr in the early 1990s. Consequently, the avoided cost associated with backing out these units would fall in this range. If significant load shedding is occurring, then all of the units are likely to be highly utilized, and the use of the Lakhra plants might save an amount equal to about 4.5¢/kw-hr.

---

[5] Nitin Desai, Economic Analysis of Power Projects, The Asian Development Bank, January 1985, pp. 23-26.

Table I-2

Variable Cost of Operating Existing Generating Units on the WAPDA System (1985 dollars)

	OIL-STEAM	GAS TURBINE	DIESEL
Heat Rate (kcal/kw-hr)	2800	3200	3800
Variable O&M/kw-hr	.23¢	.30¢	.35¢

	Fuel Cost U.S. ¢/1000 kcal		Variable Cost/kw-hr (1985 U.S. ¢)			
	Diesel	Furnace	Oil-Steam	Gas Turbine		Diesel
				Gas	Diesel	
1990	1.25	.98	2.97	3.43	4.30	5.10
1995	1.45	1.14	3.42	3.94	4.94	5.86
2000	1.68	1.32	3.92	4.52	5.68	6.73
2010	2.26	1.77	5.19	5.96	7.53	8.94

[1] Assumed to be burning gas priced equal to furnace oil on a kcal basis.

Source: Heat rate, O&M rates, and fuel costs from June 1986 WASP III run assumptions.

Value of Incremental Power/Outage Costs[6]

Outage costs are defined as the costs society incurs when the supply of electricity is not sufficient to satisfy demand, or is not expected to be sufficient to satisfy demand. Short-run outage costs are incurred when unexpected interruptions in electricity supply occur. Long-run outage costs may be incurred if consumers adjust their behavior or make investments in order to reduce the cost of expected future interruptions. For example, consumers may purchase stand-by electricity generators in order to reduce

[6] The following discussion of outage costs is based on a literature review. Two works in particular provided useful discussions of the theory of outage cost measurement and a review of previous attempts to estimate outage costs: Mohan Munasinghe, The Economics of Power System Reliability and Planning, The John Hopkins University Press, 1979. Arun P. Sanghvi, "Economic Costs of Electricity Supply Interruptions," Energy Economics, Vol. 4, No. 3, July 1982, pp. 180-198.

192

future outage costs. Long-run outage costs are also referred to as adaptive response costs.

Figure I-1 demonstrates that both the actual and expected level of reliability of electricity supply affect total outage costs per kw-hr. Outage costs per kw-hr will be highest when consumers expect reliability to be high, i.e. few outages are expected, and actual reliability is low. In this case, consumers will have done little to minimize expected future outage costs and adaptive response costs will be low, but short-run costs related to the unexpected electricity outage will be high.

If the reliability of electricity supply is expected to be low, consumers will incur adaptive response costs in order to reduce expected total outage costs. If actual reliability is low, total outage costs will be high, but not as high as they would have been had consumers not adjusted their behavior.

In addition to the general conditions of actual and expected reliability, the outage cost per kw-hr incurred by consumers is affected by the following factors:

- time of occurrence;
- duration;
- warning time.

Outage cost per kw-hr typically will be higher when the interruption occurs during periods of peak load because electricity use in these time periods is likely to be for essential purposes. In general, the longer the interruption lasts, the higher outage costs will be. However, the relationship between outage costs and the length of the interruptions is not linear in many cases. The costs of a very brief outage may be minimal for most residential uses. However, industries that employ continuous production processes may incur sizable outage costs with even the shortest interruption in electricity supply. For these industrial users, outage costs may be nearly as high for a one minute interruption as for a two-hour interruption. For other consumers outage costs may increase linearly with outage duration up to a threshold level. Interruptions that last longer than this threshold duration may lead to large increases in outage costs due to product spoilage. For example, residential consumers may be forced to throw away food stored in refrigerators if outages last longer than a few hours. Dairy farmers who store and process milk may also have similar threshold duration levels. Incremental outage costs may decline for very lengthy outages.

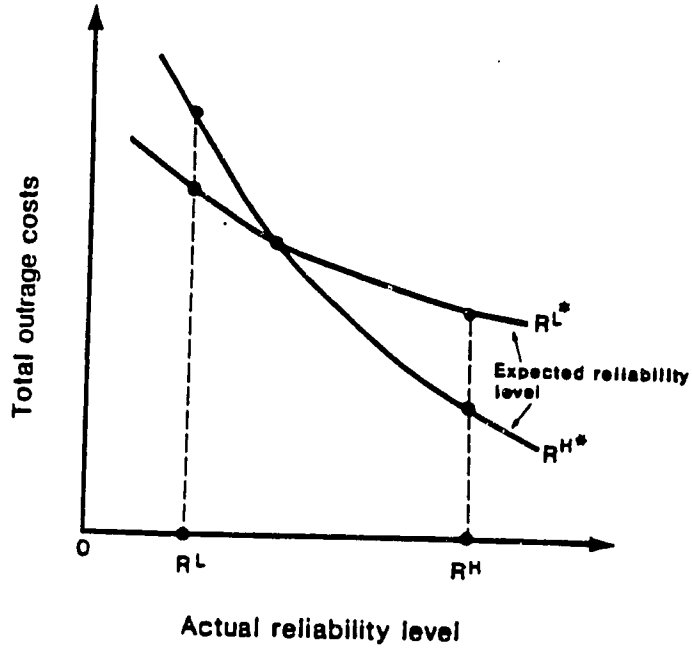
If customers are given sufficient warning of an impending interruption in electricity supply, outage costs may be substantially reduced. Sanghvi has concluded that advanced warning reduces residential outage costs by 30 to 60 percent.[7] A Finnish study found that the cost per kw-hr of a one-hour outage to industrial users could be reduced typically by 50 percent and in

---

[7] Sanghvi, op. cit., p. 189.

Figure I-1

Relationship Between Total Outage Costs and the Levels of Actual and Expected Reliability



Note: R^H = actual high reliability level; R^L = actual low reliability level, R^{H*} = expected high reliability level; R^{L*} = expected low reliability level.

Source: Mohan Munasinghe, The Economics of Power System Reliability and Planning, The John Hopkins University Press, 1979, p. 47.

some instances up to 90 percent if a twelve to twenty-four hour warning were given.[8]

ESTIMATING OUTAGE COSTS

According to free market economic theory, the value of electricity is the amount consumers are willing to pay for it. This amount is determined by such factors as the consumer's income, the price of substitutes, and any economic losses which may be incurred if electricity is not obtained. Since each consumer is willing to pay a different amount for electricity, estimating the value of electricity to the nation is a complex task.

---

[8] Finnish Power Producers Coordinating Council (STYU), Report on the Value of Non-Distributed Energy, August 1979. As sited in Sanghvi, op. cit., p. 192.

Typically, the overall willingness to pay varies from very little (for poor consumers or for those operating marginal enterprises) to a great deal (for wealthy consumers or for those operating enterprises seriously affected by outages). The diagram in Figure I-2 provides an illustration of an electricity demand curve and the potential outage cost associated with a shortage of electric power.

In this diagram some consumers are willing to pay an amount equal to the price of a substitute for centrally-generated power. The substitute could be locally-generated power or some other substitute, such as kerosene for use in cooking. In the diagram up to Q_s electricity could be sold at the substitute price. Other customers are not willing to pay this much for power. The amount which can be sold as the price declines to P_o is outlined by the demand curve D over the distance dc.

If the electricity price is P_o, customers desire Q_o electricity. Since most are willing to pay more, they receive consumer surplus equal to the value they receive in excess of the price P_o. This surplus is shown as the shaded area in the diagram.

If only Q_a of electricity is available, then a shortage (Q_o-Q_a) occurs. The outage cost associated with this shortage depends on how the shortage is allocated. The least costly way to allocate the shortage is to raise the electricity price to P_a. At this price some consumers will choose to use less electricity and the shortage will disappear. The (average) outage cost per kw-hr is then only $(P_a + P_o)/2$ and the loss of consumer surplus abc is very small. Alternatively, the price can be left at P_o and the shortage can be allocated or rationed over all customers, including those who would pay a considerable amount for electricity. In this case the average outage cost per kw-hr is $(P_{sub} + P_o)/2$, and the loss of consumer surplus bcde is considerable.

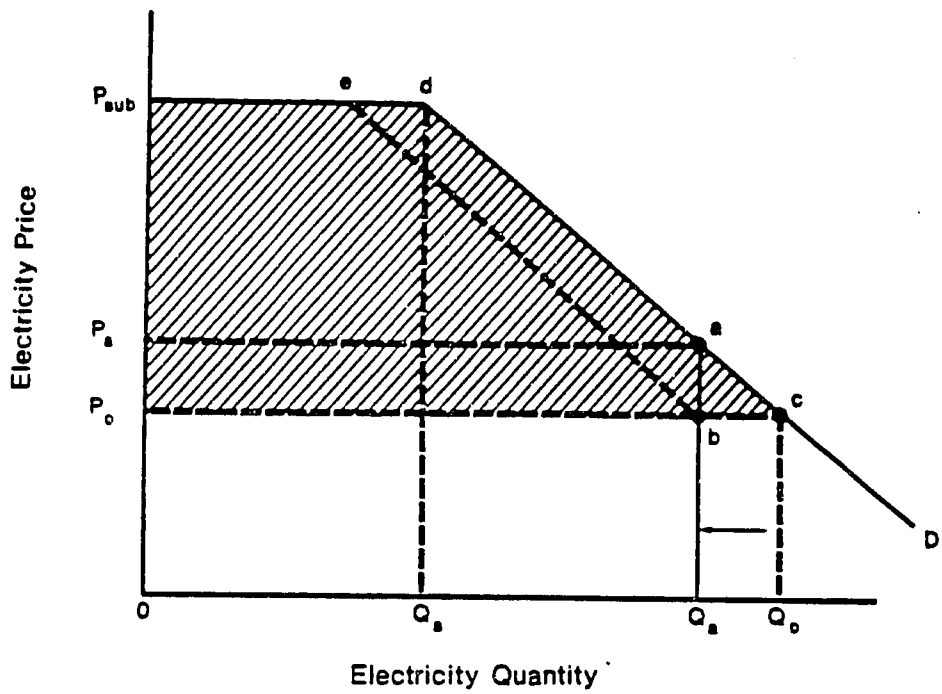
In Pakistan the normal method of dealing with power shortages is to allocate them to most customers with a limited consideration of the cost implications , thereby creating significant outage costs. Estimation of these costs requires information about the shape of the electricity demand curve in Pakistan, which is not likely to be linear and which will not have a single price for power substitutes.

Previous attempts to measure the economic costs of an interruption in electricity supply have typically taken one of two related approaches. Some studies have estimated outage costs, particularly for residential users, by attempting to measure consumers' willingness to pay for the electricity directly. In these studies, outage costs are estimated as lost consumer surplus. Other studies, particularly those focusing on industrial use , have estimated outage costs by measuring the value of the output lost because of the outage.

The following sections of this appendix provide estimates of outage costs for electricity consumers in Pakistan. Outage costs are estimated for the residential and industrial consumer categories. Finally, an aggregate measure of outage costs for all consumers in Pakistan is developed.

Figure I-2

Estimation of Outage Costs Based on Consumer Surplus Losses



Consumer surplus at price P_o.

Residential Outage Costs in Pakistan

Very little information is available on residential customer "willingness to pay" in Pakistan. Dr. Tariq Riaz estimated that residential customers have a short-run price elasticity of demand equal to -0.1 and a long-run price elasticity of demand equal to -0.3,[9] which indicates relatively little responsiveness to price over the historical range of prices and a willingness to pay more. However, the historical range of prices has been very low, well below the cost of supplying electricity.

Kerosene and diesel fuel can be a substitute for electricity for cooking, heating, and irrigation, but it is a poor substitute for lighting and refrigeration and cannot be used for leisure appliances, such as television. An upper bound price of a substitute is the cost of electricity generated by a small back-up power system.

---

[9] Dr. Tariq Riaz, Pakistan, The Energy Sector, 1984, pp. 64-65.

Dr. Arun Sanghvi has performed an extensive review of existing studies of outage costs in the residential sector.[10] Most of these studies have been performed in developed countries and examine unexpected outages of short duration. For this type of situation Dr. Sanghvi concludes that residential outage costs are generally in the 6¢ to $1.80 per kw-hr range, where the lower bound is determined by the electricity price and the upper bound by the cost of power from a back-up system. However, he concludes that shortage costs, where ample warning time is provided and curtailments occur frequently, are only $.06-.60 per kw-hr (1985 dollars).

This range of outage costs is probably too high for Pakistan's residential customers. Wage rates of residential customers in Pakistan are much lower than in developed countries, reducing the value of leisure time lost and the amount customers can afford to pay.

The average residential electricity price was .41 rupees per kw-hr in fiscal year 1983-84 and was about .45 rupees/kw-hr in fiscal year 1986. If the rate structure is not changed, implementation of the World Bank tariff increases will raise this rate to about .63 rupees per kw-hr. or 3.9¢/kw-hr (1985 dollars). Consequently, for the marginal residential customer the value of electricity is likely to be only 4¢ per kw-hr. ICF concludes that residential outage costs in Pakistan are likely to be primarily in the 4 to 30¢ per kw-hr range.

Industrial Outage Costs in Pakistan

Industrial outage costs are typically measured as the value of output lost because of the interruption of electricity supply or the cost of standby power, whichever is less. This approach can be applied to all electricity users that produce a marketable product. Thus, it can be used to measure outage costs not only for manufacturing establishments, but also for construction, mining, trade, services, and agriculture. Value added per kw-hr will underestimate actual outage costs in cases where there are substantial spoilage or shut down and restart costs. On the other hand, value added per kw-hr will overestimate outage costs if the lost value added can be made up by increasing capacity utilization or by working overtime in uninterrupted periods.

Based on a review of numerous studies, Sanghvi concludes that outage costs for a short-run 1 hour interruption in the industrial sector in developed countries are $1.20 to $8.40 per kw-hr, but only $0.06 to $1.20 per kw-hr (1985 dollars) for regular planned curtailments.[11] Since wage rates are lower in Pakistan than in the developed countries and customers expect low reliability, it is likely that the cost of outages in Pakistan is lower.

The average price of electricity to industrial customers was .63 rupees in fiscal year 1984 and was about .69 rupees or 4.3¢/kw-hr in fiscal year 1986.

---

[10] Sanghvi, op. cit., pp. 190-192.

[11] Ibid, pp. 192-195.

The implementation of the tariff increases will raise this price to about 6¢/kw-hr. This is a lower bound estimate of the value of electricity for industrial customers in Pakistan.

As noted above, electricity reliability expectations in Pakistan are relatively low. Consequently, industrial users with continuous production processes who would face substantial spoilage or significant shut down or restarting costs in the event of an interruption have installed standby generators. For these users, centrally-generated electricity outage costs can be calculated as the cost of producing electricity from a standby generator. ICF has estimated the cost of electricity from a standby 2 Megawatt generator to range from 16¢ per kwh if it is used 10 percent of the time to 25¢ per kwh if it is used only 5 percent of the time. The above analyses suggest that the cost to the industrial sector in Pakistan of frequent, planned outages might range from 6¢ to 40¢ per kw-hr.

IRR for the Lakhra Power Project

In 1992 when the Lakhra project would commence operation the WAPDA system reserve margin is projected to be low, perhaps 7-8% above peak demand. With an annual load growth rate greater than this margin, load shedding would increase rapidly in the absence of new construction.

Based on the analysis presented above, ICF has developed an estimate of the fraction of Lakhra power which would back out existing plants, the value of that power, and the value of the fraction which reduces outages or provides incremental supply. The avoided cost estimate is based on the calculations shown in Table I-2.

The analysis of long-run outage costs suggests that these costs lie in the 4-30¢ range for the residential sector and the 6-40¢ range for the industrial sector. The residential sector accounts for about 25 percent of total electricity consumption. We have used 20¢/kw-hr as a conservative estimate of the average social cost of power shortages in Pakistan. From this value is subtracted the transmission and distribution cost (1.4¢ per kw-hr) to obtain a value of 18.6¢ per kw-hr sold at the bus bar. Adjusting for the current loss rate of 29.3%, the value of power generated at the bus bar is 13.2¢ per kw-hr. ICF has used 10¢/kw-hr at the bus bar as our estimate of the value of baseload power to customers. The resulting value of power by year from a new baseload plant is shown in Table I-3. The internal real rate of return associated with this value of power and the undiscounted Lakhra project costs is 19.4 percent.

This estimate implicitly assumes that power shortages are allocated to all customers. A more efficient rationing approach would reduce the outage cost and, in turn, the IRR of the project. Nevertheless, the conservative assumptions used to produce the estimate of outage costs makes significant reductions in outage costs quite difficult.[12] Consequently, this analysis strongly indicates that a new baseload power project forms part of Pakistan's optimal project investment plan.

---

[12] For example, shortages could be eliminated by raising tariffs to reduce demand. A 100 percent tariff increase might reduce electricity demand by 10 percent. Given the high load growth, however, this action would merely delay the incidence of the outage costs by one year.

Table I-3

Value of Baseload Electricity (1985 U.S. Cents/Kw-Hr)

Year	Avoided Cost Fraction	Avoided Cost Cost	Outage Cost[1] Fraction	Outage Cost[1] Cost	Average Value
1992	1.00	4.0	.00	10.0	4.0
1993	0.75	4.5	.25	10.0	5.9
1994	0.50	5.0	.50	10.0	7.5
1995	0.25	5.0	.75	10.0	8.8
1996+	0.0	--	1.00	10.0	10.0

[1] For baseload power at the bus bar in planned or anticipated shortages.

APPENDIX J

Financial Plan Details and Annual Cash Flows

APPENDIX J

Financial Plan Details and Annual Cash Flows

This appendix presents the detailed financial plans developed for this project and summarized in the main body of the report. Five plans are shown:

- Base Coal Mine Case: Funds flow directly to the project from respective donors. Import taxes and duties are 10 percent of imported capital equipment costs.

- Government Loan Coal Mine Case: Funds from foreign lenders are loaned to the government of Pakistan, which then makes a single loan with different loan terms to the mining project. Import taxes and duties are again 10 percent.

- High Duty Coal Mine Case: Funds flow directly to the project, but import taxes and duties are 45 percent of capital equipment costs.

- Base Power Plant Case: Funds flow directly to the project from respective donors. Import taxes and duties are 10 percent of imported capital equipment costs. Base Case coal mine costs are used.

- High Duty Power Plant Case: Funds flow directly to the project, but import taxes and duties are 45 percent of capital equipment costs. High Duty Coal Mine costs are used.

Organization of the Financial Plan

Each plan includes one summary page of project assumptions and one summary page of project results followed by eight pages of detailed cash flows. In addition, since all six years of project start-up and 30 years of project operation could not be shown on one page, each plan runs through 2003 in the first ten pages and then runs from 2004 to 2022 in the second ten pages. Each plan contains 20 pages in total.

1	FINANCIAL MODEL (LAKIB, 8/25)		**** BASE CASE ****																		
2																					
3			--VARIABLE--																		
4		TYPE	NAME	DATA																	
5	**PROJECT DESCRIPTION																				
6	Annual Production (MIL Tonnes)	*V		0.00	0.00	0.00	0.03	0.16	0.90	2.82	2.78	2.73	2.63	2.50	2.37	2.70	2.66	2.80	2.80	2.78	2.78
7	Coal Consumption	*V		0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
8	Coal In Stockpile	calc		0.0	0.0	0.0	0.0	0.2	1.1	1.2	1.3	1.3	1.3	1.1	0.7	0.7	0.7	0.8	0.9	1.0	1.0
9	Year of Full Operation	*	YR.OP	1992																	
10	Project Life (#Years after 1st Full Op.	*	YR.LAST	30																	
11																					
12																					
13	**COST ASSUMPTIONS in MIL Constant DLR																				
14	Relative Year	*V	YR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
15	Infrastructure --Local	*V	INFRA.LOC	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
16	Infrastructure --Foreign	*V	INFRA.FOR	0.23	0.18	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
17	Machinery --Local	*V	MACH.LOC	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
18	Machinery --Foreign	*V	MACH.FOR	0.00	17.62	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
19	Total Capital Costs (MIL Constant DLR)	calc		7.46	28.30	56.49	61.48	48.29	66.74	5.90	4.27	4.56	4.73	7.81	24.06	7.34	12.15	17.45	4.12	13.69	13.69
20	O&M Expenses --Local	*V	O&M	0.65	1.82	7.25	13.56	22.80	32.45	41.44	41.07	41.21	40.70	39.80	38.80	38.86	39.03	39.08	39.12	37.32	37.32
21	O&M Expenses --Foreign	*V		0.43	1.34	3.75	6.37	10.64	14.60	17.85	17.84	17.76	17.58	17.57	17.15	17.09	17.09	17.09	17.09	16.10	16.10
22	Royalty Rate RUP/TON	*		15.0																	
23	Excise Tax RUP/TON	*		2.0																	
24	Workers Participation Fund(%of PBT)	*		5.0%																	
25	Workers Welfare Fund(%of PBT)	*		2.0%																	
26	Management Fee $Real/TON	*		1.50																	
27																					
28	**TAX ASSUMPTIONS																				
29	IGRA & Subsidy (% of Foreign Expenses)	*	IMPORT	10.0%																	
30	Other Import Duties & Sales Taxes	*	DUTY.OTHR	0.0%																	
31	Income Tax Rate	*V	TXRATE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32	Depletion Rate	*	DEPLRATE	20.0%																	
33																					
34																					
35	**ECONOMIC ASSUMPTIONS																				
36	Calendar Year	*V	YEAR	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
37	Inflation Rate -- Rupees	*V	INFRUP	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38	Inflation Rate -- Dollars	*V	INFDLR	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39	Exchange Rate (RUP/DLR)	*V	EXCHG	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.4	24.1	24.7	25.5	26.2	27.0
40	Base Year for Constant DLR	*	YR.BASE	1985																	
41	Inflation Index -- Rupees	calc	INDXRUP	1.070	1.145	1.225	1.311	1.403	1.501	1.606	1.718	1.838	1.967	2.105	2.252	2.410	2.579	2.759	2.952	3.159	3.380
42	Inflation Index -- Dollars	calc	INDXDLR	1.030	1.071	1.114	1.159	1.205	1.253	1.303	1.355	1.410	1.466	1.525	1.586	1.649	1.715	1.784	1.855	1.929	2.006
43																					
44																					
45	**FINANCE ASSUMPTIONS																				
46	All Loans Thru Govt of Pak?	*	GOVT.FIN	0	=Project Gets Financing Benefits Directly																
47	Maximum Funds Available in MILLION NOMINAL DOLLARS																				
48	Local Equity	*		50.0																	
49	Local Loans	*		25.0																	
50	Foreign Equity	*		50.0																	
51	US-AID Loan	*		25.0																	
52	Development Donors' Loans	*		350.0																	
53	Export Credit Loans	*		75.0																	

202

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLARS **** BASE CASE ****

56

		copyYEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
57																				
58	Annual Revenue -- MIL Constant DLR	calc	0.0	0.0	0.0	0.0	0.0	0.0	155.4	149.4	143.2	136.4	133.5	144.0	121.5	122.2	145.2	125.4	120.0	116.2
59	Cost / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	57.6	55.3	53.0	50.5	49.4	53.3	45.0	45.3	53.8	46.4	44.5	43.0
60																				
61	**Revenue Components																			
62	O & M Expense (w/ mgat fee)	calc	0.5	3.2	11.3	20.5	34.6	49.7	65.1	64.7	64.7	63.8	62.7	61.0	61.5	61.6	61.9	61.9	59.0	59.0
63	Royalty & Excise Duty	calc	0.0	0.0	0.0	0.0	0.1	0.6	1.9	1.7	1.6	1.4	1.3	1.1	1.2	1.1	1.1	1.0	0.9	0.9
64	Workers Participation & Welfare Funds	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.7	2.5	2.4	2.3	2.2	2.1	3.1	3.0	2.4	2.2
65	IGRA, Subsidy, & Other Import Duties	calc	0.0	1.8	4.1	4.5	3.4	5.1	0.1	0.3	0.4	0.4	0.7	1.9	0.7	1.1	1.6	0.4	1.3	1.3
66	Income Tax	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	19.0	15.1	14.3
67	Interest	calc	0.0	1.0	2.7	7.5	13.6	20.0	29.9	26.3	22.8	19.6	16.7	13.9	11.3	8.9	6.7	4.7	2.8	1.5
68	New Invest & Princ. Repay	calc	0.0	0.0	0.0	0.0	0.0	0.0	37.4	34.3	33.3	32.3	34.9	50.2	32.3	36.1	40.4	28.1	30.1	29.4
69	Return on Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	21.0	19.3	17.7	16.2	14.8	13.5	12.4	11.3	10.2	9.3	8.4	7.6
70	---------		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71	= TOTAL (Constant $)	sum	0.5	6.1	18.1	32.5	51.7	75.4	155.4	149.4	143.2	136.4	133.5	144.0	121.5	122.2	145.2	125.4	120.0	116.2
72	==========																			
73																				
74	REVENUE -- NOMINAL DOLLAR (MIL)	calc	0.0	0.0	0.0	0.0	0.0	0.0	202.6	202.5	201.9	199.9	203.5	228.4	200.4	209.6	259.0	232.6	231.6	233.1
75	NOMINAL DOLLARS / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	75.0	75.0	74.8	74.0	75.4	84.6	74.2	77.6	95.9	86.1	85.8	86.3

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLARS (mil)

		YR.REL	-6	-5	-4	-3	-2	-1	PRE-OPERATION TOTAL $	% of Loc	% of Total
77	Funds Provided By:										
78	Local Equity (ex postponed ROE)	calc	0.0	9.7	9.4	9.2	8.9	8.7	45.9	65%	9%
79	Local Loans	calc	7.8	6.8	9.7	0.0	0.0	0.0	24.2	35%	4%
80	Gov't of Pakistan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
81	Unspecified Local	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
82	---------		---	---	---	---	---	---	---		---
83	LOCAL TOTAL (in Mil DLR)	sum	7.8	16.5	19.1	9.2	8.9	8.7	70.2		13%

84 note: Local Funds Provided, when expressed in Dollars, may differ from the Assumed Maximum Available
85 since that constraint was implemented based on the Rupee/Dollar Exchange Rate in the first year.

86

										% of For	% of Total
87	Foreign Equity (ex postponed ROE)	copy	0.0	10.0	10.0	10.0	10.0	10.0	50.0	11%	9%
88	US-AID Loan	copy	0.0	0.0	6.3	6.3	6.3	6.3	25.0	5%	5%
89	Development Donors' Loans	copy	0.7	3.3	25.9	61.7	73.4	154.0	318.9	68%	59%
90	Export Credit Loans	copy	0.0	7.5	22.5	22.5	22.5	0.0	75.0	16%	14%
91	Unspecified Foreign Loans	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
92	---------		---	---	---	---	---	---	---		---
93	FOREIGN TOTAL	sum	0.7	20.8	64.6	100.5	112.2	170.2	468.9		87%
94	TOTAL INVESTED (Nom DLR)	sum	8.5	37.3	83.7	109.7	121.1	178.9	539.1		100%

95

96 Local Funds Provided expressed in NOM RUPEE

97	Local Equity in NOM RUP MIL	calc	0.0	166.2	166.2	166.2	166.2	166.2	831.1
98	Local Loans in NOM RUP MIL	calc	130.0	115.6	169.9	0.0	0.0	0.0	415.5
99	Gov't of Pakistan in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100	Unspecified Local in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101	---------		---	---	---	---	---	---	---
102	LOCAL TOTAL in NOM RUP MIL	sum	130.0	281.8	336.2	166.2	166.2	166.2	1246.6

103 ----------

104

105	Levelized Real Annuity Per Tonne	Disc. Rate	$/Tonne	PV REV	PV Tonnes
106	(For Illustrative comparison)	5.0%	$39.24	$1,276	32.5
107		7.0%	$40.04	$957	23.9

203

109 CAPITAL COSTS BY YEAR

		copyYR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
110																				
111 Input $ Conversion Factor		*	1.00 (=Base Year Currency Index / Input Year Currency Index)																	
112 TYPE 1 : Infrastructure																				
113 Local Sources (Constant $MIL)		copy	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
114 Foreign Sources (Constant $MIL)		copy	0.23	0.19	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
115 Depreciable %		*	100.0%																	
116 Tax Depreciation -- Initial Yr		* DEPR.INIT	25.0%																	
117 Tax Deprec Rate (*Decl. Bal)		* DEPR.NORM	10.0%																	
118 Capital Required:																				
119 Local Sources -- NOM RUP MIL		calc	128.6	131.2	143.2	128.3	69.9	2.1	0.0	0.1	0.1	0.1	0.8	1.8	1.4	2.1	0.1	0.2	2.5	2.7
120 Foreign Sources--NOM DLR MIL		calc	0.2	0.2	0.6	0.4	0.4	0.3	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.5	0.0	0.1	0.3	0.3
121 Adds to Deprec Base NOM RUP MIL		calc	132	135	153	136	77	8	0	1	1	1	7	10	10	13	1	2	10	11
122 Deprec.Expense (Initial)		calc	0.0	0.0	0.0	0.0	0.0	0.0	160.4	0.2	0.2	0.1	1.8	2.5	2.5	3.3	0.3	0.6	2.6	2.7
123 Deprec.Expense (Normal)	(not	calc	0.0	0.0	0.0	0.0	0.0	0.0	64.2	41.7	37.6	33.9	30.6	28.0	26.0	24.1	22.7	20.5	18.6	17.5
124 Undepreciated Basis BeginYr		calc	0.0	132.5	267.1	420.2	556.3	633.6	641.6	417.0	376.1	339.0	305.5	280.3	259.9	241.3	227.0	205.1	186.3	175.4
125 Import Duty & Sales Tax NOM RUP MIL		calc	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	1	1
126 ----------																				
127 TYPE 2 : Mine Equipment																				
128 Local Sources (Constant $MIL)		copy	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
129 Foreign Sources (Constant $MIL)		copy	0.00	17.82	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
130 Depreciable %		*	100.0%																	
131 Tax Depreciation -- Initial Yr		* DEPR.INIT	100.0%																	
132 Tax Deprec Rate (*Decl. Bal)		* DEPR.NORM	0.0%																	
133 Capital Required:																				
134 Local Sources -- NOM RUP MIL		calc	0.0	64.7	170.4	237.8	255.5	382.5	139.6	29.6	16.4	13.0	36.7	179.3	20.5	51.9	55.8	15.7	39.5	42.3
135 Foreign Sources--NOM DLR MIL		calc	0.0	19.1	45.2	51.3	41.0	64.0	0.9	4.3	5.6	6.3	10.0	30.1	10.8	18.2	28.9	7.0	24.6	25.5
136 Adds to Deprec Base NOM RUP MIL		calc	0.0	391.1	965.8	1167.0	1018.6	1608.8	156.8	117.4	134.2	148.9	257.4	863.6	274.0	490.1	771.5	192.9	683.1	730.9
137 Deprec.Expense (Initial)		calc	0	0	0	0	0	0	5309	117	134	149	257	864	274	490	771	193	683	731
138 Deprec.Expense (Normal)	(not	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr		calc	0	0	391	1357	2524	3542	5151	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL		calc	0	33	80	93	76	123	2	9	12	14	22	68	25	44	72	18	64	69
141 ----------																				
142 SUM FOR ALL CAPITAL TYPES																				
143 Capital Required By Year:																				
144 Local Sources -- NOM RUP MIL		sum	128.6	196.0	313.5	366.1	325.4	384.6	139.6	29.7	16.5	13.0	37.5	181.1	21.8	54.0	56.0	15.9	42.0	45.0
145 Foreign Sources--NOM DLR MIL		sum	0.2	19.3	45.8	51.8	41.4	64.3	0.9	4.4	5.7	6.4	10.3	30.5	11.2	18.7	29.0	7.0	24.9	25.9
146 Adds to Deprec Base NOM RUP MIL		sum	132.5	525.7	1118.9	1303.1	1095.9	1616.8	156.8	118.4	134.9	149.4	264.5	873.7	283.8	503.1	772.5	195.2	693.3	741.9
147 Allowable Tax Deprec.Expense NOM RUP M		sum	0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	894.2	302.5	517.5	794.4	214.0	704.3	751.2
148 IORA, Subsidy, & Other Import Duties	NOM	sum	0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
149 ==========																				

204

151	LOCAL EQUITY																				
152	Max Cash Invest-- NOM DLR MIL	copy	50.0	50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	calc	831.1	831.1	831.1	831.1	831.1	831.1	831.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
155	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%												
156	Expected Rate of Return	*	20.0%																		
157	Repayment Period	*	30 (Starting in 1st year of Full Operation)																		
158	Repayment Type	*	Level Principal																		
159	EQUITY BALANCE (NOM RUP MIL)																				
160	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	166.2	332.4	498.6	664.9	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4
161	+ Principal Borrowed	copy		0.0	166.2	166.2	166.2	166.2	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2
163	Bal -- EOY (Principal Only)	calc	0.0	0.0	166.2	332.4	498.6	664.9	831.1	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
164	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	33.2	106.4	227.4	405.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	sum	0.0	0.0	166.2	365.7	605.0	892.2	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
166	ROE Due (Nom RUP)	calc		0.0	0.0	33.2	73.1	121.0	178.4	247.4	239.1	230.9	222.6	214.4	206.1	197.9	189.7	181.4	173.2	164.9	156.7
167	Remaining Available -- BOY	calc		831.1	831.1	664.9	498.6	332.4	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	calc	0.0	0.0	-166.2	-166.2	-166.2	-166.2	-166.2	288.6	280.4	272.1	263.9	255.6	247.4	239.1	230.9	222.6	214.4	206.1	197.9
169	----------																				
170	LOCAL LOANS																				
171	Max Available in DLR MIL	copy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	calc	415.5	415.5	415.5	415.5	415.5	415.5	415.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?	*	0 =No, Allocated as Needed																		
174	Draw Down Pattern (% of Max)	*V																			
175	Interest Rate	*	14.0%																		
176	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
177	Repayment Type	*	Level Principal																		
178	LOAN BALANCE (NOM RUP MIL)																				
179	Bal -- Begining Of Year (BOY)	calc		0.0	130.0	245.6	415.5	415.5	415.5	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0
180	+ Principal Borrowed	copy		130.0	115.6	169.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	0.0	0.0
182	Bal -- End Of Year (EOY)	calc	0.0	130.0	245.6	415.5	415.5	415.5	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0	0.0
183	Interest Due (Nom RUP)	calc		0.0	18.2	34.4	58.2	58.2	58.2	58.2	52.4	46.5	40.7	34.9	29.1	23.3	17.5	11.6	5.8	0.0	0.0
184	Remaining Available -- BOY	calc		415.5	285.6	169.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	calc	0.0	-130.0	-97.4	-135.6	58.2	58.2	58.2	99.7	93.9	88.1	82.3	76.5	70.6	64.8	59.0	53.2	47.4	0.0	0.0
186	----------																				

188 Govt of Pakistan Loan																				
189 Max Available in DLR MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?	*	0.0 =No, Allocated as Needed																		
192 Draw Down Pattern (% of Max)	*V																			
193 Interest Rate	*	14.0%																		
194 Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
195 Repayment Type	*	Level Principal																		
196 LOAN BALANCE (NOM RUP MIL)																				
197 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201 Interest Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202 Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204 ----------																				
205 UNSPECIFIED LOCAL LOAN																				
206 Interest Rate	*	14.0%																		
207 Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
208 Repayment Type	*	Level Principal																		
209 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
210 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
213 Interest Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
214 Net Cash Flow to Unspec. Local Loan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
215 ==========																				

217	FOREIGN EQUITY																					
218	Max Cash Invest-- NOM DLR MIL	copy		50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
220	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%													
221	Expected Rate of Return	*	20.0%																			
222	Repayment Period	*	30.0 (Starting in 1st year of Full Operation)																			
223	Repayment Type	*	Level Principal																			
224	EQUITY BALANCE (NOM DLR MIL)																					
225	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	10.0	20.0	30.0	40.0	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	
226	+ Principal Borrowed	copy		0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
228	Bal. -- EOY (Principal Only)	calc	0.0	0.0	10.0	20.0	30.0	40.0	50.0	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
229	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	2.0	6.4	13.7	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
230	Bal -- End Of Year (EOY)	sum	0.0	0.0	10.0	22.0	36.4	53.7	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
231	ROE Due (Nom DLR)	calc		0.0	0.0	2.0	4.4	7.3	10.7	14.9	14.4	13.9	13.4	12.9	12.4	11.9	11.4	10.9	10.4	9.9	9.4	
232	Remaining Available -- BOY	calc		50.0	50.0	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
233	Net Cash Flow to Foreign Equity	calc	0.0	0.0	-10.0	-10.0	-10.0	-10.0	-10.0	17.4	16.9	16.4	15.9	15.4	14.9	14.4	13.9	13.4	12.9	12.4	11.9	
234	----------																					
235	FOREIGN LOAN 1 US-AID Loan																					
236	Max Available in NOM DLR MIL	copy		25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
238	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	25.0%	25.0%	25.0%	25.0%													
239	Interest Rate	*	3.0%																			
240	Repayment Period	*	26 Starting in Year 5 (10 Year Grace Period)																			
241	Repayment Type	*	Level Principal																			
242	LOAN BALANCE (Nom DLR)																					
243	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	6.3	12.5	18.8	25.0	25.0	25.0	25.0	25.0	24.0	23.1	22.1	21.2	20.2	19.2	18.3	
244	+ Principal Borrowed	copy		0.0	0.0	6.3	6.3	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
245	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
246	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	6.3	12.5	18.8	25.0	25.0	25.0	25.0	25.0	24.0	23.1	22.1	21.2	20.2	19.2	18.3	17.3	
247	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.2	0.4	0.6	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	
248	Remaining Available -- BOY	calc		25.0	25.0	25.0	18.8	12.5	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
249	Net Cash Flow to US-AID	calc	0.0	0.0	0.0	-6.3	-6.1	-5.9	-5.7	0.8	0.8	0.8	0.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	
250	----------																					
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																					
252	Max Available in NOM DLR MIL	copy		350.0	350.0	350.0	350.0	350.0	350.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
253	Draw Down Pattern Assumed?	*	0.0 =No, Allocated as Needed																			
254	Draw Down Pattern (% of Max)	*V																				
255	Interest Rate	*	9.0%																			
256	Repayment Period	*	12 (Starting in 1st year of Full Operation)																			
257	Repayment Type	*	Level Principal																			
258	LOAN BALANCE (Nom DLR)																					
259	Bal -- Begining Of Year (BOY)	calc		0.0	0.7	3.9	29.8	91.5	165.0	318.9	292.4	265.8	239.2	212.6	186.1	159.5	132.9	106.3	79.7	53.2	26.6	
260	+ Principal Borrowed	copy		0.7	3.3	25.9	61.7	73.4	154.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
261	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	
262	Bal -- End Of Year (EOY)	calc	0.0	0.7	3.9	29.8	91.5	165.0	318.9	292.4	265.8	239.2	212.6	186.1	159.5	132.9	106.3	79.7	53.2	26.6	0.0	
263	Interest Due (Nom DLR)	calc		0.0	0.1	0.4	2.7	8.2	14.8	28.7	26.3	23.9	21.5	19.1	16.7	14.4	12.0	9.6	7.2	4.8	2.4	
264	Remaining Available -- BOY	calc		350.0	349.3	346.1	320.2	258.5	185.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
265	Net Cash Flow to Develop. Donors	calc	0.0	-0.7	-3.2	-25.5	-59.0	-65.2	-139.1	55.3	52.9	50.5	48.1	45.7	43.3	40.9	38.5	36.1	33.8	31.4	29.0	
266	----------																					

268 FOREIGN LOAN 3 -- EXPORT CREDITS																					
269 Max Available in DLR MIL	calc		75.0	75.0	75.0	75.0	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
271 Draw Down Pattern (% of Max)	*V		0.0%	10.0%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272 Interest Rate	*	8.8%																			
273 Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
274 Repayment Type	*	Level Principal																			
275 LOAN BALANCE (Nom DLR)																					
276 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	7.5	30.0	52.5	75.0	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0	0.0
277 + Principal Borrowed	copy		0.0	7.5	22.5	22.5	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	calc	0.0	0.0	7.5	30.0	52.5	75.0	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	calc		0.0	0.0	0.7	2.6	4.6	6.6	6.6	5.9	5.3	4.6	4.0	3.3	2.6	2.0	1.3	0.7	0.0	0.0	0.0
281 Remaining Available -- BOY	calc		75.0	75.0	67.5	45.0	22.5	0.0	-75.0	-67.5	-60.0	-52.5	-45.0	-37.5	-30.0	-22.5	-15.0	-7.5	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	calc	0.0	0.0	-7.5	-21.8	-19.9	-17.9	6.6	14.1	13.4	12.8	12.1	11.5	10.8	10.1	9.5	8.8	8.2	0.0	0.0	0.0
283 ----------																					
284 UNSPECIFIED FOREIGN LOAN																					
285 Max Available in DLR MIL	calc		999.0	999.0	999.0	999.0	999.0														
286 Draw Down Pattern Assumed?	*	0 =No, Allocated as Needed																			
287 Draw Down Pattern (% of Max)	*V																				
288 Interest Rate	*	15.0%																			
289 Repayment Period	*	5 (Starting in 1st year of Full Operation)																			
290 Repayment Type	*	Level Principal																			
291 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																					
298 Total Interest Exp: NOM RUP	calc		0.0	19.2	52.2	157.9	304.6	479.9	769.0	721.7	671.5	618.2	561.7	501.0	436.8	368.9	296.8	220.8	140.5	79.2	
299 Total ROE : NOM RUP	calc		0.0	0.0	68.4	152.8	256.6	384.2	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7	
300 O&M Local : NOM RUP	calc		1.0	34.7	147.6	295.5	531.6	809.4	1106.1	1172.8	1259.1	1330.8	1392.3	1452.3	1556.5	1672.8	1792.2	1919.7	1959.4	2096.5	
301 O&M Foreign:(w/Fee) NOM DOLLAR	calc		0.4	1.4	4.2	7.4	13.1	20.0	28.8	29.8	30.8	31.5	32.5	32.8	34.9	36.1	38.0	39.5	39.1	40.7	
302																					
303 Summary of Fixed Amounts of Financing																					
304 Local Sources -- NOM RUP MIL																					
305 Local Equity	calc		0.0	166.2	166.2	166.2	166.2	166.2													
306 Local Loans	calc		0.0	0.0	0.0	0.0	0.0	0.0													
307 Gov't of Pakistan	calc		0.0	0.0	0.0	0.0	0.0	0.0													
308 TOTAL LOCAL -- NOM RUP	sum		0.0	166.2	166.2	166.2	166.2	166.2													
309 Foreign Sources--NOM DLR																					
310 Equity	calc		0.0	10.0	10.0	10.0	10.0	10.0													
311 Loan 1 -- US-AID	calc		0.0	0.0	6.3	6.3	6.3	6.3													
312 Loan 2 -- Development Donors	calc		0.0	0.0	0.0	0.0	0.0	0.0													
313 Loan 3 -- Export Credits	calc		0.0	7.5	22.5	22.5	22.5	0.0													
314 Unspecified Foreign	calc		0.0	0.0	0.0	0.0	0.0	0.0													
315 TOTAL FOREIGN -- NOM DLR	sum		0.0	17.5	38.8	38.8	38.8	16.3													
316 ==========																					

318	TOTAL CAPITAL NEEDS																			
319	Local Sources -- NOM RUP																			
320	Investment costs	copy	129	196	314	366	325	385	140	30	17	13	57	181	22	54	56	16	42	45
321	Interest & ROE	calc	0	18	34	58	58	58	306	291	277	263	249	235	221	207	193	179	165	157
322	Principal Repayment (D + E)	calc	0	0	0	0	0	0	83	83	83	83	83	83	83	83	83	83	41	41
323	Pre-Op Import Duty	calc	0	33	81	94	77	123	0	0	0	0	0	0	0	0	0	0	0	0
324	Pre-Op Royalty	calc	0	0	0	1	3	15	0	0	0	0	0	0	0	0	0	0	0	0
325	Pre-Op O&M - Local	calc	1	35	148	295	532	809	0	0	0	0	0	0	0	0	0	0	0	0
326	Foreign Needs Thru Govt of Pak(in Rup	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327	Total Needs	sum	130	282	576	814	995	1391	528	404	377	359	370	499	326	344	332	278	248	243
328	- Fixed Amounts Assumed	copy	0	166	166	166	166	166	0	0	0	0	0	0	0	0	0	0	0	0
329	LOCAL To Be Allocated (NOM RUP)	sum NEED.RUP	130	116	410	648	829	1225	528	404	377	359	370	499	326	344	332	278	248	243
330	Foreign Sources--NOM DLR																			
331	Investment costs	copy	0	19	46	52	41	64	1	4	6	6	10	30	11	19	29	7	25	26
332	Interest & ROE	calc	0	0	1	6	13	22	51	47	44	40	37	33	30	26	22	19	15	12
333	Principal Repayment (D + E)	calc	0	0	0	0	0	0	37	37	37	37	38	38	38	38	38	38	30	30
334	Pre-Op O&M - Foreign	calc	0	1	4	7	13	20	0	0	0	0	0	0	0	0	0	0	0	0
335	Unfinanced Local Needs(in Dollars)	calc	0.0	0.0	13.6	35.8	44.5	63.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336	Total Needs	sum	0.7	20.8	64.6	100.5	112.2	170.2	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
337	- Fixed Amounts Assumed	copy	0	18	39	39	39	16	0	0	0	0	0	0	0	0	0	0	0	0
338	FOREIGN To Be Allocated (NOM DLR)	sum NEED.DLR	1	3	26	62	73	154	88	88	86	83	85	101	78	82	89	63	70	68
339	CAPITAL AVAILABLE FOR ALLOCATION (Begin Yr)																			
340	Local Sources -- NOM RUP																			
341	Local Equity	calc	0	0	0	0	0	0												
342	Local Loans	calc	416	286	170	0	0	0												
343	Gov't of Pakistan	calc	0	0	0	0	0	0												
344	TOTAL LOCAL : NOM RUP	calcAVAIL.RUP	416	286	170	0	0	0												
345	Foreign Sources--NOM DLR																			
346	Equity	calc	0	0	0	0	0	0												
347	Loan 1 -- US-AID	calc	0	0	0	0	0	0												
348	Loan 2 -- Development Donors	calc	350	349	346	320	258	185												
349	Loan 3 -- Export Credits	calc	0	0	0	0	0	0												
350	TOTAL FOREIGN : NOM DLR	calcAVAIL.DLR	350	349	346	320	258	185												
351	Allocation FACTOR -- LOCAL	calc	0.31	0.40	1.00	0.00	0.00	0.00												
352	Allocation FACTOR -- FOREIGN	calc	0.00	0.01	0.07	0.19	0.28	0.83												
353	SOURCES OF CAPITAL -- BY YEAR																			
354	Local Sources -- NOM RUP																			
355	Local Equity	calc	0.0	166.2	166.2	166.2	166.2	166.2												
356	Local Loans	calc	130.0	115.6	169.9	0.0	0.0	0.0												
357	Pakistan Gov't	calc	0.0	0.0	0.0	0.0	0.0	0.0												
358	Unspecified Local	calc	0.0	0.0	0.0	0.0	0.0	0.0												
359	Local Needs - Local Capital (NOM RUP)	calc	0.0	0.0	239.9	647.7	828.7	1224.6	527.9	404.0	376.7	359.2	369.6	499.1	325.8	343.9	331.8	277.7	248.2	242.9
360																				
361	Foreign Sources--Nom DLR																			
362	Equity	calc	0.0	10.0	10.0	10.0	10.0	10.0												
363	Loan 1 - US-AID	calc	0.0	0.0	6.3	6.3	6.3	6.3												
364	Loan 2 -- Development Donors	calc	0.7	3.3	25.9	61.7	73.4	154.0												
365	Loan 3 -- Export Credits	calc	0.0	7.5	22.5	22.5	22.5	0.0												
366	Unspecified Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0												
367	ForeignNeeds - ForeignCapital(NOM $)	calc	0.0	0.0	-13.6	-35.8	-44.5	-63.9	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
368	TOTAL REQUIRED FROM REV-- NOM RUP	calc	0.0	0.0	0.0	0.0	0.0	0.0	2270.1	2195.4	2172.9	2145.6	2237.1	2798.2	2157.0	2321.4	2539.3	1892.7	2086.4	2082.3

370	CAPITAL SUMMARY IN NOM DOLLARS																				
371	Local + Foreign Needs in $		Sum(0disct)																		
372	Investment costs	calc	843.5	8.0	30.7	63.6	72.0	58.8	84.4	8.0	5.8	5.5	7.0	12.0	38.4	12.1	20.9	31.2	7.7	26.5	27.5
373	Interest & ROE	calc	686.6	0.0	1.1	3.0	8.7	16.4	25.0	66.4	61.8	57.1	52.6	48.0	43.5	39.1	34.6	30.2	25.9	21.6	18.2
374	Principal Repayment (D + E)	calc	554.8	0.0	0.0	0.0	0.0	0.0	0.0	40.8	40.6	40.5	40.4	41.3	41.2	41.1	41.0	40.9	40.8	31.6	31.6
375	Pre-Op Import Duty	calc	22.3	0.0	1.9	4.6	5.2	4.1	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	calc	1.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op O&M	calc	144.2	0.5	3.5	12.6	23.7	41.6	62.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	sum	2252.3	8.5	37.3	83.7	109.7	121.1	178.9	115.2	108.2	104.1	99.9	101.3	123.1	92.3	96.5	102.3	74.3	79.6	77.3
379	Needs -- Local in $	calc	404.7	7.8	16.5	32.7	45.0	53.4	72.6	26.8	19.9	18.1	16.7	16.7	22.0	13.9	14.3	13.4	10.9	9.5	9.0
380	Needs -- Foreign in $	copy	2005.4	0.7	20.8	64.6	100.5	112.2	170.2	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
381	- Adj for Cross-Finance	calc	-157.8	0.0	0.0	-13.6	-35.8	-44.5	-63.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	sum	2252.3	8.5	37.3	83.7	109.7	121.1	178.9	115.2	108.2	104.1	99.9	101.3	123.1	92.3	96.5	102.3	74.3	79.6	77.3
383	Sources -- Local in $	sum	404.7	7.8	16.5	32.7	45.0	53.4	72.6	26.8	19.9	18.1	16.7	16.7	22.0	13.9	14.3	13.4	10.9	9.5	9.0
384	Sources -- Foreign in $	sum	1847.6	0.7	20.8	51.0	64.7	67.7	106.3	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
385	= Total Sources ($)	sum	2252.3	8.5	37.3	83.7	109.7	121.1	178.9	115.2	108.2	104.1	99.9	101.3	123.1	92.3	96.5	102.3	74.3	79.6	77.3
386	Needs - Sources (s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																				
388	Earnings Before Interest & Taxes	calc		-0.5	-5.0	-15.4	-25.0	-38.1	-55.4	88.4	79.9	73.9	68.2	66.4	77.7	55.9	56.3	77.5	59.1	56.4	52.8
389	- Income Tax	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	19.0	15.1	14.3
390	- Capital Invested	calc		7.7	28.7	57.1	62.1	48.8	67.3	6.1	4.3	4.6	4.7	7.9	24.2	7.4	12.2	17.5	4.1	13.7	13.7
391	= Net Cash Flow to Investors	calc		-8.2	-33.7	-72.5	-87.1	-86.9	-122.8	82.3	75.6	69.3	63.4	58.6	53.4	48.6	44.1	39.9	35.9	27.6	24.8
392	Program Check:Cash FlowDelta(s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393	Program Check: NPV to Investors	test	0.0																		
394	==========																				

396 REVENUE REQUIRED TO BREAK EVEN	copy	YEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
397 NOMINAL RUPEES MIL	PV@	14.0%																		
398 O & M Expense (w/ Mgmt Fee)	calc	10,109	8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
399 Royalty & Excise Duty	calc	155	0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
400 Workers Participation & Welfare Funds	copy	226	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.0	78.9	79.8	82.2	83.2	84.1	85.2	138.2	139.8	119.1	120.0
401 Interest	copy	1,928	0.0	19.2	52.2	157.9	304.6	479.9	769.0	721.7	671.5	618.2	561.7	501.0	436.8	368.8	296.8	220.8	140.5	79.2
402 IORA, Subsidy, & Other Import Duties	copy	349	0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
403 New Invest & Princ. Repay	copy	3,686	0.0	0.0	0.0	0.0	0.0	0.0	960.4	942.7	930.6	1017.1	1176.1	1309.2	1243.9	1488.5	1784.0	1233.4	1521.1	1592.3
404 Return on Equity	copy	1,466	0.0	0.0	0.0	0.0	0.0	0.0	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7
405 Income Tax	calc	559	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	888.3	898.7	765.4	771.7
406 ---------			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407 = REVENUE (NOM RUP)	sum		0.0	0.0	0.0	0.0	0.0	0.0	3993.2	4107.7	4212.2	4291.6	4494.6	5189.5	4684.9	5041.0	6410.3	5922.3	6066.7	6283.3
408																				
409 Tax Calculation (note: Carry Forward does not separately carry forward depreciation, nor does it check on 6 year max)																				
410 Carry-Forward Balance -- BOY	calc	0.0	0.0	8.7	120.1	474.0	1156.0	2315.9	4126.8	4158.3	4014.5	3917.9	3778.6	3604.3	2415.2	1213.7	0.0	0.0	0.0	0.0
411 Carry-Forward USED (ADDED)	calc		-8.7	-111.4	-353.9	-682.0	-1159.9	-1810.9	-4031.5	1113.8	1126.6	1139.4	1174.3	1189.0	1201.5	1213.7	0.0	0.0	0.0	0.0
412																				
413 Revenue (NOM RUP)	copy		0.0	0.0	0.0	0.0	0.0	0.0	3993.2	4107.7	4212.2	4291.6	4494.6	5189.5	4684.9	5041.0	6410.3	5922.3	6066.7	6283.3
414 - O & M (w/ Mgmt Fee)	copy		8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
415 - Royalty & Excise Duty	copy		0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
416 - Interest	copy		0.0	19.2	52.2	157.9	304.6	479.9	769.0	721.7	671.5	618.2	561.7	501.0	436.8	368.8	296.8	220.8	140.5	79.2
417 - IORA, Subsidy, & Other Import Duties	copy		0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
418 - Tax Depreciation	copy		0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	394.2	302.5	517.5	794.4	214.0	704.3	751.2
419 = Taxable Income BEFORE Depletion	sum		-8.7	-111.4	-353.9	-682.0	-1159.9	-1810.9	-4031.5	1392.2	1408.2	1424.2	1467.9	1486.3	1501.9	1522.3	2467.6	2496.4	2126.1	2143.6
420 - Depletion Allowance	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	278.4	281.6	284.8	293.6	297.3	300.4	304.5	493.5	499.3	425.2	428.7
421 = Taxable Income BEFORE Worker Funds	sum		-8.7	-111.4	-353.9	-682.0	-1159.9	-1810.9	-4031.5	1113.8	1126.6	1139.4	1174.3	1189.0	1201.5	1217.8	1974.0	1997.1	1700.9	1714.9
422 - Workers Partic. & Welfare Funds	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.0	78.9	79.8	82.2	83.2	84.1	85.2	138.2	139.8	119.1	120.0
423 = Taxable Income BEFORE Carry Forward	calc		-8.7	-111.4	-353.9	-682.0	-1159.9	-1810.9	-4031.5	1113.8	1126.6	1139.4	1174.3	1189.0	1201.5	1217.8	1974.0	1997.1	1700.9	1714.9
424 - Carry Forward Used	copy		-8.7	-111.4	-353.9	-682.0	-1159.9	-1810.9	-4031.5	1113.8	1126.6	1139.4	1174.3	1189.0	1201.5	1213.7	0.0	0.0	0.0	0.0
425 = Taxable Income	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1974.0	1997.1	1700.9	1714.9
426 Tax = Tax * Taxable Income	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	888.3	898.7	765.4	771.7
427 Convergence Gap	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
**BOYD ESTIMATES FOR 3.0MIL TON MINE (BEFORE 5.1%Adj)			D-6	D-5	D-4	D-3	D-2	D-1	D+1	D+2	D+3	D+4	D+5	D+6	D+7	D+8	D+9	D+10	D+11	D+12

1 FINANCIAL MODEL (LAKIB, 8/25)																			
2																			
3																			
4																			
5 **PROJECT DESCRIPTION																			
6 Annual Production (MIL Tonnes)	2.78	2.78	2.78	2.69	2.69	2.69	2.69	2.69	2.65	2.65	2.65	2.65	2.65	2.55	2.55	2.55	2.55	2.55	0.00
7 Coal Consumption	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	0.0
8 Coal In Stockpile	1.1	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	0.8	0.7	0.5	0.4	0.2	0.2
9 Year of Full Operation																			
10 Project Life (#Years after 1st Full Op.																			
11																			
12																			
13 **COST ASSUMPTIONS in MIL Constant DLR																			
14 Relative Year	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15 Infrastructure --Local	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
16 Infrastructure --Foreign	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.00
17 Machinery --Local	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	-23.21	0.00
18 Machinery --Foreign	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
19 Total Capital Costs (MIL Constant DLR)	13.69	13.69	13.69	9.09	9.09	9.09	9.09	9.09	10.91	10.91	10.91	10.91	10.91	2.46	2.46	2.46	2.46	(20.75)	0.00
20 O&M Expenses --Local	37.32	37.32	37.32	37.01	37.01	37.01	37.01	37.01	37.39	37.39	37.39	37.39	37.39	38.00	38.00	38.00	38.00	38.00	0.00
21 O&M Expenses --Foreign	16.10	16.10	16.10	15.71	15.71	15.71	15.71	15.71	14.71	14.71	14.71	14.71	14.71	18.22	18.22	18.22	18.22	18.22	0.00
22 Royalty Rate RUP/TON																			
23 Excise Tax RUP/TON																			
24 Workers Participation Fund(%of PBT)																			
25 Workers Welfare Fund(%of PBT)																			
26 Management Fee $Real/TON																			
27																			
28 **TAX ASSUMPTIONS																			
29 IQRA & Subsidy (% of Foreign Expenses)																			
30 Other Import Duties & Sales Taxes																			
31 Income Tax Rate	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32 Depletion Rate																			
33																			
34																			
35 **ECONOMIC ASSUMPTIONS																			
36 Calendar Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
37 Inflation Rate -- Rupees	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38 Inflation Rate -- Dollars	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39 Exchange Rate (RUP/DLR)	27.7	28.5	29.4	30.2	31.1	32.0	32.9	33.8	34.8	35.8	36.9	37.9	39.0	40.1	41.3	42.5	43.7	45.0	46.3
40 Base Year for Constant DLR																			
41 Inflation Index -- Rupees	3.617	3.870	4.141	4.430	4.741	5.072	5.427	5.807	6.214	6.649	7.114	7.612	8.145	8.715	9.325	9.978	10.677	11.424	12.224
42 Inflation Index -- Dollars	2.087	2.170	2.257	2.347	2.441	2.539	2.640	2.746	2.856	2.970	3.089	3.212	3.341	3.474	3.613	3.758	3.908	4.064	4.227
43																			
44																			
45 **FINANCE ASSUMPTIONS																			
46 All Loans Thru Govt of Pak?																			
47 Maximum Funds Available in MILLION NOMI																			
48 Local Equity																			
49 Local Loans																			
50 Foreign Equity																			
51 US-AID Loan																			
52 Development Donors' Loans																			
53 Export Credit Loans																			

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLAR
56

57	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
58 Annual Revenue -- MIL Constant DLR	90.8	89.3	88.0	80.8	79.7	78.6	77.6	76.7	77.3	76.5	75.7	75.0	74.4	68.5	67.9	67.4	67.0	42.1	0.0
59 Cost / Tonne Consumed	33.6	33.1	32.6	29.9	29.5	29.1	28.8	28.4	28.6	28.3	28.0	27.8	27.6	25.4	25.2	25.0	24.8	15.6	0.0
60																			
61 **Revenue Components																			
62 O & M Expense (w/ mgmt fee)	59.0	59.0	59.0	58.2	58.2	58.2	58.2	58.2	57.5	57.5	57.5	57.5	57.5	61.5	61.5	61.5	61.5	61.5	0.0
63 Royalty & Excise Duty	0.8	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.0
64 Workers Participation & Welfare Funds	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.0
65 IQRA, Subsidy, & Other Import Duties	1.3	1.3	1.3	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	0.2	0.2	0.0
66 Income Tax	5.6	5.1	4.7	4.2	3.8	3.5	3.1	2.8	2.6	2.3	2.1	1.9	1.7	1.4	1.2	1.0	0.9	0.4	0.0
67 Interest	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
68 New Invest & Princ. Repay	16.1	16.0	15.9	11.1	11.1	11.0	10.9	10.8	12.6	12.5	12.4	12.3	12.3	3.7	3.7	3.6	3.6	20.6	0.0
69 Return on Equity	6.8	6.2	5.5	4.9	4.4	3.9	3.4	3.0	2.6	2.2	1.9	1.6	1.3	1.0	0.8	0.6	0.4	0.2	0.0
70 ---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71 = TOTAL (Constant $)	90.8	89.3	88.0	80.8	79.7	78.6	77.6	76.7	77.3	76.5	75.7	75.0	74.4	68.5	67.9	67.4	67.0	42.1	0.0
72 ==========																			
73																			
74 REVENUE -- NOMINAL DOLLAR (MIL)	189.4	193.9	198.6	189.7	194.5	199.6	204.9	210.6	220.6	227.1	233.9	241.1	248.6	237.9	245.5	253.4	261.8	171.0	0.0
75 NOMINAL DOLLARS / Tonne Consumed	70.2	71.8	73.6	70.3	72.0	73.9	75.9	78.0	81.7	84.1	86.6	89.3	92.1	88.1	90.9	93.9	97.0	63.3	0.0

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLA
77 Funds Provided By:
78 Local Equity (ex postponed ROE)
79 Local Loans
80 Gov't of Pakistan
81 Unspecified Local
82 ---
83 LOCAL TOTAL (in Mil DLR)
84 note: Local Funds Provided, when exp
85 since that constraint was implemen
86
87 Foreign Equity (ex postponed ROE)
88 US-AID Loan
89 Development Donors' Loans
90 Export Credit Loans
91 Unspecified Foreign Loans
92 ---
93 FOREIGN TOTAL
94 TOTAL INVESTED (Nom DLR)
95
96 Local Funds Provided expressed in NOM
97 Local Equity in NOM RUP MIL
98 Local Loans in NOM RUP MIL
99 Gov't of Pakistan in NOM RUP MIL
100 Unspecified Local in NOM RUP MIL
101 ---
102 LOCAL TOTAL in NOM RUP MIL
103 ----------
104
105 Levelized Real Annuity Per Tonne
106 (For Illustrative comparison)
107

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
109 CAPITAL COSIS BY YEAR																			
110																			
111 Input $ Conversion Factor																			
112 TYPE 1 : Infrastructure																			
113 Local Sources (Constant $MIL)	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.00
115 Depreciable %																			
116 Tax Depreciation -- Initial Yr																			
117 Tax Deprec Rate (*Decl. Bal)																			
118 Capital Required:																			
119 Local Sources -- NOM RUP MIL	2.9	3.1	3.3	0.9	1.0	1.0	1.1	1.2	3.3	3.5	3.8	4.0	4.3	0.4	0.4	0.5	0.5	0.5	0.0
120 Foreign Sources--NOM DLR MIL	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.6	0.6	0.6	0.1	0.1	0.1	0.1	0.1	0.0
121 Adds to Deprec Base NOM RUP MIL	12	13	13	6	6	7	7	8	21	23	24	26	28	5	5	6	6	7	0
122 Deprec.Expense (Initial)	2.9	3.1	3.4	1.5	1.6	1.7	1.8	2.0	5.3	5.7	6.1	6.5	7.0	1.3	1.4	1.4	1.5	0.0	0.0
123 Deprec.Expense (Normal) (not	16.6	15.8	15.2	14.7	13.7	12.8	12.0	11.3	10.8	11.3	11.9	12.5	13.3	14.0	13.0	12.1	11.3	113.3	0.0
124 Undepreciated Basis BeginYr	166.0	158.2	151.8	146.7	136.5	127.6	120.0	113.5	108.0	113.2	119.0	125.5	132.5	140.3	130.0	121.1	113.3	106.6	0.0
125 Import Duty & Sales Tax NOM RUP MIL	1	1	1	1	1	1	1	1	2	2	2	2	2	0	0	1	1	1	0
126 ----------																			
127 TYPE 2 : Mine Equipment																			
128 Local Sources (Constant $MIL)	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	(23.21)	0.00
129 Foreign Sources (Constant $MIL)	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
130 Depreciable %																			
131 Tax Depreciation -- Initial Yr																			
132 Tax Deprec Rate (*Decl. Bal)																			
133 Capital Required:																			
134 Local Sources -- NOM RUP MIL	45.3	48.4	51.8	22.7	24.3	26.0	27.9	29.8	54.2	58.0	62.1	66.4	71.1	0.0	0.0	0.0	0.0	-4406.5	0.0
135 Foreign Sources--NOM DLR MIL	26.6	27.6	28.7	20.4	21.2	22.1	23.0	23.9	29.0	30.2	31.4	32.7	34.0	8.4	8.8	9.1	9.5	9.9	0.0
136 Adds to Deprec Base NOM RUP MIL	782.1	836.8	895.4	639.0	683.7	731.6	782.8	837.6	1065.5	1140.1	1219.9	1305.3	1396.7	338.2	361.9	387.2	414.3	-3963.2	0.0
137 Deprec.Expense (Initial)	782	837	895	639	684	732	783	838	1066	1140	1220	1305	1397	338	362	387	414	0	0
138 Deprec.Expense (Normal) (not	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3963	0
139 Undepreciated Basis BeginYr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL	74	79	84	62	66	71	75	81	101	108	116	124	133	34	36	39	41	44	0
141 ----------																			
142 SUM FOR ALL CAPITAL TYPES																			
143 Capital Required By Year:																			
144 Local Sources -- NOM RUP MIL	48.1	51.5	55.1	23.6	25.3	27.1	28.9	31.0	57.5	61.6	65.9	70.5	75.4	0.4	0.4	0.5	0.5	-4406.0	0.0
145 Foreign Sources--NOM DLR MIL	26.9	28.0	29.1	20.6	21.4	22.3	23.1	24.1	29.6	30.7	32.0	33.3	34.6	8.5	8.9	9.2	9.6	10.0	0.0
146 Adds to Deprec Base NOM RUP MIL	793.8	849.4	908.8	645.0	690.1	738.4	790.1	845.4	1086.9	1162.9	1244.4	1331.5	1424.7	343.2	367.3	393.0	420.5	-3956.6	0.0
147 Allowable Tax Deprec.Expense NOM RUP M	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
148 IGRA, Subsidy, & Other Import DutiesNOM	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
149 ==========																			

151	LOCAL EQUITY																		
152	Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?																		
155	Draw Down Pattern (% of Max)																		
156	Expected Rate of Return																		
157	Repayment Period																		
158	Repayment Type																		
159	EQUITY BALANCE (NOM RUP MIL)																		
160	Bal -- Begining Of Year (BOY)	742.1	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	0.0
161	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	0.0
163	Bal -- EOY (Principal Only)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	0.0	0.0
164	+ Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	0.0	0.0
166	ROE Due (Nom RUP)	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	41.2	33.0	24.7	16.5	8.2	0.0
167	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	189.7	181.4	173.2	164.9	156.7	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	0.0
169	----------																			
170	LOCAL LOANS																		
171	Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?																		
174	Draw Down Pattern (% of Max)																		
175	Interest Rate																		
176	Repayment Period																		
177	Repayment Type																		
178	LOAN BALANCE (NOM RUP MIL)																		
179	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	----------																			

188 Govt of Pakistan Loan																			
189 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?																			
192 Draw Down Pattern (% of Max)																			
193 Interest Rate																			
194 Repayment Period																			
195 Repayment Type																			
196 LOAN BALANCE (NOM RUP MIL)																			
197 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204 ----------																			
205 UNSPECIFIED LOCAL LOAN																			
206 Interest Rate																			
207 Repayment Period																			
208 Repayment Type																			
209 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
210 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
213 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
214 Net Cash Flow to Unspec. Local Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
215 ==========																			

216

217	FOREIGN EQUITY																		
218	Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?																		
220	Draw Down Pattern (% of Max)																		
221	Expected Rate of Return																		
222	Repayment Period																		
223	Repayment Type																		
224	EQUITY BALANCE (NOM DLR MIL)																		
225	Bal -- Begining Of Year (BOY)	44.6	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0
226	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	- Principal Repaid	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0
228	Bal -- EOY (Principal Only)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
229	+ Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230	Bal -- End Of Year (EOY)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
231	ROE Due (Nom DLR)	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
232	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
233	Net Cash Flow to Foreign Equity	11.4	10.9	10.4	9.9	9.4	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	0.0
234	----------																			
235	FOREIGN LOAN 1 US-AID Loan																			
236	Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Draw Down Pattern Assumed?																			
238	Draw Down Pattern (% of Max)																			
239	Interest Rate																			
240	Repayment Period																			
241	Repayment Type																			
242	LOAN BALANCE (Nom DLR)																			
243	Bal -- Begining Of Year (BOY)	17.3	16.3	15.4	14.4	13.5	12.5	11.5	10.6	9.6	8.7	7.7	6.7	5.8	4.8	3.8	2.9	1.9	1.0	0.0
244	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245	- Principal Repaid	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
246	Bal -- End Of Year (EOY)	16.3	15.4	14.4	13.5	12.5	11.5	10.6	9.6	8.7	7.7	6.7	5.8	4.8	3.8	2.9	1.9	1.0	0.0	0.0
247	Interest Due (Nom DLR)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
248	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	Net Cash Flow to US-AID	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.0
250	----------																			
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																			
252	Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253	Draw Down Pattern Assumed?																			
254	Draw Down Pattern (% of Max)																			
255	Interest Rate																			
256	Repayment Period																			
257	Repayment Type																			
258	LOAN BALANCE (Nom DLR)																			
259	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
262	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
263	Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
264	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265	Net Cash Flow to Develop. Donors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
266	----------																			

217

268 FOREIGN LOAN 3 -- EXPORT CREDITS																			
269 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?																			
271 Draw Down Pattern (% of Max)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272 Interest Rate																			
273 Repayment Period																			
274 Repayment Type																			
275 LOAN BALANCE (Nom DLR)																			
276 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283 ----------																			
284 UNSPECIFIED FOREIGN LOAN																			
285 Max Available in DLR MIL																			
286 Draw Down Pattern Assumed?																			
287 Draw Down Pattern (% of Max)																			
288 Interest Rate																			
289 Repayment Period																			
290 Repayment Type																			
291 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																			
298 Total Interest Exp: NOM RUP	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
299 Total ROE : NOM RUP	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
300 O&M Local : NOM RUP	2243.3	2400.3	2568.3	2725.3	2916.1	3120.2	3338.6	3572.3	3861.8	4132.1	4421.4	4730.8	5062.0	5505.0	5890.3	6302.7	6743.9	7215.9	0.0
301 O&M Foreign:(w/Fee) NOM DOLLAR	42.3	44.0	45.7	46.3	48.2	50.1	52.1	54.2	53.4	55.5	57.7	60.0	62.4	76.6	79.7	82.8	86.2	89.6	0.0
302																			
303 Summary of Fixed Amounts of Financing																			
304 Local Sources -- NOM RUP MIL																			
305 Local Equity																			
306 Local Loans																			
307 Gov't of Pakistan																			
308 TOTAL LOCAL -- NOM RUP																			
309 Foreign Sources--NOM DLR																			
310 Equity																			
311 Loan 1 -- US-AID																			
312 Loan 2 -- Development Donors																			
313 Loan 3 -- Export Credits																			
314 Unspecified Foreign																			
315 TOTAL FOREIGN -- NOM DLR																			
316 ==========																			

318 TOTAL CAPITAL NEEDS																			
319 Local Sources -- NOM RUP																			0.0
320 Investment costs	48	51	55	24	25	27	29	31	58	62	66	70	75	0	0	0	1	-4406	0
321 Interest & ROE	148	140	132	124	115	107	99	91	82	74	66	58	49	41	33	25	16	8	0
322 Principal Repayment (D + E)	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0
323 Pre-Op Import Duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
324 Pre-Op Royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325 Pre-Op O&M - Local	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
326 Foreign Needs Thru Govt of Pak(in Rup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327 Total Needs	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	0
328 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
329 LOCAL To Be Allocated (NOM RUP)	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	0
330 Foreign Sources--NOM DLR																			
331 Investment costs	27	28	29	21	21	22	23	24	30	31	32	33	35	9	9	9	10	10	0
332 Interest & ROE	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0
333 Principal Repayment (D + E)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
334 Pre-Op O&M - Foreign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
335 Unfinanced Local Needs(in Dollars)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336 Total Needs	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
337 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
338 FOREIGN To Be Allocated (NOM DLR)	40	40	41	32	32	33	33	33	38	39	40	40	41	15	14	14	14	14	0
339 CAPITAL AVAILABLE FOR ALLOCATION (Begin																			
340 Local Sources -- NOM RUP																			
341 Local Equity																			
342 Local Loans																			
343 Gov't of Pakistan																			
344 TOTAL LOCAL : NOM RUP																			
345 Foreign Sources--NOM DLR																			
346 Equity																			
347 Loan 1 -- US-AID																			
348 Loan 2 -- Development Donors																			
349 Loan 3 -- Export Credits																			
350 TOTAL FOREIGN : NOM DLR																			
351 Allocation FACTOR -- LOCAL																			
352 Allocation FACTOR -- FOREIGN																			
353 SOURCES OF CAPITAL -- BY YEAR																			
354 Local Sources -- NOM RUP																			
355 Local Equity																			
356 Local Loans																			
357 Pakistan Gov't																			
358 Unspecified Local																			
359 Local Needs - Local Capital (NOM RUP)	237.8	232.9	228.3	188.5	182.0	175.5	169.1	162.9	181.2	177.0	173.1	169.4	166.1	82.9	74.7	66.4	58.2	-4356.5	0.0
360																			
361 Foreign Sources--Nom DLR																			
362 Equity																			
363 Loan 1 -- US-AID																			
364 Loan 2 -- Development Donors																			
365 Loan 3 -- Export Credits																			
366 Unspecified Foreign																			
367 ForeignNeeds - ForeignCapital(NOM $)	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
368 TOTAL REQUIRED FROM REV-- NOM RUP	1340.9	1383.6	1429.6	1151.6	1182.1	1215.0	1250.7	1289.2	1513.2	1570.9	1633.2	1700.2	1772.5	669.2	670.3	672.1	674.6	-3728.7	0.0

370 CAPITAL SUMMARY IN NOM DOLLARS

371	Local + Foreign Needs in $																		
372	Investment costs	28.6	29.8	31.0	21.4	22.2	23.1	24.0	25.0	31.2	32.5	33.8	35.1	36.5	8.6	8.9	9.3	9.6	-88.0	0.0
373	Interest & ROE	14.8	13.8	12.9	12.0	11.1	10.2	9.3	8.5	7.6	6.8	6.0	5.2	4.4	3.7	2.9	2.2	1.4	0.7	0.0
374	Principal Repayment (D + E)	4.9	4.9	4.8	4.8	4.8	4.7	4.7	4.7	4.6	4.6	4.6	4.5	4.5	4.5	4.4	4.4	4.4	4.4	0.0
375	Pre-Op Import Duty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
379	Needs -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	0.0
380	Needs -- Foreign in $	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
381	- Adj for Cross-Finance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
383	Sources -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	0.0
384	Sources -- Foreign in $	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
385	= Total Sources ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
386	Needs - Sources (s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																			
388	Earnings Before Interest & Taxes	28.8	27.5	26.3	20.5	19.4	18.4	17.5	16.7	17.8	17.1	16.4	15.8	15.3	6.2	5.7	5.2	4.8	-20.0	0.0
389	- Income Tax	5.6	5.1	4.7	4.2	3.8	3.5	3.1	2.8	2.6	2.3	2.1	1.9	1.7	1.4	1.2	1.0	0.9	0.4	0.0
390	- Capital Invested	13.7	13.7	13.7	9.1	9.1	9.1	9.1	9.1	10.9	10.9	10.9	10.9	10.9	2.5	2.5	2.5	2.5	-21.6	0.0
391	= Net Cash Flow to Investors	9.5	8.6	7.9	7.1	6.5	5.9	5.3	4.8	4.3	3.8	3.4	3.0	2.7	2.3	2.0	1.7	1.5	1.2	0.0
392	Program Check:Cash FlowDelta(s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393	Program Check: NPV to Investors																			
394	==========																			

220

396 REVENUE REQUIRED TO BREAK EVEN	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
397 NOMINAL RUPEES MIL																			
398 O & M Expense (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
399 Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
400 Workers Participation & Welfare Funds	50.3	49.3	48.1	46.4	45.1	43.8	42.4	41.0	40.4	38.8	37.1	35.3	33.5	29.7	27.7	25.7	23.5	11.6	0.0
401 Interest	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
402 IGRA, Subsidy, & Other Import Duties	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
403 New Invest & Princ. Repay	930.5	988.8	1051.1	790.1	838.3	889.7	944.5	1003.1	1247.9	1327.5	1412.4	1503.2	1600.2	522.6	550.6	580.4	612.2	3760.6	0.0
404 Return on Equity	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
405 Income Tax	323.6	316.8	309.5	298.0	290.1	281.7	272.9	263.6	259.8	249.3	238.4	227.0	215.0	191.0	178.3	164.9	150.9	74.3	0.0
406 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407 = REVENUE (NOM RUP)	5252.5	5531.6	5830.6	5728.7	6043.1	6379.9	6740.9	7127.8	7680.7	8133.9	8619.6	9140.1	9697.9	9546.7	10136.1	10767.6	11444.2	7691.6	0.0
408																			
409 Tax Calculation (note: Carry Forward doe																			
410 Carry-Forward Balance -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
411 Carry-Forward USED (ADDED)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
412																			
413 Revenue (NOM RUP)	5252.5	5531.6	5830.6	5728.7	6043.1	6379.9	6740.9	7127.8	7680.7	8133.9	8619.6	9140.1	9697.9	9546.7	10136.1	10767.6	11444.2	7691.6	0.0
414 - O & M (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
415 - Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
416 - Interest	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
417 - IGRA, Subsidy, & Other Import Duties	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
418 - Tax Depreciation	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
419 = Taxable Income BEFORE Depletion	898.9	879.9	859.8	827.8	805.8	782.5	758.0	732.2	721.7	692.6	662.2	630.5	597.3	530.5	495.3	458.2	419.1	206.3	0.0
420 - Depletion Allowance	179.8	176.0	172.0	165.6	161.2	156.5	151.6	146.4	144.3	138.5	132.4	126.1	119.5	106.1	99.1	91.6	83.8	41.3	0.0
421 = Taxable Income BEFORE Worker Funds	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.4	396.2	366.5	335.3	165.1	0.0
422 - Workers Partic. & Welfare Funds	50.3	49.3	48.1	46.4	45.1	43.8	42.4	41.0	40.4	38.8	37.1	35.3	33.5	29.7	27.7	25.7	23.5	11.6	0.0
423 = Taxable Income BEFORE Carry Forward	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.4	396.2	366.5	335.3	165.1	0.0
424 - Carry Forward Used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
425 = Taxable Income	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.4	396.2	366.5	335.3	165.1	0.0
426 Tax = Tax * Taxable Income	323.6	316.8	309.5	298.0	290.1	281.7	272.9	263.6	259.8	249.3	238.4	227.0	215.0	191.0	178.3	164.9	150.9	74.3	0.0
427 Convergence Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
**BOYD ESTIMATES FOR 3.0MIL TON MINE (BE	D*13	D*14	D*15	D*16	D*17	D*18	D*19	D*20	D*21	D*22	D*23	D*24	D*25	D*26	D*27	D*28	D*29	D*30	

221

1 FINANCIAL MODEL (LAK1g, 8/25) **** BASE CASE with ALL LOANS FLOWING THRU THE GOV'T OF PAKISTAN****

		--VARIABLE-- TYPE	NAME	DATA																	
5	**PROJECT DESCRIPTION																				
6	Annual Production (MIL Tonnes)	*V		0.00	0.00	0.00	0.03	0.16	0.90	2.82	2.78	2.73	2.63	2.50	2.37	2.70	2.66	2.80	2.80	2.78	2.78
7	Coal Consumption	*V		0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
8	Coal In Stockpile	calc		0.0	0.0	0.0	0.0	0.2	1.1	1.2	1.3	1.3	1.3	1.1	0.7	0.7	0.7	0.8	0.9	1.0	1.0
9	Year of Full Operation	*	YR.OP	1992																	
10	Project Life (#Years after 1st Full Op.*		YR.LAST	30																	
11																					
12																					
13	**COST ASSUMPTIONS in MIL Constant DLR																				
14	Relative Year	*V	YR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
15	Infrastructure --Local	*V	INFRA.LOC	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
16	Infrastructure --Foreign	*V	INFRA.FOR	0.23	0.18	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
17	Machinery --Local	*V	MACH.LOC	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
18	Machinery --Foreign	*V	MACH.FOR	0.00	17.82	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
19	Total Capital Costs (MIL Constant DLR)	calc		7.46	28.30	56.49	61.48	48.29	66.74	5.90	4.27	4.56	4.73	7.81	24.06	7.34	12.15	17.45	4.12	13.69	13.69
20	O&M Expenses --Local	*V	O&M	0.05	1.82	7.25	13.56	22.80	32.45	41.44	41.07	41.21	40.70	39.80	38.80	38.86	39.03	39.08	39.12	37.32	37.32
21	O&M Expenses --Foreign	*V		0.43	1.34	3.75	6.37	10.64	14.60	17.85	17.84	17.76	17.58	17.57	17.15	17.09	17.09	17.09	17.09	16.10	16.10
22	Royalty Rate RUP/TON	*		15.0																	
23	Excise Tax RUP/TON	*		2.0																	
24	Workers Participation Fund(%of PBT)	*		5.0%																	
25	Workers Welfare Fund(%of PBT)	*		2.0%																	
26	Management Fee $Real/TON	*		1.50																	
27																					
28	**TAX ASSUMPTIONS																				
29	IQRA & Subsidy (% of Foreign Expenses)	*	IMPORT	10.0%																	
30	Other Import Duties & Sales Taxes	*	DUTY.OTHR	0.0%																	
31	Income Tax Rate	*V	TXRATE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32	Depletion Rate	*	DEPLRATE	20.0%																	
33																					
34																					
35	**ECONOMIC ASSUMPTIONS																				
36	Calendar Year	*V	YEAR	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
37	Inflation Rate -- Rupees	*V	INFRUP	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38	Inflation Rate -- Dollars	*V	INFDLR	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39	Exchange Rate (RUP/DLR)	*V	EXCHG	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.4	24.1	24.7	25.5	26.2	27.0
40	Base Year for Constant DLR	*	YR.BASE	1985																	
41	Inflation Index -- Rupees	calc	INDXRUP	1.070	1.145	1.225	1.311	1.403	1.501	1.606	1.718	1.838	1.967	2.105	2.252	2.410	2.579	2.759	2.952	3.159	3.380
42	Inflation Index -- Dollars	calc	INDXDLR	1.030	1.071	1.114	1.159	1.205	1.253	1.303	1.355	1.410	1.466	1.525	1.586	1.649	1.715	1.784	1.855	1.929	2.006
43																					
44																					
45	**FINANCE ASSUMPTIONS																				
46	All Loans Thru Govt of Pak?	*	GOVT.FIN	1 =All Loans Flow Thru Govt																	
47	Maximum Funds Available in MILLION NOMINAL DOLLARS																				
48	Local Equity	*		50.0																	
49	Local Loans	*		0.0																	
50	Foreign Equity	*		50.0																	
51	US-AID Loan	*		0.0																	
52	Development Donors' Loans	*		0.0																	
53	Export Credit Loans	*		0.0																	

SUMMARY OF RESULTS -- CONSTANT DOLLARS * BASE CASE with ALL LOANS FLOWING THRU THE GOV'T OF PAKISTAN****

	copyYEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
Annual Revenue -- MIL Constant DLR	calc	0.0	0.0	0.0	0.0	0.0	0.0	178.8	168.2	157.6	146.9	140.1	147.9	123.0	121.9	142.4	120.9	92.8	91.2
Cost / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	66.2	62.3	58.4	54.4	51.9	54.8	45.5	45.1	52.7	44.8	34.4	33.8
**Revenue Components																			
O & M Expense (w/ mgmt fee)	calc	0.5	3.2	11.3	20.5	34.6	49.7	65.1	64.7	64.7	63.8	62.7	61.0	61.5	61.6	61.9	61.9	59.0	59.0
Royalty & Excise Duty	calc	0.0	0.0	0.0	0.0	0.1	0.6	1.9	1.7	1.6	1.4	1.3	1.1	1.2	1.1	1.1	1.0	0.9	0.9
Workers Participation & Welfare Funds	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	2.9	2.7	2.5	2.4	2.2	2.1	3.0	2.8	1.0	0.9
IORA, Subsidy, & Other Import Duties	calc	0.0	1.8	4.1	4.5	3.4	5.1	0.1	0.3	0.4	0.4	0.7	1.2	0.7	1.1	1.6	0.4	1.3	1.3
Income Tax	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	19.6	18.2	6.3	5.8
Interest	calc	0.0	1.1	3.2	10.6	20.5	31.1	47.3	39.8	33.0	27.0	21.6	16.9	12.6	8.8	5.5	2.6	0.0	0.0
New Invest & Princ. Repay	calc	0.0	0.0	0.0	0.0	0.0	0.0	43.4	39.2	37.3	35.3	36.5	51.0	32.4	35.7	39.5	24.7	15.9	15.7
Return on Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	21.0	19.3	17.7	16.2	14.8	13.5	12.4	11.3	10.2	9.5	8.4	7.6
= TOTAL (Constant $)	sum	0.5	6.1	18.5	35.5	58.6	86.6	178.8	168.2	157.6	146.9	140.1	147.9	123.0	121.9	142.4	120.9	92.8	91.2
REVENUE -- NOMINAL DOLLAR (MIL)	calc	0.0	0.0	0.0	0.0	0.0	0.0	233.0	227.9	222.1	215.4	213.6	234.4	202.8	209.0	254.0	224.2	179.0	183.0
NOMINAL DOLLARS / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	86.3	84.4	82.5	79.8	79.1	86.8	75.1	77.4	94.1	83.1	66.3	67.8

CAPITALIZATION SUMMARY-- NOMINAL DOLLARS (mil)

Funds Provided By:	YR.REL	-6	-5	-4	-3	-2	-1	PRE-OPERATION TOTAL $	% of Tot	% of Total
Local Equity (ex postponed ROE)	calc	0.0	9.7	9.4	9.2	8.9	8.7	45.9	9%	8%
Local Loans	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
Gov't of Pakistan	calc	8.5	17.6	64.8	94.0	110.5	174.2	469.6	91%	83%
Unspecified Local	calc	0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0%	0%
LOCAL TOTAL (in Mil DLR)	sum	8.5	27.3	74.3	103.2	119.4	182.9	515.5		91%

note: Local Funds Provided, when expressed in Dollars, may differ from the Assumed Maximum Available since that constraint was implemented based on the Rupee/Dollar Exchange Rate in the first year.

									% of For	% of Total
Foreign Equity (ex postponed ROE)	copy	0.0	10.0	10.0	10.0	10.0	10.0	50.0	100%	9%
US-AID Loan	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
Development Donors' Loans	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
Export Credit Loans	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
Unspecified Foreign Loans	copy	-0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0%	-0%
FOREIGN TOTAL	sum	-0.0	10.0	10.0	10.0	10.0	10.0	50.0		9%
TOTAL INVESTED (Nom DLR)	sum	8.5	37.3	84.3	113.2	129.4	192.9	565.5		100%

Local Funds Provided expressed in NOM RUPEE

Local Equity in NOM RUP MIL	calc	0.0	166.2	166.2	166.2	166.2	166.2	831.1
Local Loans in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gov't of Pakistan in NOM RUP MIL	calc	141.2	300.4	1140.2	1701.4	2058.4	3337.8	8679.3
Unspecified Local in NOM RUP MIL	calc	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
LOCAL TOTAL in NOM RUP MIL	sum	141.2	466.6	1306.4	1867.6	2224.6	3504.0	9510.4

Levelized Real Annuity Per Tonne (For Illustrative comparison)	Disc. Rate	$/Tonne	PV REV	PV Tonnes
	5.0%	$39.93	$1,299	32.5
	7.0%	$41.01	$980	23.9

109 CAPITAL COSTS BY YEAR																				
110		copyYR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
111 Input $ Conversion Factor		*	1.00 (=Base Year Currency Index / Input Year Currency Index)																	
112 TYPE 1 : Infrastructure																				
113 Local Sources (Constant $MIL)		copy	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
114 Foreign Sources (Constant $MIL)		copy	0.23	0.18	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
115 Depreciable %		*	100.0%																	
116 Tax Depreciation -- Initial Yr		*	DEPR.INIT	25.0%																
117 Tax Deprec Rate (*Decl. Bal)		*	DEPR.NORM	10.0%																
118 Capital Required:																				
119 Local Sources -- MOM RUP MIL		calc	128.6	131.2	143.2	128.3	69.9	2.1	0.0	0.1	0.1	0.1	0.8	1.8	1.4	2.1	0.1	0.2	2.5	2.7
120 Foreign Sources--MOM DLR MIL		calc	0.2	0.2	0.6	0.4	0.4	0.3	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.5	0.0	0.1	0.3	0.3
121 Adds to Deprec Base MOM RUP MIL		calc	132	135	153	136	77	8	0	1	1	1	7	10	10	13	1	2	10	11
122 Deprec.Expense (Initial)		calc	0.0	0.0	0.0	0.0	0.0	0.0	160.4	0.2	0.2	0.1	1.8	2.5	2.5	3.3	0.3	0.6	2.6	2.7
123 Deprec.Expense (Normal)	(notcalc		0.0	0.0	0.0	0.0	0.0	0.0	64.2	41.7	37.6	33.9	30.6	28.0	26.0	24.1	22.7	20.5	18.6	17.5
124 Undepreciated Basis BeginYr		calc	0.0	132.5	267.1	420.2	556.3	633.6	641.6	417.0	376.1	339.0	305.5	280.3	259.9	241.3	227.0	205.1	186.3	175.4
125 Import Duty & Sales Tax MOM RUP MIL		calc	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	1	1
126 ----------																				
127 TYPE 2 : Mine Equipment																				
128 Local Sources (Constant $MIL)		copy	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
129 Foreign Sources (Constant $MIL)		copy	0.00	17.82	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
130 Depreciable %		*	100.0%																	
131 Tax Depreciation -- Initial Yr		*	DEPR.INIT	100.0%																
132 Tax Deprec Rate (*Decl. Bal)		*	DEPR.NORM	0.0%																
133 Capital Required:																				
134 Local Sources -- MOM RUP MIL		calc	0.0	64.7	170.4	237.8	255.5	382.5	139.6	29.6	16.4	13.0	36.7	179.3	20.5	51.9	55.8	15.7	39.5	42.3
135 Foreign Sources--MOM DLR MIL		calc	0.0	19.1	45.2	51.3	41.0	64.0	0.9	4.3	5.6	6.3	10.0	30.1	10.8	18.2	28.9	7.0	24.6	25.5
136 Adds to Deprec Base MOM RUP MIL		calc	0.0	391.1	965.8	1167.0	1018.6	1608.8	156.8	117.4	134.2	148.9	257.4	863.6	274.0	490.1	771.5	192.9	683.1	730.9
137 Deprec.Expense (Initial)		calc	0	0	0	0	0	0	5308	117	134	149	257	864	274	490	771	193	683	731
138 Deprec.Expense (Normal)	(notcalc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr		calc	0	0	391	1357	2524	3542	5151	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax MOM RUP MIL		calc	0	33	80	93	76	123	2	9	12	14	22	68	25	44	72	18	64	69
141 ----------																				
142 SUM FOR ALL CAPITAL TYPES																				
143 Capital Required By Year:																				
144 Local Sources -- MOM RUP MIL		sum	128.6	196.0	313.5	366.1	325.4	384.6	139.6	29.7	16.5	13.0	37.5	181.1	21.8	54.0	56.0	15.9	42.0	45.0
145 Foreign Sources--MOM DLR MIL		sum	0.2	19.3	45.8	51.8	41.4	64.3	0.9	4.4	5.7	6.4	10.3	30.5	11.2	18.7	29.0	7.0	24.9	25.9
146 Adds to Deprec Base MOM RUP MIL		sum	132.5	525.7	1118.9	1303.1	1095.9	1616.8	156.8	118.4	134.9	149.4	264.5	873.7	283.8	503.1	772.5	195.2	693.3	741.9
147 Allowable Tax Deprec.Expense MOM RUP M		sum	0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	894.2	302.5	517.5	794.4	214.0	704.3	751.2
148 IGRA, Subsidy, & Other Import DutiesMOM		sum	0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
149 ==========																				

224

151	LOCAL EQUITY																				
152	Max Cash Invest-- NOM DLR MIL	copy	50.0	50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	calc	831.1	831.1	831.1	831.1	831.1	831.1	831.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
155	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%												
156	Expected Rate of Return	*	20.0%																		
157	Repayment Period	*	30 (Starting in 1st year of Full Operation)																		
158	Repayment Type	*	Level Principal																		
159	EQUITY BALANCE (NOM RUP MIL)																				
160	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	166.2	332.4	498.6	664.9	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4
161	+ Principal Borrowed	copy		0.0	166.2	166.2	166.2	166.2	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2
163	Bal -- EOY (Principal Only)	calc	0.0	0.0	166.2	332.4	498.6	664.9	831.1	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
164	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	33.2	106.4	227.4	405.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	sum	0.0	0.0	166.2	365.7	605.0	892.2	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
166	ROE Due (Nom RUP)	calc		0.0	0.0	33.2	73.1	121.0	178.4	247.4	239.1	230.9	222.6	214.4	206.1	197.9	189.7	181.4	173.2	164.9	156.7
167	Remaining Available -- BOY	calc		831.1	831.1	664.9	498.6	332.4	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	calc	0.0	0.0	-166.2	-166.2	-166.2	-166.2	-166.2	288.6	280.4	272.1	263.9	255.6	247.4	239.1	230.9	222.6	214.4	206.1	197.9
169	----------																				
170	LOCAL LOANS																				
171	Max Available in DLR MIL	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?	*	0 =No, Allocated as Needed																		
174	Draw Down Pattern (% of Max)	*V																			
175	Interest Rate	*	14.0%																		
176	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
177	Repayment Type	*	Level Principal																		
178	LOAN BALANCE (NOM RUP MIL)																				
179	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	Interest Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	----------																				

188	Govt of Pakistan Loan																				
189	Max Available in DLR MIL	calc	999.0	999.0	999.0	999.0	999.0	999.0	999.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	Max-- MOM RUP MIL(does not inflate)	calc	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	Draw Down Pattern Assumed?	*	0.0	=No, Allocated as Needed																	
192	Draw Down Pattern (% of Max)	*V																			
193	Interest Rate	*	14.0%																		
194	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
195	Repayment Type	*	Level Principal																		
196	LOAN BALANCE (MOM RUP MIL)																				
197	Bal -- Begining Of Year (BOY)	calc		0.0	141.2	441.6	1581.8	3283.2	5341.6	8679.3	7811.4	6943.5	6075.5	5207.6	4339.7	3471.7	2603.8	1735.9	867.9	0.0	0.0
198	+ Principal Borrowed	copy		141.2	300.4	1140.2	1701.4	2058.4	3337.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	867.9	867.9	867.9	867.9	867.9	867.9	867.9	867.9	867.9	867.9	0.0	0.0
200	Bal -- End Of Year (EOY)	calc	0.0	141.2	441.6	1581.8	3283.2	5341.6	8679.3	7811.4	6943.5	6075.5	5207.6	4339.7	3471.7	2603.8	1735.9	867.9	0.0	0.0	0.0
201	Interest Due (Mom RUP)	calc		0.0	19.8	61.8	221.4	459.6	747.8	1215.1	1093.6	972.1	850.6	729.1	607.6	486.0	364.5	243.0	121.5	0.0	0.0
202	Remaining Available -- BOY	calc		16604.7	16463.6	16163.2	15023.0	13321.6	11263.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203	Net Cash Flow to Govt of Pak Loan	calc	0.0	-141.2	-280.6	-1078.4	-1480.0	-1598.7	-2590.0	2083.0	1961.5	1840.0	1718.5	1597.0	1475.5	1354.0	1232.5	1111.0	989.4	0.0	0.0
204	----------																				
205	UNSPECIFIED LOCAL LOAN																				
206	Interest Rate	*	14.0%																		
207	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
208	Repayment Type	*	Level Principal																		
209	Bal -- Begining Of Year (BOY)	calc		0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0
210	+ Principal Borrowed	copy		-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212	Bal -- End Of Year (EOY)	calc	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
213	Interest Due (Mom RUP)	calc		0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0
214	Net Cash Flow to Unspec. Local Loan	calc	-0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0
215	==========																				

217 FOREIGN EQUITY																					
218 Max Cash Invest-- NOM DLR MIL	copy		50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219 Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
220 Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%													
221 Expected Rate of Return	*	20.0%																			
222 Repayment Period	*	30.0 (Starting in 1st year of Full Operation)																			
223 Repayment Type	*	Level Principal																			
224 EQUITY BALANCE (NOM DLR MIL)																					
225 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	10.0	20.0	30.0	40.0	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	
226 + Principal Borrowed	copy		0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
227 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
228 Bal -- EOY (Principal Only)	calc	0.0	0.0	10.0	20.0	30.0	40.0	50.0	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
229 + Capitalized R.O.E.	calc	0.0	0.0	0.0	2.0	6.4	13.7	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
230 Bal -- End Of Year (EOY)	sum	0.0	0.0	10.0	22.0	36.4	53.7	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
231 ROE Due (Nom DLR)	calc		0.0	0.0	2.0	4.4	7.3	10.7	14.9	14.4	13.9	13.4	12.9	12.4	11.9	11.4	10.9	10.4	9.9	9.4	
232 Remaining Available -- BOY	calc		50.0	50.0	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
233 Net Cash Flow to Foreign Equity	calc	0.0	0.0	-10.0	-10.0	-10.0	-10.0	-10.0	17.4	16.9	16.4	15.9	15.4	14.9	14.4	13.9	13.4	12.9	12.4	11.9	
234 ----------																					
235 FOREIGN LOAN 1 US-AID Loan																					
236 Max Available in NOM DLR MIL	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
237 Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
238 Draw Down Pattern (% of Max)	*V		0.0%	0.0%	25.0%	25.0%	25.0%	25.0%													
239 Interest Rate	*	3.0%																			
240 Repayment Period	*	26 Starting in Year 5 (10 Year Grace Period)								2.0											
241 Repayment Type	*	Level Principal																			
242 LOAN BALANCE (Nom DLR)																					
243 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
244 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
245 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
246 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
247 Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
248 Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
249 Net Cash Flow to US-AID	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
250 ----------																					
251 FOREIGN LOAN 2 -- DEVELOPMENT DONORS																					
252 Max Available in NOM DLR MIL	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
253 Draw Down Pattern Assumed?	*	0.0 =No, Allocated as Needed																			
254 Draw Down Pattern (% of Max)	*V																				
255 Interest Rate	*	9.0%																			
256 Repayment Period	*	12 (Starting in 1st year of Full Operation)																			
257 Repayment Type	*	Level Principal																			
258 LOAN BALANCE (Nom DLR)																					
259 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
260 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
261 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
262 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
263 Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
264 Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
265 Net Cash Flow to Develop. Donors	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
266 ----------																					

227

268	FOREIGN LOAN 3 -- EXPORT CREDITS																				
269	Max Available in DLR MIL	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
271	Draw Down Pattern (% of Max)	*V		0.0%	10.0%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272	Interest Rate	*	8.6%																		
273	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
274	Repayment Type	*	Level Principal																		
275	LOAN BALANCE (Nom DLR)																				
276	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281	Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282	Net Cash Flow to Export Credits	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283	----------																				
284	UNSPECIFIED FOREIGN LOAN																				
285	Max Available in DLR MIL	calc		999.0	999.0	999.0	999.0	999.0													
286	Draw Down Pattern Assumed?	*	0 =No, Allocated as Needed																		
287	Draw Down Pattern (% of Max)	*V																			
288	Interest Rate	*	15.0%																		
289	Repayment Period	*	5 (Starting in 1st year of Full Operation)																		
290	Repayment Type	*	Level Principal																		
291	Bal -- Begining Of Year (BOY)	calc		0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
292	+ Principal Borrowed	copy		-0.0	-0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294	Bal -- End Of Year (EOY)	calc	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
295	Interest Due (Nom DLR)	calc		0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
296	Net Cash Flow to Unspec. Foreign	calc	-0.0	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
297	----------																				
298	Total Interest Exp: NOM RUP	calc		0.0	19.8	61.8	221.4	459.6	747.8	1215.1	1093.6	972.1	850.6	729.1	607.6	486.0	364.5	243.0	121.5	0.0	0.0
299	Total ROE : NOM RUP	calc		0.0	0.0	68.4	152.8	256.6	384.2	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7
300	O&M Local : NOM RUP	calc		1.0	34.7	147.6	295.5	531.6	809.4	1106.1	1172.8	1259.1	1330.8	1392.3	1452.3	1556.5	1672.8	1792.2	1919.7	1959.4	2096.5
301	O&M Foreign:(w/Fee) NOM DOLLAR	calc		0.4	1.4	4.2	7.4	13.1	20.0	28.8	29.8	30.8	31.5	32.5	32.8	34.9	36.1	38.0	39.5	39.1	40.7
302																					
303	Summary of Fixed Amounts of Financing																				
304	Local Sources -- NOM RUP MIL																				
305	Local Equity	calc		0.0	166.2	166.2	166.2	166.2	166.2												
306	Local Loans	calc		0.0	0.0	0.0	0.0	0.0	0.0												
307	Gov't of Pakistan	calc		0.0	0.0	0.0	0.0	0.0	0.0												
308	TOTAL LOCAL -- NOM RUP	sum		0.0	166.2	166.2	166.2	166.2	166.2												
309	Foreign Sources--NOM DLR																				
310	Equity	calc		0.0	10.0	10.0	10.0	10.0	10.0												
311	Loan 1 -- US-AID	calc		0.0	0.0	0.0	0.0	0.0	0.0												
312	Loan 2 -- Development Donors	calc		0.0	0.0	0.0	0.0	0.0	0.0												
313	Loan 3 -- Export Credits	calc		0.0	0.0	0.0	0.0	0.0	0.0												
314	Unspecified Foreign	calc		0.0	0.0	0.0	0.0	0.0	0.0												
315	TOTAL FOREIGN -- NOM DLR	sum		0.0	10.0	10.0	10.0	10.0	10.0												
316	==========																				

318	TOTAL CAPITAL NEEDS																			
319	Local Sources -- NOM RUP																			
320	Investment costs	copy	129	196	314	366	325	385	140	30	17	13	37	181	22	54	56	16	42	45
321	Interest & ROE	calc	0	20	62	221	460	748	1462	1333	1203	1073	943	814	684	554	424	295	165	157
322	Principal Repayment (D + E)	calc	0	0	0	0	0	0	909	909	909	909	909	909	909	909	909	909	41	41
323	Pre-Op Import Duty	calc	0	33	81	94	77	123	0	0	0	0	0	0	0	0	0	0	0	0
324	Pre-Op Royalty	calc	0	0	0	1	3	15	0	0	0	0	0	0	0	0	0	0	0	0
325	Pre-Op O&M - Local	calc	1	35	148	295	532	809	0	0	0	0	0	0	0	0	0	0	0	0
326	Foreign Needs Thru Govt of Pak(in Rup	calc	11.2	183.2	702.9	890.4	828.2	1423.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327	Total Needs	sum	141	467	1306	1868	2225	3504	2511	2272	2129	1995	1890	1904	1615	1517	1399	1220	248	243
328	- Fixed Amounts Assumed	copy	0	166	166	166	166	166	0	0	0	0	0	0	0	0	0	0	0	0
329	LOCAL To Be Allocated (NOM RUP)	sum NEED.RUP	141	300	1140	1701	2058	3338	2511	2272	2129	1995	1890	1904	1615	1517	1390	1220	248	243
330	Foreign Sources--NOM DLR																			
331	Investment costs	copy	0	19	46	52	41	64	1	4	6	6	10	30	11	19	29	7	25	26
332	Interest & ROE	calc	0	-0	-0	-0	-0	0	15	14	14	13	13	12	12	11	11	10	10	9
333	Principal Repayment (D + E)	calc	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2
334	Pre-Op O&M - Foreign	calc	0	1	4	7	13	20	0	0	0	0	0	0	0	0	0	0	0	0
335	Unfinanced Local Needs(in Dollars)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336	Total Needs	sum	0.7	20.7	50.0	59.2	54.5	84.3	18.2	21.2	22.0	22.2	25.7	45.4	25.6	32.6	42.3	19.9	37.3	37.8
337	- Fixed Amounts Assumed	copy	0	10	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0
338	FOREIGN To Be Allocated (NOM DLR)	sum NEED.DLR	1	11	40	49	44	74	18	21	22	22	26	45	26	33	42	20	37	38
339	CAPITAL AVAILABLE FOR ALLOCATION (Begin Yr)																			
340	Local Sources -- NOM RUP																			
341	Local Equity	calc	0	0	0	0	0	0												
342	Local Loans	calc	0	0	0	0	0	0												
343	Gov't of Pakistan	calc	16605	16464	16163	15023	13322	11263												
344	TOTAL LOCAL : NOM RUP	calcAVAIL.RUP	16605	16464	16163	15023	13322	11263												
345	Foreign Sources--NOM DLR																			
346	Equity	calc	0	0	0	0	0	0												
347	Loan 1 -- US-AID	calc	0	0	0	0	0	0												
348	Loan 2 -- Development Donors	calc	0	0	0	0	0	0												
349	Loan 3 -- Export Credits	calc	0	0	0	0	0	0												
350	TOTAL FOREIGN : NOM DLR	calcAVAIL.DLR	0	0	0	0	0	0												
351	Allocation FACTOR -- LOCAL	calc	0.01	0.02	0.07	0.11	0.15	0.30												
352	Allocation FACTOR -- FOREIGN	calc	0.00	0.00	0.00	0.00	0.00	0.00												
353	SOURCES OF CAPITAL -- BY YEAR																			
354	Local Sources -- NOM RUP																			
355	Local Equity	calc	0.0	166.2	166.2	166.2	166.2	166.2												
356	Local Loans	calc	0.0	0.0	0.0	0.0	0.0	0.0												
357	Pakistan Gov't	calc	141.2	300.4	1140.2	1701.4	2058.4	3337.8												
358	Unspecified Local	calc	-0.0	-0.0	-0.0	-0.0	0.0	0.0												
359	Local Needs - Local Capital (NOM RUP)	calc	-11.2	-183.2	-702.9	-890.4	-828.2	-1423.6	2511.3	2271.6	2128.7	1995.4	1890.1	1903.9	1614.9	1517.4	1389.6	1219.8	248.2	242.9
360																				
361	Foreign Sources--Nom DLR																			
362	Equity	calc	0.0	10.0	10.0	10.0	10.0	10.0												
363	Loan 1 -- US-AID	calc	0.0	0.0	0.0	0.0	0.0	0.0												
364	Loan 2 -- Development Donors	calc	0.0	0.0	0.0	0.0	0.0	0.0												
365	Loan 3 -- Export Credits	calc	0.0	0.0	0.0	0.0	0.0	0.0												
366	Unspecified Foreign	calc	-0.0	-0.0	-0.0	0.0	0.0	-0.0												
367	ForeignNeeds - ForeignCapital(NOM $)	calc	0.7	10.7	40.0	49.2	44.5	74.3	18.2	21.2	22.0	22.2	25.7	45.4	25.6	32.6	42.3	19.9	37.3	37.8
368	TOTAL REQUIRED FROM REV-- NOM RUP	calc	-0.0	-0.0	-0.0	0.0	0.0	-0.0	2870.8	2702.4	2588.7	2472.6	2456.9	2934.8	2213.3	2300.6	2437.7	1727.5	1224.4	1260.7

229

370	CAPITAL SUMMARY IN NOM DOLLARS																				
371	Local + Foreign Needs in $		Sum(0disct)																		
372	Investment costs	calc	843.5	8.0	30.7	63.6	72.0	58.8	84.4	8.0	5.8	6.5	7.0	12.0	38.4	12.1	20.9	31.2	7.7	26.5	27.5
373	Interest & ROE	calc	774.1	0.0	1.2	3.5	12.2	24.7	39.0	89.1	80.1	71.5	63.4	55.6	48.2	41.2	34.4	28.1	22.0	16.2	15.2
374	Principal Repayment (D + E)	calc	505.9	0.0	0.0	0.0	0.0	0.0	0.0	48.6	47.3	46.0	44.8	43.6	42.5	41.4	40.3	39.2	38.2	4.1	4.0
375	Pre-Op Import Duty	calc	22.3	0.0	1.9	4.6	5.2	4.1	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	calc	1.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op O&M	calc	144.2	0.5	3.5	12.6	23.7	41.6	62.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	sum	2290.9	8.5	37.3	84.3	113.2	129.4	192.9	145.6	133.2	124.1	115.2	111.2	129.1	94.7	95.6	98.5	67.8	46.7	46.8
379	Needs -- Local in $	calc	1359.4	8.5	27.3	74.3	103.2	119.4	182.9	127.4	112.0	102.0	92.9	85.6	83.8	69.1	63.1	56.1	47.9	9.5	9.0
380	Needs -- Foreign in $	copy	1150.8	0.7	20.7	50.0	59.2	54.5	84.3	18.2	21.2	22.0	22.2	25.7	45.4	25.6	32.6	42.3	19.9	37.3	37.8
381	- Adj for Cross-Finance	calc	-219.3	-0.7	-10.7	-40.0	-49.2	-44.5	-74.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	sum	2290.9	8.5	37.3	84.3	113.2	129.4	192.9	145.6	133.2	124.1	115.2	111.2	129.1	94.7	95.6	98.5	67.8	46.7	46.8
383	Sources -- Local in $	sum	1140.1	7.8	16.6	34.3	54.0	75.0	108.6	127.4	112.0	102.0	92.9	85.6	83.8	69.1	63.1	56.1	47.9	9.5	9.0
384	Sources -- Foreign in $	sum	1150.8	0.7	20.7	50.0	59.2	54.5	84.3	18.2	21.2	22.0	22.2	25.7	45.4	25.6	32.6	42.3	19.9	37.3	37.8
385	= Total Sources ($)	sum	2290.9	8.5	37.3	84.3	113.2	129.4	192.9	145.6	133.2	124.1	115.2	111.2	129.1	94.7	95.6	98.5	67.8	46.7	46.8
386	Needs - Sources (s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																				
388	Earnings Before Interest & Taxes	calc		-0.5	-5.0	-15.4	-25.0	-38.1	-55.4	111.7	98.3	88.0	78.6	73.0	81.4	57.4	56.0	74.8	54.7	30.6	29.1
389	- Income Tax	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	19.6	18.2	6.3	5.8
390	- Capital Invested	calc		7.7	28.7	57.1	62.1	48.8	67.3	6.1	4.3	4.6	4.7	7.9	24.2	7.4	12.2	17.5	4.1	13.7	13.7
391	= Net Cash Flow to Investors	calc		-8.2	-33.7	-72.5	-87.1	-86.9	-122.8	105.6	94.0	83.4	73.8	65.1	57.2	50.0	43.6	37.7	32.4	10.5	9.6
392	Program Check:Cash FlowDelta(s/b 0)	test	0.0	0.0	-0.0	-0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0
393	Program Check: NPV to Investors	test	0.0																		
394	==========																				

396 REVENUE REQUIRED TO BREAK EVEN	copy	YEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
397 NOMINAL RUPEES MIL	PV@	14.0%																		
398 O & M Expense (w/ Mgmt Fee)	calc	10,109	8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
399 Royalty & Excise Duty	calc	155	0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
400 Workers Participation & Welfare Funds	copy	216	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.0	85.7	85.4	85.3	85.0	84.5	84.8	134.3	133.5	49.9	48.9
401 Interest	copy	2,659	0.0	19.8	61.8	221.4	459.6	747.8	1215.1	1093.6	972.1	850.6	729.1	607.6	486.0	364.5	243.0	121.5	0.0	0.0
402 IQRA, Subsidy, & Other Import Duties	copy	349	0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
403 New Invest & Princ. Repay	copy	3,693	0.0	0.0	0.0	0.0	0.0	0.0	1114.9	1077.9	1095.8	1111.9	1228.5	1839.3	1251.0	1472.0	1743.1	1167.5	799.5	849.9
404 Return on Equity	copy	1,466	0.0	0.0	0.0	0.0	0.0	0.0	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7
405 Income Tax	calc	449	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	863.1	858.1	320.6	314.1
406 ---------			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407 = REVENUE (NOM RUP)	sum		0.0	0.0	0.0	0.0	0.0	0.0	4593.9	4622.7	4634.8	4624.3	4717.5	5327.9	4741.7	5028.7	6286.5	5710.2	4690.8	4932.9
408																				
409 Tax Calculation (note: Carry Forward does not separately carry forward depreciation, nor does it check on 6 year max)																				
410 Carry-Forward Balance -- BOY	calc	0.0	0.0	8.7	120.6	484.1	1229.6	2544.6	4623.4	8500.3	7272.0	6047.7	4828.1	3609.4	2394.9	1187.4	0.0	0.0	0.0	0.0
411 Carry-Forward USED (ADDED)	calc		-8.7	-111.9	-363.5	-745.6	-1315.0	-2078.8	-3877.0	1228.3	1224.2	1219.6	1218.7	1214.5	1207.5	1187.4	0.0	0.0	0.0	0.0
412																				
413 Revenue (NOM RUP)	copy		0.0	0.0	0.0	0.0	0.0	0.0	4593.9	4622.7	4634.8	4624.3	4717.5	5327.9	4741.7	5028.7	6286.5	5710.2	4690.8	4932.9
414 - O & M (w/ Mgmt Fee)	copy		8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
415 - Royalty & Excise Duty	copy		0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
416 - Interest	copy		0.0	19.8	61.8	221.4	459.6	747.8	1215.1	1093.6	972.1	850.6	729.1	607.6	486.0	364.5	243.0	121.5	0.0	0.0
417 - IQRA, Subsidy, & Other Import Duties	copy		0.4	33.0	80.5	93.7	77.0	123.2	1.7	8.9	11.8	13.6	22.7	69.3	26.2	44.9	71.7	17.9	65.1	69.7
418 - Tax Depreciation	copy		0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	894.2	302.5	517.5	794.4	214.0	704.3	751.2
419 = Taxable Income BEFORE Depletion	sum		-8.7	-111.9	-363.5	-745.6	-1315.0	-2078.8	-3877.0	1535.4	1530.3	1524.5	1523.4	1518.1	1509.4	1514.3	2397.6	2383.6	890.6	872.5
420 - Depletion Allowance	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	307.1	306.1	304.9	304.7	303.6	301.9	302.9	479.5	476.7	178.1	174.5
421 = Taxable Income BEFORE Worker Funds	sum		-8.7	-111.9	-363.5	-745.6	-1315.0	-2078.8	-3877.0	1228.3	1224.2	1219.6	1218.7	1214.5	1207.5	1211.4	1918.1	1906.9	712.5	698.0
422 - Workers Partic. & Welfare Funds	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.0	85.7	85.4	85.3	85.0	84.5	84.8	134.3	133.5	49.9	48.9
423 = Taxable Income BEFORE Carry Forward	calc		-8.7	-111.9	-363.5	-745.6	-1315.0	-2078.8	-3877.0	1228.3	1224.2	1219.6	1218.7	1214.5	1207.5	1211.4	1918.1	1906.9	712.5	698.0
424 - Carry Forward Used	copy		-8.7	-111.9	-363.5	-745.6	-1315.0	-2078.8	-3877.0	1228.3	1224.2	1219.6	1218.7	1214.5	1207.5	1187.4	0.0	0.0	0.0	0.0
425 = Taxable Income	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	1918.1	1906.9	712.5	698.0
426 Tax = Tax @ Taxable Income	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	863.1	858.1	320.6	314.1
427 Convergence Gap	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 FINANCIAL MODEL (LAXlg, 8/25)																			
2																			
3																			
4																			
5 **PROJECT DESCRIPTION																			
6 Annual Production (MIL Tonnes)	2.78	2.78	2.78	2.69	2.69	2.69	2.69	2.69	2.65	2.65	2.65	2.65	2.65	2.55	2.55	2.55	2.55	2.55	0.00
7 Coal Consumption	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	0.0
8 Coal In Stockpile	1.1	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	0.8	0.7	0.5	0.4	0.2	0.2
9 Year of Full Operation																			
10 Project Life (#Years after 1st Full Op.																			
11																			
12																			
13 **COST ASSUMPTIONS in MIL Constant DLR																			
14 Relative Year	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15 Infrastructure --Local	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
16 Infrastructure --Foreign	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.00
17 Machinery --Local	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	-23.21	0.00
18 Machinery --Foreign	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
19 Total Capital Costs (MIL Constant DLR)	13.69	13.69	13.69	9.09	9.09	9.09	9.09	9.09	10.91	10.91	10.91	10.91	10.91	2.46	2.46	2.46	2.46	(20.75)	0.00
20 O&M Expenses --Local	37.32	37.32	37.32	37.01	37.01	37.01	37.01	37.01	37.39	37.39	37.39	37.39	37.39	38.00	38.00	38.00	38.00	38.00	0.00
21 O&M Expenses --Foreign	16.10	16.10	16.10	15.71	15.71	15.71	15.71	15.71	14.71	14.71	14.71	14.71	14.71	18.22	18.22	18.22	18.22	18.22	0.00
22 Royalty Rate RUP/TON																			
23 Excise Tax RUP/TON																			
24 Workers Participation Fund(%of PBT)																			
25 Workers Welfare Fund(%of PBT)																			
26 Management Fee $Real/TON																			
27																			
28 **TAX ASSUMPTIONS																			
29 IGRA & Subsidy (% of Foreign Expenses)																			
30 Other Import Duties & Sales Taxes																			
31 Income Tax Rate	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32 Depletion Rate																			
33																			
34																			
35 **ECONOMIC ASSUMPTIONS																			
36 Calendar Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
37 Inflation Rate -- Rupees	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38 Inflation Rate -- Dollars	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39 Exchange Rate (RUP/DLR)	27.7	28.5	29.4	30.2	31.1	32.0	32.9	33.8	34.8	35.8	36.9	37.9	39.0	40.1	41.3	42.5	43.7	45.0	46.3
40 Base Year for Constant DLR																			
41 Inflation Index -- Rupees	3.617	3.870	4.141	4.430	4.741	5.072	5.427	5.807	6.214	6.649	7.114	7.612	8.145	8.715	9.325	9.978	10.677	11.424	12.224
42 Inflation Index -- Dollars	2.087	2.170	2.257	2.347	2.441	2.539	2.640	2.746	2.856	2.970	3.089	3.212	3.341	3.474	3.613	3.758	3.908	4.064	4.227
43																			
44																			
45 **FINANCE ASSUMPTIONS																			
46 All Loans Thru Govt of Pak?																			
47 Maximum Funds Available in MILLION MOMI																			
48 Local Equity																			
49 Local Loans																			
50 Foreign Equity																			
51 US-AID Loan																			
52 Development Donors' Loans																			
53 Export Credit Loans																			

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLAR

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
58 Annual Revenue -- MIL Constant DLR	89.7	88.4	87.1	79.9	78.8	77.8	76.9	76.0	76.6	75.8	75.1	74.5	73.9	67.9	67.4	67.0	66.6	41.7	0.0
59 Cost / Tonne Consumed	33.2	32.7	32.3	29.6	29.2	28.8	28.5	28.1	28.4	28.1	27.8	27.6	27.4	25.2	25.0	24.8	24.7	15.4	0.0
60																			
61 **Revenue Components																			
62 O & M Expense (w/ mgmt fee)	59.0	59.0	59.0	58.2	58.2	58.2	58.2	58.2	57.5	57.5	57.5	57.5	57.5	61.5	61.5	61.5	61.5	61.5	0.0
63 Royalty & Excise Duty	0.8	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.0
64 Workers Participation & Welfare Funds	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.0
65 IGRA, Subsidy, & Other Import Duties	1.3	1.3	1.3	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	0.2	0.2	0.0
66 Income Tax	5.3	4.8	4.4	4.0	3.6	3.2	2.9	2.6	2.4	2.1	1.9	1.7	1.5	1.2	1.0	0.9	0.7	0.3	0.0
67 Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68 New Invest & Princ. Repay	15.6	15.5	15.4	10.7	10.7	10.6	10.5	10.4	12.2	12.2	12.1	12.0	12.0	3.5	3.4	3.4	3.3	-20.8	0.0
69 Return on Equity	6.8	6.2	5.5	4.9	4.4	3.9	3.4	3.0	2.6	2.2	1.9	1.6	1.3	1.0	0.8	0.6	0.4	0.2	0.0
70 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71 = TOTAL (Constant $)	89.7	88.4	87.1	79.9	78.8	77.8	76.9	76.0	76.6	75.8	75.1	74.5	73.9	67.9	67.4	67.0	66.6	41.7	0.0
72 ==========																			
73																			
74 REVENUE -- NOMINAL DOLLAR (MIL)	187.2	191.7	196.5	187.6	192.4	197.5	203.0	208.7	218.7	225.2	232.0	239.2	246.8	236.1	243.7	251.7	260.1	169.4	0.0
75 NOMINAL DOLLARS / Tonne Consumed	69.3	71.0	72.8	69.5	71.3	73.2	75.2	77.3	81.0	83.4	85.9	88.6	91.4	87.4	90.3	93.2	96.3	62.7	0.0

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLA
77 Funds Provided By:
78 Local Equity (ex postponed ROE)
79 Local Loans
80 Gov't of Pakistan
81 Unspecified Local
82 ---
83 LOCAL TOTAL (in Mil DLR)
84 note: Local Funds Provided, when exp
85 since that constraint was implemen
86
87 Foreign Equity (ex postponed ROE)
88 US-AID Loan
89 Development Donors' Loans
90 Export Credit Loans
91 Unspecified Foreign Loans
92 ---
93 FOREIGN TOTAL
94 TOTAL INVESTED (Nom DLR)
95
96 Local Funds Provided expressed in NOM
97 Local Equity in NOM RUP MIL
98 Local Loans in NOM RUP MIL
99 Gov't of Pakistan in NOM RUP MIL
100 Unspecified Local in NOM RUP MIL
101 ---
102 LOCAL TOTAL in NOM RUP MIL
103 ----------
104
105 Levelized Real Annuity Per Tonne
106 (For Illustrative comparison)
107

		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
109	CAPITAL COSTS BY YEAR																			
111	Input $ Conversion Factor																			
112	TYPE 1 : Infrastructure																			
113	Local Sources (Constant $MIL)	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
114	Foreign Sources (Constant $MIL)	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.00
115	Depreciable %																			
116	Tax Depreciation -- Initial Yr																			
117	Tax Deprec Rate (*Decl. Bal)																			
118	Capital Required:																			
119	Local Sources -- MOM RUP MIL	2.9	3.1	3.3	0.9	1.0	1.0	1.1	1.2	3.3	3.5	3.8	4.0	4.3	0.4	0.4	0.5	0.5	0.5	0.0
120	Foreign Sources--MOM DLR MIL	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.6	0.6	0.6	0.1	0.1	0.1	0.1	0.1	0.0
121	Adds to Deprec Base MOM RUP MIL	12	13	13	6	6	7	7	8	21	23	24	26	28	5	5	6	6	7	0
122	Deprec.Expense (Initial)	2.9	3.1	3.4	1.5	1.6	1.7	1.8	2.0	5.3	5.7	6.1	6.5	7.0	1.3	1.4	1.4	1.5	0.0	0.0
123	Deprec.Expense (Normal) (not	16.6	15.8	15.2	14.7	13.7	12.8	12.0	11.3	10.8	11.3	11.9	12.5	13.3	14.0	13.0	12.1	11.3	113.3	0.0
124	Undepreciated Basis BeginYr	166.0	158.2	151.8	146.7	136.5	127.6	120.0	113.5	108.0	113.2	119.0	125.5	132.5	140.3	130.0	121.1	113.3	106.6	0.0
125	Import Duty & Sales Tax MOM RUP MIL	1	1	1	1	1	1	1	1	2	2	2	2	2	0	0	1	1	1	0
126	----------																			
127	TYPE 2 : Mine Equipment																			
128	Local Sources (Constant $MIL)	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	(23.21)	0.00
129	Foreign Sources (Constant $MIL)	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
130	Depreciable %																			
131	Tax Depreciation -- Initial Yr																			
132	Tax Deprec Rate (*Decl. Bal)																			
133	Capital Required:																			
134	Local Sources -- MOM RUP MIL	45.3	48.4	51.8	22.7	24.3	26.0	27.9	29.8	54.2	58.0	62.1	66.4	71.1	0.0	0.0	0.0	0.0	-4406.5	0.0
135	Foreign Sources--MOM DLR MIL	26.6	27.6	28.7	20.4	21.2	22.1	23.0	23.9	29.0	30.2	31.4	32.7	34.0	8.4	8.8	9.1	9.5	9.9	0.0
136	Adds to Deprec Base MOM RUP MIL	782.1	836.8	895.4	639.0	683.7	731.6	782.8	837.6	1065.5	1140.1	1219.9	1305.3	1396.7	338.2	361.9	387.2	414.3	-3963.2	0.0
137	Deprec.Expense (Initial)	782	837	895	639	684	732	783	838	1066	1140	1220	1305	1397	338	362	387	414	0	0
138	Deprec.Expense (Normal) (not	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3963	0
139	Undepreciated Basis BeginYr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	Import Duty & Sales Tax MOM RUP MIL	74	79	84	62	66	71	75	81	101	108	116	124	133	34	36	39	41	44	0
141	----------																			
142	SUM FOR ALL CAPITAL TYPES																			
143	Capital Required By Year:																			
144	Local Sources -- MOM RUP MIL	48.1	51.5	55.1	23.6	25.3	27.1	28.9	31.0	57.5	61.6	65.9	70.5	75.4	0.4	0.4	0.5	0.5	-4406.0	0.0
145	Foreign Sources--MOM DLR MIL	26.9	28.0	29.1	20.6	21.4	22.3	23.1	24.1	29.6	30.7	32.0	33.3	34.6	8.5	8.9	9.2	9.6	10.0	0.0
146	Adds to Deprec Base MOM RUP MIL	793.8	849.4	908.8	645.0	690.1	738.4	790.1	845.4	1086.9	1162.9	1244.4	1331.5	1424.7	343.2	367.3	393.0	420.5	-3956.6	0.0
147	Allowable Tax Deprec.Expense MOM RUP M	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
148	IGRA, Subsidy, & Other Import DutiesMOM	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
149	==========																			

234

151 LOCAL EQUITY																			
152 Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154 Draw Down Pattern Assumed?																			
155 Draw Down Pattern (% of Max)																			
156 Expected Rate of Return																			
157 Repayment Period																			
158 Repayment Type																			
159 EQUITY BALANCE (NOM RUP MIL)																			
160 Bal -- Begining Of Year (BOY)	742.1	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0
161 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162 - Principal Repaid	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	0.0
163 Bal -- EOY (Principal Only)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0	-0.0
164 + Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165 Bal -- End Of Year (EOY)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0	-0.0
166 ROE Due (Nom RUP)	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	41.2	33.0	24.7	16.5	8.2	-0.0
167 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168 Net Cash Flow to Local Equity	189.7	181.4	173.2	164.9	156.7	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	-0.0
169 ----------																			
170 LOCAL LOANS																			
171 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173 Draw Down Pattern Assumed?																			
174 Draw Down Pattern (% of Max)																			
175 Interest Rate																			
176 Repayment Period																			
177 Repayment Type																			
178 LOAN BALANCE (NOM RUP MIL)																			
179 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185 Net Cash Flow to Local Loan 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186 ----------																			

ICF INCORPORATED

188	Govt of Pakistan Loan																		
189	Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	Draw Down Pattern Assumed?																			
192	Draw Down Pattern (% of Max)																			
193	Interest Rate																			
194	Repayment Period																			
195	Repayment Type																			
196	LOAN BALANCE (NOM RUP MIL)																			
197	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201	Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203	Net Cash Flow to Govt of Pak Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204	----------																			
205	UNSPECIFIED LOCAL LOAN																			
206	Interest Rate																			
207	Repayment Period																			
208	Repayment Type																			
209	Bal -- Begining Of Year (BOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
210	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212	Bal -- End Of Year (EOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
213	Interest Due (Nom RUP)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
214	Net Cash Flow to Unspec. Local Loan	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
215	==========																			

217 FOREIGN EQUITY																			
218 Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219 Draw Down Pattern Assumed?																			
220 Draw Down Pattern (% of Max)																			
221 Expected Rate of Return																			
222 Repayment Period																			
223 Repayment Type																			
224 EQUITY BALANCE (NOM DLR MIL)																			
225 Bal -- Begining Of Year (BOY)	44.6	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0
226 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227 - Principal Repaid	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0
228 Bal -- EOY (Principal Only)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
229 + Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230 Bal -- End Of Year (EOY)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
231 ROE Due (Nom DLR)	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
232 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
233 Net Cash Flow to Foreign Equity	11.4	10.9	10.4	9.9	9.4	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	0.0
234 ----------																			
235 FOREIGN LOAN 1 US-AID Loan																			
236 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237 Draw Down Pattern Assumed?																			
238 Draw Down Pattern (% of Max)																			
239 Interest Rate																			
240 Repayment Period																			
241 Repayment Type																			
242 LOAN BALANCE (Nom DLR)																			
243 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
244 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
246 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
247 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
248 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249 Net Cash Flow to US-AID	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
250 ----------																			
251 FOREIGN LOAN 2 -- DEVELOPMENT DONORS																			
252 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253 Draw Down Pattern Assumed?																			
254 Draw Down Pattern (% of Max)																			
255 Interest Rate																			
256 Repayment Period																			
257 Repayment Type																			
258 LOAN BALANCE (Nom DLR)																			
259 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
262 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
263 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
264 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265 Net Cash Flow to Develop. Donors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
266 ----------																			

268 FOREIGN LOAN 3 -- EXPORT CREDITS																			
269 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?																			
271 Draw Down Pattern (% of Max)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272 Interest Rate																			
273 Repayment Period																			
274 Repayment Type																			
275 LOAN BALANCE (Nom DLR)																			
276 Bal - Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283 ----------																			
284 UNSPECIFIED FOREIGN LOAN																			
285 Max Available in DLR MIL																			
286 Draw Down Pattern Assumed?																			
287 Draw Down Pattern (% of Max)																			
288 Interest Rate																			
289 Repayment Period																			
290 Repayment Type																			
291 Bal -- Begining Of Year (BOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
292 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
295 Interest Due (Nom DLR)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
296 Net Cash Flow to Unspec. Foreign	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
297 ----------																			
298 Total Interest Exp: NOM RUP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
299 Total ROE : NOM RUP	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
300 O&M Local : NOM RUP	2243.3	2400.3	2568.3	2725.3	2916.1	3120.2	3338.6	3572.3	3861.8	4132.1	4421.4	4730.9	5062.0	5505.0	5890.3	6302.7	6743.9	7215.9	0.0
301 O&M Foreign:(w/Fee) NOM DOLLAR	42.3	44.0	45.7	46.3	48.2	50.1	52.1	54.2	53.4	55.5	57.7	60.0	62.4	76.6	79.7	82.8	86.2	89.6	0.0
302																			
303 Summary of Fixed Amounts of Financing																			
304 Local Sources -- NOM RUP MIL																			
305 Local Equity																			
306 Local Loans																			
307 Gov't of Pakistan																			
308 TOTAL LOCAL -- NOM RUP																			
309 Foreign Sources--NOM DLR																			
310 Equity																			
311 Loan 1 -- US-AID																			
312 Loan 2 -- Development Donors																			
313 Loan 3 -- Export Credits																			
314 Unspecified Foreign																			
315 TOTAL FOREIGN -- NOM DLR																			
316 ==========																			

318 TOTAL CAPITAL NEEDS																			0.0
319 Local Sources -- MOM RUP																			
320 Investment costs	48	51	55	24	25	27	29	31	58	62	66	70	75	0	0	0	1	-4406	0
321 Interest & ROE	148	140	132	124	115	107	99	91	82	74	66	58	49	41	33	25	16	8	0
322 Principal Repayment (D + E)	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0
323 Pre-Op Import Duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
324 Pre-Op Royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325 Pre-Op O&M - Local	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
326 Foreign Needs Thru Govt of Pak(in Rup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327 Total Needs	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	0
328 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
329 LOCAL To Be Allocated (MOM RUP)	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	0
330 Foreign Sources--MOM DLR																			
331 Investment costs	27	28	29	21	21	22	23	24	30	31	32	33	35	9	9	9	10	10	0
332 Interest & ROE	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0	0
333 Principal Repayment (D + E)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
334 Pre-Op O&M - Foreign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
335 Unfinanced Local Needs(in Dollars)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336 Total Needs	38.3	38.9	39.5	30.5	30.8	31.2	31.6	32.0	37.0	37.7	38.4	39.2	40 0	13.5	13.3	13.2	13.1	13.0	0.0
337 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
338 FOREIGN To Be Allocated (MOM DLR)	38	39	40	30	31	31	32	32	37	38	38	39	40	14	13	13	13	13	0
339 CAPITAL AVAILABLE FOR ALLOCATION (Begin																			
340 Local Sources -- MOM RUP																			
341 Local Equity																			
342 Local Loans																			
343 Gov't of Pakistan																			
344 TOTAL LOCAL : MOM RUP																			
345 Foreign Sources--MOM DLR																			
346 Equity																			
347 Loan 1 -- US-AID																			
348 Loan 2 -- Development Donors																			
349 Loan 3 -- Export Credits																			
350 TOTAL FOREIGN : MOM DLR																			
351 Allocation FACTOR -- LOCAL																			
352 Allocation FACTOR -- FOREIGN																			
353 SOURCES OF CAPITAL -- BY YEAR																			
354 Local Sources -- MOM RUP																			
355 Local Equity																			
356 Local Loans																			
357 Pakistan Gov't																			
358 Unspecified Local																			
359 Local Needs - Local Capital (MOM RUP)	237.8	232.9	228.3	188.5	182.0	175.5	169.1	162.9	181.2	177.0	173.1	169.4	166.1	82.9	74.7	66.4	58.2	-4356.5	0.0
360																			
361 Foreign Sources--Mom DLR																			
362 Equity																			
363 Loan 1 -- US-AID																			
364 Loan 2 -- Development Donors																			
365 Loan 3 -- Export Credits																			
366 Unspecified Foreign																			
367 ForeignNeeds - ForeignCapital(MOM $)	38.3	38.9	39.5	30.5	30.8	31.2	31.6	32.0	37.0	37.7	38.4	39.2	40.0	13.5	13.3	13.2	13.1	13.0	0.0
368 TOTAL REQUIRED FROM REV-- MOM RUP	1299.9	1342.2	1387.8	1109.5	1139.7	1172.3	1207.7	1245.9	1469.6	1527.2	1589.2	1656.1	1728.2	624.8	625.9	627.6	630.0	-3773.3	0.0

370	CAPITAL SUMMARY IN MOM DOLLARS																		
371	Local + Foreign Needs in $																		
372	Investment costs	28.6	29.8	31.0	21.4	22.2	23.1	24.0	25.0	31.2	32.5	33.8	35.1	36.5	8.6	8.9	9.3	9.6	-88.0	0.0
373	Interest & ROE	14.3	13.3	12.4	11.5	10.7	9.8	9.0	8.1	7.3	6.5	5.8	5.0	4.2	3.5	2.8	2.1	1.4	0.7	0.0
374	Principal Repayment (D + E)	4.0	3.9	3.9	3.8	3.8	3.8	3.7	3.7	3.7	3.6	3.6	3.6	3.5	3.5	3.5	3.5	3.4	3.4	0.0
375	Pre-Op Import Duty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	46.9	47.0	47.3	36.7	36.7	36.7	36.7	36.8	42.2	42.6	43.1	43.7	44.3	15.6	15.2	14.8	14.4	-83.9	0.0
379	Needs -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	0.0
380	Needs -- Foreign in $	38.3	38.9	39.5	30.5	30.8	31.2	31.6	32.0	37.0	37.7	38.4	39.2	40.0	13.5	13.3	13.2	13.1	13.0	0.0
381	- Adj for Cross-Finance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	46.9	47.0	47.3	36.7	36.7	36.7	36.7	36.8	42.2	42.6	43.1	43.7	44.3	15.6	15.2	14.8	14.4	-83.9	0.0
383	Sources -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	0.0
384	Sources -- Foreign in $	38.3	38.9	39.5	30.5	30.8	31.2	31.6	32.0	37.0	37.7	38.4	39.2	40.0	13.5	13.3	13.2	13.1	13.0	0.0
385	= Total Sources ($)	46.9	47.0	47.3	36.7	36.7	36.7	36.7	36.8	42.2	42.6	43.1	43.7	44.3	15.6	15.2	14.8	14.4	-83.9	0.0
386	Needs - Sources (s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																			
388	Earnings Before Interest & Taxes	27.8	26.5	25.4	19.6	18.6	17.7	16.8	16.0	17.2	16.5	15.9	15.3	14.7	5.7	5.2	4.8	4.4	-20.4	0.0
389	- Income Tax	5.3	4.8	4.4	4.0	3.6	3.2	2.9	2.6	2.4	2.1	1.9	1.7	1.5	1.2	1.0	0.9	0.7	0.3	0.0
390	- Capital Invested	13.7	13.7	13.7	9.1	9.1	9.1	9.1	9.1	10.9	10.9	10.9	10.9	10.9	2.5	2.5	2.5	2.5	-21.6	0.0
391	= Net Cash Flow to Investors	8.7	8.0	7.2	6.6	5.9	5.3	4.8	4.3	3.9	3.4	3.0	2.7	2.3	2.0	1.7	1.5	1.2	1.0	0.0
392	Program Check:Cash FlowDelta(s/b 0)	0.0	0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
393	Program Check: NPV to Investors																			
394	==========																			

396 REVENUE REQUIRED TO BREAK EVEN	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
397 NOMINAL RUPEES MIL																			
398 O & M Expense (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
399 Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
400 Workers Participation & Welfare Funds	47.8	46.6	45.4	43.6	42.3	40.9	39.4	37.9	37.2	35.5	33.7	31.8	29.9	26.0	23.9	21.7	19.4	7.4	0.0
401 Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
402 IQRA, Subsidy, & Other Import Duties	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
403 New Invest & Princ. Repay	903.8	961.4	1022.9	761.1	808.4	858.9	912.9	970.6	1214.5	1293.0	1377.0	1466.7	1562.7	484.0	510.9	539.6	570.1	-3803.8	0.0
404 Return on Equity	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
405 Income Tax	307.2	299.8	292.1	280.1	271.7	262.8	253.4	243.5	239.2	228.1	216.6	204.5	191.9	167.2	153.8	139.8	125.0	47.6	0.0
406 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407 = REVENUE (NOM RUP)	5192.4	5470.6	5768.7	5665.9	5979.3	6315.3	6675.4	7061.3	7613.3	8065.7	8550.5	9070.1	9626.9	9474.8	10063.4	10694.0	11369.7	7616.2	0.0
408																			
409 Tax Calculation (note: Carry Forward doe																			
410 Carry-Forward Balance -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
411 Carry-Forward USED (ADDED)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
412																			
413 Revenue (NOM RUP)	5192.4	5470.6	5768.7	5665.9	5979.3	6315.3	6675.4	7061.3	7613.3	8065.7	8550.5	9070.1	9626.9	9474.8	10063.4	10694.0	11369.7	7616.2	0.0
414 - O & M (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
415 - Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
416 - Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
417 - IQRA, Subsidy, & Other Import Duties	74.6	79.8	85.4	62.1	66.5	71.1	76.1	81.4	102.9	110.1	117.8	126.1	134.9	34.3	36.7	39.3	42.0	44.9	0.0
418 - Tax Depreciation	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
419 = Taxable Income BEFORE Depletion	853.2	832.9	811.4	778.0	754.6	729.9	703.9	676.5	664.4	633.7	601.6	568.1	533.1	464.4	427.3	388.3	347.2	132.2	-0.0
420 - Depletion Allowance	170.6	166.6	162.3	155.6	150.9	146.0	140.8	135.3	132.9	126.7	120.3	113.6	106.6	92.9	85.5	77.7	69.4	26.4	0.0
421 = Taxable Income BEFORE Worker Funds	682.6	666.3	649.2	622.4	603.7	583.9	563.1	541.2	531.5	506.9	481.3	454.5	426.5	371.6	341.9	310.6	277.8	105.7	-0.0
422 - Workers Partic. & Welfare Funds	47.8	46.6	45.4	43.6	42.3	40.9	39.4	37.9	37.2	35.5	33.7	31.8	29.9	26.0	23.9	21.7	19.4	7.4	0.0
423 = Taxable Income BEFORE Carry Forward	682.6	666.3	649.2	622.4	603.7	583.9	563.1	541.2	531.5	506.9	481.3	454.5	426.5	371.6	341.9	310.6	277.8	105.7	-0.0
424 - Carry Forward Used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
425 = Taxable Income	682.6	666.3	649.2	622.4	603.7	583.9	563.1	541.2	531.5	506.9	481.3	454.5	426.5	371.6	341.9	310.6	277.8	105.7	0.0
426 Tax = Tax @ Taxable Income	307.2	299.8	292.1	280.1	271.7	262.8	253.4	243.5	239.2	228.1	216.6	204.5	191.9	167.2	153.8	139.8	125.0	47.6	0.0
427 Convergence Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

141

1	FINANCIAL MODEL 2 (LAK2h, 8/25)			**** ILLUSTRATIVE HI-DUTY CASE POWER PLANT using HI-DUTY CASE COAL MINE COSTS****																	
2																					
3			--VARIABLE--																		
4		TYPE	NAME	DATA																	
5	**PROJECT DESCRIPTION																				
6	Electricity Generated Mil kwh	*V		0.00	0.00	0.00	0.00	0.00	0.00	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066
7	Coal Consumption	*V		0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
8	Year of Full Operation	*	YR.OP	1992																	
9	Project Life (#Years after 1st Full Op.*		YR.LAST	30																	
10			0.0																		
11																					
12	**COST ASSUMPTIONS in MIL Constant DLR		0.0																		
13	Relative Year	*V	YR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
14	Unit 1 w/ Common --Local	*V	116.2	0.70	5.58	33.48	51.45	20.22	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Unit 1 w/ Common --Foreign	*V	152.9	1.65	4.96	17.56	83.19	34.72	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Unit 2 --Local	*V	49.9	0.00	0.00	11.93	23.32	11.18	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Unit 2 --Foreign	*V	124.9	0.00	0.00	14.93	72.89	26.71	10.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Total Capital Costs (MIL Constant DLR)	calc	443.9	2.34	10.54	77.89	230.85	92.83	29.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	O&M Expenses --Local	*V	O&M	0.00	0.00	0.00	0.00	0.00	0.00	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
20	O&M Expenses --Foreign	*V		0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
21	Royalty Rate RUP/TON	*		NA																	
22	Excise Tax RUP/TON	*		NA																	
23	Workers Participation Fund(%of PBT)	*		5.0%																	
24	Workers Welfare Fund(%of PBT)	*		2.0%																	
25	Coal Cost Constant Dollar / Tonne	*V		0.00	0.00	0.00	0.00	0.00	0.00	63.81	61.32	58.44	55.33	54.02	59.05	48.70	49.01	55.35	49.51	46.13	44.70
26	G&A and Insurance(%ofTotCap)	*		1.5%																	
27																					
28	**TAX ASSUMPTIONS																				
29	IGRA & Subsidy (% of Foreign Expenses)	*	IMPORT	10.0%																	
30	Other Import Duties & Sales Taxes	*	DUTY.OTHR	35.0%																	
31	Income Tax Rate	*V	TXRATE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	Depletion Rate	*	DEPLRATE	20.0%																	
33																					
34	**ECONOMIC ASSUMPTIONS																				
35	Calendar Year	*V	YEAR	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
36	Inflation Rate -- Rupees	*V	INFRUP	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
37	Inflation Rate -- Dollars	*V	INFDLR	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
38	Exchange Rate (RUP/DLR)	*V	EXCHG	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.4	24.1	24.7	25.5	26.2	27.0
39	Base Year for Constant DLR	*	YR.BASE	1985																	
40	Inflation Index -- Rupees	calc	INDXRUP	1.070	1.145	1.225	1.311	1.403	1.501	1.606	1.718	1.838	1.967	2.105	2.252	2.410	2.579	2.759	2.952	3.159	3.380
41	Inflation Index -- Dollars	calc	INDXDLR	1.030	1.071	1.114	1.159	1.205	1.253	1.303	1.355	1.410	1.466	1.525	1.586	1.649	1.715	1.784	1.855	1.929	2.006
42																					
43																					
44	**FINANCE ASSUMPTIONS																				
45	All Loans Thru Govt of Pak?	*	GOVT.FIN	0 =Project Gets Financing Benefits Directly																	
46	Maximum Funds Available in MILLION NOMINAL DOLLARS																				
47	Local Equity	*		0.0																	
48	Local Loans	*		25.0																	
49	Arab Fund Loan	*		50.0																	
50	US-AID Loan	*		125.0																	
51	Development Donors' Loans	*		200.0																	
52	Export Credit Loans	*		75.0																	
53	Government of Pakistan Loan	*		999.0																	

242

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLARS **** ILLUSTRATIVE HI-DUTY CASE POWER PLANT using HI-DUTY CASE COAL MINE COSTS****

		copyYEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
58	Annual Revenue -- MIL Constant DLR	calc	0.0	0.0	0.0	0.0	0.0	0.0	298.9	282.6	264.4	246.5	237.5	242.8	207.2	201.1	211.8	190.1	157.9	152.2
59	Constant Dollar cents / kwh Generated	calc	0.0	0.0	0.0	0.0	0.0	0.0	9.7	9.2	8.6	8.0	7.7	7.9	6.8	6.6	6.9	6.2	5.2	5.0
60																				
61	**Revenue Components																			
62	O & M Expense (incl G&A)	calc	0.0	0.0	0.0	0.0	0.0	0.0	20.5	19.9	19.4	18.9	18.4	18.0	17.6	17.2	16.8	16.5	16.2	15.9
63	Fuel Cost	calc	0.0	0.0	0.0	0.0	0.0	0.0	172.3	165.6	157.8	149.4	145.9	159.4	131.5	132.3	149.4	133.7	124.5	120.7
64	Workers Participation & Welfare Funds	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.7	1.7	1.9	1.8	1.8	1.7	1.7	1.6	0.6	0.6
65	IORA, Subsidy, & Other Import Duties	calc	0.7	2.2	14.6	70.2	27.6	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	Income Tax	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	Interest	calc	0.0	0.4	1.9	11.7	41.8	54.4	60.5	52.1	44.6	37.7	31.4	25.7	20.5	15.8	11.5	7.7	4.2	3.1
68	New Invest & Princ. Repay	calc	0.0	0.0	0.0	0.0	0.0	0.0	45.6	43.2	40.9	38.7	39.9	37.8	35.9	34.0	32.3	30.7	12.4	11.9
69	Return on Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	---------		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71	= TOTAL (Constant $)	sum	0.7	2.6	16.5	82.0	69.4	63.9	298.9	282.6	264.4	246.5	237.5	242.8	207.2	201.1	211.8	190.1	157.9	152.2
72	==========																			
73																				
74	REVENUE -- NOMINAL DOLLAR (MIL)	calc	0.0	0.0	0.0	0.0	0.0	0.0	389.6	383.0	372.7	361.3	362.1	384.9	341.7	344.8	377.7	352.7	304.7	305.4
75	NOMINAL DOLLARS cents / kwh Generacalc		0.0	0.0	0.0	0.0	0.0	0.0	12.7	12.5	12.2	11.8	11.8	12.6	11.1	11.2	12.3	11.5	9.9	10.0

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLARS (mil)

		YR.REL	-6	-5	-4	-3	-2	-1	PRE-OPERATION TOTAL $	% of Loc	% of Total
77	Funds Provided By:										
78	Local Equity (ex postponed ROE)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
79	Local Loans	calc	0.0	4.9	4.7	4.6	4.5	4.3	23.0	6%	3%
80	Gov't of Pakistan	calc	2.8	4.1	52.6	160.3	66.0	46.1	331.8	94%	41%
81	Unspecified Local	calc	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0%	-0%
82	---------		---	---	---	---	---	---	---		---
83	LOCAL TOTAL (in Mil DLR)	sum	2.8	9.0	57.4	164.9	70.4	50.4	354.8		44%

84 note: Local Funds Provided, when expressed in Dollars, may differ from the Assumed Maximum Available
85 since that constraint was implemented based on the Rupee/Dollar Exchange Rate in the first year.

										% of For	% of Total
86											
87	Arab Fund Loan	copy	0.0	0.0	12.5	12.5	12.5	12.5	50.0	11%	6%
88	US-AID Loan	copy	0.0	0.0	12.5	56.3	37.5	18.8	125.0	28%	16%
89	Development Donors' Loans	copy	0.0	4.0	16.0	90.0	60.0	30.0	200.0	44%	25%
90	Export Credit Loans	copy	0.4	1.3	8.8	42.1	16.6	5.7	75.0	17%	9%
91	Unspecified Foreign Loans	copy	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0%	0%
92	---------		---	---	---	---	---	---	---		---
93	FOREIGN TOTAL	sum	0.4	5.3	49.8	200.9	126.6	67.0	450.0		56%
94	TOTAL INVESTED (Nom DLR)	sum	3.2	14.3	107.1	365.8	197.0	117.4	804.8		100%
95											
96	Local Funds Provided expressed in NOM RUPEE										
97	Local Equity in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
98	Local Loans in NOM RUP MIL	calc	0.0	83.1	83.1	83.1	83.1	83.1	415.5		
99	Gov't of Pakistan in NOM RUP MIL	calc	45.9	70.5	926.1	2901.8	1228.3	882.8	6055.3		
100	Unspecified Local in NOM RUP MIL	calc	0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0		
101	---------		---	---	---	---	---	---	---		
102	LOCAL TOTAL in NOM RUP MIL	sum	45.9	153.6	1009.2	2984.9	1311.4	965.9	6470.9		

103 ----------
104

		Disc. Rate	cents/kwh	PV REV	PV kwh
105	Levelized Real Annuity cents / kwh				
106	(For Illustrative comparison)	5.0%	5.71	$2,008	35170.6
107		7.0%	6.06	$1,536	25351.7

			-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
109 CAPITAL COSTS BY YEAR																				
110		copyYR.REL																		
111 Input $ Conversion Factor		*	1.00 (=Base Year Currency Index / Input Year Currency Index)																	
112 TYPE 1 : Unit 1 (w/ Common Facilities)																				
113 Local Sources (Constant $MIL)		copy	0.70	5.58	33.48	51.45	20.22	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)		copy	1.65	4.96	17.56	83.19	34.72	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115 Depreciable %		*	100.0%																	
116 Tax Depreciation -- Initial Yr	*	DEPR.INIT	25.0%																	
117 Tax Deprec Rate (*Decl. Bal)	*	DEPR.NORM	10.0%																	
118 Capital Required:																				
119 Local Sources -- NOM RUP MIL		calc	12.4	106.1	681.6	1121.0	471.3	118.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120 Foreign Sources--NOM DLR MIL		calc	1.7	5.3	19.6	96.4	41.8	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
121 Adds to Deprec Base NOM RUP MIL		calc	41	197	1026	2866	1250	378	0	0	0	0	0	0	0	0	0	0	0	0
122 Deprec.Expense (Initial)		calc	0.0	0.0	0.0	0.0	0.0	0.0	1439.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
123 Deprec.Expense (Normal)		(notcalc	0.0	0.0	0.0	0.0	0.0	0.0	575.8	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
124 Undepreciated Basis BeginYr		calc	0.0	40.6	237.5	1263.2	4129.0	5379.3	5757.8	3742.6	3368.3	3031.5	2728.3	2455.5	2209.9	1989.0	1790.1	1611.0	1449.9	1305.0
125 Import Duty & Sales Tax NOM RUP MIL		calc	13	41	155	785	351	117	0	0	0	0	0	0	0	0	0	0	0	0
126 ----------																				
127 TYPE 2 : Unit 2																				
128 Local Sources (Constant $MIL)		copy	0.00	0.00	11.93	23.32	11.18	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129 Foreign Sources (Constant $MIL)		copy	0.00	0.00	14.93	72.89	26.71	10.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130 Depreciable %		*	100.0%																	
131 Tax Depreciation -- Initial Yr	*	DEPR.INIT	100.0%																	
132 Tax Deprec Rate (*Decl. Bal)	*	DEPR.NORM	0.0%																	
133 Capital Required:																				
134 Local Sources -- NOM RUP MIL		calc	0.0	0.0	243.0	508.1	260.7	86.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
135 Foreign Sources--NOM DLR MIL		calc	0.0	0.0	16.6	84.4	32.2	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
136 Adds to Deprec Base NOM RUP MIL		calc	0.0	0.0	555.6	2036.7	860.0	335.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
137 Deprec.Expense (Initial)		calc	0	0	0	0	0	0	3768	0	0	0	0	0	0	0	0	0	0	0
138 Deprec.Expense (Normal)		(notcalc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr		calc	0	0	0	536	2572	3432	3768	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL		calc	0	0	132	688	270	112	0	0	0	0	0	0	0	0	0	0	0	0
141 ----------																				
142 SUM FOR ALL CAPITAL TYPES																				
143 Capital Required By Year:																				
144 Local Sources -- NOM RUP MIL		sum	12.4	106.1	924.6	1629.0	731.9	204.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145 Foreign Sources--NOM DLR MIL		sum	1.7	5.3	36.2	180.8	74.0	26.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146 Adds to Deprec Base NOM RUP MIL		sum	40.6	197.0	1561.3	4902.5	2110.4	713.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
147 Allowable Tax Deprec.Expense NOM RUP M		sum	0.0	0.0	0.0	0.0	0.0	0.0	5782.9	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
148 IQRA, Subsidy, & Other Import DutiesNOM		sum	12.7	40.9	286.5	1473.1	620.3	229.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
149 ==========																				

151	LOCAL EQUITY																			
152	Max Cash Invest-- MOM DLR MIL	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- MOM RUP MIL(does not inflate)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																	
155	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%											
156	Expected Rate of Return	*	20.0%																	
157	Repayment Period	*	30 (Starting in 1st year of Full Operation)																	
158	Repayment Type	*	Level Principal																	
159	EQUITY BALANCE (MOM RUP MIL)																			
160	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
161	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
163	Bal -- EOY (Principal Only)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
164	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	sum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
166	ROE Due (Mom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
167	Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
169	----------																			
170	LOCAL LOANS																			
171	Max Available in DLR MIL	copy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- MOM RUP MIL(does not inflate)	calc	415.5	415.5	415.5	415.5	415.5	415.5	415.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																	
174	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%											
175	Interest Rate	*	14.0%																	
176	Repayment Period	*	10 (Starting in 1st year of Full Operation)																	
177	Repayment Type	*	Level Principal																	
178	LOAN BALANCE (MOM RUP MIL)																			
179	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	83.1	166.2	249.3	332.4	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0
180	+ Principal Borrowed	copy		0.0	83.1	83.1	83.1	83.1	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	0.0	0.0
182	Bal -- End Of Year (EOY)	calc	0.0	0.0	83.1	166.2	249.3	332.4	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0
183	Interest Due (Mom RUP)	calc		0.0	0.0	11.6	23.3	34.9	46.5	58.2	52.4	46.5	40.7	34.9	29.1	23.3	17.5	11.6	5.8	0.0	0.0
184	Remaining Available -- BOY	calc		415.5	415.5	332.4	249.3	166.2	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan I	calc	0.0	0.0	-83.1	-71.5	-59.8	-48.2	-36.6	99.7	93.9	88.1	82.3	76.5	70.6	64.8	59.0	53.2	47.4	0.0	0.0
186	----------																			

188	Govt of Pakistan Loan																				
189	Max Available in DLR MIL	calc	999.0	999.0	999.0	999.0	999.0	999.0	999.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	Max-- NOM RUP MIL(does not inflate)	calc	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	Draw Down Pattern Assumed?	*	0.0 =No, Allocated as Needed																		
192	Draw Down Pattern (% of Max)	*V																			
193	Interest Rate	*	14.0%																		
194	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
195	Repayment Type	*	Level Principal																		
196	LOAN BALANCE (NOM RUP MIL)																				
197	Bal -- Begining Of Year (BOY)	calc		0.0	45.9	116.4	1042.5	3944.3	5172.6	6055.3	5449.8	4844.3	4238.7	3633.2	3027.7	2422.1	1816.6	1211.1	605.5	0.0	0.0
198	+ Principal Borrowed	copy		45.9	70.5	926.1	2901.8	1228.3	882.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	605.5	605.5	605.5	605.5	605.5	605.5	605.5	605.5	605.5	605.5	0.0	0.0
200	Bal -- End Of Year (EOY)	calc	0.0	45.9	116.4	1042.5	3944.3	5172.6	6055.3	5449.8	4844.3	4238.7	3633.2	3027.7	2422.1	1816.6	1211.1	605.5	0.0	0.0	0.0
201	Interest Due (Nom RUP)	calc		0.0	6.4	16.3	146.0	552.2	724.2	847.7	763.0	678.2	593.4	508.6	423.9	339.1	254.3	169.5	84.8	0.0	0.0
202	Remaining Available -- BOY	calc		16604.7	16558.8	16488.3	15562.2	12660.5	11432.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203	Net Cash Flow to Govt of Pak Loan	calc	0.0	-45.9	-64.1	-909.8	-2755.8	-676.1	-159.6	1453.3	1368.5	1283.7	1199.0	1114.2	1029.4	944.6	859.9	775.1	690.3	0.0	0.0
204	----------																				
205	UNSPECIFIED LOCAL LOAN																				
206	Interest Rate	*	14.0%																		
207	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
208	Repayment Type	*	Level Principal																		
209	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
210	+ Principal Borrowed	copy		0.0	-0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
212	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
213	Interest Due (Nom RUP)	calc		0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
214	Net Cash Flow to Unspec. Local Loan	calc	-0.0	-0.0	0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
215	==========																				

246

217	ARAB FUND LOAN																				
218	Max Available in NOM DLR MIL	copy		50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
220	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	25.0%	25.0%	25.0%	25.0%												
221	Interest Rate	*	9.0%																		
222	Repayment Period	*	20.0 (Starting in 1st year of Full Operation)																		
223	Repayment Type	*	Level Principal																		
224	LOAN BALANCE (Nom DLR)																				
225	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	12.5	25.0	37.5	50.0	47.5	45.0	42.5	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5
226	+ Principal Borrowed	copy		0.0	0.0	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
228	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	12.5	25.0	37.5	50.0	47.5	45.0	42.5	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5	20.0
229	Interest Due (Nom DLR)	calc	0.0	0.0	0.0	0.0	1.1	2.3	3.4	4.5	4.3	4.1	3.8	3.6	3.4	3.2	2.9	2.7	2.5	2.3	2.0
230	Remaining Available -- BOY	sum	0.0	50.0	50.0	50.0	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
231	Net Cash Flow to Arab Fund	calc	0.0	0.0	0.0	-12.5	-11.4	-10.3	-9.1	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.4	5.2	5.0	4.8	4.5
232																					
233																					
234	----------																				
235	FOREIGN LOAN 1 US-AID Loan																				
236	Max Available in NOM DLR MIL	copy		125.0	125.0	125.0	125.0	125.0	125.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
238	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	10.0%	45.0%	30.0%	15.0%												
239	Interest Rate	*	3.0%																		
240	Repayment Period	*	26 Starting in Year 5 (10 Year Grace Period)																		
241	Repayment Type	*	Level Principal																		
242	LOAN BALANCE (Nom DLR)																				
243	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	12.5	68.8	106.3	125.0	125.0	125.0	125.0	125.0	120.2	115.4	110.6	105.8	101.0	96.2	91.3
244	+ Principal Borrowed	copy		0.0	0.0	12.5	56.3	37.5	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
246	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	12.5	68.8	106.3	125.0	125.0	125.0	125.0	125.0	120.2	115.4	110.6	105.8	101.0	96.2	91.3	86.5
247	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.4	2.1	3.2	3.8	3.8	3.8	3.8	3.8	3.6	3.5	3.3	3.2	3.0	2.9	2.7
248	Remaining Available -- BOY	calc		125.0	125.0	125.0	112.5	56.3	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	Net Cash Flow to US-AID	calc	0.0	0.0	0.0	-12.5	-55.9	-35.4	-15.6	3.8	3.8	3.8	3.8	8.6	8.4	8.3	8.1	8.0	7.8	7.7	7.5
250	----------																				
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																				
252	Max Available in NOM DLR MIL	copy		200.0	200.0	200.0	200.0	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253	Draw Down Pattern Assumed?	*	1.0 =Yes, Fixed by Assumption																		
254	Draw Down Pattern (% of Max)	*V		0.0%	2.0%	8.0%	45.0%	30.0%	15.0%												
255	Interest Rate	*	9.0%																		
256	Repayment Period	*	12 (Starting in 1st year of Full Operation)																		
257	Repayment Type	*	Level Principal																		
258	LOAN BALANCE (Nom DLR)																				
259	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	4.0	20.0	110.0	170.0	200.0	183.3	166.7	150.0	133.3	116.7	100.0	83.3	66.7	50.0	33.3	16.7
260	+ Principal Borrowed	copy		0.0	4.0	16.0	90.0	60.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
262	Bal -- End Of Year (EOY)	calc	0.0	0.0	4.0	20.0	110.0	170.0	200.0	183.3	166.7	150.0	133.3	116.7	100.0	83.3	66.7	50.0	33.3	16.7	0.0
263	Interest Due (Nom DLR)	calc		0.0	0.0	0.4	1.8	9.9	15.3	18.0	16.5	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5
264	Remaining Available -- BOY	calc		200.0	200.0	196.0	180.0	90.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265	Net Cash Flow to Develop. Donors	calc	0.0	0.0	-4.0	-15.6	-88.2	-50.1	-14.7	34.7	33.2	31.7	30.2	28.7	27.2	25.7	24.2	22.7	21.2	19.7	18.2
266	----------																				

268 FOREIGN LOAN 3 -- EXPORT CREDITS																					
269 Max Available in DLR MIL	calc		75.0	75.0	75.0	75.0	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
271 Draw Down Pattern (% of Max)	*V		0.6%	1.8%	11.7%	56.2%	22.1%	7.6%													
272 Interest Rate	*	8.8%																			
273 Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
274 Repayment Type	*	Level Principal																			
275 LOAN BALANCE (Mom DLR)																					
276 Bal -- Begining Of Year (BOY)	calc		0.0	0.4	1.8	10.6	52.7	69.3	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0
277 + Principal Borrowed	copy		0.4	1.3	8.8	42.1	16.6	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0	0.0
279 Bal -- End Of Year (EOY)	calc	0.0	0.4	1.8	10.6	52.7	69.3	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0	0.0
280 Interest Due (Mom DLR)	calc		0.0	0.0	0.2	0.9	4.6	6.1	6.6	5.9	5.3	4.6	4.0	3.3	2.6	2.0	1.3	0.7	0.0	0.0
281 Remaining Available -- BOY	calc		75.0	74.6	73.2	64.4	22.3	5.7	-75.0	-67.5	-60.0	-52.5	-45.0	-37.5	-30.0	-22.5	-15.0	-7.5	0.0	0.0
282 Net Cash Flow to Export Credits	calc	0.0	-0.4	-1.3	-8.6	-41.2	-11.9	0.4	14.1	13.4	12.8	12.1	11.5	10.8	10.1	9.5	8.8	8.2	0.0	0.0
283 ----------																					
284 UNSPECIFIED FOREIGN LOAN																					
285 Max Available in DLR MIL	calc		0.0	0.0	0.0	0.0	0.0														
286 Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
287 Draw Down Pattern (% of Max)	*V		0.0%	0.0%	0.0%	0.0%	0.0%														
288 Interest Rate	*	15.0%																			
289 Repayment Period	*	5 (Starting in 1st year of Full Operation)																			
290 Repayment Type	*	Level Principal																			
291 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Mom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																					
298 Total Interest Exp: MOM RUP	calc		0.0	7.1	37.0	245.8	938.1	1306.4	1553.5	1433.2	1310.7	1185.8	1058.4	925.2	789.1	650.0	507.7	362.1	213.1	168.9
299 Total ROE : MOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
300 O&M Local : MOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	246.9	264.2	282.7	302.5	323.7	346.3	370.6	396.5	424.3	454.0	485.7	519.7
301 O&M Foreign : MOM DOLLAR	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.3
302 G&A Local : MOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3
303 G&A Foreign : MOM DOLLAR	calc		0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
304																					
305 Summary of Fixed Amounts of Financing																					
306 Local Sources -- MOM RUP MIL																					
307 Local Equity	calc		0.0	0.0	0.0	0.0	0.0	0.0													
308 Local Loans	calc		0.0	83.1	83.1	83.1	83.1	83.1													
309 Gov't of Pakistan	calc		0.0	0.0	0.0	0.0	0.0	0.0													
310 TOTAL LOCAL -- MOM RUP	sum		0.0	83.1	83.1	83.1	83.1	83.1													
311 Foreign Sources--MOM DLR																					
312 Arab Fund Loan	calc		0.0	0.0	12.5	12.5	12.5	12.5													
313 Loan 1 -- US-AID	calc		0.0	0.0	12.5	56.3	37.5	18.8													
314 Loan 2 -- Development Donors	calc		0.0	4.0	16.0	90.0	60.0	30.0													
315 Loan 3 -- Export Credits	calc		0.4	1.3	8.8	42.1	16.6	5.7													
316 Unspecified Foreign	calc		0.0	0.0	0.0	0.0	0.0	0.0													
317 TOTAL FOREIGN -- MOM DLR	sum		0.4	5.3	49.8	200.9	126.6	67.0													
318 ==========																					

248

320	TOTAL CAPITAL NEEDS																			
321	Local Sources -- NOM RUP																			
322	Investment costs	copy	12	106	925	1629	732	205	0	0	0	0	0	0	0	0	0	0	0	0
323	Interest & ROE	calc	0	6	28	169	587	771	906	815	725	634	544	453	362	272	181	91	0	0
324	Principal Repayment (D + E)	calc	0	0	0	0	0	0	647	647	647	647	647	647	647	647	647	647	0	0
325	Pre-Op Import Duty	calc	13	41	287	1473	628	229	0	0	0	0	0	0	0	0	0	0	0	0
326	Pre-Op Royalty	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
327	Pre-Op O&M - Local	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328	Foreign Needs Thru Govt of Pak(in Rup	calc	20.8	0.2	-229.8	-286.4	-627.9	-238.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
329	Total Needs	sum	46	154	1009	2985	1311	966	1553	1462	1372	1281	1191	1100	1009	919	828	738	0	0
330	- Fixed Amounts Assumed	copy	0	83	83	83	83	83	0	0	0	0	0	0	0	0	0	0	0	0
331	LOCAL To Be Allocated (NOM RUP)	sum NEED.RUP	46	71	926	2902	1228	883	1553	1462	1372	1281	1191	1100	1009	919	828	738	0	0
332	Foreign Sources--NOM DLR																			
333	Investment costs	copy	2	5	36	181	74	27	0	0	0	0	0	0	0	0	0	0	0	0
334	Interest & ROE	calc	0	0	1	4	19	28	33	30	28	26	23	21	18	16	13	11	8	6
335	Principal Repayment (D + E)	calc	0	0	0	0	0	0	27	27	27	27	31	31	31	31	31	31	24	24
336	Pre-Op O&M - Foreign	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337	Unfinanced Local Needs(in Dollars)	set to 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
338	Total Needs	sum	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
339	- Fixed Amounts Assumed	copy	0	5	50	201	127	67	0	0	0	0	0	0	0	0	0	0	0	0
340	FOREIGN To Be Allocated (NOM DLR)	sum NEED.DLR	1	0	-13	-16	-34	-12	60	57	55	52	55	52	50	47	45	42	32	30
341	CAPITAL AVAILABLE FOR ALLOCATION (Begin Yr)																			
342	Local Sources -- NOM RUP																			
343	Local Equity	calc	0	0	0	0	0	0												
344	Local Loans	calc	0	0	0	0	0	0												
345	Gov't of Pakistan	calc	16605	16559	16488	15562	12660	11432												
346	TOTAL LOCAL : NOM RUP	calcAVAIL.RUP	16605	16559	16488	15562	12660	11432												
347	Foreign Sources--NOM DLR																			
348	Arab Fund Loan	calc	0	0	0	0	0	0												
349	Loan 1 -- US-AID	calc	0	0	0	0	0	0												
350	Loan 2 -- Development Donors	calc	0	0	0	0	0	0												
351	Loan 3 -- Export Credits	calc	0	0	0	0	0	0												
352	TOTAL FOREIGN : NOM DLR	calcAVAIL.DLR	0	0	0	0	0	0												
353	Allocation FACTOR -- LOCAL	calc	0.00	0.00	0.06	0.19	0.10	0.08												
354	Allocation FACTOR -- FOREIGN	calc	0.00	0.00	0.00	0.00	0.00	0.00												
355	SOURCES OF CAPITAL -- BY YEAR																			
356	Local Sources -- NOM RUP																			
357	Local Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0												
358	Local Loans	calc	0.0	83.1	83.1	83.1	83.1	83.1												
359	Pakistan Gov't	calc	45.9	70.5	926.1	2901.8	1228.3	882.8												
360	Unspecified Local	calc	0.0	-0.0	-0.0	0.0	0.0	-0.0												
361	Local Needs - Local Capital (NOM RUP)	calc	-20.8	-0.2	229.8	286.4	627.9	238.5	1553.0	1462.4	1371.8	1281.2	1190.6	1100.0	1009.5	918.9	828.3	737.7	0.0	0.0
362																				
363	Foreign Sources--Nom DLR																			
364	Arab Fund Loan	calc	0.0	0.0	12.5	12.5	12.5	12.5												
365	Loan 1 -- US-AID	calc	0.0	0.0	12.5	56.3	37.5	18.8												
366	Loan 2 -- Development Donors	calc	0.0	4.0	16.0	90.0	60.0	30.0												
367	Loan 3 -- Export Credits	calc	0.4	1.3	8.8	42.1	16.6	5.7												
368	Unspecified Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0												
369	ForeignNeeds - ForeignCapital(NOM $)	calc	1.3	0.0	-13.1	-15.8	-33.7	-12.4	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
370	TOTAL REQUIRED FROM REV-- NOM RUP	calc	-0.0	-0.0	-0.0	0.0	0.0	0.0	2726.3	2621.2	2514.3	2405.4	2400.8	2287.6	2172.1	2054.2	1933.8	1810.7	841.2	815.1

249

372 CAPITAL SUMMARY IN MOM DOLLARS

			Sum(0disct)																		
373	Local + Foreign Needs in $																				
374	Investment costs	calc	524.1	2.4	11.5	88.7	270.8	113.3	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
375	Interest & ROE	calc	633.5	0.0	0.4	2.1	13.6	50.4	68.2	78.8	70.7	62.8	55.2	47.9	40.7	33.7	27.0	20.5	14.2	8.1	6.3
376	Principal Repayment (D + E)	calc	739.8	0.0	0.0	0.0	0.0	0.0	0.0	59.5	58.6	57.7	56.8	60.8	59.9	59.1	58.4	57.6	56.9	24.0	24.0
377	Pre-Op Import Duty	calc	146.1	0.8	2.4	16.3	81.4	33.3	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Pre-Op Royalty	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
379	Pre-Op O&M	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380	Total Needs ($)	sum	2043.4	3.2	14.3	107.1	365.8	197.0	117.4	138.3	129.2	120.5	112.0	108.7	100.7	92.9	85.4	78.1	71.1	32.1	30.2
381	Needs -- Local in $	calc	877.2	2.8	9.0	57.4	164.9	70.4	50.4	78.8	72.1	65.7	59.7	53.9	48.4	43.2	38.2	33.5	29.0	0.0	0.0
382	Needs -- Foreign in $	copy	1092.4	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
383	- Adj for Cross-Finance	calc	73.8	-1.3	-0.0	13.1	15.8	33.7	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
384	= Total Needs ($)	sum	2043.4	3.2	14.3	107.1	365.8	197.0	117.4	138.3	129.2	120.5	112.0	108.7	100.7	92.9	85.4	78.1	71.1	32.1	30.2
385	Sources -- Local in $	sum	951.0	1.5	9.0	70.4	180.7	104.1	62.9	78.8	72.1	65.7	59.7	53.9	48.4	43.2	38.2	33.5	29.0	0.0	0.0
386	Sources -- Foreign in $	sum	1092.4	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
387	= Total Sources ($)	sum	2043.4	3.2	14.3	107.1	365.8	197.0	117.4	138.3	129.2	120.5	112.0	108.7	100.7	92.9	85.4	78.1	71.1	32.1	30.2
388	Needs - Sources (s/b 0)	test	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
389	CASH FLOW SUMMARY -- CONSTANT DOLLARS																				
390	Earnings Before Interest & Taxes	calc		-0.7	-2.2	-14.6	-70.2	-27.6	-9.5	106.1	95.3	85.5	76.4	71.3	63.5	56.3	49.8	43.8	38.3	16.6	15.1
391	- Income Tax	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
392	- Capital Invested	calc		2.4	10.8	79.7	233.8	94.0	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393	= Net Cash Flow to Investors	calc		-3.1	-13.0	-94.3	-304.0	-121.7	-39.3	106.1	95.3	85.5	76.4	71.3	63.5	56.3	49.8	43.8	38.3	16.6	15.1
394	Program Check:Cash FlowDelta(s/b 0)	test	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
395	Program Check: NPV to Investors	test	0.0																		

396 ==========

398 REVENUE REQUIRED TO BREAK EVEN	copy	YEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
399 NOMINAL RUPEES MIL	PV@	14.0%																		
400 O & M Expense (incl. G&A)	calc	2,384	0.0	0.0	0.0	0.0	0.0	0.0	526.9	548.1	570.8	595.1	620.9	648.6	678.2	709.7	743.5	779.5	818.0	859.1
401 Coal Cost	calc	17,528	0.0	0.0	0.0	0.0	0.0	0.0	4426.4	4551.6	4641.5	4702.4	4912.2	5745.1	5069.9	5459.5	6596.9	6314.8	6294.7	6527.2
402 Workers Participation & Welfare Funds	copy	131	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.3	51.4	54.4	63.4	66.3	68.9	71.5	74.0	76.4	28.7	30.6
403 Interest	copy	3,999	0.0	7.1	37.0	245.8	938.1	1306.4	1553.5	1433.2	1310.7	1185.8	1058.4	925.2	789.1	650.0	507.7	362.1	213.1	168.9
404 IGRA, Subsidy, & Other Import Duties	copy	1,535	12.7	40.9	286.5	1473.1	620.3	229.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
405 New Invest & Princ. Repay	copy	3,296	0.0	0.0	0.0	0.0	0.0	0.0	1172.8	1188.0	1203.6	1219.6	1342.3	1362.4	1383.0	1404.2	1426.1	1448.5	628.1	646.2
406 Return on Equity	copy	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
407 Income Tax	calc	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
408 ---			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
409 = REVENUE (NOM RUP)	sum		0.0	0.0	0.0	0.0	0.0	0.0	7679.6	7769.2	7778.0	7757.2	7997.3	8747.5	7989.1	8295.0	9348.1	8981.3	7982.5	8232.0
410																				
411 Tax Calculation (note: Carry Forward does not separately carry forward depreciation, nor does it check on 6 year max)																				
412 Carry-Forward Balance -- BOY	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
413 Carry-Forward USED (ADDED)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
414																				
415 Revenue (NOM RUP)	copy		0.0	0.0	0.0	0.0	0.0	0.0	7679.6	7769.2	7778.0	7757.2	7997.3	8747.5	7989.1	8295.0	9348.1	8981.3	7982.5	8232.0
416 - O & M (inc. G&A)	copy		0.0	0.0	0.0	0.0	0.0	0.0	526.9	548.1	570.8	595.1	620.9	648.6	678.2	709.7	743.5	779.5	818.0	859.1
417 - Coal Cost	copy		0.0	0.0	0.0	0.0	0.0	0.0	4426.4	4551.6	4641.5	4702.4	4912.2	5745.1	5069.9	5459.5	6596.9	6314.8	6294.7	6527.2
418 - Interest	copy		0.0	7.1	37.0	245.8	938.1	1306.4	1553.5	1433.2	1310.7	1185.8	1058.4	925.2	789.1	650.0	507.7	362.1	213.1	168.9
419 - IGRA, Subsidy, & Other Import Duties	copy		12.7	40.9	286.5	1473.1	620.3	229.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
420 - Tax Depreciation	copy		0.0	0.0	0.0	0.0	0.0	0.0	5782.9	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
421 = Taxable Income BEFORE Depletion	sum		-12.7	-48.0	-323.6	-1718.8	-1558.5	-1535.5	-4610.1	862.0	918.1	970.8	1132.9	1183.1	1230.9	1276.8	1321.0	1363.8	511.8	546.3
422 - Depletion Allowance	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	172.4	183.6	194.2	226.6	236.6	246.2	255.4	264.2	272.8	102.4	109.3
423 = Taxable Income BEFORE Worker Funds	sum		-12.7	-48.0	-323.6	-1718.8	-1558.5	-1535.5	-4610.1	689.6	734.5	776.7	906.3	946.5	984.8	1021.5	1056.8	1091.1	409.4	437.0
424 - Workers Partic. & Welfare Funds	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.3	51.4	54.4	63.4	66.3	68.9	71.5	74.0	76.4	28.7	30.6
425 = Taxable Income BEFORE Carry Forward	calc		-12.7	-48.0	-323.6	-1718.8	-1558.5	-1535.5	-4610.1	689.6	734.5	776.7	906.3	946.5	984.8	1021.5	1056.8	1091.1	409.4	437.0
426 - Carry Forward Used	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427 = Taxable Income	sum		-12.7	-48.0	-323.6	-1718.8	-1558.5	-1535.5	-4610.1	689.6	734.5	776.7	906.3	946.5	984.8	1021.5	1056.8	1091.1	409.4	437.0
428 Tax = Tax * Taxable Income	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
429 Convergence Gap	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 FINANCIAL MODEL 2 (LAK2h, 8/25)																			
2																			
3																			
4																			
5 **PROJECT DESCRIPTION																			
6 Electricity Generated Mil kwh	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	0.00
7 Coal Consumption	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	0.0
8 Year of Full Operation																			
9 Project Life (#Years after 1st Full Op.																			
10																			
11																			
12 **COST ASSUMPTIONS in MIL Constant DLR																			
13 Relative Year	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14 Unit 1 w/ Common --Local	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Unit 1 w/ Common --Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 Unit 2 --Local	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17 Unit 2 --Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 Total Capital Costs (MIL Constant DLR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19 O&M Expenses --Local	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	0.00
20 O&M Expenses --Foreign	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	0.00
21 Royalty Rate RUP/TON																			
22 Excise Tax RUP/TON																			
23 Workers Participation Fund(%of PBT)																			
24 Workers Welfare Fund(%of PBT)																			
25 Coal Cost Constant Dollar / Tonne	35.29	34.76	34.27	31.07	30.64	30.25	29.89	29.55	29.95	29.66	29.39	29.14	28.90	25.68	25.48	25.30	25.13	15.90	0.00
26 G&A and Insurance(%ofTotCap)																			
27																			
28 **TAX ASSUMPTIONS																			
29 IGRA & Subsidy (% of Foreign Expenses)																			
30 Other Import Duties & Sales Taxes																			
31 Income Tax Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32 Depletion Rate																			
33																			
34 **ECONOMIC ASSUMPTIONS																			
35 Calendar Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
36 Inflation Rate -- Rupees	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
37 Inflation Rate -- Dollars	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
38 Exchange Rate (RUP/DLR)	27.7	28.5	29.4	30.2	31.1	32.0	32.9	33.8	34.8	35.8	36.9	37.9	39.0	40.1	41.3	42.5	43.7	45.0	46.3
39 Base Year for Constant DLR																			
40 Inflation Index -- Rupees	3.617	3.870	4.141	4.430	4.741	5.072	5.427	5.807	6.214	6.649	7.114	7.612	8.145	8.715	9.325	9.978	10.677	11.424	12.224
41 Inflation Index -- Dollars	2.087	2.170	2.257	2.347	2.441	2.539	2.640	2.746	2.856	2.970	3.089	3.212	3.341	3.474	3.613	3.758	3.908	4.064	4.227
42																			
43																			
44 **FINANCE ASSUMPTIONS																			
45 All Loans Thru Govt of Pak?																			
46 Maximum Funds Available in MILLION MOMI																			
47 Local Equity																			
48 Local Loans																			
49 Arab Fund Loan																			
50 US-AID Loan																			
51 Development Donors' Loans																			
52 Export Credit Loans																			
53 Government of Pakistan Loan																			

2522

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLAR
56

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
57																			
58 Annual Revenue -- MIL Constant DLR	116.6	114.5	112.6	103.4	101.7	100.1	98.7	97.3	97.0	96.0	95.0	94.0	93.1	84.2	83.5	82.8	82.1	57.0	0.0
59 Constant Dollar cents / kwh Generated	3.8	3.7	3.7	3.4	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.1	3.0	2.7	2.7	2.7	2.7	1.9	0.0
60																			
61 **Revenue Components																			
62 O & M Expense (incl G&A)	15.6	15.3	15.1	14.9	14.7	14.4	14.3	14.1	13.9	13.8	13.6	13.5	13.3	13.2	13.1	13.0	12.9	12.8	0.0
63 Fuel Cost	95.3	93.9	92.5	83.9	82.7	81.7	80.7	79.8	80.9	80.1	79.3	78.7	78.0	69.3	68.8	68.3	67.9	42.9	0.0
64 Workers Participation & Welfare Funds	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
65 IDRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66 Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67 Interest	2.1	1.9	1.6	1.4	1.2	1.0	0.8	0.7	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0
68 New Invest & Princ. Repay	3.5	3.4	3.2	3.1	3.0	2.9	2.8	2.7	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.2	0.0
69 Return on Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70 ---------																			
71 = TOTAL (Constant $)	116.6	114.5	112.6	103.4	101.7	100.1	98.7	97.3	97.0	96.0	95.0	94.0	93.1	84.2	83.5	82.8	82.1	57.0	0.0
72 ==========																			
73																			
74 REVENUE -- NOMINAL DOLLAR (MIL)	243.3	248.5	254.1	242.6	248.3	254.2	260.5	267.2	277.1	285.0	293.3	302.0	311.2	292.5	301.5	311.0	320.9	231.5	0.0
75 NOMINAL DOLLARS cents / kwh Genera	7.9	8.1	8.3	7.9	8.1	8.3	8.5	8.7	9.0	9.3	9.6	9.9	10.1	9.5	9.8	10.1	10.5	7.6	0.0

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLA
77 Funds Provided By:
78 Local Equity (ex postponed ROE)
79 Local Loans
80 Gov't of Pakistan
81 Unspecified Local
82 ---
83 LOCAL TOTAL (in Mil DLR)
84 note: Local Funds Provided, when exp
85 since that constraint was implemen
86
87 Arab Fund Loan
88 IDA-AID Loan
89 Development Donors' Loans
90 Export Credit Loans
91 Unspecified Foreign Loans
92 ---
93 FOREIGN TOTAL
94 TOTAL INVESTED (Nom DLR)
95
96 Local Funds Provided expressed in NOM
97 Local Equity in NOM RUP MIL
98 Local Loans in NOM RUP MIL
99 Gov't of Pakistan in NOM RUP MIL
100 Unspecified Local in NOM RUP MIL
101 ---
102 LOCAL TOTAL in NOM RUP MIL
103 ----------
104
105 Levelized Real Annuity cents / kwh
106 (For Illustrative comparison)
107

109 CAPITAL COSTS BY YEAR

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
110																			
111 Input $ Conversion Factor																			
112 TYPE 1 : Unit 1 (w/ Common Facilities)																			
113 Local Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115 Depreciable %																			
116 Tax Depreciation -- Initial Yr																			
117 Tax Deprec Rate (%Decl. Bal)																			
118 Capital Required:																			
119 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
121 Adds to Deprec Base NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122 Deprec.Expense (Initial)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
123 Deprec.Expense (Normal) (not	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
124 Undepreciated Basis BeginYr	1174.5	1057.0	951.3	856.2	770.6	693.5	624.2	561.7	505.6	455.0	409.5	368.6	331.7	298.5	268.7	241.8	217.6	195.9	0.0
125 Import Duty & Sales Tax NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
126 ----------																			
127 TYPE 2 : Unit 2																			
128 Local Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129 Foreign Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130 Depreciable %																			
131 Tax Depreciation -- Initial Yr																			
132 Tax Deprec Rate (%Decl. Bal)																			
133 Capital Required:																			
134 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
135 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
136 Adds to Deprec Base NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
137 Deprec.Expense (Initial)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138 Deprec.Expense (Normal) (not	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141 ----------																			
142 SUM FOR ALL CAPITAL TYPES																			
143 Capital Required By Year:																			
144 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146 Adds to Deprec Base NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
147 Allowable Tax Deprec.Expense NOM RUP M	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
148 IGRA, Subsidy, & Other Import DutiesNOM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
149 ==========																			

254

151 LOCAL EQUITY																			
152 Max Cash Invest -- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154 Draw Down Pattern Assumed?																			
155 Draw Down Pattern (% of Max)																			
156 Expected Rate of Return																			
157 Repayment Period																			
158 Repayment Type																			
159 EQUITY BALANCE (NOM RUP MIL)																			
160 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
161 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
163 Bal -- EOY (Principal Only)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
164 + Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
166 ROE Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
167 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168 Net Cash Flow to Local Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
169 ----------																			
170 LOCAL LOANS																			
171 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173 Draw Down Pattern Assumed?																			
174 Draw Down Pattern (% of Max)																			
175 Interest Rate																			
176 Repayment Period																			
177 Repayment Type																			
178 LOAN BALANCE (NOM RUP MIL)																			
179 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185 Net Cash Flow to Local Loan 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186 ----------																			

255

188 Govt of Pakistan Loan																			
189 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?																			
192 Draw Down Pattern (% of Max)																			
193 Interest Rate																			
194 Repayment Period																			
195 Repayment Type																			
196 LOAN BALANCE (NOM RUP MIL)																			
197 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204 ----------																			
205 UNSPECIFIED LOCAL LOAN																			
206 Interest Rate																			
207 Repayment Period																			
208 Repayment Type																			
209 Bal -- Begining Of Year (BOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
210 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
213 Interest Due (Nom RUP)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
214 Net Cash Flow to Unspec. Local Loan	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
215 ==========																			

ICF INCORPORATED

217 ARAB FUND LOAN																			
218 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219 Draw Down Pattern Assumed?																			
220 Draw Down Pattern (% of Max)																			
221 Interest Rate																			
222 Repayment Period																			
223 Repayment Type																			
224 LOAN BALANCE (Nom DLR)																			
225 Bal -- Begining Of Year (BOY)	20.0	17.5	15.0	12.5	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
226 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227 - Principal Repaid	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
228 Bal -- End Of Year (EOY)	17.5	15.0	12.5	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
229 Interest Due (Nom DLR)	1.8	1.6	1.3	1.1	0.9	0.7	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
231 Net Cash Flow to Arab Fund	4.3	4.1	3.9	3.6	3.4	3.2	3.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
232																			
233																			
234 ----------																			
235 FOREIGN LOAN 1 US-AID Loan																			
236 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237 Draw Down Pattern Assumed?																			
238 Draw Down Pattern (% of Max)																			
239 Interest Rate																			
240 Repayment Period																			
241 Repayment Type																			
242 LOAN BALANCE (Nom DLR)																			
243 Bal -- Begining Of Year (BOY)	86.5	81.7	76.9	72.1	67.3	62.5	57.7	52.9	48.1	43.3	38.5	33.7	28.8	24.0	19.2	14.4	9.6	4.8	0.0
244 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245 - Principal Repaid	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0.0
246 Bal -- End Of Year (EOY)	81.7	76.9	72.1	67.3	62.5	57.7	52.9	48.1	43.3	38.5	33.7	28.8	24.0	19.2	14.4	9.6	4.8	0.0	0.0
247 Interest Due (Nom DLR)	2.6	2.5	2.3	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
248 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249 Net Cash Flow to US-AID	7.4	7.3	7.1	7.0	6.8	6.7	6.5	6.4	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
250 ----------																			
251 FOREIGN LOAN 2 -- DEVELOPMENT DONORS																			
252 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253 Draw Down Pattern Assumed?																			
254 Draw Down Pattern (% of Max)																			
255 Interest Rate																			
256 Repayment Period																			
257 Repayment Type																			
258 LOAN BALANCE (Nom DLR)																			
259 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
262 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
263 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
264 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265 Net Cash Flow to Develop. Donors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
266 ----------																			

268 FOREIGN LOAN 3 -- EXPORT CREDITS																			
269 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?																			
271 Draw Down Pattern (% of Max)																			
272 Interest Rate																			
273 Repayment Period																			
274 Repayment Type																			
275 LOAN BALANCE (Nom DLR)																			
276 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283 ----------																			
284 UNSPECIFIED FOREIGN LOAN																			
285 Max Available in DLR MIL																			
286 Draw Down Pattern Assumed?																			
287 Draw Down Pattern (% of Max)																			
288 Interest Rate																			
289 Repayment Period																			
290 Repayment Type																			
291 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																			
298 Total Interest Exp: NOM RUP	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
299 Total ROE : NOM RUP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
300 O&M Local : NOM RUP	556.1	595.1	636.7	681.3	729.0	780.0	834.6	893.0	955.5	1022.4	1094.0	1170.6	1252.5	1340.2	1434.0	1534.4	1641.8	1756.7	0.0
301 O&M Foreign : NOM DOLLAR	3.4	3.5	3.7	3.8	4.0	4.1	4.3	4.5	4.7	4.8	5.0	5.2	5.5	5.7	5.9	6.1	6.4	6.6	0.0
302 G&A Local : NOM RUP	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	202.3	0.0
303 G&A Foreign : NOM DOLLAR	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	0.0
304																			
305 Summary of Fixed Amounts of Financing																			
306 Local Sources -- NOM RUP MIL																			
307 Local Equity																			
308 Local Loans																			
309 Gov't of Pakistan																			
310 TOTAL LOCAL -- NOM RUP																			
311 Foreign Sources--NOM DLR																			
312 Arab Fund Loan																			
313 Loan 1 -- US-AID																			
314 Loan 2 -- Development Donors																			
315 Loan 3 -- Export Credits																			
316 Unspecified Foreign																			
317 TOTAL FOREIGN -- NOM DLR																			
318 ==========																			

320 TOTAL CAPITAL NEEDS																			
321 Local Sources -- NOM RUP																			0.0
322 Investment costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
323 Interest & ROE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
324 Principal Repayment (D + E)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325 Pre-Op Import Duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
326 Pre-Op Royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
327 Pre-Op O&M - Local	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328 Foreign Needs Thru Govt of Pak(in Rup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
329 Total Needs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
330 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
331 LOCAL To Be Allocated (NOM RUP)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332 Foreign Sources--NOM DLR																			
333 Investment costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
334 Interest & ROE	4	4	4	3	3	3	2	2	1	1	1	1	1	1	1	0	0	0	0
335 Principal Repayment (D + E)	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	5	5	0
336 Pre-Op O&M - Foreign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337 Unfinanced Local Needs(in Dollars)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
338 Total Needs	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
339 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
340 FOREIGN To Be Allocated (NOM DLR)	12	11	11	11	10	10	9	9	6	6	6	6	6	6	5	5	5	5	0
341 CAPITAL AVAILABLE FOR ALLOCATION (Begin																			
342 Local Sources -- NOM RUP																			
343 Local Equity																			
344 Local Loans																			
345 Gov't of Pakistan																			
346 TOTAL LOCAL : NOM RUP																			
347 Foreign Sources--NOM DLR																			
348 Arab Fund Loan																			
349 Loan 1 -- US-AID																			
350 Loan 2 -- Development Donors																			
351 Loan 3 -- Export Credits																			
352 TOTAL FOREIGN : NOM DLR																			
353 Allocation FACTOR -- LOCAL																			
354 Allocation FACTOR -- FOREIGN																			
355 SOURCES OF CAPITAL -- BY YEAR																			
356 Local Sources -- NOM RUP																			
357 Local Equity																			
358 Local Loans																			
359 Pakistan Gov't																			
360 Unspecified Local																			
361 Local Needs - Local Capital (NOM RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
362																			
363 Foreign Sources--Nom DLR																			
364 Arab Fund Loan																			
365 Loan 1 -- US-AID																			
366 Loan 2 -- Development Donors																			
367 Loan 3 -- Export Credits																			
368 Unspecified Foreign																			
369 ForeignNeeds - ForeignCapital(NOM $)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
370 TOTAL REQUIRED FROM REV-- NOM RUP	324.6	323.4	321.9	320.0	317.8	315.1	312.1	308.6	217.6	218.7	219.7	220.6	221.3	221.9	222.3	222.6	222.8	222.7	0.0

372 CAPITAL SUMMARY IN NOM DOLLARS																			
373 Local + Foreign Needs in $																			
374 Investment costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
375 Interest & ROE	4.4	4.0	3.7	3.3	2.9	2.6	2.2	1.8	1.4	1.3	1.2	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
376 Principal Repayment (D + E)	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0.0
377 Pre-Op Import Duty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378 Pre-Op Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
379 Pre-Op O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380 Total Needs ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
381 Needs -- Local in $	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382 Needs -- Foreign in $	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
383 - Adj for Cross-Finance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
384 = Total Needs ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
385 Sources -- Local in $	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
386 Sources -- Foreign in $	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
387 = Total Sources ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
388 Needs - Sources (s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
389 CASH FLOW SUMMARY -- CONSTANT DOLLARS																			
390 Earnings Before Interest & Taxes	5.6	5.2	4.9	4.5	4.2	3.9	3.6	3.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	0.0
391 - Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
392 - Capital Invested	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393 = Net Cash Flow to Investors	5.6	5.2	4.9	4.5	4.2	3.9	3.6	3.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	0.0
394 Program Check:Cash FlowDelta(s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
395 Program Check: NPV to Investors																			
396 ==========																			

398 REVENUE REQUIRED TO BREAK EVEN	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
399 NOMINAL RUPEES MIL																			
400 O & M Expense (incl. G&A)	903.1	950.1	1000.3	1054.0	1111.4	1172.7	1238.2	1308.3	1383.2	1463.3	1548.9	1640.4	1738.2	1842.8	1954.7	2074.3	2202.1	2338.9	0.0
401 Coal Cost	5513.5	5810.8	6129.4	5946.1	6275.7	6628.9	7007.3	7412.8	8041.0	8519.4	9032.1	9581.5	10170.1	9666.7	10264.5	10905.0	11591.1	7847.9	0.0
402 Workers Participation & Welfare Funds	5.1	6.1	7.1	8.0	8.9	9.7	10.6	11.3	6.9	7.5	8.1	8.6	9.2	9.7	10.2	10.7	11.2	1.2	0.0
403 Interest	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
404 IGRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
405 New Invest & Princ. Repay	202.7	208.5	214.5	220.7	227.1	233.6	240.4	247.3	167.4	172.2	177.2	182.3	187.5	193.0	198.5	204.3	210.1	216.2	0.0
406 Return on Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
407 Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
408 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
409 = REVENUE (NOM RUP)	6746.2	7090.4	7458.7	7328.2	7713.8	8126.5	8568.2	9041.1	9648.7	10208.9	10808.8	11451.1	12138.8	11741.1	12451.7	13212.6	14027.2	10410.6	0.0
410																			
411 Tax Calculation (note: Carry Forward doe																			
412 Carry-Forward Balance -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
413 Carry-Forward USED (ADDED)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
414																			
415 Revenue (NOM RUP)	6746.2	7090.4	7458.7	7328.2	7713.8	8126.5	8568.2	9041.1	9648.7	10208.9	10808.8	11451.1	12138.8	11741.1	12451.7	13212.6	14027.2	10410.6	0.0
416 - O & M (inc. G&A)	903.1	950.1	1000.3	1054.0	1111.4	1172.7	1238.2	1308.3	1383.2	1463.3	1548.9	1640.4	1738.2	1842.8	1954.7	2074.3	2202.1	2338.9	0.0
417 - Coal Cost	5513.5	5810.8	6129.4	5946.1	6275.7	6628.9	7007.3	7412.8	8041.0	8519.4	9032.1	9581.5	10170.1	9666.7	10264.5	10905.0	11591.1	7847.9	0.0
418 - Interest	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
419 - IGRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
420 - Tax Depreciation	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
421 = Taxable Income BEFORE Depletion	90.3	108.9	126.5	143.1	158.9	174.0	188.5	202.5	123.8	134.2	144.3	154.1	163.5	172.8	181.8	190.8	199.6	21.5	-0.0
422 - Depletion Allowance	18.1	21.8	25.3	28.6	31.8	34.8	37.7	40.5	24.8	26.8	28.9	30.8	32.7	34.6	36.4	38.2	39.9	4.3	0.0
423 = Taxable Income BEFORE Worker Funds	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	-0.0
424 - Workers Partic. & Welfare Funds	5.1	6.1	7.1	8.0	8.9	9.7	10.6	11.3	6.9	7.5	8.1	8.6	9.2	9.7	10.2	10.7	11.2	1.2	0.0
425 = Taxable Income BEFORE Carry Forward	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	-0.0
426 - Carry Forward Used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427 = Taxable Income	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	-0.0
428 Tax = Tax * Taxable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
429 Convergence Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 FINANCIAL MODEL 2 (LAK2b, 8/25) **** ILLUSTRATIVE BASE CASE POWER PLANT using BASE CASE COAL MINE COSTS****
2
3 --VARIABLE--

		TYPE	NAME	DATA																	
4																					
5	**PROJECT DESCRIPTION																				
6	Electricity Generated Mil kwh	*V		0.00	0.00	0.00	0.00	0.00	0.00	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066
7	Coal Consumption	*V		0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
8	Year of Full Operation	*	YR.OP	1992																	
9	Project Life (#Years after 1st Full Op.*		YR.LAST	30																	
10				0.0																	
11																					
12	**COST ASSUMPTIONS in MIL Constant DLR			0.0																	
13	Relative Year	*V	YR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
14	Unit 1 w/ Common --Local	*V	116.2	0.70	5.58	33.48	51.45	20.22	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Unit 1 w/ Common --Foreign	*V	152.9	1.65	4.96	17.56	83.19	34.72	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Unit 2 --Local	*V	49.9	0.00	0.00	11.93	23.32	11.18	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Unit 2 --Foreign	*V	124.9	0.00	0.00	14.93	72.89	26.71	10.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Total Capital Costs (MIL Constant DLR)	calc	443.9	2.34	10.54	77.89	230.85	92.83	29.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	O&M Expenses --Local	*V	O&M	0.00	0.00	0.00	0.00	0.00	0.00	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
20	O&M Expenses --Foreign	*V		0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
21	Royalty Rate RUP/TON	*		NA																	
22	Excise Tax RUP/TON	*		NA																	
23	Workers Participation Fund(%of PBT)	*		5.0%																	
24	Workers Welfare Fund(%of PBT)	*		2.0%																	
25	Coal Cost Constant Dollar / Tonne	*V		0.00	0.00	0.00	0.00	0.00	0.00	57.56	55.34	53.04	50.50	49.43	53.34	45.00	45.25	53.78	46.44	44.46	43.03
26	G&A and Insurance(%ofTotCap)	*		1.5%																	
27																					
28	**TAX ASSUMPTIONS																				
29	IQRA & Subsidy (% of Foreign Expenses)	*	IMPORT	10.0%																	
30	Other Import Duties & Sales Taxes	*	DUTY.OTHR	0.0%																	
31	Income Tax Rate	*V	TXRATE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	Depletion Rate	*	DEPLRATE	20.0%																	
33																					
34	**ECONOMIC ASSUMPTIONS																				
35	Calendar Year	*V	YEAR	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
36	Inflation Rate -- Rupees	*V	INFRUP	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
37	Inflation Rate -- Dollars	*V	INFDLR	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
38	Exchange Rate (RUP/DLR)	*V	EXCHG	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.4	24.1	24.7	25.5	26.2	27.0
39	Base Year for Constant DLR	*	YR.BASE	1985																	
40	Inflation Index -- Rupees	calc	INDXRUP	1.070	1.145	1.225	1.311	1.403	1.501	1.606	1.718	1.838	1.967	2.105	2.252	2.410	2.579	2.759	2.952	3.159	3.380
41	Inflation Index -- Dollars	calc	INDXDLR	1.030	1.071	1.114	1.159	1.205	1.253	1.303	1.355	1.410	1.466	1.525	1.586	1.649	1.715	1.784	1.855	1.929	2.006
42																					
43																					
44	**FINANCE ASSUMPTIONS																				
45	All Loans Thru Govt of Pak?	*	GOVT.FIN	0 =Project Gets Financing Benefits Directly																	
46	Maximum Funds Available in MILLION NOMINAL DOLLARS																				
47	Local Equity	*		0.0																	
48	Local Loans	*		25.0																	
49	Arab Fund Loan	*		50.0																	
50	US-AID Loan	*		125.0																	
51	Development Donors' Loans	*		200.0																	
52	Export Credit Loans	*		75.0																	
53	Government of Pakistan Loan	*		999.0																	

ICF INCORPORATED

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLARS **** ILLUSTRATIVE BASE CASE POWER PLANT using BASE CASE COAL MINE COSTS****

56																				
57		copyYEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
58	Annual Revenue -- Mil Constant DLR	calc	0.0	0.0	0.0	0.0	0.0	0.0	255.9	242.8	229.0	215.1	209.0	213.3	185.1	180.5	198.6	174.2	152.6	146.9
59	Constant Dollar cents / kwh Generated	calc	0.0	0.0	0.0	0.0	0.0	0.0	8.3	7.9	7.5	7.0	6.8	7.0	6.0	5.9	6.5	5.7	5.0	4.8
60																				
61	**Revenue Components																			
62	O & M Expense (incl G&A)	calc	0.0	0.0	0.0	0.0	0.0	0.0	18.9	18.4	18.0	17.5	17.2	16.8	16.5	16.1	15.8	15.6	15.3	15.1
63	Fuel Cost	calc	0.0	0.0	0.0	0.0	0.0	0.0	155.4	149.4	143.7	136.4	133.5	144.0	121.5	122.2	145.2	125.4	120.0	116.2
64	Workers Participation & Welfare Funds	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.4	1.4	1.4	1.4	1.3	1.3	0.6	0.6
65	IORA, Subsidy, & Other Import Duties	calc	0.2	0.5	3.2	15.6	6.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	Income Tax	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	Interest	calc	0.0	0.3	1.6	7.9	32.7	41.9	46.2	40.1	34.6	29.5	24.9	20.6	16.7	13.1	9.8	6.9	4.2	3.1
68	New Invest & Princ. Repay	calc	0.0	0.0	0.0	0.0	0.0	0.0	35.4	33.7	32.0	30.4	32.1	30.5	29.1	27.7	26.4	25.1	12.4	11.9
69	Return on Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	---		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71	= TOTAL (Constant $)	sum	0.2	0.8	4.8	25.5	38.9	44.0	255.9	242.8	229.0	215.1	209.0	213.3	185.1	180.5	198.6	174.2	152.6	146.9
72	==========																			
73																				
74	REVENUE -- NOMINAL DOLLAR (MIL)	calc	0.0	0.0	0.0	0.0	0.0	0.0	333.5	329.1	322.8	315.3	318.7	338.3	305.2	309.5	354.2	323.2	294.3	294.7
75	NOMINAL DOLLARS cents / kwh Generacalc		0.0	0.0	0.0	0.0	0.0	0.0	10.9	10.7	10.5	10.3	10.4	11.0	10.0	10.1	11.6	10.5	9.6	9.6

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLARS (mil)

								PRE-OPERATION		
77	Funds Provided By:	YR.REL	-6	-5	-4	-3	-2	-1	TOTAL $	% of Loc	% of Total
78	Local Equity (ex postponed ROE)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
79	Local Loans	calc	0.0	4.9	4.7	4.6	4.5	4.3	23.0	11%	3%
80	Gov't of Pakistan	calc	2.2	2.2	39.6	94.9	29.1	21.1	189.1	89%	29%
81	Unspecified Local	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
82	---		---	---	---	---	---	---	---		---
83	LOCAL TOTAL (in Mil DLR)	sum	2.2	7.0	44.4	99.5	33.6	25.5	212.1		32%

84 note: Local Funds Provided, when expressed in Dollars, may differ from the Assumed Maximum Available
85 since that constraint was implemented based on the Rupee/Dollar Exchange Rate in the first year.

86										% of For	% of Total
87	Arab Fund Loan	copy	0.0	0.0	12.5	12.5	12.5	12.5	50.0	11%	8%
88	US-AID Loan	copy	0.0	0.0	12.5	56.3	37.5	18.8	125.0	28%	19%
89	Development Donors' Loans	copy	0.0	4.0	16.0	90.0	60.0	30.0	200.0	44%	30%
90	Export Credit Loans	copy	0.4	1.3	8.8	42.1	16.6	5.7	75.0	17%	11%
91	Unspecified Foreign Loans	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
92	---		---	---	---	---	---	---	---		---
93	FOREIGN TOTAL	sum	0.4	5.3	49.8	200.9	126.6	67.0	450.0		68%
94	TOTAL INVESTED (Nom DLR)	sum	2.6	12.4	94.1	300.4	160.2	92.4	662.1		100%
95											
96	Local Funds Provided expressed in NOM RUPEE										
97	Local Equity in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
98	Local Loans in NOM RUP MIL	calc	0.0	83.1	83.1	83.1	83.1	83.1	415.5		
99	Gov't of Pakistan in NOM RUP MIL	calc	36.0	37.3	697.2	1718.0	542.0	404.7	3435.3		
100	Unspecified Local in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
101	---		---	---	---	---	---	---	---		
102	LOCAL TOTAL in NOM RUP MIL	sum	36.0	120.5	780.3	1801.1	625.2	487.8	3850.9		

103 ---

104				
105	Levelized Real Annuity cents / kwh	Disc. Rate	cents/kwh	PV REV	PV kwh
106	(For Illustrative comparison)	5.0%	5.17	$1,818	35170.6
107		7.0%	5.45	$1,382	25351.7

292

109 CAPITAL COSTS BY YEAR																				
110		copyYR.REF	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
111 Input $ Conversion Factor		*	1.00 (=Base Year Currency Index / Input Year Currency Index)																	
112 TYPE 1 : Unit 1 (w/ Common Facilities)																				
113 Local Sources (Constant $MIL)		copy	0.70	5.58	33.48	51.45	20.22	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)		copy	1.65	4.96	17.56	83.19	34.72	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115 Depreciable %		*	100.0%																	
116 Tax Depreciation -- Initial Yr	* DEPR.INIT		25.0%																	
117 Tax Deprec Rate (*Decl. Bal)	* DEPR.NORM		10.0%																	
118 Capital Required:																				
119 Local Sources -- NOM RUP MIL		calc	12.4	106.1	681.6	1121.0	471.3	118.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120 Foreign Sources--NOM DLR MIL		calc	1.7	5.3	19.6	96.4	41.8	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
121 Adds to Deprec Base NOM RUP MIL		calc	41	197	1326	2866	1250	378	0	0	0	0	0	0	0	0	0	0	0	0
122 Deprec.Expense (Initial)		calc	0.0	0.0	0.0	0.0	0.0	0.0	1439.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
123 Deprec.Expense (Normal)		(notcalc	0.0	0.0	0.0	0.0	0.0	0.0	575.8	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
124 Undepreciated Basis BeginYr		calc	0.0	40.6	237.5	1263.2	4129.0	5379.3	5757.8	3742.6	3368.3	3031.5	2728.3	2455.5	2209.9	1989.0	1790.1	1611.0	1449.9	1305.0
125 Import Duty & Sales Tax NOM RUP MIL		calc	3	9	34	174	78	26	0	0	0	0	0	0	0	0	0	0	0	0
126 ----------																				
127 TYPE 2 : Unit 2																				
128 Local Sources (Constant $MIL)		copy	0.00	0.00	11.93	23.32	11.18	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129 Foreign Sources (Constant $MIL)		copy	0.00	0.00	14.93	72.89	26.71	10.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130 Depreciable %		*	100.0%																	
131 Tax Depreciation -- Initial Yr	* DEPR.INIT		100.0%																	
132 Tax Deprec Rate (*Decl. Bal)	* DEPR.NORM		0.0%																	
133 Capital Required:																				
134 Local Sources -- NOM RUP MIL		calc	0.0	0.0	243.0	503.1	260.7	86.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
135 Foreign Sources--NOM DLR MIL		calc	0.0	0.0	16.6	84.4	32.2	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
136 Adds to Deprec Base NOM RUP MIL		calc	0.0	0.0	535.6	2036.7	860.0	335.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
137 Deprec.Expense (Initial)		calc	0	0	0	0	0	0	3768	0	0	0	0	0	0	0	0	0	0	0
138 Deprec.Expense (Normal)		(notcalc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr		calc	0	0	0	536	2577	3432	3768	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL		calc	0	0	29	153	60	25	0	0	0	0	0	0	0	0	0	0	0	0
141 ----------																				
142 SUM FOR ALL CAPITAL TYPES																				
143 Capital Required By Year:																				
144 Local Sources -- NOM RUP MIL		sum	12.4	106.1	924.6	1629.0	731.9	204.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145 Foreign Sources--NOM DLR MIL		sum	1.7	5.3	36.2	180.8	74.0	26.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146 Adds to Deprec Base NOM RUP MIL		sum	40.6	197.0	1561.3	4902.5	2110.4	713.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
147 Allowable Tax Deprec.Expense NOM RUP M		sum	0.0	0.0	0.0	0.0	0.0	0.0	5782.9	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
148 IORA, Subsidy, & Other Import DutiesNOM		sum	2.8	9.1	65.7	327.3	137.8	50.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
149 ==========																				

151	LOCAL EQUITY																				
152	Max Cash Invest-- NOM DLR MIL	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
155	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%												
156	Expected Rate of Return	*	20.0%																		
157	Repayment Period	*	30 (Starting in 1st year of Full Operation)																		
158	Repayment Type	*	Level Principal																		
159	EQUITY BALANCE (NOM RUP MIL)																				
160	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
161	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
163	Bal -- EOY (Principal Only)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
164	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	sum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
166	ROE Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
167	Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
169	---																				
170	LOCAL LOANS																				
171	Max Available in DLR MIL	copy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	calc	415.5	415.5	415.5	415.5	415.5	415.5	415.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
174	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%												
175	Interest Rate	*	14.0%																		
176	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
177	Repayment Type	*	Level Principal																		
178	LOAN BALANCE (NOM RUP MIL)																				
179	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	83.1	166.2	249.3	332.4	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0
180	+ Principal Borrowed	copy		0.0	83.1	83.1	83.1	83.1	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	0.0	0.0
182	Bal -- End Of Year (EOY)	calc	0.0	0.0	83.1	166.2	249.3	332.4	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0	0.0
183	Interest Due (Nom RUP)	calc		0.0	0.0	11.6	23.3	34.9	46.5	58.2	52.4	46.5	40.7	34.9	29.1	23.3	17.5	11.6	5.8	0.0	0.0
184	Remaining Available -- BOY	calc		415.5	415.5	332.4	249.3	166.2	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	calc	0.0	0.0	-83.1	-71.5	-59.8	-48.2	-36.6	99.7	93.9	88.1	82.3	76.5	70.6	64.8	59.0	53.2	47.4	0.0	0.0
186	---																				

188 Govt of Pakistan Loan																					
189 Max Available in DLR MIL	calc	999.0	999.0	999.0	999.0	999.0	999.0	999.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	calc	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	16604.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?	*	0.0 :No, Allocated as Needed																			
192 Draw Down Pattern (% of Max)	*V																				
193 Interest Rate	*	14.0%																			
194 Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
195 Repayment Type	*	Level Principal																			
196 LOAN BALANCE (NOM RUP MIL)																					
197 Bal -- Begining Of Year (BOY)	calc		0.0	36.0	73.4	770.6	2488.6	3030.6	3435.3	3091.8	2748.3	2404.7	2061.2	1717.7	1374.1	1030.6	687.1	343.5	0.0	0.0
198 + Principal Borrowed	copy		36.0	37.3	697.2	1718.0	542.0	404.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	343.5	343.5	343.5	343.5	343.5	343.5	343.5	343.5	343.5	343.5	0.0	0.0
200 Bal -- End Of Year (EOY)	calc	0.0	36.0	73.4	770.6	2488.6	3030.6	3435.3	3091.8	2748.3	2404.7	2061.2	1717.7	1374.1	1030.6	687.1	343.5	0.0	0.0	0.0
201 Interest Due (Nom RUP)	calc		0.0	5.0	10.3	107.9	348.4	424.3	480.9	432.9	384.8	336.7	288.6	240.5	192.4	144.3	96.2	48.1	0.0	0.0
202 Remaining Available -- BOY	calc		16604.7	16568.7	16531.4	15834.1	14116.2	13574.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	calc	0.0	-36.0	-32.3	-687.0	-1610.1	-193.6	19.6	824.5	776.4	728.3	680.2	632.1	584.0	535.9	487.8	439.7	391.6	0.0	0.0
204 ----------																					
205 UNSPECIFIED LOCAL LOAN																					
206 Interest Rate	*	14.0%																			
207 Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
208 Repayment Type	*	Level Principal																			
209 Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
210 + Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
213 Interest Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
214 Net Cash Flow to Unspec. Local Loan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
215 ==========																					

266

217	ARAB FUND LOAN																					
218	Max Available in NOM DLR MIL	copy		50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
220	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	25.0%	25.0%	25.0%	25.0%													
221	Interest Rate	*	9.0%																			
222	Repayment Period	*	20.0 (Starting in 1st year of Full Operation)																			
223	Repayment Type	*	Level Principal																			
224	LOAN BALANCE (Nom DLR)																					
225	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	12.5	25.0	37.5	50.0	47.5	45.0	42.5	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5
226	+ Principal Borrowed	copy		0.0	0.0	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
228	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	12.5	25.0	37.5	50.0	47.5	45.0	42.5	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5	20.0
229	Interest Due (Nom DLR)	calc	0.0	0.0	0.0	0.0	1.1	2.3	3.4	4.5	4.3	4.1	3.8	3.6	3.4	3.2	2.9	2.7	2.5	2.3	2.0
230	Remaining Available -- BOY	sum	0.0	50.0	50.0	50.0	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
231	Net Cash Flow to Arab Fund	calc	0.0	0.0	0.0	-12.5	-11.4	-10.3	-9.1	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.4	5.2	5.0	4.8	4.5
232																						
233																						
234	----------																					
235	FOREIGN LOAN 1 US-AID Loan																					
236	Max Available in NOM DLR MIL	copy		125.0	125.0	125.0	125.0	125.0	125.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
238	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	10.0%	45.0%	30.0%	15.0%													
239	Interest Rate	*	3.0%																			
240	Repayment Period	*	26 Starting in Year 5 (10 Year Grace Period)																			
241	Repayment Type	*	Level Principal																			
242	LOAN BALANCE (Nom DLR)																					
243	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	12.5	68.8	106.3	125.0	125.0	125.0	125.0	125.0	120.2	115.4	110.6	105.8	101.0	96.2	91.3
244	+ Principal Borrowed	copy		0.0	0.0	12.5	56.3	37.5	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
246	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	12.5	68.8	106.3	125.0	125.0	125.0	125.0	125.0	120.2	115.4	110.6	105.8	101.0	96.2	91.3	86.5
247	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.4	2.1	3.2	3.8	3.8	3.8	3.8	3.8	3.6	3.5	3.3	3.2	3.0	2.9	2.7
248	Remaining Available -- BOY	calc		125.0	125.0	125.0	112.5	56.3	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	Net Cash Flow to US-AID	calc	0.0	0.0	0.0	-12.5	-55.9	-35.4	-15.6	3.8	3.8	3.8	3.8	8.6	8.4	8.3	8.1	8.0	7.8	7.7	7.5
250	----------																					
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																					
252	Max Available in NOM DLR MIL	copy		200.0	200.0	200.0	200.0	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253	Draw Down Pattern Assumed?	*	1.0 :Yes, Fixed by Assumption																			
254	Draw Down Pattern (% of Max)	*V		0.0%	2.0%	8.0%	45.0%	30.0%	15.0%													
255	Interest Rate	*	9.0%																			
256	Repayment Period	*	12 (Starting in 1st year of Full Operation)																			
257	Repayment Type	*	Level Principal																			
258	LOAN BALANCE (Nom DLR)																					
259	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	4.0	20.0	110.0	170.0	200.0	183.3	166.7	150.0	133.3	116.7	100.0	83.3	66.7	50.0	33.3	16.7
260	+ Principal Borrowed	copy		0.0	4.0	16.0	90.0	60.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
262	Bal -- End Of Year (EOY)	calc	0.0	0.0	4.0	20.0	110.0	170.0	200.0	183.3	166.7	150.0	133.3	116.7	100.0	83.3	66.7	50.0	33.3	16.7	0.0
263	Interest Due (Nom DLR)	calc		0.0	0.0	0.4	1.8	9.9	15.3	18.0	16.5	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5
264	Remaining Available -- BOY	calc		200.0	200.0	196.0	180.0	90.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265	Net Cash Flow to Develop. Donors	calc	0.0	0.0	-4.0	-15.6	-88.2	-50.1	-14.7	34.7	33.2	31.7	30.2	28.7	27.2	25.7	24.2	22.7	21.2	19.7	18.2
266	----------																					

268	FOREIGN LOAN 3 -- EXPORT CREDITS																					
269	Max Available in DLR MIL	calc		75.0	75.0	75.0	75.0	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
271	Draw Down Pattern (% of Max)	*y		0.6%	1.8%	11.7%	56.2%	22.1%	7.6%													
272	Interest Rate	*	8.8%																			
273	Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
274	Repayment Type	*	Level Principal																			
275	LOAN BALANCE (Nom DLR)																					
276	Bal -- Begining Of Year (BOY)	calc		0.0	0.4	1.8	10.6	52.7	69.3	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0
277	+ Principal Borrowed	copy		0.4	1.3	8.8	42.1	16.6	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0	0.0
279	Bal -- End Of Year (EOY)	calc	0.0	0.4	1.8	10.6	52.7	69.3	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0	0.0
280	Interest Due (Nom DLR)	calc		0.0	0.0	0.2	0.9	4.6	6.1	6.6	5.9	5.3	4.6	4.0	3.3	2.6	2.0	1.3	0.7	0.0	0.0
281	Remaining Available -- BOY	calc		75.0	74.6	73.2	64.4	22.3	5.7	-75.0	-67.5	-60.0	-52.5	-45.0	-37.5	-30.0	-22.5	-15.0	-7.5	0.0	0.0
282	Net Cash Flow to Export Credits	calc	0.0	-0.4	-1.3	-8.6	-41.2	-11.9	0.4	14.1	13.4	12.8	12.1	11.5	10.8	10.1	9.5	8.8	8.2	0.0	0.0
283	----------																					
284	UNSPECIFIED FOREIGN LOAN																					
285	Max Available in DLR MIL	calc		0.0	0.0	0.0	0.0	0.0														
286	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
287	Draw Down Pattern (% of Max)	*y		0.0%	0.0%	0.0%	0.0%	0.0%														
288	Interest Rate	*	15.0%																			
289	Repayment Period	*	5 (Starting in 1st year of Full Operation)																			
290	Repayment Type	*	Level Principal																			
291	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296	Net Cash Flow to Unspec. Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297	----------																					
298	Total Interest Exp: NOM RUP	calc		0.0	5.7	31.0	207.7	734.4	1006.5	1186.7	1103.1	1017.3	929.0	838.4	741.8	642.4	540.0	434.4	325.5	213.1	168.9
299	Total ROE : NOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
300	O&M Local : NOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	246.9	264.2	282.7	302.5	323.7	346.3	370.6	396.5	424.3	454.0	485.7	519.7
301	O&M Foreign : NOM DOLLAR	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.3
302	G&A Local : NOM RUP	calc		0.0	0.0	0.0	0.0	0.0	0.0	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4
303	G&A Foreign : NOM DOLLAR	calc		0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
304																						
305	Summary of Fixed Amounts of Financing																					
306	Local Sources -- NOM RUP MIL																					
307	Local Equity	calc		0.0	0.0	0.0	0.0	0.0	0.0													
308	Local Loans	calc		0.0	83.1	83.1	83.1	83.1	83.1													
309	Gov't of Pakistan	calc		0.0	0.0	0.0	0.0	0.0	0.0													
310	TOTAL LOCAL -- NOM RUP	sum		0.0	83.1	83.1	83.1	83.1	83.1													
311	Foreign Sources--NOM DLR																					
312	Arab Fund Loan	calc		0.0	0.0	12.5	12.5	12.5	12.5													
313	Loan 1 -- US-AID	calc		0.0	0.0	12.5	56.3	37.5	18.8													
314	Loan 2 -- Development Donors	calc		0.0	4.0	16.0	90.0	60.0	30.0													
315	Loan 3 -- Export Credits	calc		0.4	1.3	8.8	42.1	16.6	5.7													
316	Unspecified Foreign	calc		0.0	0.0	0.0	0.0	0.0	0.0													
317	TOTAL FOREIGN -- NOM DLR	sum		0.4	-5.3	49.8	200.9	126.6	67.0													
318	==========																					

320	TOTAL CAPITAL NEEDS																			
321	Local Sources -- NOM RUP																			
322	Investment costs	copy	12	106	925	1629	732	205	0	0	0	0	0	0	0	0	0	0	0	0
323	Interest & ROE	calc	0	5	22	131	383	471	539	485	431	377	323	270	216	162	108	54	0	0
324	Principal Repayment (D + E)	calc	0	0	0	0	0	0	385	385	385	385	385	385	385	385	385	385	0	0
325	Pre-Op Import Duty	calc	3	9	64	327	138	51	0	0	0	0	0	0	0	0	0	0	0	0
326	Pre-Op Royalty	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
327	Pre-Op O&M - Local	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328	Foreign Needs Thru Govt of Pak(in Rup	calc	20.8	0.2	-229.8	-286.4	-627.9	-238.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
329	Total Needs	sum	36	120	780	1801	625	488	924	870	816	762	709	655	601	547	493	439	0	0
330	- Fixed Amounts Assumed	copy	0	83	83	83	83	83	0	0	0	0	0	0	0	0	0	0	0	0
331	LOCAL To Be Allocated (NOM RUP)	sum NEED.RUP	36	37	697	1718	542	405	924	870	816	762	709	655	601	547	493	439	0	0
332	Foreign Sources--NOM DLR																			
333	Investment costs	copy	2	5	36	181	74	27	0	0	0	0	0	0	0	0	0	0	0	0
334	Interest & ROE	calc	0	0	1	4	19	28	33	30	28	26	23	21	18	16	13	11	8	6
335	Principal Repayment (D + E)	calc	0	0	0	0	0	0	27	27	27	27	31	31	31	31	31	31	24	24
336	Pre-Op O&M - Foreign	calc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337	Unfinanced Local Needs(in Dollars)	set to 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
338	Total Needs	sum	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
339	- Fixed Amounts Assumed	copy	0	5	50	201	127	67	0	0	0	0	0	0	0	0	0	0	0	0
340	FOREIGN To Be Allocated (NOM DLR)	sum NEED.DLR	1	0	-13	-16	-34	-12	60	57	55	52	55	52	50	47	45	42	32	30
341	CAPITAL AVAILABLE FOR ALLOCATION (Begin Yr)																			
342	Local Sources -- NOM RUP																			
343	Local Equity	calc	0	0	0	0	0	0												
344	Local Loans	calc	0	0	0	0	0	0												
345	Gov't of Pakistan	calc	16605	16569	16531	15834	14116	13574												
346	TOTAL LOCAL : NOM RUP	calcAVAIL.RUP	16605	16569	16531	15834	14116	13574												
347	Foreign Sources--NOM DLR																			
348	Arab Fund Loan	calc	0	0	0	0	0	0												
349	Loan 1 -- US-AID	calc	0	0	0	0	0	0												
350	Loan 2 -- Development Donors	calc	0	0	0	0	0	0												
351	Loan 3 -- Export Credits	calc	0	0	0	0	0	0												
352	TOTAL FOREIGN : NOM DLR	calcAVAIL.DLR	0	0	0	0	0	0												
353	Allocation FACTOR -- LOCAL	calc	0.00	0.00	0.04	0.11	0.04	0.03												
354	Allocation FACTOR -- FOREIGN	calc	0.00	0.00	0.00	0.00	0.00	0.00												
355	SOURCES OF CAPITAL -- BY YEAR																			
356	Local Sources -- NOM RUP																			
357	Local Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0												
358	Local Loans	calc	0.0	83.1	83.1	83.1	83.1	83.1												
359	Pakistan Gov't	calc	36.0	37.3	697.2	1718.0	542.0	404.7												
360	Unspecified Local	calc	0.0	0.0	0.0	0.0	0.0	0.0												
361	Local Needs - Local Capital (NOM RUP)	calc	-20.8	-0.2	229.8	286.4	627.9	238.5	924.2	870.3	816.4	762.5	708.6	654.6	600.7	546.8	492.9	439.0	0.0	0.0
362																				
363	Foreign Sources--Nom DLR																			
364	Arab Fund Loan	calc	0.0	0.0	12.5	12.5	12.5	12.5												
365	Loan 1 -- US-AID	calc	0.0	0.0	12.5	56.3	37.5	18.8												
366	Loan 2 -- Development Donors	calc	0.0	4.0	16.0	90.0	60.0	30.0												
367	Loan 3 -- Export Credits	calc	0.4	1.3	8.8	42.1	16.6	5.7												
368	Unspecified Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0												
369	ForeignNeeds - ForeignCapital(NOM $)	calc	1.3	0.0	-13.1	-15.8	-33.7	-12.4	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
370	TOTAL REQUIRED FROM REV-- NOM RUP	calc	0.0	0.0	0.0	0.0	0.0	0.0	2097.5	2029.1	1958.8	1886.6	1918.7	1842.2	1763.4	1682.2	1598.4	1512.0	841.2	815.1

372	CAPITAL SUMMARY IN NOM DOLLARS																				
373	Local + Foreign Needs in $		Sum(0disrt)																		
374	Investment costs	calc	524.1	2.4	11.5	88.7	270.8	113.3	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
375	Interest & ROE	calc	510.1	0.0	0.3	1.8	11.5	39.4	52.5	60.2	54.4	48.7	43.3	38.0	32.6	27.5	22.4	17.5	12.8	8.1	6.3
376	Principal Repayment (D + E)	calc	622.4	0.0	0.0	0.0	0.0	0.0	0.0	46.2	45.7	45.1	44.6	48.9	48.4	47.9	47.5	47.0	46.6	24.0	24.0
377	Pre-Op Import Duty	calc	32.5	0.2	0.5	3.6	18.1	7.4	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Pre-Op Royalty	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
379	Pre-Op O&M	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380	Total Needs ($)	sum	1689.2	2.6	12.4	94.1	300.4	160.2	92.4	106.4	100.0	93.9	87.9	86.9	81.1	75.4	69.9	64.6	59.4	32.1	30.2
381	Needs -- Local in $	calc	523.0	2.2	7.0	44.4	99.5	33.6	25.5	46.9	42.9	39.1	35.5	32.1	28.8	25.7	22.7	19.9	17.2	0.0	0.0
382	Needs -- Foreign in $	copy	1092.4	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
383	- Adj for Cross-Finance	calc	73.8	-1.3	0.0	13.1	15.8	33.7	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
384	= Total Needs ($)	sum	1689.2	2.6	12.4	94.1	300.4	160.2	92.4	106.4	100.0	93.9	87.9	86.9	81.1	75.4	69.9	64.6	59.4	32.1	30.2
385	Sources -- Local in $	sum	596.8	0.9	7.0	57.4	115.3	67.3	37.9	46.9	42.9	39.1	35.5	32.1	28.8	25.7	22.7	19.9	17.2	0.0	0.0
386	Sources -- Foreign in $	sum	1092.4	1.7	5.3	36.7	185.1	92.9	54.5	59.5	57.1	54.7	52.4	54.8	52.3	49.7	47.2	44.7	42.1	32.1	30.2
387	= Intal Sources ($)	sum	1689.2	2.6	12.4	94.1	300.4	160.2	92.4	106.4	100.0	93.9	87.9	86.9	81.1	75.4	69.9	64.6	59.4	32.1	30.2
388	Needs - Sources (s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
389	CASH FLOW SUMMARY -- CONSTANT DOLLARS																				
390	Earnings Before Interest & Taxes	calc		-0.2	-0.5	-3.2	-15.6	-6.1	-2.1	81.6	73.8	66.6	59.9	57.0	51.1	45.7	40.8	36.2	32.0	16.6	15.1
391	- Income Tax	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
392	- Capital Invested	calc		2.4	10.8	79.7	233.8	94.0	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393	= Net Cash Flow to Investors	calc		-2.5	-11.2	-82.9	-249.4	-100.2	-31.8	81.6	73.8	66.6	59.9	57.0	51.1	45.7	40.8	36.2	32.0	16.6	15.1
394	Program Check:Cash FlowDelta(s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
395	Program Check: NPV to Investors	test	0.0																		
396	==========																				

270

ICF INCORPORATED

398 REVENUE REQUIRED TO BREAK EVEN	copy	YEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
399 NOMINAL RUPEES MIL	PV@	14.0%																		
400 O & M Expense (incl. G&A)	calc	2,245	0.0	0.0	0.0	0.0	0.0	0.0	484.7	505.7	528.2	552.3	578.0	605.4	634.8	666.1	699.6	735.4	773.7	814.6
401 Coal Cost	calc	16,314	0.0	0.0	0.0	0.0	0.0	0.0	3993.2	4107.7	4212.2	4291.6	4494.6	5189.5	4684.9	5041.0	6410.3	5922.3	6066.7	6283.3
402 Workers Participation & Welfare Funds	copy	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.7	35.9	38.8	47.9	50.7	53.4	56.0	58.4	60.8	28.7	30.6
403 Interest	copy	3,158	0.0	5.7	31.0	207.7	734.4	1006.5	1186.7	1103.1	1017.3	929.0	838.4	741.8	642.4	540.0	434.4	325.5	213.1	168.9
404 IORA, Subsidy, & Other Import Duties	copy	341	2.8	9.1	63.7	327.3	137.8	50.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
405 New Invest & Princ. Repay	copy	2,673	0.0	0.0	0.0	0.0	0.0	0.0	910.8	926.0	941.6	957.6	1080.3	1100.4	1121.0	1142.2	1164.1	1186.5	628.1	646.2
406 Return on Equity	copy	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
407 Income Tax	calc	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
408 ---------			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
409 = REVENUE (NOM RUP)	sum		0.0	0.0	0.0	0.0	0.0	0.0	6575.3	6675.2	6735.1	6769.4	7039.2	7687.8	7136.5	7445.2	8766.8	8230.6	7710.3	7943.6
410																				
411 Tax Calculation (note: Carry Forward does not separately carry forward depreciation, nor does it check on 6 year max)																				
412 Carry-Forward Balance -- BOY	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
413 Carry-Forward USED (ADDED)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
414																				
415 Revenue (NOM RUP)	copy		0.0	0.0	0.0	0.0	0.0	0.0	6575.3	6675.2	6735.1	6769.4	7039.2	7687.8	7136.5	7445.2	8766.8	8230.6	7710.3	7943.6
416 - O & M (inc. G&A)	copy		0.0	0.0	0.0	0.0	0.0	0.0	484.7	505.7	528.2	552.3	578.0	605.4	634.8	666.1	699.6	735.4	773.7	814.6
417 - Coal Cost	copy		0.0	0.0	0.0	0.0	0.0	0.0	3993.2	4107.7	4212.2	4291.6	4494.6	5189.5	4684.9	5041.0	6410.3	5922.3	6066.7	6283.3
418 - Interest	copy		0.0	5.7	31.0	207.7	734.4	1006.5	1186.7	1103.1	1017.3	929.0	838.4	741.8	642.4	540.0	434.4	325.5	213.1	168.9
419 - IORA, Subsidy, & Other Import Duties	copy		2.8	9.1	63.7	327.3	137.8	50.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
420 - Tax Depreciation	copy		0.0	0.0	0.0	0.0	0.0	0.0	5782.9	374.3	336.8	303.1	272.8	245.5	221.0	198.9	179.0	161.1	145.0	130.5
421 = Taxable Income BEFORE Depletion	sum		-2.8	-14.8	-94.7	-535.0	-872.2	-1057.5	-4872.1	584.4	640.6	693.3	855.4	905.5	953.4	999.3	1043.5	1086.3	511.8	546.3
422 - Depletion Allowance	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	116.9	128.1	138.7	171.1	181.1	190.7	199.9	208.7	217.3	102.4	109.3
423 = Taxable Income BEFORE Worker Funds	sum		-2.8	-14.8	-94.7	-535.0	-872.2	-1057.5	-4872.1	467.5	512.5	554.6	684.3	724.4	762.7	799.4	834.8	869.0	409.4	437.0
424 - Workers Partic. & Welfare Funds	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.7	35.9	38.8	47.9	50.7	53.4	56.0	58.4	60.8	28.7	30.6
425 = Taxable Income BEFORE Carry Forward	calc		-2.8	-14.8	-94.7	-535.0	-872.2	-1057.5	-4872.1	467.5	512.5	554.6	684.3	724.4	762.7	799.4	834.8	869.0	409.4	437.0
426 - Carry Forward Used	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427 = Taxable Income	sum		-2.8	-14.8	-94.7	-535.0	-872.2	-1057.5	-4872.1	467.5	512.5	554.6	684.3	724.4	762.7	799.4	834.8	869.0	409.4	437.0
428 Tax = Tax * Taxable Income	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
429 Convergence Gap	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

271

1 FINANCIAL MODEL 2 (LAK2b, 8/25)
2
3
4
5 **PROJECT DESCRIPTION

6 Electricity Generated Mil kwh	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	3066	0.00
7 Coal Consumption	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	0.0
8 Year of Full Operation																			
9 Project Life (#Years after 1st Full Op.																			
10																			
11																			
12 **COST ASSUMPTIONS in MIL Constant DLR																			
13 Relative Year	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14 Unit 1 w/ Common --Local	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 Unit 1 w/ Common --Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 Unit 2 --Local	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17 Unit 2 --Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 Total Capital Costs (MIL Constant DLR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19 O&M Expenses --Local	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	0.00
20 O&M Expenses --Foreign	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	0.00
21 Royalty Rate RUP/TON																			
22 Excise Tax RUP/TON																			
23 Workers Participation Fund(%of PBT)																			
24 Workers Welfare Fund(%of PBT)																			
25 Coal Cost Constant Dollar / Tonne	33.62	33.09	32.60	29.93	29.51	29.12	28.75	28.41	28.61	28.32	28.05	27.79	27.56	25.36	25.16	24.98	24.81	15.59	0.00
26 G&A and Insurance(%ofTotCap)																			
27																			
28 **TAX ASSUMPTIONS																			
29 IORA & Subsidy (% of Foreign Expenses)																			
30 Other Import Duties & Sales Taxes																			
31 Income Tax Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32 Depletion Rate																			
33																			
34 **ECONOMIC ASSUMPTIONS																			
35 Calendar Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
36 Inflation Rate -- Rupees	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
37 Inflation Rate -- Dollars	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
38 Exchange Rate (RUP/DLR)	27.7	28.5	29.4	30.2	31.1	32.0	32.9	33.8	34.8	35.8	36.9	37.9	39.0	40.1	41.3	42.5	43.7	45.0	46.3
39 Base Year for Constant DLR																			
40 Inflation Index -- Rupees	3.617	3.870	4.141	4.430	4.741	5.072	5.427	5.807	6.214	6.649	7.114	7.612	8.145	8.715	9.325	9.978	10.677	11.424	12.224
41 Inflation Index -- Dollars	2.087	2.170	2.257	2.347	2.441	2.539	2.640	2.746	2.856	2.970	3.089	3.212	3.341	3.474	3.613	3.758	3.908	4.064	4.227
42																			
43																			
44 **FINANCE ASSUMPTIONS																			
45 All Loans Thru Govt of Pak?																			
46 Maximum Funds Available in MILLION NOMI																			
47 Local Equity																			
48 Local Loans																			
49 Arab Fund Loan																			
50 US-AID Loan																			
51 Development Donors' Loans																			
52 Export Credit Loans																			
53 Government of Pakistan Loan																			

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLAR
56

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
57																			
58 Annual Revenue -- MIL Constant DLR	111.3	109.3	107.4	99.7	98.0	96.5	95.1	93.7	93.0	91.9	90.9	90.0	89.1	83.0	82.3	81.6	81.0	55.8	0.0
59 Constant Dollar cents / kwh Generated	3.6	3.6	3.5	3.3	3.2	3.1	3.1	3.1	3.0	3.0	3.0	2.9	2.9	2.7	2.7	2.7	2.6	1.8	0.0
60																			
61 **Revenue Components																			
62 O & M Expense (incl G&A)	14.8	14.6	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.2	13.1	13.0	12.9	12.8	12.7	12.6	12.5	0.0
63 Fuel Cost	90.8	89.3	88.0	80.8	79.7	78.6	77.6	76.7	77.3	76.5	75.7	75.0	74.4	68.5	67.9	67.4	67.0	42.1	0.0
64 Workers Participation & Welfare Funds	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
65 IQRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66 Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67 Interest	2.1	1.9	1.6	1.4	1.2	1.0	0.8	0.7	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0
68 New Invest & Princ. Repay	3.5	3.4	3.2	3.1	3.0	2.9	2.8	2.7	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.2	0.0
69 Return on Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70 ---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71 = TOTAL (Constant $)	111.3	109.3	107.4	99.7	98.0	96.5	95.1	93.7	93.0	91.9	90.9	90.0	89.1	83.0	82.3	81.6	81.0	55.8	0.0
72 ==========																			
73																			
74 REVENUE -- NOMINAL DOLLAR (MIL)	232.2	237.1	242.4	233.9	239.3	245.0	251.0	257.4	265.4	272.9	280.8	289.1	297.8	288.3	297.2	306.6	316.4	226.9	0.0
75 NOMINAL DOLLARS cents / kwh Genera	7.6	7.7	7.9	7.6	7.8	8.0	8.2	8.4	8.7	8.9	9.2	9.4	9.7	9.4	9.7	10.0	10.3	7.4	0.0
76 CAPITALIZATION SUMMARY-- NOMINAL DOLLA																			
77 Funds Provided By:																			
78 Local Equity (ex postponed ROE)																			
79 Local Loans																			
80 Gov't of Pakistan																			
81 Unspecified Local																			
82 ---																			
83 LOCAL TOTAL (in Mil DLR)																			
84 note: Local Funds Provided, when exp																			
85 since that constraint was implemen																			
86																			
87 Arab Fund Loan																			
88 US-AID Loan																			
89 Development Donors' Loans																			
90 Export Credit Loans																			
91 Unspecified Foreign Loans																			
92 ---																			
93 FOREIGN TOTAL																			
94 TOTAL INVESTED (Nom DLR)																			
95																			
96 Local Funds Provided expressed in NOM																			
97 Local Equity in NOM RUP MIL																			
98 Local Loans in NOM RUP MIL																			
99 Gov't of Pakistan in NOM RUP MIL																			
100 Unspecified Local in NOM RUP MIL																			
101 ---																			
102 LOCAL TOTAL in NOM RUP MIL																			
103 ----------																			
104																			
105 Levelized Real Annuity cents / kwh																			
106 (For Illustrative comparison)																			
107																			

272

109 CAPITAL COSTS BY YEAR

110	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
111 Input $ Conversion Factor																			
112 TYPE 1 : Unit 1 (w/ Common Facilities)																			
113 Local Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115 Depreciable %																			
116 Tax Depreciation -- Initial Yr																			
117 Tax Deprec Rate (%Decl. Bal)																			
118 Capital Required:																			
119 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
121 Adds to Deprec Base NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122 Deprec.Expense (Initial)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
123 Deprec.Expense (Normal) (not	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
124 Undepreciated Basis BeginYr	1174.5	1057.0	951.3	856.2	770.6	693.5	624.2	561.7	505.6	455.0	409.5	368.6	331.7	298.5	268.7	241.8	217.6	195.9	0.0
125 Import Duty & Sales Tax NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
126 ----------																			
127 TYPE 2 : Unit 2																			
128 Local Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129 Foreign Sources (Constant $MIL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130 Depreciable %																			
131 Tax Depreciation -- Initial Yr																			
132 Tax Deprec Rate (%Decl. Bal)																			
133 Capital Required:																			
134 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
135 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
136 Adds to Deprec Base NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
137 Deprec.Expense (Initial)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138 Deprec.Expense (Normal) (not	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141 ----------																			
142 SUM FOR ALL CAPITAL TYPES																			
143 Capital Required By Year:																			
144 Local Sources -- NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145 Foreign Sources--NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146 Adds to Deprec Base NOM RUP MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
147 Allowable Tax Deprec.Expense NOM RUP M	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
148 IQRA, Subsidy, & Other Import DutiesNOM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
149 ==========																			

151	LOCAL EQUITY																		
152	Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?																			
155	Draw Down Pattern (% of Max)																			
156	Expected Rate of Return																			
157	Repayment Period																			
158	Repayment Type																			
159	EQUITY BALANCE (NOM RUP MIL)																			
160	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
161	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
163	Bal -- EOY (Principal Only)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
164	+ Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
166	ROE Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
167	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
169	----------																			
170	LOCAL LOANS																			
171	Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?																			
174	Draw Down Pattern (% of Max)																			
175	Interest Rate																			
176	Repayment Period																			
177	Repayment Type																			
178	LOAN BALANCE (NOM RUP MIL)																			
179	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	----------																			

188 Govt of Pakistan Loan																			
189 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?																			
192 Draw Down Pattern (% of Max)																			
193 Interest Rate																			
194 Repayment Period																			
195 Repayment Type																			
196 LOAN BALANCE (NOM RUP MIL)																			
197 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204 ----------																			
205 UNSPECIFIED LOCAL LOAN																			
206 Interest Rate																			
207 Repayment Period																			
208 Repayment Type																			
209 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
210 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
213 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
214 Net Cash Flow to Unspec. Local Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
215 ==========																			

ICF INCORPORATED

217	ARAB FUND LOAN																		
218	Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?																		
220	Draw Down Pattern (% of Max)																		
221	Interest Rate																		
222	Repayment Period																		
223	Repayment Type																		
224	LOAN BALANCE (Nom DLR)																		
225	Bal -- Begining Of Year (BOY)	20.0	17.5	15.0	12.5	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
226	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227	- Principal Repaid	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
228	Bal -- End Of Year (EOY)	17.5	15.0	12.5	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
229	Interest Due (Nom DLR)	1.8	1.6	1.4	1.1	0.9	0.7	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
231	Net Cash Flow to Arab Fund	4.3	4.1	3.9	3.6	3.4	3.2	3.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
232																			
233																			
234	----------																		
235	FOREIGN LOAN 1 US-AID Loan																		
236	Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Draw Down Pattern Assumed?																		
238	Draw Down Pattern (% of Max)																		
239	Interest Rate																		
240	Repayment Period																		
241	Repayment Type																		
242	LOAN BALANCE (Nom DLR)																		
243	Bal -- Begining Of Year (BOY)	86.5	81.7	76.9	72.1	67.3	62.5	57.7	52.9	48.1	43.3	38.5	33.7	28.8	24.0	19.2	14.4	9.6	4.8	0.0
244	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245	- Principal Repaid	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0.0
246	Bal -- End Of Year (EOY)	81.7	76.9	72.1	67.3	62.5	57.7	52.9	48.1	43.3	38.5	33.7	28.8	24.0	19.2	14.4	9.6	4.8	0.0	0.0
247	Interest Due (Nom DLR)	2.6	2.5	2.3	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
248	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	Net Cash Flow to US-AID	7.4	7.3	7.1	7.0	6.8	6.7	6.5	6.4	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
250	----------																		
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																		
252	Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253	Draw Down Pattern Assumed?																		
254	Draw Down Pattern (% of Max)																		
255	Interest Rate																		
256	Repayment Period																		
257	Repayment Type																		
258	LOAN BALANCE (Nom DLR)																		
259	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
262	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
263	Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
264	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265	Net Cash Flow to Develop. Donors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
266	----------																		

268 FOREIGN LOAN 3 -- EXPORT CREDITS																			
269 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?																			
271 Draw Down Pattern (% of Max)																			
272 Interest Rate																			
273 Repayment Period																			
274 Repayment Type																			
275 LOAN BALANCE (Nom DLR)																			
276 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283 ----------																			
284 UNSPECIFIED FOREIGN LOAN																			
285 Max Available in DLR MIL																			
286 Draw Down Pattern Assumed?																			
287 Draw Down Pattern (% of Max)																			
288 Interest Rate																			
289 Repayment Period																			
290 Repayment Type																			
291 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																			
298 Total Interest Exp: NOM RUP	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
299 Total ROE : NOM RUP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
300 O&M Local : NOM RUP	556.1	595.1	636.7	681.3	729.0	780.0	834.6	893.0	955.5	1022.4	1094.0	1170.6	1252.5	1340.2	1434.0	1534.4	1641.8	1756.7	0.0
301 O&M Foreign : NOM DOLLAR	3.4	3.5	3.7	3.8	4.0	4.1	4.3	4.5	4.7	4.8	5.0	5.2	5.5	5.7	5.9	6.1	6.4	6.6	0.0
302 G&A Local : NOM RUP	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	166.4	0.0
303 G&A Foreign : NOM DOLLAR	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	0.0
304																			
305 Summary of Fixed Amounts of Financing																			
306 Local Sources -- NOM RUP MIL																			
307 Local Equity																			
308 Local Loans																			
309 Gov't of Pakistan																			
310 TOTAL LOCAL -- NOM RUP																			
311 Foreign Sources--NOM DLR																			
312 Arab Fund Loan																			
313 Loan 1 -- US-AID																			
314 Loan 2 -- Development Donors																			
315 Loan 3 -- Export Credits																			
316 Unspecified Foreign																			
317 TOTAL FOREIGN -- NOM DLR																			
318 ==========																			

320 TOTAL CAPITAL NEEDS																			
321 Local Sources -- NOM RUP																			0.0
322 Investment costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
323 Interest & ROE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
324 Principal Repayment (D + E)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325 Pre-Op Import Duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
326 Pre-Op Royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
327 Pre-Op O&M - Local	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328 Foreign Needs Thru Govt of Pak(in Rup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
329 Total Needs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
330 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
331 LOCAL To Be Allocated (NOM RUP)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332 Foreign Sources--NOM DLR																			
333 Investment costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
334 Interest & ROE	4	4	4	3	3	3	2	2	1	1	1	1	1	1	1	0	0	0	0
335 Principal Repayment (D + E)	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	5	5	0
336 Pre-Op O&M - Foreign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337 Unfinanced Local Needs(in Dollars)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
338 Total Needs	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
339 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
340 FOREIGN To Be Allocated (NOM DLR)	12	11	11	11	10	10	9	9	6	6	6	6	6	6	5	5	5	5	0
341 CAPITAL AVAILABLE FOR ALLOCATION (Begin																			
342 Local Sources -- NOM RUP																			
343 Local Equity																			
344 Local Loans																			
345 Gov't of Pakistan																			
346 TOTAL LOCAL : NOM RUP																			
347 Foreign Sources--NOM DLR																			
348 Arab Fund Loan																			
349 Loan 1 -- US-AID																			
350 Loan 2 -- Development Donors																			
351 Loan 3 -- Export Credits																			
352 TOTAL FOREIGN : NOM DLR																			
353 Allocation FACTOR -- LOCAL																			
354 Allocation FACTOR -- FOREIGN																			
355 SOURCES OF CAPITAL -- BY YEAR																			
356 Local Sources -- NOM RUP																			
357 Local Equity																			
358 Local Loans																			
359 Pakistan Gov't																			
360 Unspecified Local																			
361 Local Needs - Local Capital (NOM RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
362																			
363 Foreign Sources--Nom DLR																			
364 Arab Fund Loan																			
365 Loan 1 -- US-AID																			
366 Loan 2 -- Development Donors																			
367 Loan 3 -- Export Credits																			
368 Unspecified Foreign																			
369 ForeignNeeds - ForeignCapital(NOM $)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
370 TOTAL REQUIRED FROM REV-- NOM RUP	324.6	323.4	321.9	320.0	317.8	315.1	312.1	308.6	217.6	218.7	219.7	220.6	221.3	221.9	222.3	222.6	222.8	222.7	0.0

372 CAPITAL SUMMARY IN MOM DOLLARS																			
373 Local + Foreign Needs in $																			
374 Investment costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
375 Interest & ROE	4.4	4.0	3.7	3.3	2.9	2.6	2.2	1.8	1.4	1.3	1.2	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
376 Principal Repayment (D + E)	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0.0
377 Pre-Op Import Duty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378 Pre-Op Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
379 Pre-Op O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
380 Total Needs ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
381 Needs -- Local in $	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382 Needs -- Foreign in $	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
383 - Adj for Cross-Finance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
384 = Total Needs ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
385 Sources -- Local in $	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
386 Sources -- Foreign in $	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
387 = Total Sources ($)	11.7	11.3	11.0	10.6	10.2	9.9	9.5	9.1	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.2	5.1	5.0	0.0
388 Needs - Sources (s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
389 CASH FLOW SUMMARY -- CONSTANT DOLLARS																			
390 Earnings Before Interest & Taxes	5.6	5.2	4.9	4.5	4.2	3.9	3.6	3.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	0.0
391 - Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
392 - Capital Invested	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
393 = Net Cash Flow to Investors	5.6	5.2	4.9	4.5	4.2	3.9	3.6	3.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	0.0
394 Program Check:Cash FlowDelta(s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
395 Program Check: NPV to Investors																			
396 ==========																			

398 REVENUE REQUIRED TO BREAK EVEN	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
399 NOMINAL RUPEES MIL																			
400 O & M Expense (incl. G&A)	858.3	905.1	955.0	1008.4	1065.5	1126.5	1191.8	1261.6	1336.1	1415.9	1501.2	1592.3	1689.8	1794.1	1905.5	2024.7	2152.2	2288.5	0.0
401 Coal Cost	5252.5	5531.6	5830.6	5728.7	6043.1	6379.9	6740.9	7127.8	7680.7	8133.9	8619.6	9140.1	9697.9	9546.7	10136.1	10767.6	11444.2	7691.6	0.0
402 Workers Participation & Welfare Funds	5.1	6.1	7.1	8.0	8.9	9.7	10.6	11.3	6.9	7.5	8.1	8.6	9.2	9.7	10.2	10.7	11.2	1.2	0.0
403 Interest	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
404 IGRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
405 New Invest & Princ. Repay	202.7	208.5	214.5	220.7	227.1	233.6	240.4	247.3	167.4	172.2	177.2	182.3	187.5	193.0	198.5	204.3	210.1	216.2	0.0
406 Return on Equity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
407 Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
408 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
409 = REVENUE (NOM RUP)	6440.5	6766.1	7114.6	7065.1	7435.2	7831.4	8255.4	8709.3	9241.4	9776.1	10348.6	10961.7	11618.2	11572.3	12274.2	13025.7	13830.3	10204.1	0.0
410																			
411 Tax Calculation (note: Carry Forward doe																			
412 Carry-Forward Balance -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
413 Carry-Forward USED (ADDED)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
414																			
415 Revenue (NOM RUP)	6440.5	6766.1	7114.6	7065.1	7435.2	7831.4	8255.4	8709.3	9241.4	9776.1	10348.6	10961.7	11618.2	11572.3	12274.2	13025.7	13830.3	10204.1	0.0
416 - O & M (inc. G&A)	858.3	905.1	955.0	1008.4	1065.5	1126.5	1191.8	1261.6	1336.1	1415.9	1501.2	1592.3	1689.8	1794.1	1905.5	2024.7	2152.2	2288.5	0.0
417 - Coal Cost	5252.5	5531.6	5830.6	5728.7	6043.1	6379.9	6740.9	7127.8	7680.7	8133.9	8619.6	9140.1	9697.9	9546.7	10136.1	10767.6	11444.2	7691.6	0.0
418 - Interest	121.9	114.9	107.4	99.3	90.7	81.5	71.7	61.3	50.2	46.5	42.5	38.3	33.8	28.9	23.8	18.4	12.6	6.5	0.0
419 - IGRA, Subsidy, & Other Import Duties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
420 - Tax Depreciation	117.4	105.7	95.1	85.6	77.1	69.4	62.4	56.2	50.6	45.5	41.0	36.9	33.2	29.9	26.9	24.2	21.8	195.9	0.0
421 = Taxable Income BEFORE Depletion	90.3	108.9	126.5	143.1	158.9	174.0	188.5	202.5	123.8	134.2	144.3	154.1	163.5	172.8	181.8	190.8	199.6	21.5	0.0
422 - Depletion Allowance	18.1	21.8	25.3	28.6	31.8	34.8	37.7	40.5	24.8	26.8	28.9	30.8	32.7	34.6	36.4	38.2	39.9	4.3	0.0
423 = Taxable Income BEFORE Worker Funds	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	0.0
424 - Workers Partic. & Welfare Funds	5.1	6.1	7.1	8.0	8.9	9.7	10.6	11.3	6.9	7.5	8.1	8.6	9.2	9.7	10.2	10.7	11.2	1.2	0.0
425 = Taxable Income BEFORE Carry Forward	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	0.0
426 - Carry Forward Used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427 = Taxable Income	72.2	87.1	101.2	114.5	127.1	139.2	150.8	162.0	99.0	107.4	115.4	123.3	130.8	138.2	145.5	152.6	159.6	17.2	0.0
428 Tax = Tax * Taxable Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
429 Convergence Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 FINANCIAL MODEL (LAKIh, 8/25) **** HI IMPORT DUTY CASE ****
2
3 --VARIABLE--

		TYPE	NAME	DATA																	
4																					
5	**PROJECT DESCRIPTION																				
6	Annual Production (MIL Tonnes)	*V		0.09	0.09	0.00	0.03	0.16	0.90	2.82	2.78	2.73	2.63	2.50	2.37	2.70	2.66	2.80	2.80	2.78	2.78
7	Coal Consumption	*V		0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
8	Coal In Stockpile	calc		0.0	0.0	0.0	0.0	0.2	1.1	1.2	1.3	1.3	1.3	1.1	0.7	0.7	0.7	0.8	0.9	1.0	1.0
9	Year of Full Operation	*	YR.OP	1992																	
10	Project Life (#Years after 1st Full Op.*		YR.LAST	30																	
11																					
12																					
13	**COST ASSUMPTIONS in MIL Constant DLR																				
14	Relative Year	*V	YR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
15	Infrastructure --Local	*V	INFRA.LOC	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
16	Infrastructure --Foreign	*V	INFRA.FOR	0.23	0.18	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
17	Machinery --Local	*V	MACH.LOC	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
18	Machinery --Foreign	*V	MACH.FOR	0.00	17.82	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
19	Total Capital Costs (MIL Constant DLR)	calc		7.56	28.30	56.49	61.48	48.29	66.74	5.90	4.27	4.56	4.73	7.81	24.06	7.34	12.15	17.45	4.12	13.69	13.69
20	O&M Expenses --Local	*V	O&M	0.05	1.82	7.25	13.56	22.80	32.45	41.44	41.07	41.21	40.70	39.80	38.80	38.86	39.03	39.08	39.12	37.32	37.32
21	O&M Expenses --Foreign	*V		0.43	1.34	3.75	6.37	10.64	14.60	17.85	17.84	17.76	17.58	17.57	17.15	17.09	17.09	17.09	17.09	16.10	16.10
22	Royalty Rate RUP/TON	*		15.0																	
23	Excise Tax RUP/TON	*		2.0																	
24	Workers Participation Fund(%of PBT)	*		5.0%																	
25	Workers Welfare Fund(%of PBT)	*		2.0%																	
26	Management Fee $Real/TON	*		1.50																	
27																					
28	**TAX ASSUMPTIONS																				
29	IORA & Subsidy (% of Foreign Expenses)	*	IMPORT	10.0%																	
30	Other Import Duties & Sales Taxes	*	DUTY.OTHR	35.0%																	
31	Income Tax Rate	*V	TXRATE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32	Depletion Rate	*	DEPLRATE	20.0%																	
33																					
34																					
35	**ECONOMIC ASSUMPTIONS																				
36	Calendar Year	*V	YEAR	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
37	Inflation Rate -- Rupees	*V	INFRUP	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38	Inflation Rate -- Dollars	*V	INFDLR	3.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39	Exchange Rate (RUP/DLR)	*V	EXCHG	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.4	24.1	24.7	25.5	26.2	27.0
40	Base Year for Constant DLR	*	YR.BASE	1985																	
41	Inflation Index -- Rupees	calc	INDXRUP	1.070	1.145	1.225	1.311	1.403	1.501	1.606	1.718	1.838	1.967	2.105	2.252	2.410	2.579	2.759	2.952	3.159	3.380
42	Inflation Index -- Dollars	calc	INDXDLR	1.030	1.071	1.114	1.159	1.205	1.253	1.303	1.355	1.410	1.466	1.525	1.586	1.649	1.715	1.784	1.855	1.929	2.006
43																					
44																					
45	**FINANCE ASSUMPTIONS																				
46	All Loans Thru Govt of Pak?	*	GOVT.FIN	0 =Project Gets Financing Benefits Directly																	
47	Maximum Funds Available in MILLION NOMINAL DOLLARS																				
48	Local Equity	*		50.0																	
49	Local Loans	*		25.0																	
50	Foreign Equity	*		50.0																	
51	US-AID Loan	*		25.0																	
52	Development Donors' Loans	*		350.0																	
53	Export Credit Loans	*		75.0																	

55 ***SUMMARY OF RESULTS -- CONSTANT DOLLARS **** HI IMPORT DUTY CASE ****

		copyYEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
58	Annual Revenue -- MIL Constant DLR	calc	0.0	0.0	0.0	0.0	0.0	0.0	172.3	165.6	157.8	149.4	145.9	159.4	131.4	132.3	149.4	133.7	124.5	120.7
59	Cost / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	63.8	61.3	58.4	55.3	54.0	59.0	48.7	49.0	55.3	49.5	46.1	44.7
60																				
61	**Revenue Components																			
62	O & M Expense (w/ agmt fee)	calc	0.5	3.2	11.3	20.5	34.6	49.7	65.1	64.7	64.7	63.8	62.7	61.0	61.5	61.6	61.9	61.9	59.0	59.0
63	Royalty & Excise Duty	calc	0.0	0.0	0.0	0.0	0.1	0.6	1.9	1.7	1.6	1.4	1.3	1.1	1.2	1.1	1.1	1.0	0.9	0.9
64	Workers Participation & Welfare Funds	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.0	2.9	2.8	2.6	2.5	2.3	3.0	3.3	2.4	2.2
65	IGRA, Subsidy, & Other Import Duties	calc	0.1	8.1	18.5	20.1	15.4	23.1	0.3	1.5	1.8	2.0	3.0	8.6	3.1	4.9	7.3	1.7	5.8	5.8
66	Income Tax	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.7	21.3	15.1	14.3
67	Interest	calc	0.0	1.1	3.5	10.3	18.6	26.9	39.6	34.4	29.6	25.2	21.1	17.4	13.9	10.8	7.9	5.2	2.8	1.5
68	New Invest & Princ. Repay.	calc	0.0	0.0	0.0	0.0	0.0	0.0	44.3	40.8	39.4	38.0	40.2	55.1	36.9	40.4	44.4	29.9	30.1	29.4
69	Return on Equity	calc	0.0	0.0	0.0	0.0	0.0	0.0	21.0	19.3	17.7	16.2	14.8	13.5	12.4	11.3	10.2	9.3	8.4	7.6
70	---------		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71	= TOTAL (Constant $)	sum	0.6	12.4	33.3	50.9	68.7	100.3	172.3	165.6	157.8	149.4	145.9	159.4	131.4	132.3	149.4	133.7	124.5	120.7
72	==========																			
73																				
74	REVENUE -- NOMINAL DOLLAR (MIL)	calc	0.0	0.0	0.0	0.0	0.0	0.0	224.5	224.4	222.4	219.0	222.4	252.8	216.6	227.0	266.5	243.0	240.3	242.2
75	NOMINAL DOLLARS / Tonne Consumed	calc	0.0	0.0	0.0	0.0	0.0	0.0	83.2	83.1	82.4	81.1	82.4	93.6	80.2	84.1	98.7	91.8	89.0	89.7

76 CAPITALIZATION SUMMARY-- NOMINAL DOLLARS (mil)

		YR.REL	-6	-5	-4	-3	-2	-1	PRE-OPERATION TOTAL $	% of Loc	% of Total
77	Funds Provided By:										
78	Local Equity (ex postponed ROE)	calc	0.0	9.7	9.4	9.2	8.9	8.7	45.9	28%	7%
79	Local Loans	calc	7.9	13.5	3.0	0.0	0.0	0.0	24.4	15%	4%
80	Gov't of Pakistan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
81	Unspecified Local	calc	0.0	0.0	23.6	21.3	20.5	31.2	96.6	58%	15%
82	---------		---	---	---	---	---	---	---		---
83	LOCAL TOTAL (in Mil DLR)	sum	7.9	23.2	36.1	30.5	29.4	39.8	167.0		26%

84 note: Local Funds Provided, when expressed in Dollars, may differ from the Assumed Maximum Available
85 since that constraint was implemented based on the Rupee/Dollar Exchange Rate in the first year.
86

										% of For	% of Total
87	Foreign Equity (ex postponed ROE)	copy	0.0	10.0	10.0	10.0	10.0	10.0	50.0	11%	8%
88	US-AID Loan	copy	0.0	0.0	6.3	6.3	6.3	6.3	25.0	5%	4%
89	Development Donors' Loans	copy	0.7	3.3	25.9	61.7	73.4	154.0	318.9	68%	50%
90	Export Credit Loans	copy	0.0	7.5	22.5	22.5	22.5	0.0	75.0	16%	12%
91	Unspecified Foreign Loans	copy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	0%
92	---------		---	---	---	---	---	---	---		---
93	FOREIGN TOTAL	sum	0.7	20.8	64.6	100.5	112.2	170.2	468.9		74%
94	TOTAL INVESTED (Nom DLR)	sum	8.6	44.0	100.7	131.0	141.6	210.0	635.9		100%
95											
96	Local Funds Provided expressed in NOM RUPEE										
97	Local Equity in NOM RUP MIL	calc	0.0	166.2	166.2	166.2	166.2	166.2	831.1		
98	Local Loans in NOM RUP MIL	calc	131.3	231.2	53.0	0.0	0.0	0.0	415.5		
99	Gov't of Pakistan in NOM RUP MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
100	Unspecified Local in NOM RUP MIL	calc	0.0	0.0	415.2	386.1	381.8	596.9	1780.0		
101	---------		---	---	---	---	---	---	---		
102	LOCAL TOTAL in NOM RUP MIL	sum	131.3	397.4	634.4	552.3	548.0	763.1	3026.6		

103 ----------
104

		Disc. Rate	$/Tonne	PV REV	PV Tonnes
105	Levelized Real Annuity Per Tonne				
106	(For Illustrative comparison)	5.0%	$42.05	$1,367	32.5
107		7.0%	$43.05	$1,028	23.9

109 CAPITAL COSTS BY YEAR																				
110		copyYR.REL	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
111 Input $ Conversion Factor		*	1.00 (=Base Year Currency Index / Input Year Currency Index)																	
112 TYPE 1 : Infrastructure																				
113 Local Sources (Constant $MIL)		copy	7.23	6.89	7.03	5.89	3.00	0.08	0.00	0.00	0.00	0.00	0.02	0.05	0.03	0.05	0.00	0.00	0.05	0.05
114 Foreign Sources (Constant $MIL)		copy	0.23	0.18	0.51	0.37	0.33	0.25	0.00	0.03	0.02	0.02	0.19	0.23	0.22	0.26	0.02	0.05	0.15	0.15
115 Depreciable %		*	100.0%																	
116 Tax Depreciation -- Initial Yr	*	DEPR.INIT	25.0%																	
117 Tax Deprec Rate (*Decl. Bal)	*	DEPR.NORM	10.0%																	
118 Capital Required:																				
119 Local Sources -- NOM RUP MIL		calc	128.6	131.2	143.2	128.3	69.9	2.1	0.0	0.1	0.1	0.1	0.8	1.8	1.4	2.1	0.1	0.2	2.5	2.7
120 Foreign Sources--NOM DLR MIL		calc	0.2	0.2	0.6	0.4	0.4	0.3	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.5	0.0	0.1	0.3	0.3
121 Adds to Deprec Base NOM RUP MIL		calc	132	135	153	136	72	8	0	1	1	1	7	10	10	13	1	2	10	11
122 Deprec.Expense (Initial)		calc	0.0	0.0	0.0	0.0	0.0	0.0	160.4	0.2	0.2	0.1	1.8	2.5	2.5	3.3	0.3	0.6	2.6	2.7
123 Deprec.Expense (Normal)		(notcalc	0.0	0.0	0.0	0.0	0.0	0.0	64.2	41.7	37.6	33.9	30.6	28.0	26.6	24.1	22.7	20.5	18.6	17.5
124 Undepreciated Basis BeginYr		calc	0.0	132.5	267.1	420.2	556.3	633.6	641.6	417.0	376.1	339.0	305.5	280.3	259.3	241.3	227.0	205.1	186.3	175.4
125 Import Duty & Sales Tax NOM RUP MIL		calc	2	2	4	3	3	3	0	0	0	0	3	4	4	5	0	1	3	4
126 ----------																				
127 TYPE 2 : Mine Equipment																				
128 Local Sources (Constant $MIL)		copy	0.00	3.40	8.37	10.91	10.96	15.34	5.23	1.04	0.54	0.40	1.05	4.79	0.51	1.21	1.22	0.32	0.75	0.75
129 Foreign Sources (Constant $MIL)		copy	0.00	17.82	40.58	44.31	34.01	51.07	0.67	3.20	4.00	4.32	6.55	18.99	6.58	10.62	16.21	3.75	12.73	12.73
130 Depreciable %		*	100.0%																	
131 Tax Depreciation -- Initial Yr	*	DEPR.INIT	100.0%																	
132 Tax Deprec Rate (*Decl. Bal)	*	DEPR.NORM	0.0%																	
133 Capital Required:																				
134 Local Sources -- NOM RUP MIL		calc	0.0	64.7	170.4	237.8	255.5	382.5	139.6	29.6	16.4	13.0	36.7	179.3	20.5	51.9	55.8	15.7	39.5	42.3
135 Foreign Sources--NOM DLR MIL		calc	0.0	19.1	45.2	51.3	41.0	64.0	0.9	4.3	5.6	6.3	10.0	30.1	10.8	18.2	28.9	7.0	24.6	25.5
136 Adds to Deprec Base NOM RUP MIL		calc	0.0	391.1	965.8	1167.0	1018.6	1608.8	156.8	117.4	134.2	148.9	257.4	863.6	274.0	490.1	771.5	192.9	683.1	730.9
137 Deprec.Expense (Initial)		calc	0	0	0	0	0	0	5308	117	134	149	257	864	274	490	771	193	683	731
138 Deprec.Expense (Normal)		(notcalc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139 Undepreciated Basis BeginYr		calc	0	0	391	1357	2524	3542	5151	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL		calc	0	147	358	418	343	552	8	40	53	61	99	308	114	197	322	80	290	310
141 ----------																				
142 SUM FOR ALL CAPITAL TYPES																				
143 Capital Required By Year:																				
144 Local Sources -- NOM RUP MIL		sum	128.6	196.0	313.5	366.1	325.4	384.6	139.6	29.7	16.5	13.0	37.5	181.1	21.8	54.0	56.0	15.9	42.0	45.0
145 Foreign Sources--NOM DLR MIL		sum	0.2	19.3	45.8	51.8	41.4	64.3	0.9	4.4	5.7	6.4	10.3	30.5	11.2	18.7	29.0	7.0	24.9	25.9
146 Adds to Deprec Base NOM RUP MIL		sum	132.5	525.7	1118.9	1303.1	1095.9	1616.8	156.8	118.4	134.9	149.4	264.5	873.7	283.8	503.1	772.5	195.2	693.3	741.9
147 Allowable Tax Deprec.Expense NOM RUP M		sum	0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	894.2	302.5	517.5	794.4	214.0	704.3	751.2
148 IGRA, Subsidy, & Other Import DutiesNOM		sum	1.7	148.4	362.4	421.6	346.7	554.5	7.8	39.9	53.3	61.4	102.2	311.7	117.9	202.1	322.5	80.7	293.1	313.6
149 ==========																				

284

151	LOCAL EQUITY																				
152	Max Cash Invest-- NOM DLR MIL	copy	50.0	50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	calc	831.1	831.1	831.1	831.1	831.1	831.1	831.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																		
155	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%												
156	Expected Rate of Return	*	20.0%																		
157	Repayment Period	*	30 (Starting in 1st year of Full Operation)																		
158	Repayment Type	*	Level Principal																		
159	EQUITY BALANCE (NOM RUP MIL)																				
160	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	166.2	332.4	498.6	664.9	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4
161	+ Principal Borrowed	copy		0.0	166.2	166.2	166.2	166.2	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2
163	Bal -- EOY (Principal Only)	calc	0.0	0.0	166.2	332.4	498.6	664.9	831.1	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
164	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	33.2	106.4	227.4	405.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	sum	0.0	0.0	166.2	365.7	605.0	892.2	1236.9	1195.7	1154.4	1113.2	1072.0	1030.7	989.5	948.3	907.1	865.8	824.6	783.4	742.1
166	ROE Due (Nom RUP)	calc		0.0	0.0	33.2	73.1	121.0	178.4	247.4	239.1	230.9	222.6	214.4	206.1	197.9	189.7	181.4	173.2	164.9	156.7
167	Remaining Available -- BOY	calc		831.1	831.1	664.9	498.6	332.4	166.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	calc	0.0	0.0	-166.2	-166.2	-166.2	-166.2	-166.2	288.6	280.4	272.1	263.9	255.6	247.4	239.1	230.9	222.6	214.4	206.1	197.9
169	----------																				
170	LOCAL LOANS																				
171	Max Available in DLR MIL	copy	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	calc	415.5	415.5	415.5	415.5	415.5	415.5	415.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?	*	0 =No, Allocated as Needed																		
174	Draw Down Pattern (% of Max)	*V																			
175	Interest Rate	*	14.0%																		
176	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
177	Repayment Type	*	Level Principal																		
178	LOAN BALANCE (NOM RUP MIL)																				
179	Bal -- Begining Of Year (BOY)	calc		0.0	131.3	362.5	415.5	415.5	415.5	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0
180	+ Principal Borrowed	copy		131.3	231.2	53.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	0.0	0.0
182	Bal -- End Of Year (EOY)	calc	0.0	131.3	362.5	415.5	415.5	415.5	415.5	374.0	332.4	290.9	249.3	207.8	166.2	124.7	83.1	41.6	0.0	0.0	0.0
183	Interest Due (Nom RUP)	calc		0.0	18.4	50.8	58.2	58.2	58.2	58.2	52.4	46.5	40.7	34.9	29.1	23.3	17.5	11.6	5.8	0.0	0.0
184	Remaining Available -- BOY	calc		415.5	284.2	53.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	calc	0.0	-131.3	-212.8	-2.2	58.2	58.2	58.2	99.7	93.9	88.1	82.3	76.5	70.6	64.8	59.0	53.2	47.4	0.0	0.0
186	----------																				

188	Govt of Pakistan Loan																				
189	Max Available in DLR MIL	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190	Max-- NOM RUP MIL(does not inflate)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	Draw Down Pattern Assumed?	*	0.0 :No, Allocated as Needed																		
192	Draw Down Pattern (% of Max)	*V																			
193	Interest Rate	*	14.0%																		
194	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
195	Repayment Type	*	Level Principal																		
196	LOAN BALANCE (NOM RUP MIL)																				
197	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201	Interest Due (Nom RUP)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202	Remaining Available -- BOY	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203	Net Cash Flow to Govt of Pak Loan	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204	----------																				
205	UNSPECIFIED LOCAL LOAN																				
206	Interest Rate	*	14.0%																		
207	Repayment Period	*	10 (Starting in 1st year of Full Operation)																		
208	Repayment Type	*	Level Principal																		
209	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	415.2	801.3	1183.1	1780.0	1602.0	1424.0	1246.0	1068.0	890.0	712.0	534.0	356.0	178.0	-0.0	-0.0
210	+ Principal Borrowed	copy		0.0	0.0	415.2	386.1	381.8	596.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	0.0	0.0
212	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	415.2	801.3	1183.1	1780.0	1602.0	1424.0	1246.0	1068.0	890.0	712.0	534.0	356.0	178.0	-0.0	-0.0	-0.0
213	Interest Due (Nom RUP)	calc		0.0	0.0	0.0	58.1	112.2	165.6	249.2	224.3	199.4	174.4	149.5	124.6	99.7	74.8	49.8	24.9	-0.0	-0.0
214	Net Cash Flow to Unspec. Local Loan	calc	0.0	0.0	0.0	-415.2	-327.9	-269.6	-431.3	427.2	402.3	377.4	352.4	327.5	302.6	277.7	252.8	227.8	202.9	-0.0	-0.0
215	==========																				

286

217	FOREIGN EQUITY																					
218	Max Cash Invest-- NOM DLR MIL	copy		50.0	50.0	50.0	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
220	Draw Down Pattern (% of Max)	*V		0.0%	20.0%	20.0%	20.0%	20.0%	20.0%													
221	Expected Rate of Return	*	20.0%																			
222	Repayment Period	*	30.0 (Starting in 1st year of Full Operation)																			
223	Repayment Type	*	Level Principal																			
224	EQUITY BALANCE (NOM DLR MIL)																					
225	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	10.0	20.0	30.0	40.0	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	
226	+ Principal Borrowed	copy		0.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
227	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
228	Bal -- EOY (Principal Only)	calc	0.0	0.0	10.0	20.0	30.0	40.0	50.0	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
229	+ Capitalized R.O.E.	calc	0.0	0.0	0.0	2.0	6.4	13.7	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
230	Bal -- End Of Year (EOY)	sum	0.0	0.0	10.0	22.0	36.4	53.7	74.4	71.9	69.5	67.0	64.5	62.0	59.5	57.1	54.6	52.1	49.6	47.1	44.6	
231	ROE Due (Nom DLR)	calc		0.0	0.0	2.0	4.4	7.3	10.7	14.9	14.4	13.9	13.4	12.9	12.4	11.9	11.4	10.9	10.4	9.9	9.4	
232	Remaining Available -- BOY	calc		50.0	50.0	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
233	Net Cash Flow to Foreign Equity	calc	0.0	0.0	-10.0	-10.0	-10.0	-10.0	-10.0	17.4	16.9	16.4	15.9	15.4	14.9	14.4	13.9	13.4	12.9	12.4	11.9	
234	---																					
235	FOREIGN LOAN 1 US-AID Loan																					
236	Max Available in NOM DLR MIL	copy		25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
237	Draw Down Pattern Assumed?	*	1 :Yes, Fixed by Assumption																			
238	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	25.0%	25.0%	25.0%	25.0%													
239	Interest Rate	*	3.0%																			
240	Repayment Period	*	26 Starting in Year 5 (10 Year Grace Period)								2.0											
241	Repayment Type	*	Level Principal																			
242	LOAN BALANCE (Nom DLR)																					
243	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	6.3	12.5	18.8	25.0	25.0	25.0	25.0	25.0	24.0	23.1	22.1	21.2	20.2	19.2	18.3	
244	+ Principal Borrowed	copy		0.0	0.0	6.3	6.3	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
245	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
246	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	6.3	12.5	18.8	25.0	25.0	25.0	25.0	25.0	24.0	23.1	22.1	21.2	20.2	19.2	18.3	17.3	
247	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.2	0.4	0.6	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	
248	Remaining Available -- BOY	calc		25.0	25.0	25.0	18.8	12.5	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
249	Net Cash Flow to US-AID	calc	0.0	0.0	0.0	-6.3	-6.1	-5.9	-5.7	0.8	0.8	0.8	0.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	
250	---																					
251	FOREIGN LOAN 2 -- DEVELOPMENT DONORS																					
252	Max Available in NOM DLR MIL	copy		350.0	350.0	350.0	350.0	350.0	350.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
253	Draw Down Pattern Assumed?	*	1.0 :Yes, Fixed by Assumption																			
254	Draw Down Pattern (% of Max)	*V		0.2%	0.9%	7.4%	17.6%	21.0%	44.0%													
255	Interest Rate	*	9.0%																			
256	Repayment Period	*	12 (Starting in 1st year of Full Operation)																			
257	Repayment Type	*	Level Principal																			
258	LOAN BALANCE (Nom DLR)																					
259	Bal -- Begining Of Year (BOY)	calc		0.0	0.7	3.9	29.8	91.5	165.0	318.9	292.4	265.8	239.2	212.6	186.1	159.5	132.9	106.3	79.7	53.2	26.6	
260	+ Principal Borrowed	copy		0.7	3.3	25.9	61.7	73.4	154.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
261	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	
262	Bal -- End Of Year (EOY)	calc	0.0	0.7	3.9	29.8	91.5	165.0	318.9	292.4	265.8	239.2	212.6	186.1	159.5	132.9	106.3	79.7	53.2	26.6	0.0	
263	Interest Due (Nom DLR)	calc		0.0	0.1	0.4	2.7	8.2	14.8	28.7	26.3	23.9	21.5	19.1	16.7	14.4	12.0	9.6	7.2	4.8	2.4	
264	Remaining Available -- BOY	calc		350.0	349.3	346.1	320.2	258.5	185.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
265	Net Cash Flow to Develop. Donors	calc	0.0	-0.7	-3.2	-25.5	-59.0	-65.2	-139.1	55.3	52.9	50.5	48.1	45.7	43.3	40.9	38.5	36.1	33.8	31.4	29.0	
266	---																					

251

268	FOREIGN LOAN 3 -- EXPORT CREDITS																					
269	Max Available in DLR MIL	calc		75.0	75.0	75.0	75.0	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
271	Draw Down Pattern (% of Max)	*V		0.0%	10.0%	30.0%	30.0%	30.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272	Interest Rate	*	8.8%																			
273	Repayment Period	*	10 (Starting in 1st year of Full Operation)																			
274	Repayment Type	*	Level Principal																			
275	LOAN BALANCE (Nom DLR)																					
276	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	7.5	30.0	52.5	75.0	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0
277	+ Principal Borrowed	copy		0.0	7.5	22.5	22.5	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0	0.0
279	Bal -- End Of Year (EOY)	calc	0.0	0.0	7.5	30.0	52.5	75.0	75.0	67.5	60.0	52.5	45.0	37.5	30.0	22.5	15.0	7.5	0.0	0.0	0.0
280	Interest Due (Nom DLR)	calc		0.0	0.0	0.7	2.6	4.6	6.6	6.6	5.9	5.3	4.6	4.0	3.3	2.6	2.0	1.3	0.7	0.0	0.0
281	Remaining Available -- BOY	calc		75.0	75.0	67.5	45.0	22.5	0.0	-75.0	-67.5	-60.0	-52.5	-45.0	-37.5	-30.0	-22.5	-15.0	-7.5	0.0	0.0
282	Net Cash Flow to Export Credits	calc	0.0	0.0	-7.5	-21.8	-19.9	-17.9	6.6	14.1	13.4	12.8	12.1	11.5	10.8	10.1	9.5	8.8	8.2	0.0	0.0
283	----------																					
284	UNSPECIFIED FOREIGN LOAN																					
285	Max Available in DLR MIL	calc		999.0	999.0	999.0	999.0	999.0														
286	Draw Down Pattern Assumed?	*	1 =Yes, Fixed by Assumption																			
287	Draw Down Pattern (% of Max)	*V		0.0%	0.0%	0.0%	0.0%	0.0%														
288	Interest Rate	*	15.0%																			
289	Repayment Period	*	5 (Starting in 1st year of Full Operation)																			
290	Repayment Type	*	Level Principal																			
291	Bal -- Begining Of Year (BOY)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292	+ Principal Borrowed	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293	- Principal Repaid	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294	Bal -- End Of Year (EOY)	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295	Interest Due (Nom DLR)	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296	Net Cash Flow to Unspec. Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297	----------																					
298	Total Interest Exp: NOM RUP	calc		0.0	19.4	68.6	216.0	416.8	645.6	1018.2	946.0	870.9	792.7	711.2	625.6	536.4	443.5	346.7	245.7	140.5	79.2
299	Total ROE : NOM RUP	calc		0.0	0.0	68.4	152.8	256.6	384.2	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7
300	O&M Local : NOM RUP	calc		1.0	34.7	147.6	295.5	531.6	809.4	1106.1	1172.8	1259.1	1330.8	1392.3	1452.3	1556.5	1672.8	1792.2	1919.7	1959.4	2096.5
301	O&M Foreign:(w/Fee) NOM DOLLAR	calc		0.4	1.4	4.2	7.4	13.1	20.0	28.8	29.8	30.8	31.5	32.5	32.8	34.9	36.1	38.0	39.5	39.1	40.7
302																						
303	Summary of Fixed Amounts of Financing																					
304	Local Sources -- NOM RUP MIL																					
305	Local Equity	calc		0.0	166.2	166.2	166.2	166.2	166.2													
306	Local Loans	calc		0.0	0.0	0.0	0.0	0.0	0.0													
307	Gov't of Pakistan	calc		0.0	0.0	0.0	0.0	0.0	0.0													
308	TOTAL LOCAL -- NOM RUP	sum		0.0	166.2	166.2	166.2	166.2	166.2													
309	Foreign Sources--NOM DLR																					
310	Equity	calc		0.0	10.0	10.0	10.0	10.0	10.0													
311	Loan 1 -- US-AID	calc		0.0	0.0	6.3	6.3	6.3	6.3													
312	Loan 2 -- Development Donors	calc		0.7	3.3	25.9	61.7	73.4	154.0													
313	Loan 3 -- Export Credits	calc		0.0	7.5	22.5	22.5	22.5	0.0													
314	Unspecified Foreign	calc		0.0	0.0	0.0	0.0	0.0	0.0													
315	TOTAL FOREIGN -- NOM DLR	sum		0.7	20.8	64.6	100.5	112.2	170.2													
316	==========																					

318	TOTAL CAPITAL NEEDS																			
319	Local Sources -- NOM RUP																			
320	Investment costs	copy	129	196	314	366	325	385	140	30	17	13	37	181	22	54	56	16	42	45
321	Interest & ROE	calc	0	18	51	116	170	224	555	516	477	438	399	360	321	282	243	204	165	157
322	Principal Repayment (D + E)	calc	0	0	0	0	0	0	261	261	261	261	261	261	261	261	261	261	41	41
323	Pre-Op Import Duty	calc	2	148	362	422	347	554	0	0	0	0	0	0	0	0	0	0	0	0
324	Pre-Op Royalty	calc	0	0	0	1	3	15	0	0	0	0	0	0	0	0	0	0	0	0
325	Pre-Op O&M - Local	calc	1	35	148	295	532	809	0	0	0	0	0	0	0	0	0	0	0	0
326	Foreign Needs Thru Govt of Pak(in Rup	calc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327	Total Needs	sum	131	397	874	1200	1377	1988	955	806	754	712	697	802	603	597	560	481	248	243
328	- Fixed Amounts Assumed	copy	0	166	166	166	166	166	0	0	0	0	0	0	0	0	0	0	0	0
329	LOCAL To Be Allocated (NOM RUP)	sum NEED.RUP	131	231	708	1034	1211	1821	955	806	754	712	697	802	603	597	560	481	248	243
330	Foreign Sources--NOM DLR																			
331	Investment costs	copy	0	19	46	52	41	64	1	4	6	6	10	30	11	19	29	7	25	26
332	Interest & ROE	calc	0	0	1	6	13	22	51	47	44	40	37	33	30	26	22	19	15	12
333	Principal Repayment (D + E)	calc	0	0	0	0	0	0	37	37	37	37	38	38	38	38	38	38	30	30
334	Pre-Op O&M - Foreign	calc	0	1	4	7	13	20	0	0	0	0	0	0	0	0	0	0	0	0
335	Unfinanced Local Needs(in Dollars)	calc	0.0	0.0	37.2	57.1	65.0	95.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336	Total Needs	sum	0.7	20.8	88.2	121.8	132.7	201.4	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
337	- Fixed Amounts Assumed	copy	1	21	65	100	112	170	0	0	0	0	0	0	0	0	0	0	0	0
338	FOREIGN To Be Allocated (NOM DLR)	sum NEED.DLR	0	0	24	21	21	31	88	88	86	83	85	101	78	82	89	63	70	68
339	CAPITAL AVAILABLE FOR ALLOCATION (Begin Yr)																			
340	Local Sources -- NOM RUP																			
341	Local Equity	calc	0	0	0	0	0	0												
342	Local Loans	calc	416	284	53	0	0	0												
343	Gov't of Pakistan	calc	0	0	0	0	0	0												
344	TOTAL LOCAL : NOM RUP	calcAVAIL.RUP	416	284	53	0	0	0												
345	Foreign Sources--NOM DLR																			
346	Equity	calc	0	0	0	0	0	0												
347	Loan 1 -- US-AID	calc	0	0	0	0	0	0												
348	Loan 2 -- Development Donors	calc	0	0	0	0	0	0												
349	Loan 3 -- Export Credits	calc	0	0	0	0	0	0												
350	TOTAL FOREIGN : NOM DLR	calcAVAIL.DLR	0	0	0	0	0	0												
351	Allocation FACTOR -- LOCAL	calc	0.32	0.81	1.00	0.00	0.00	0.00												
352	Allocation FACTOR -- FOREIGN	calc	0.00	0.00	0.00	0.00	0.00	0.00												
353	SOURCES OF CAPITAL -- BY YEAR																			
354	Local Sources -- NOM RUP																			
355	Local Equity	calc	0.0	166.2	166.2	166.2	166.2	166.2												
356	Local Loans	calc	131.3	231.2	53.0	0.0	0.0	0.0												
357	Pakistan Gov't	calc	0.0	0.0	0.0	0.0	0.0	0.0												
358	Unspecified Local	calc	0.0	0.0	415.2	386.1	381.8	596.9												
359	Local Needs - Local Capital (NOM RUP)	calc	0.0	0.0	239.9	647.7	828.7	1224.6	955.1	806.3	754.1	711.6	697.1	801.7	603.5	596.7	559.6	480.6	248.2	242.9
360																				
361	Foreign Sources--Nom DLR																			
362	Equity	calc	0.0	10.0	10.0	10.0	10.0	10.0												
363	Loan 1 -- US-AID	calc	0.0	0.0	6.3	6.3	6.3	6.3												
364	Loan 2 -- Development Donors	calc	0.7	3.3	25.9	61.7	73.4	154.0												
365	Loan 3 -- Export Credits	calc	0.0	7.5	22.5	22.5	22.5	0.0												
366	Unspecified Foreign	calc	0.0	0.0	0.0	0.0	0.0	0.0												
367	ForeignNeeds - ForeignCapital(NOM $)	calc	0.0	0.0	-13.6	-35.8	-44.5	-63.9	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
368	TOTAL REQUIRED FROM REV- NOM RUP	calc	0.0	0.0	0.0	-0.0	-0.0	0.0	2697.3	2597.7	2550.2	2498.0	2564.6	3100.8	2434.7	2574.2	2760.2	2095.6	2086.4	2082.3

370	CAPITAL SUMMARY IN MOM DOLLARS																				
371	Local + Foreign Needs in $		Sum(0disct)																		
372	Investment costs	calc	843.5	8.0	30.7	63.6	72.0	58.8	84.4	8.0	5.8	6.5	7.0	12.0	38.4	12.1	20.9	31.2	7.7	26.5	27.5
373	Interest & ROE	calc	769.4	0.0	1.1	3.9	11.9	22.4	33.7	79.1	72.8	66.7	60.7	54.8	49.0	43.3	37.7	32.3	26.9	21.6	18.2
374	Principal Repayment (D + E)	calc	634.5	0.0	0.0	0.0	0.0	0.0	0.0	49.8	49.4	49.1	48.7	49.3	49.0	48.7	48.4	48.1	47.8	31.6	31.6
375	Pre-Op Import Duty	calc	100.2	0.1	8.7	20.6	23.3	18.6	28.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	calc	1.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op C&M	calc	144.2	0.5	3.5	12.6	23.7	41.6	62.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	sum	2492.8	8.6	44.0	100.7	131.0	141.6	210.0	136.8	128.1	122.2	116.4	116.1	136.4	104.1	107.0	111.5	82.3	79.6	77.3
379	Needs -- Local in $	calc	645.2	7.9	23.2	49.7	66.3	73.9	103.7	48.5	39.8	36.1	33.1	31.6	35.3	25.8	24.8	22.6	18.9	9.5	9.0
380	Needs -- Foreign in $	copy	2102.0	0.7	20.8	88.2	121.8	132.7	201.4	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
381	- Adj for Cross-Finance	calc	-254.4	0.0	0.0	-37.2	-57.1	-65.0	-95.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	sum	2492.8	8.6	44.0	100.7	131.0	141.6	210.0	136.8	128.1	122.2	116.4	116.1	136.4	104.1	107.0	111.5	82.3	79.6	77.3
383	Sources -- Local in $	sum	645.2	7.9	23.2	49.7	66.3	73.9	103.7	48.5	39.8	36.1	33.1	31.6	35.3	25.8	24.8	22.6	18.9	9.5	9.0
384	Sources -- Foreign in $	sum	1847.6	0.7	20.8	51.0	64.7	67.7	106.3	88.4	88.3	86.1	83.2	84.5	101.2	78.3	82.2	88.9	63.4	70.2	68.2
385	= Total Sources ($)	sum	2492.8	8.6	44.0	100.7	131.0	141.6	210.0	136.8	128.1	122.2	116.4	116.1	136.4	104.1	107.0	111.5	82.3	79.6	77.3
386	Needs - Sources (s/b 0)	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																				
388	Earnings Before Interest & Taxes	calc		-0.6	-11.3	-29.8	-40.6	-50.1	-73.4	105.0	94.5	86.7	79.4	76.2	86.1	63.1	62.4	76.2	65.7	56.4	52.8
389	- Income Tax	copy		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.7	21.3	15.1	14.3
390	- Capital Invested	calc		7.7	28.7	57.1	62.1	48.8	67.3	6.1	4.3	4.6	4.7	7.9	24.2	7.4	12.2	17.5	4.1	13.7	13.7
391	= Net Cash Flow to Investors	calc		-8.3	-40.0	-86.9	-102.8	-99.0	-140.7	98.9	90.2	82.1	74.6	68.3	61.8	55.8	50.2	45.0	40.2	27.6	24.3
392	Program Check:Cash FlowDelta(s/b 0)	test	-0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	0.0
393	Program Check: NPV to Investors	test	0.0																		
394	==========																				

290

396	REVENUE REQUIRED TO BREAK EVEN	copy	YEAR	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12
397	NOMINAL RUPEES MIL	PV0	14.0%																		
398	O & M Expense (w/ Mgmt Fee)	calc	10,109	8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
399	Royalty & Excise Duty	calc	155	0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
400	Workers Participation & Welfare Funds	copy	245	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.5	89.4	90.3	92.8	93.8	94.7	95.7	131.8	156.9	119.1	120.0
401	Interest	copy	2,495	0.0	19.4	68.6	216.0	416.8	645.6	1018.2	946.0	870.9	792.7	711.2	625.6	536.4	443.5	346.7	245.7	140.5	79.2
402	IORA, Subsidy, & Other Import Duties	copy	1,569	1.7	148.4	362.4	421.6	346.7	554.5	7.8	39.9	53.3	61.4	102.2	311.7	117.9	202.1	322.5	80.7	293.1	313.6
403	New Invest & Princ. Repay	copy	4,109	0.0	0.0	0.0	0.0	0.0	0.0	1138.4	1120.7	1158.6	1195.1	1354.1	1987.2	1421.9	1666.5	1962.0	1411.4	1521.1	1592.3
404	Return on Equity	copy	1,466	0.0	0.0	0.0	0.0	0.0	0.0	540.8	530.9	520.8	510.2	499.3	488.0	476.3	464.1	451.5	438.5	424.9	410.7
405	Income Tax	calc	532	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	602.7	1008.4	765.4	771.7
406	---------			---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407	= REVENUE (NOM RUP)	sum		0.0	0.0	0.0	0.0	0.0	0.0	4426.4	4551.6	4641.5	4702.4	4912.2	5745.1	5064.9	5459.5	6596.9	6314.8	6294.7	6527.2
408																					
409	Tax Calculation (note: Carry Forward does not separately carry forward depreciation, nor does it check on 6 year max)																				
410	Carry-Forward Balance -- BOY	calc	0.0	0.0	10.0	237.0	889.2	1957.3	3499.0	5906.8	9760.3	8495.7	7218.3	5928.0	4602.9	3263.0	1910.7	543.5	0.0	0.0	0.0
411	Carry-Forward USED (ADDED)	calc		-10.0	-227.0	-652.1	-1068.1	-1541.8	-2407.8	-3853.5	1264.6	1277.4	1290.2	1325.2	1339.9	1352.3	1367.1	543.5	0.0	0.0	0.0
412																					
413	Revenue (NOM RUP)	copy		0.0	0.0	0.0	0.0	0.0	0.0	4426.4	4551.6	4641.5	4702.4	4912.2	5745.1	5064.9	5459.5	6596.9	6314.8	6294.7	6527.2
414	- O & M (w/ Mgmt Fee)	copy		8.3	59.2	221.1	429.9	775.6	1192.4	1673.4	1778.1	1902.2	2008.0	2110.2	2198.4	2371.7	2542.3	2732.2	2925.6	2983.5	3192.4
415	- Royalty & Excise Duty	copy		0.0	0.0	0.0	0.5	2.7	15.3	48.0	47.3	46.4	44.6	42.5	40.3	46.0	45.2	47.6	47.6	47.2	47.2
416	- Interest	copy		0.0	19.4	68.6	216.0	416.8	645.6	1018.2	946.0	870.9	792.7	711.2	625.6	536.4	443.5	346.7	245.7	140.5	79.2
417	- IORA, Subsidy, & Other Import Duties	copy		1.7	148.4	362.4	421.6	346.7	554.5	7.8	39.9	53.3	61.4	102.2	311.7	117.9	202.1	322.5	80.7	293.1	313.6
418	- Tax Depreciation	copy		0.0	0.0	0.0	0.0	0.0	0.0	5532.6	159.4	172.0	182.9	289.7	894.2	302.5	517.5	794.4	214.0	704.3	751.2
419	= Taxable Income BEFORE Depletion	sum		-10.0	-227.0	-652.1	-1068.1	-1541.8	-2407.8	-3853.5	1580.8	1596.8	1612.8	1656.5	1674.8	1690.4	1708.9	2353.5	2801.2	2126.1	2143.6
420	- Depletion Allowance	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	316.2	319.4	322.6	331.3	335.0	338.1	341.8	470.7	560.2	425.2	428.7
421	= Taxable Income BEFORE Worker Funds	sum		-10.0	-227.0	-652.1	-1068.1	-1541.8	-2407.8	-3853.5	1264.6	1277.4	1290.2	1325.2	1339.9	1352.3	1367.1	1882.8	2241.0	1700.9	1714.9
422	- Workers Partic. & Welfare Funds	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.5	89.4	90.3	92.8	93.8	94.7	95.7	131.8	156.9	119.1	120.0
423	= Taxable Income BEFORE Carry Forward	calc		-10.0	-227.0	-652.1	-1068.1	-1541.8	-2407.8	-3853.5	1264.6	1277.4	1290.2	1325.2	1339.9	1352.3	1367.1	1882.8	2241.0	1700.9	1714.9
424	- Carry Forward Used	copy		-10.0	-227.0	-652.1	-1068.1	-1541.8	-2407.8	-3853.5	1264.6	1277.4	1290.2	1325.2	1339.9	1352.3	1367.1	543.5	0.0	0.0	0.0
425	= Taxable Income	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1339.3	2241.0	1700.9	1714.9
426	Tax = Tax * Taxable Income	calc		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	602.7	1008.4	765.4	771.7
427	Convergence Gap	test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1 FINANCIAL MODEL (LAK1h, 8/25)																			
2																			
3																			
4																			
5 **PROJECT DESCRIPTION																			
6 Annual Production (MIL Tonnes)	2.78	2.78	2.78	2.69	2.69	2.69	2.69	2.69	2.65	2.65	2.65	2.65	2.65	2.55	2.55	2.55	2.55	2.55	0.00
7 Coal Consumption	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	0.0
8 Coal In Stockpile	1.1	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	0.8	0.7	0.5	0.4	0.2	0.2
9 Year of Full Operation																			
10 Project Life (#Years after 1st Full Op.																			
11																			
12																			
13 **COST ASSUMPTIONS in MIL Constant DLR																			
14 Relative Year	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15 Infrastructure --Local	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
16 Infrastructure --Foreign	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.00
17 Machinery --Local	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	-23.21	0.00
18 Machinery --Foreign	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
19 Total Capital Costs (MIL Constant DLR)	13.69	13.69	13.69	9.09	9.09	9.09	9.09	9.09	10.91	10.91	10.91	10.91	10.91	2.46	2.46	2.46	2.46	(20.75)	0.00
20 O&M Expenses --Local	37.32	37.32	37.32	37.01	37.01	37.01	37.01	37.01	37.39	37.39	37.39	37.39	37.39	38.00	38.00	38.00	38.00	38.00	0.00
21 O&M Expenses --Foreign	16.10	16.10	16.10	15.71	15.71	15.71	15.71	15.71	14.71	14.71	14.71	14.71	14.71	18.22	18.22	18.22	18.22	18.22	0.00
22 Royalty Rate RUP/TON																			
23 Excise Tax RUP/TON																			
24 Workers Participation Fund(%of PBT)																			
25 Workers Welfare Fund(%of PBT)																			
26 Management Fee $Real/TON																			
27																			
28 **TAX ASSUMPTIONS																			
29 IORA & Subsidy (% of Foreign Expenses)																			
30 Other Import Duties & Sales Taxes																			
31 Income Tax Rate	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
32 Depletion Rate																			
33																			
34																			
35 **ECONOMIC ASSUMPTIONS																			
36 Calendar Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
37 Inflation Rate -- Rupees	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
38 Inflation Rate -- Dollars	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
39 Exchange Rate (RUP/DLR)	27.7	28.5	29.4	30.2	31.1	32.0	32.9	33.8	34.8	35.8	36.9	37.9	39.0	40.1	41.3	42.5	43.7	45.0	46.3
40 Base Year for Constant DLR																			
41 Inflation Index -- Rupees	3.617	3.870	4.141	4.430	4.741	5.072	5.427	5.807	6.214	6.649	7.114	7.612	8.145	8.715	9.325	9.978	10.677	11.424	12.224
42 Inflation Index -- Dollars	2.087	2.170	2.257	2.347	2.441	2.539	2.640	2.746	2.856	2.970	3.089	3.212	3.341	3.474	3.613	3.758	3.908	4.064	4.227
43																			
44																			
45 **FINANCE ASSUMPTIONS																			
46 All Loans Thru Govt of Pak?																			
47 Maximum Funds Available in MILLION NOMI																			
48 Local Equity																			
49 Local Loans																			
50 Foreign Equity																			
51 US-AID Loan																			
52 Development Donors' Loans																			
53 Export Credit Loans																			

***SUMMARY OF RESULTS -- CONSTANT DOLLAR

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Annual Revenue -- MIL Constant DLR	95.3	93.9	92.5	83.9	82.7	81.7	80.7	79.8	80.9	80.1	79.3	78.7	78.0	69.3	68.8	68.3	67.9	42.9	0.0
Cost / Tonne Consumed	35.3	34.8	34.3	31.1	30.6	30.3	29.9	29.5	30.0	29.7	29.4	29.1	28.9	25.7	25.5	25.3	25.1	15.9	0.0
**Revenue Components																			
O & M Expense (w/ mgmt fee)	59.0	59.0	59.0	58.2	58.2	58.2	58.2	58.2	57.5	57.5	57.5	57.5	57.5	61.5	61.5	61.5	61.5	61.5	0.0
Royalty & Excise Duty	0.8	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.0
Workers Participation & Welfare Funds	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.0
IGRA, Subsidy, & Other Import Duties	5.8	5.8	5.8	3.9	3.9	3.9	3.9	3.9	4.7	4.7	4.7	4.7	4.7	1.1	1.1	1.1	1.1	1.1	0.0
Income Tax	5.6	5.1	4.7	4.2	3.8	3.5	3.1	2.8	2.6	2.3	2.1	1.9	1.7	1.4	1.2	1.0	0.9	0.4	0.0
Interest	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
New Invest & Princ. Repay	16.1	16.0	15.9	11.1	11.1	11.0	10.9	10.8	12.6	12.5	12.4	12.3	12.3	3.7	3.7	3.6	3.6	-20.6	0.0
Return on Equity	6.8	6.2	5.5	4.9	4.4	3.9	3.4	3.0	2.6	2.2	1.9	1.6	1.3	1.0	0.8	0.6	0.4	0.2	0.0
= TOTAL (Constant $)	95.3	93.9	92.5	83.9	82.7	81.7	80.7	79.8	80.9	80.1	79.3	78.7	78.0	69.3	68.8	68.3	67.9	42.9	0.0
REVENUE -- NOMINAL DOLLAR (MIL)	198.8	203.7	208.8	196.9	202.0	207.4	213.0	219.1	231.0	237.8	245.1	252.7	260.7	240.9	248.6	256.7	265.2	174.5	0.0
NOMINAL DOLLARS / Tonne Consumed	73.6	75.4	77.3	72.9	74.8	76.8	78.9	81.1	85.5	88.1	90.8	93.6	96.6	89.2	92.1	95.1	98.2	64.6	0.0

CAPITALIZATION SUMMARY-- NOMINAL DOLLA

Funds Provided By:

Local Equity (ex postponed ROE)
Local Loans
Gov't of Pakistan
Unspecified Local

LOCAL TOTAL (in Mil DLR)
note: Local Funds Provided, when exp
since that constraint was implemen

Foreign Equity (ex postponed ROE)
US-AID Loan
Development Donors' Loans
Export Credit Loans
Unspecified Foreign Loans

FOREIGN TOTAL
TOTAL INVESTED (N)

Local Funds Provided expressed in MOM

Local Equity	in MOM RUP	MIL
Local Loans	in MOM RUP	MIL
Gov't of Pakistan	in MOM RUP	MIL
Unspecified Local	in MOM RUP	MIL

LOCAL TOTAL	in MOM RUP	MIL

Levelized Real Annuity Per Tonne
(For Illustrative comparison)

109 CAPITAL COSTS BY YEAR

110	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
111 Input $ Conversion Factor																			
112 TYPE 1 : Infrastructure																			
113 Local Sources (Constant $MIL)	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
114 Foreign Sources (Constant $MIL)	0.15	0.15	0.15	0.07	0.07	0.07	0.07	0.07	0.18	0.18	0.18	0.18	0.18	0.03	0.03	0.03	0.03	0.03	0.60
115 Depreciable %																			
116 Tax Depreciation -- Initial Yr																			
117 Tax Deprec Rate (*Decl. Bal)																			
118 Capital Required:																			
119 Local Sources -- NOM RUP MIL	2.9	3.1	3.3	0.9	1.0	1.0	1.1	1.2	3.3	3.5	3.8	4.0	4.3	0.4	0.4	0.5	0.5	0.5	0.0
120 Foreign Sources--NOM DLR MIL	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.6	0.6	0.6	0.1	0.1	0.1	0.1	0.1	0.0
121 Adds to Deprec Base NOM RUP MIL	12	13	13	6	6	7	7	8	21	23	24	26	28	5	5	6	6	7	0
122 Deprec.Expense (Initial)	2.9	3.1	3.4	1.5	1.6	1.7	1.8	2.0	5.3	5.7	6.1	6.5	7.0	1.3	1.4	1.4	1.5	0.0	0.0
123 Deprec.Expense (Normal) (not	16.6	15.8	15.2	14.7	13.7	12.8	12.0	11.3	10.8	11.3	11.9	12.5	13.3	14.0	13.0	12.1	11.3	113.3	0.0
124 Undepreciated Basis BeginYr	166.0	158.2	151.8	146.7	136.5	127.6	120.0	113.5	108.0	113.2	119.0	125.5	132.5	140.3	130.0	121.1	113.3	106.6	0.0
125 Import Duty & Sales Tax NOM RUP MIL	4	4	5	2	2	3	3	3	8	9	9	10	11	2	2	2	3	3	0
126 ----------																			
127 TYPE 2 : Mine Equipment																			
128 Local Sources (Constant $MIL)	0.75	0.75	0.75	0.31	0.31	0.31	0.31	0.31	0.53	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00	(23.21)	0.00
129 Foreign Sources (Constant $MIL)	12.73	12.73	12.73	8.69	8.69	8.69	8.69	8.69	10.17	10.17	10.17	10.17	10.17	2.43	2.43	2.43	2.43	2.43	0.00
130 Depreciable %																			
131 Tax Depreciation -- Initial Yr																			
132 Tax Deprec Rate (*Decl. Bal)																			
133 Capital Required:																			
134 Local Sources -- NOM RUP MIL	45.3	48.4	51.8	22.7	24.3	26.0	27.9	29.8	54.2	58.0	62.1	66.4	71.1	0.0	0.0	0.0	0.0	-4406.5	0.0
135 Foreign Sources--NOM DLR MIL	26.6	27.6	28.7	20.4	21.2	22.1	23.0	23.9	29.0	30.2	31.4	32.7	34.0	8.4	8.8	9.1	9.5	9.9	0.0
136 Adds to Deprec Base NOM RUP MIL	782.1	836.8	895.4	639.0	683.7	731.6	782.8	837.6	1065.5	1140.1	1219.9	1305.3	1396.7	338.2	361.9	387.2	414.3	-3963.2	0.0
137 Deprec.Expense (Initial)	782	837	[illegible]	639	684	732	783	838	1066	1140	1220	1305	1397	338	362	387	414	0	0
138 Deprec.Expense (Normal) (not	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3963	0
139 Undepreciated Basis BeginYr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140 Import Duty & Sales Tax NOM RUP MIL	332	355	380	277	297	317	340	364	455	487	521	557	597	152	163	174	186	199	0
141 ----------																			
142 SUM FOR ALL CAPITAL TYPES																			
143 Capital Required By Year:																			
144 Local Sources -- NOM RUP MIL	48.1	51.5	55.1	23.6	25.3	27.1	28.9	31.0	57.5	61.6	65.9	70.5	75.4	0.4	0.4	0.5	0.5	-4406.0	0.0
145 Foreign Sources--NOM DLR MIL	26.9	28.0	29.1	20.6	21.4	22.3	23.1	24.1	29.6	30.7	32.0	33.3	34.6	8.5	8.9	9.2	9.6	10.0	0.0
146 Adds to Deprec Base NOM RUP MIL	793.8	849.4	908.8	645.0	690.1	738.4	790.1	845.4	1086.9	1162.9	1244.4	1331.5	1424.7	343.2	367.3	393.0	420.5	-3956.6	0.0
147 Allowable Tax Deprec.Expense NOM RUP M	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
148 IQRA, Subsidy, & Other Import DutiesNOM	335.5	359.0	384.2	279.6	299.2	320.1	342.5	366.5	463.2	495.6	530.3	567.4	607.2	154.3	165.1	176.6	189.0	202.2	0.0
149 ==========																			

151	LOCAL EQUITY																		
152	Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
153	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
154	Draw Down Pattern Assumed?																		
155	Draw Down Pattern (% of Max)																		
156	Expected Rate of Return																		
157	Repayment Period																		
158	Repayment Type																		
159	EQUITY BALANCE (NOM RUP MIL)																		
160	Bal -- Begining Of Year (BOY)	742.1	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0
161	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
162	- Principal Repaid	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	0.0
163	Bal -- EOY (Principal Only)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0	-0.0
164	+ Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	Bal -- End Of Year (EOY)	700.9	659.7	618.4	577.2	536.0	494.8	453.5	412.3	371.1	329.8	288.6	247.4	206.1	164.9	123.7	82.5	41.2	-0.0	-0.0
166	ROE Due (Nom RUP)	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	41.2	33.0	24.7	16.5	8.2	-0.0
167	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
168	Net Cash Flow to Local Equity	189.7	181.4	173.2	164.9	156.7	148.4	140.2	131.9	123.7	115.4	107.2	99.0	90.7	82.5	74.2	66.0	57.7	49.5	-0.0
169	----------																			
170	LOCAL LOANS																			
171	Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
172	Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	Draw Down Pattern Assumed?																		
174	Draw Down Pattern (% of Max)																		
175	Interest Rate																		
176	Repayment Period																		
177	Repayment Type																		
178	LOAN BALANCE (NOM RUP MIL)																		
179	Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
180	+ Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	- Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185	Net Cash Flow to Local Loan 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	----------																			

188 Govt of Pakistan Loan																			
189 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
190 Max-- NOM RUP MIL(does not inflate)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191 Draw Down Pattern Assumed?																			
192 Draw Down Pattern (% of Max)																			
193 Interest Rate																			
194 Repayment Period																			
195 Repayment Type																			
196 LOAN BALANCE (NOM RUP MIL)																			
197 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
198 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
199 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
200 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
201 Interest Due (Nom RUP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
202 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203 Net Cash Flow to Govt of Pak Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204 ----------																			
205 UNSPECIFIED LOCAL LOAN																			
206 Interest Rate																			
207 Repayment Period																			
208 Repayment Type																			
209 Bal -- Begining Of Year (BOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
210 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
211 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
212 Bal -- End Of Year (EOY)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
213 Interest Due (Nom RUP)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
214 Net Cash Flow to Unspec. Local Loan	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
215 ==========																			

296

217 FOREIGN EQUITY																			
218 Max Cash Invest-- NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
219 Draw Down Pattern Assumed?																			
220 Draw Down Pattern (% of Max)																			
221 Expected Rate of Return																			
222 Repayment Period																			
223 Repayment Type																			
224 EQUITY BALANCE (NOM DLR MIL)																			
225 Bal -- Begining Of Year (BOY)	44.6	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0
226 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
227 - Principal Repaid	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0
228 Bal -- EOY (Principal Only)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
229 + Capitalized R.O.E.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230 Bal -- End Of Year (EOY)	42.2	39.7	37.2	34.7	32.2	29.8	27.3	24.8	22.3	19.8	17.4	14.9	12.4	9.9	7.4	5.0	2.5	0.0	0.0
231 ROE Due (Nom DLR)	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
232 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
233 Net Cash Flow to Foreign Equity	11.4	10.9	10.4	9.9	9.4	8.9	8.4	7.9	7.4	6.9	6.4	6.0	5.5	5.0	4.5	4.0	3.5	3.0	0.0
234 ----------																			
235 FOREIGN LOAN 1 US-AID Loan																			
236 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237 Draw Down Pattern Assumed?																			
238 Draw Down Pattern (% of Max)																			
239 Interest Rate																			
240 Repayment Period																			
241 Repayment Type																			
242 LOAN BALANCE (Nom DLR)																			
243 Bal -- Begining Of Year (BOY)	17.3	16.3	15.4	14.4	13.5	12.5	11.5	10.6	9.6	8.7	7.7	6.7	5.8	4.8	3.8	2.9	1.9	1.0	0.0
244 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
245 - Principal Repaid	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
246 Bal -- End Of Year (EOY)	16.3	15.4	14.4	13.5	12.5	11.5	10.6	9.6	8.7	7.7	6.7	5.8	4.8	3.8	2.9	1.9	1.0	0.0	0.0
247 Interest Due (Nom DLR)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
248 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249 Net Cash Flow to US-AID	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.0
250 ----------																			
251 FOREIGN LOAN 2 -- DEVELOPMENT DONORS																			
252 Max Available in NOM DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253 Draw Down Pattern Assumed?																			
254 Draw Down Pattern (% of Max)																			
255 Interest Rate																			
256 Repayment Period																			
257 Repayment Type																			
258 LOAN BALANCE (Nom DLR)																			
259 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
260 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
261 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
262 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
263 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
264 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
265 Net Cash Flow to Develop. Donors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
266 ----------																			

268 FOREIGN LOAN 3 -- EXPORT CREDITS																			
269 Max Available in DLR MIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
270 Draw Down Pattern Assumed?																			
271 Draw Down Pattern (% of Max)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
272 Interest Rate																			
273 Repayment Period																			
274 Repayment Type																			
275 LOAN BALANCE (Nom DLR)																			
276 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
277 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
278 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
279 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
280 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
281 Remaining Available -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
282 Net Cash Flow to Export Credits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
283 ----------																			
284 UNSPECIFIED FOREIGN LOAN																			
285 Max Available in DLR MIL																			
286 Draw Down Pattern Assumed?																			
287 Draw Down Pattern (% of Max)																			
288 Interest Rate																			
289 Repayment Period																			
290 Repayment Type																			
291 Bal -- Begining Of Year (BOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
292 + Principal Borrowed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
293 - Principal Repaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
294 Bal -- End Of Year (EOY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
295 Interest Due (Nom DLR)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
296 Net Cash Flow to Unspec. Foreign	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
297 ----------																			
298 Total Interest Exp: NOM RUP	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
299 Total ROE : NOM RUP	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
300 O&M Local : NOM RUP	2243.3	2400.3	2568.3	2725.3	2916.1	3120.2	3338.6	3572.3	3861.8	4132.1	4421.4	4730.8	5062.0	5505.0	5890.3	6302.7	6743.9	7215.9	0.0
301 O&M Foreign:(w/Fee) NOM DOLLAR	42.3	44.0	45.7	46.3	48.2	50.1	52.1	54.2	53.4	55.5	57.7	60.0	62.4	76.6	79.7	82.8	86.2	89.6	0.0
302																			
303 Summary of Fixed Amounts of Financing																			
304 Local Sources -- NOM RUP MIL																			
305 Local Equity																			
306 Local Loans																			
307 Gov't of Pakistan																			
308 TOTAL LOCAL -- NOM RUP																			
309 Foreign Sources--NOM DLR																			
310 Equity																			
311 Loan 1 -- US-AID																			
312 Loan 2 -- Development Donors																			
313 Loan 3 -- Export Credits																			
314 Unspecified Foreign																			
315 TOTAL FOREIGN -- NOM DLR																			
316 ==========																			

298

318 TOTAL CAPITAL NEEDS																			
319 Local Sources -- NOM RUP																			0.0
320 Investment costs	48	51	55	24	25	27	29	31	58	62	66	70	75	0	0	0	1	-4406	0
321 Interest & ROE	148	140	132	124	115	107	99	91	82	74	66	58	49	41	33	25	16	8	-0
322 Principal Repayment (D + E)	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0
323 Pre-Op Import Duty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
324 Pre-Op Royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325 Pre-Op O&M - Local	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
326 Foreign Needs Thru Govt of Pak(in Rup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
327 Total Needs	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	-0
328 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
329 LOCAL To Be Allocated (NOM RUP)	238	233	228	189	182	175	169	163	181	177	173	169	166	83	75	66	58	-4357	-0
330 Foreign Sources--NOM DLR																			
331 Investment costs	27	28	29	21	21	22	23	24	30	31	32	33	35	9	9	9	10	10	0
332 Interest & ROE	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0
333 Principal Repayment (D + E)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
334 Pre-Op O&M - Foreign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
335 Unfinanced Local Needs(in Dollars)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336 Total Needs	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
337 - Fixed Amounts Assumed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
338 FOREIGN To Be Allocated (NOM DLR)	40	40	41	32	32	33	33	33	38	39	40	40	41	15	14	14	14	14	0
339 CAPITAL AVAILABLE FOR ALLOCATION (Begin																			
340 Local Sources -- NOM RUP																			
341 Local Equity																			
342 Local Loans																			
343 Gov't of Pakistan																			
344 TOTAL LOCAL : NOM RUP																			
345 Foreign Sources--NOM DLR																			
346 Equity																			
347 Loan 1 -- US-AID																			
348 Loan 2 -- Development Donors																			
349 Loan 3 -- Export Credits																			
350 TOTAL FOREIGN : NOM DLR																			
351 Allocation FACTOR -- LOCAL																			
352 Allocation FACTOR -- FOREIGN																			
353 SOURCES OF CAPITAL -- BY YEAR																			
354 Local Sources -- NOM RUP																			
355 Local Equity																			
356 Local Loans																			
357 Pakistan Gov't																			
358 Unspecified Local																			
359 Local Needs - Local Capital (NOM RUP)	237.8	232.9	228.3	188.5	182.0	175.5	169.1	162.9	181.2	177.0	173.1	169.4	166.1	82.9	74.7	66.4	58.2	-4356.5	-0.0
360																			
361 Foreign Sources--Nom DLR																			
362 Equity																			
363 Loan 1 -- US-AID																			
364 Loan 2 -- Development Donors																			
365 Loan 3 -- Export Credits																			
366 Unspecified Foreign																			
367 ForeignNeeds - ForeignCapital(NOM $)	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
368 TOTAL REQUIRED FROM REV-- NOM RUP	1340.9	1383.6	1429.6	1151.6	1182.1	1215.0	1250.7	1289.2	1513.2	1570.9	1633.2	1700.2	1772.5	669.2	670.3	672.1	674.6	-3728.7	0.0

299

370	CAPITAL SUMMARY IN NOM DOLLARS																		
371	Local + Foreign Needs in $																		
372	Investment costs	28.6	29.8	31.0	21.4	22.2	23.1	24.0	25.0	31.2	32.5	33.8	35.1	36.5	8.6	8.9	9.3	9.6	-88.0	0.0
373	Interest & ROE	14.8	13.8	12.9	12.0	11.1	10.2	9.3	8.5	7.6	6.8	6.0	5.2	4.4	3.7	2.9	2.2	1.4	0.7	0.0
374	Principal Repayment (D + E)	4.9	4.9	4.8	4.8	4.8	4.7	4.7	4.7	4.6	4.6	4.6	4.5	4.5	4.5	4.4	4.4	4.4	4.4	0.0
375	Pre-Op Import Duty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
376	Pre-Op Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
377	Pre-Op O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
378	Total Needs ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
379	Needs -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	-0.0
380	Needs -- Foreign in $	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
381	- Adj for Cross-Finance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
382	= Total Needs ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
383	Sources -- Local in $	8.6	8.2	7.8	6.2	5.9	5.5	5.1	4.8	5.2	4.9	4.7	4.5	4.3	2.1	1.8	1.6	1.3	-96.9	-0.0
384	Sources -- Foreign in $	39.8	40.3	40.9	31.9	32.2	32.5	32.9	33.3	38.3	38.9	39.6	40.4	41.2	14.6	14.4	14.3	14.1	14.0	0.0
385	= Total Sources ($)	48.4	48.5	48.7	38.1	38.0	38.0	38.0	38.1	43.5	43.9	44.3	44.8	45.4	16.7	16.2	15.8	15.4	-82.9	0.0
386	Needs - Sources (s/b 0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
387	CASH FLOW SUMMARY -- CONSTANT DOLLARS																			
388	Earnings Before Interest & Taxes	28.8	27.5	26.3	20.5	19.4	18.4	17.5	16.7	17.8	17.1	16.4	15.8	15.3	6.2	5.7	5.2	4.8	-20.0	0.0
389	- Income Tax	5.6	5.1	4.7	4.2	3.8	3.5	3.1	2.8	2.6	2.3	2.1	1.9	1.7	1.4	1.2	1.0	0.9	0.4	0.0
390	- Capital Invested	13.7	13.7	13.7	9.1	9.1	9.1	9.1	9.1	10.9	10.9	10.9	10.9	10.9	2.5	2.5	2.5	2.5	-21.6	0.0
391	= Net Cash Flow to Investors	9.5	8.6	7.9	7.1	6.5	5.9	5.3	4.8	4.3	3.8	3.4	3.0	2.7	2.3	2.0	1.7	1.5	1.2	0.0
392	Program Check:Cash FlowDelta(s/b 0)	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
393	Program Check: NPV to Investors																			
394	==========																			

396 REVENUE REQUIRED TO BREAK EVEN	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
397 NOMINAL RUPEES MIL																			
398 O & M Expense (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
399 Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
400 Workers Participation & Welfare Funds	50.3	49.3	48.1	46.4	45.1	43.8	42.4	41.0	40.4	38.8	37.1	35.3	33.5	29.7	27.7	25.7	23.5	11.5	0.0
401 Interest	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
402 IQRA, Subsidy, & Other Import Duties	335.5	359.0	384.2	279.6	299.2	320.1	342.5	366.5	463.2	495.6	530.3	567.4	607.2	154.3	165.1	176.6	189.0	202.2	0.0
403 New Invest & Princ. Repay	930.5	988.8	1051.1	790.1	838.3	889.7	944.5	1003.1	1247.9	1327.5	1412.4	1503.2	1600.2	522.6	550.6	580.4	612.2	-3760.6	0.0
404 Return on Equity	396.1	380.8	364.9	348.4	331.3	313.4	294.8	275.4	255.2	234.1	212.2	189.4	165.6	140.8	114.9	88.0	59.9	30.6	0.0
405 Income Tax	323.6	316.8	309.5	298.0	290.1	281.7	272.9	263.6	259.8	249.3	238.4	227.0	215.0	191.1	178.4	165.0	150.9	74.0	0.0
406 ---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
407 = REVENUE (NOM RUP)	5513.5	5810.8	6129.4	5946.1	6275.7	6628.9	7007.3	7412.8	8041.0	8519.4	9032.1	9581.5	10170.1	9666.9	10264.7	10905.1	11591.1	7848.1	0.0
408																			
409 Tax Calculation (note: Carry Forward doe																			
410 Carry-Forward Balance -- BOY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
411 Carry-Forward USED (ADDED)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
412																			
413 Revenue (NOM RUP)	5513.5	5810.8	6129.4	5946.1	6275.7	6628.9	7007.3	7412.8	8041.0	8519.4	9032.1	9581.5	10170.1	9666.9	10264.7	10905.1	11591.1	7848.1	0.0
414 - O & M (w/ Mgmt Fee)	3415.9	3655.0	3910.8	4124.8	4413.6	4722.5	5053.1	5406.8	5719.4	6119.7	6548.1	7006.5	7496.9	8579.2	9179.8	9822.4	10509.9	11245.6	0.0
415 - Royalty & Excise Duty	47.2	47.2	47.2	45.7	45.7	45.7	45.7	45.7	45.0	45.0	45.0	45.0	45.0	43.4	43.4	43.4	43.4	43.4	0.0
416 - Interest	14.4	14.0	13.5	13.1	12.5	12.0	11.4	10.7	10.0	9.3	8.5	7.7	6.8	5.8	4.8	3.7	2.5	1.3	0.0
417 - IQRA, Subsidy, & Other Import Duties	335.5	359.0	384.2	279.6	299.2	320.1	342.5	366.5	463.2	495.6	530.3	567.4	607.2	154.3	165.1	176.6	189.0	202.2	0.0
418 - Tax Depreciation	801.6	855.8	913.9	655.2	699.0	746.1	796.6	850.9	1081.6	1157.1	1237.9	1324.4	1416.9	353.5	376.2	400.8	427.2	-3850.0	0.0
419 = Taxable Income BEFORE Depletion	898.9	879.9	859.8	827.8	805.8	782.5	758.0	732.2	721.7	692.6	662.2	630.5	597.3	530.7	495.5	458.3	419.1	205.5	-0.0
420 - Depletion Allowance	179.8	176.0	172.0	165.6	161.2	156.5	151.6	146.4	144.3	138.5	132.4	126.1	119.5	106.1	99.1	91.7	83.8	41.1	0.0
421 = Taxable Income BEFORE Worker Funds	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.6	396.4	366.7	335.3	164.4	-0.0
422 - Workers Partic. & Welfare Funds	50.3	49.3	48.1	46.4	45.1	43.8	42.4	41.0	40.4	38.8	37.1	35.3	33.5	29.7	27.7	25.7	23.5	11.5	0.0
423 = Taxable Income BEFORE Carry Forward	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.6	396.4	366.7	335.3	164.4	-0.0
424 - Carry Forward Used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
425 = Taxable Income	719.1	703.9	687.8	662.2	644.6	626.0	606.4	585.7	577.4	554.1	529.8	504.4	477.9	424.6	396.4	366.7	335.3	164.4	0.0
426 Tax = Tax * Taxable Income	323.6	316.8	309.5	298.0	290.1	281.7	272.9	263.6	259.8	249.3	238.4	227.0	215.0	191.1	178.4	165.0	150.9	74.0	0.0
427 Convergence Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

-20-