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IMPLEMENTATION COMPLETION REPORT

PAKISTAN

**TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT
(Ln.3147-PAK)**

June 18, 1997

Energy and Project Finance Division
Country Department I, South Asia Region

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CURRENCY EQUIVALENTS

Currency Unit	=	Pakistan Rupee (Rs)
Appraisal Year 1989	=	US\$ 1.0 = Rs. 17.0
Intervening Year 1994	=	US\$ 1.0 = Rs. 30.2
Completion Year 1996	=	US\$ 1.0 = Rs. 40.0

GOP AND WAPDA'S FISCAL YEAR (FY)

July 1 - June 30

MEASURES AND EQUIVALENTS

1 kilometer (km)	=	0.6214 miles (mi)
1 ton	=	1000 kilograms (kg)
	=	2200 pounds (lbs)
1 kilovolt (kv)	=	1000 volts (V)
1 megawatt (MW)	=	1000 kilowatts (kW)
1 megavolt-ampere (MVA)	=	1000 kilovolt-amperes (kVA)
1 kilowatt hour (kWh)	=	1000 watt-hours (Wh)
1 gigawatt hour (GWh)	=	1 million kilowatt hours (kWh)

ACRONYMS AND ABBREVIATIONS

AEB	Area Electricity Board
EAD	Economic Affairs Division
	Ministry of Finance and Economic Affairs
ERR	Economic Rate of Return
ESL-II	Second Energy Sector Loan (Ln. 3107-PAK)
HPC	Hub Power Complex
GOP	Government of Pakistan
ICG	Internal Cash Generation
ICR	Implementation Completion Report
IsDB	Islamic Development Bank
SAR	Staff Appraisal Report
SCADA	Supervisory Control and Data Acquisition
WAPDA	Water and Power Development Authority

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IMPLEMENTATION COMPLETION REPORT

PAKISTAN

TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT **(Ln.3147-PAK)**

PREFACE

This is the Implementation Completion Report (ICR) for the Transmission Extension and Reinforcement Project in Pakistan, for which Loan 3147-PAK in the amount of US\$162 million equivalent was approved on December 18, 1989 and made effective on November 2, 1990. The legal agreements were amended in May 1995 to accommodate the project revision and additional financing provided by Islamic Development Bank and the French Government. The original closing date was December 31, 1995, but the project closed on December 31, 1996 with a one year extension. The unutilized balance of US\$2.1 million of the Loan was canceled effective May 22, 1997.

The ICR was prepared by Chandra Godavitarne (Municipal Engineer-former Bank staff member, now retired) with the assistance of Rashid Aziz (Projects Advisor, Pakistan Resident Mission). The ICR was reviewed and cleared by Zoubeida Ladhibi-Belk (Task Manager), Per Ljung (Chief, Energy and Project Finance Division) and Fakhruddin Ahmed (Project Adviser, SA1DR). The borrower and cofinanciers were provided the draft ICR for comment, and the Borrower's comments have been incorporated. No comments were received from the cofinanciers.

Preparation of this ICR was begun during the Bank's project completion mission during November 5-11, 1996. It is based on discussions with officials from the Economic Affairs Division and Ministry of Water and Power of the Government of Pakistan, Water and Power Development Authority (WAPDA), WAPDA's consultants and material in the project files. The WAPDA contributed to the preparation of the ICR and the mission's *aide-memoire*, assisting in preparing the statistical information in the draft ICR, and preparing its own evaluation included as Appendix B.

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TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT (Ln.3147-PAK)

Evaluation Summary

Introduction

The country's large hydropower plants are located in the north whereas most of the large thermal plants are located in the south. During periods of low water levels in the reservoirs, hydropower plants work at reduced capacity, which makes additional demands on thermal power stations to compensate for lost hydropower capacity. In order to meet the increasing demand for power, the Government of Pakistan (GOP) has, for the first time, decided to allow the private sector to construct a new thermal power plant on Hub River near Karachi. In order to integrate this new power plant into the national grid and improve evacuation and distribution of thermal power from the major plants at Guddu and Multan, the country's development strategy identified the need to extend and reinforce the national 500 kV network.

Project Objectives

The primary objectives of the project were to assist in the extension and reinforcement of the 500-kV network to ensure adequate and effective evacuation of power from the main thermal power generation centers at Guddu and Multan to the major load centers in the middle and northern regions of the country, and extension of the transmission link between the national 500 kV network and the Hub Power Complex (HPC)-the first major power generation complex to be financed, constructed and operated by the private sector. Institution building efforts initiated under earlier Bank operations were to be continued by strengthening WAPDA's capabilities to formulate, operate and maintain an efficient and economical transmission system.

Implementation Experience and Results

The Second Energy Sector Loan (ESL II) program provided the umbrella of priority investments and policy reforms to be implemented during the period FY89-93-including Loan 3147-PAK. The project was part of a continuing effort to promote private sector involvement in energy development and rationalizing investments in the public sector. Against these objectives, WAPDA's institutional and financial performance under the project is judged as generally satisfactory. Except for the year 1994, financial performance targets agreed under the loan were met; the project did not include any macroeconomic reform components.

Soon after the project start, WAPDA identified additional sources of cofinancing from the Islamic Development Bank (IsDB) for construction of the two transmission lines from HPC to Jamshoro, and from the French Government for grid stations. It took considerable time, until April 1995, to finalize the cofinancing agreement with the IsDB. Yet, the HPC-Jamshoro lines were completed in 1996 by the time energy was available for evacuation from HPC. The Loan funds thus freed, amounting to about \$36 million, were reallocated for the partial financing of the Third Jamshoro-Guddu 500 kV transmission line (which was not part of the originally appraised project), along with funds from the Power Sector Development Project (PSDP: Loan 3764-PAK). The closing date of the project was extended for one year until December 31, 1996. Contractual problems have delayed the start of construction of the Third Jamshoro-Guddu line, which is now expected to be completed in December 1999.

Due to a number of delays that were caused by external as well as internal factors, the implementation of some components of the project lagged slightly behind schedule. However, the core works included in the original project have been completed. They include: (a) the HPC-Jamshoro lines I and II commissioned on January 7, and October 28, 1996 respectively; (b) the third Guddu-Multan line commissioned on December 8, 1994; (c) the communications system on this line commissioned on November 22, 1995; (d) the second Multan-Gatti-Lahore line completed in two sections, the first between Gatti and Lahore commissioned on October 14, 1993, and the section between Multan and Gatti energized on March 1, 1995; and (e) the extension of substations at Lahore, Gatti, Multan and Guddu were completed on September 23, 1996. Some minor works were still going on at the time of ICR mission and are expected to be completed by July 1997. For the purposes of this ICR, the completion of the Third Jamshoro-Guddu transmission line, the construction of which will continue under the PSDP Loan, is not considered in the evaluation of performance for this project.

Apart from the Third Jamshoro-Guddu transmission line and the related grid stations at Moro and Rahim Yar Khan, the ongoing work not financed by the Bank loans includes: (a) the remaining work on the SCADA¹ system at the Jamshoro substation, expected to be completed by June 1997; and (b) the addition of auto-transformers at Guddu substation, financed under a French Protocol, expected to be completed in December 1997.

Sustainability

The project was successful in enhancing WAPDA's capacity in transmission and distribution of power through its extended and modernized 500 kV national network, especially in critical periods of low hydropower capacity and increased demand for thermal power. The project was less successful in developing the institutional capacity of WAPDA for efficient procurement management. In order to sustain these and other benefits of the project, WAPDA will need to continue to generate adequate revenues to meet all its obligations, provide adequate maintenance budgets, provide appropriate technical and human resources and carry out the necessary actions as detailed in the Operation Plan (Appendix A), agreed during the ICR mission.

Summary of Findings

The following are the major achievements of the project: (a) enhancement of an efficient transmission system for conveying power from hydro-electric generation facilities in the north, and thermal facilities in the south to major consumption centers; (b) incorporation of the first privately owned and operated thermal power plant (HPC) into the national transmission network; (c) reduction in transmission losses; and (d) improvements in voltage stability and the power factor. In addition WAPDA's institutional capacity for the expansion of the bulk transmission network was enhanced. The project greatly improved the transmission capacity along the north-south transmission axis, and enhanced WAPDA's ability to provide reliable power supply in all seasons.

Although project objectives were achieved WAPDA's performance in project management suffered from numerous problems. Difficulties were experienced in procurement under the project, leading to complaints by bidders over bid evaluations and award decisions. There is insufficient delegation of procurement responsibilities to senior managers. Training plans agreed during appraisal were not fully implemented. Given the reluctance of the Government of Pakistan (GOP) and WAPDA's authority to use loans for training, WAPDA only utilized training provided under supplier's contracts.

The overall performance of the Bank was satisfactory, as: all the core infrastructure elements of the project as appraised were completed during the project period, considerable effort was devoted to

¹ SCADA - Supervisory Control and Data Acquisition.

assist WAPDA in procurement and to remain in compliance with financial covenants. Some difficulties were experienced during project implementation, such as: delays in providing Bank comments and clearances for procurement documentation; inability to influence WAPDA on training; and insufficient supervision resources requiring Bank missions to undertake supervision of three to four projects during each mission, thereby leaving insufficient time to address the project matters in detail.

Future Operations

In order to sustain the benefits of the improved transmission network, particularly the facilities installed under this project, an operational plan was formulated, in agreement with WAPDA, which identifies the technical, financial and institutional arrangements necessary for the operation of the network at its maximum efficiency. The operational plan describes the indicators to be used in measuring the performance of the transmission lines, substations and other installed facilities. It also describes technical and financial resources that WAPDA needs to allocate on an annual basis for the operation and maintenance of these assets and provides timetables for monitoring the progression in achieving the performance targets. As part of institutional development, WAPDA needs to (a) streamline and make transparent its procurement management as being pursued under other ongoing projects; (b) improve revenue mobilization through: cost reduction measures, introduction of measures to improve billing and collection, empowering the Area Electricity Boards (AEB) to pursue revenue collection more vigorously, making the AEB's more accountable, and exploring options for privatizing distribution; and (c) undertake a structured training program for its staff to manage the improved transmission network.

Key Lessons Learned

An efficient, objective and transparent procurement management system needs to be developed in WAPDA. Specific areas that need to be addressed are: explicit bid documentation, objective and timely bid evaluations, prior agreement with GOP on procedures for opening of letters of credit, and dispensation from seeking the Standing Freight Committee approval for use of non-national vessels for Bank-financed procurement. Formal training should be provided for WAPDA staff engaged in procurement management. With respect to large core elements of a future project, the procurement process should be initiated and bids under evaluation prior to Board approval, to avoid delays in project implementation. The large accumulated arrears from government consumers can be reduced by expanding the GOP's previous action to deduct at source arrears from all government consumers. In conjunction with regular tariff increases, WAPDA needs to make an extra effort at reducing costs of operations and reducing arrears in accounts receivables from domestic, industrial and commercial customers, and improving the billing and collection performance of the AEBs by making them more accountable, or privatize its distribution arm- either by contracting out the operations or selling it altogether to the private sector. These measures are being pursued under ongoing projects.

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PART I - Project Implementation Assessment

A. Project Identity

Project Name: Transmission Extension and Reinforcement Project
Loan No.: 3147-PAK
RVP Unit: South Asia Region
Country: Pakistan
Sector: Energy
Sub-sector: Power

1. **Background.** The Water and Power Development Authority (WAPDA) was established in 1958 as a semi-autonomous agency for coordination and development of Pakistan's water and power resources. It is responsible for the generation, transmission and distribution of electricity throughout the country, with the exception of the greater Karachi area. WAPDA is organized into two largely independent wings-one for water and the other for power related activities. This report deals with power related activities of WAPDA.

2. The country's large hydropower plants are located in the north, whereas most of the large thermal plants are located in the south. During low water seasons, hydro plants work at reduced capacity which makes additional demands on thermal power to compensate for lost hydropower capacity. In order to meet the increasing demand for power, the Government of Pakistan (GOP) has, for the first time, decided to allow the private sector to construct a new thermal power plant on Hub River near Karachi. In order to integrate this new power station into the national network and improve evacuation and distribution of thermal power from the major plants at Guddu and Multan, investments for the extension and reinforcement of the national 500 kV network were considered essential.

B. Evaluation of Objectives

3. **Project Objectives.** The primary objectives of the project were to assist in the extension and reinforcement of the 500 kV network to ensure adequate and effective evacuation of power from the main thermal power generation centers at Guddu and Multan to the major load centers in the middle and northern regions of the country, and extension of the transmission link between the national 500 kV network and the Hub Power Complex (HPC) – the first major power generation complex to be financed, constructed and operated by the private sector. Institution building efforts initiated under earlier Bank operations were to be continued by strengthening WAPDA's capabilities to formulate, operate and maintain an efficient and economical transmission system.

4. **Project description.** The original project as appraised consisted of the following components:

- (a) the installation of two single circuit 500 kV transmission lines, about 200 km each, connecting the Hub Power Complex and Jamshoro;

- (b) the installation of the third single circuit 500 kV line, about 320 km long, between Guddu and Multan and a second single circuit 500 kV line, of about 300 km, between Multan and Lahore via Gatti;
- (c) the extension and reinforcement of existing 500 kV substations at Lahore, Gatti, Multan and Guddu with associated facilities including the reactive compensation, telecommunication and control equipment; and
- (d) the consulting services to assist and train WAPDA's staff in the design, construction, operation and maintenance of the 500 kV network.

5. **Project Cost and Financing Plan.** Total project cost of the appraised project, including physical and price contingencies and taxes and duties was estimated at US\$393 million. Total financing required, including interest during construction was estimated at US\$463.1 million. Of the total amount US\$162 was expected to be in foreign exchange, while the remaining US\$301.1 was to be in local currency. The Bank loan was expected to finance 100% of the foreign exchange requirements.

6. **Revised Project Cost and Financing Plan.** During project implementation, other cofinancing sources were identified by WAPDA. Cofinancing was provided by the Islamic Development Bank (IsDB) for the Hub-Jamshoro transmission lines, and the French Government for the Jamshoro substation. Both of these elements were to be financed under the Bank Loan. The legal agreements were amended in May 1995 to accommodate the project revision as a result of the mobilization of the above additional funds. The revised financing plan is as follows: Loan 3147-PAK US\$160.5 million; Loan 3764-PAK US\$18.3 million; IsDB US\$65 million; French Protocol US\$27.9 million; WAPDA US\$279 million; and bidder's finance US\$91.7 million. The revised project cost is estimated at US\$642.4 million.

7. **Project Preparation.** Design and detailed engineering for the extension and reinforcement of the 500 kV network which included some 1,012 km of transmission lines together with upgrading of existing substations, was carried out by WAPDA with the assistance of local and foreign consultants. Detailed engineering designs, specifications and bidding documents were also prepared by local consultants (NESPAK²). In view of the high moisture, salt and dust content in the coastal areas, WAPDA was required, as condition for loan effectiveness, to hire internationally experienced consultants to assist and advise them on the design of 500 kV networks in such areas (para 18).

8. The national network was designed to withstand faults without system separation, line overloading, cascade tripping and loss of load. To ascertain adequate design for each new extension of the 500 kV network, specific studies were carried out in the following areas: load flows for normal and emergency conditions and in typical cases of generation during low water and high water seasons; short circuits; transient and steady state stability; reactive power management for improvement of system power factor; mechanical and electrical design for conductor selection; tower structure and substation layout and control; metering and relaying scheme in association with telecommunication requirements and integration into the system control and data acquisition (SCADA) network.

9. **Procurement and Construction.** Most of the transmission line equipment and materials including the substations, amounting to US\$296.3 million, were to be procured under the Bank guidelines for International Competitive Bidding (ICB). Most of the control, auxiliary and miscellaneous equipment, amounting to US\$20.5 million, were also to be procured through ICB. The procurement contracts for equipment and materials, not exceeding US\$200,000 each and amounting to US\$8 million in aggregate, were to be processed in accordance with Bank guidelines for Limited International Bidding (LIB). Materials and tools, amounting to US\$6.4 million were not to be financed by the Bank, and were to be procured by local procedures. A portion of construction work, amounting to

² NESPAK - National Engineering Services of Pakistan.

US\$25 million, was eligible for Bank financing, and was to be procured through ICB as well, while the remaining construction work, amounting to US\$36 million, was to be procured according to national competitive bidding.

10. **Evaluation of Objectives.** Project objectives were clear, realistic and consistent with the Bank's and GOP's strategy for the power sector. They were clearly achievable within the project period.

C. **Achievement of Objectives**

11. **Sectoral Objectives.** Sectoral objectives contained in the project include promotion of private power development, satisfactory management, financial and operational performance by WAPDA and the strengthening of its capabilities for formulating and implementing the least-cost investment program. WAPDA's financial and operational performance during the project period was satisfactory, and it has achieved the performance targets agreed under Bank loan agreements. No macro-economic policy reforms were included in the project.

12. **Physical Objectives.** The project objectives were achieved. Institutional improvements related to procurement management showed little improvement in WAPDA, despite the experience with a number of previous Bank loans. One of the main reasons for this shortcoming lies with the substantial staff turnover within WAPDA.

13. The project was appraised in 1989; negotiations were held during 1989; and the project was approved by the Board on December 18, 1989. The Loan and Guarantee Agreements were signed on February 2, 1990, and the Loan was declared effective on November 2, 1990, following an extension requested by WAPDA due to delays in meeting the three conditions of effectiveness, namely : obtaining the Cabinet committee approval for the project, issuing of the first bid documents for the tower material as specified in the legal agreements, and appointing the consultant for supervision of works. The legal agreements were amended in May 1995 when WAPDA agreed on a loan of US\$65 million from the IsDB in December 1994 and finally concluded in April 1995. The loan was used to finance all the required equipment and services for two single-circuit 500 kV lines between HPC and Jamshoro, with the exception of insulators and hardware, which were funded out of the Loan (3147-PAK).

14. The legal agreements provided that no withdrawals would be made from the Loan for the construction of two 500 kV transmission lines between Hub Power Complex (HPC) and Jamshoro until financial closure for the construction of HPC was completed. Financial closure for the HPC occurred in January 1994 – about three years after Loan effectiveness, at which point disbursements for the insulators and hardware for the Hub-Jamshoro lines commenced. However, the HPC was commissioned in June 1996. Soon after the project start, WAPDA identified additional sources of cofinancing from the Islamic Development Bank (IsDB) for construction of the two transmission lines from HPC to Jamshoro, and from the French Government for grid stations. The Bank did not object to WAPDA securing additional resources. It took considerable time, until April 1995, to finalise the cofinancing agreement with the IsDB. This agreement freed up part of the Loan earmarked for the transmission lines. Upon the request from the GOP, the Bank's management approved the reallocation of approximately US\$36 million, originally allocated for these lines, to partially finance the supply of material for the Third Jamshoro-Guddu line. The legal agreements were amended in May 1995 to include the partial financing of the Third Jamshoro-Guddu 500 kV transmission line which was not part of the appraised project, for which funds from Loan 3147-PAK as well as the Power Sector Development Project (PSDP: Ln 3764-PAK) were also used. The two HPC - Jamshoro transmission lines were completed in 1996 in time to evacuate energy from the HPC. The closing date of the project was extended for one year until December 31, 1996. Contractual problems have delayed the start of construction of the third Jamshoro-Guddu line, which is now expected to be completed in December 1999, within the current closing date of the PSDP Loan.

15. The project, as implemented, comprised of the following components:
- (a) installation of two single-circuit 500 kV lines connecting HPC and Jamshoro (cofinanced by IsDB) in the amount of US\$65 million, and Loan 3147-PAK in the amount of US\$17.18 million;
 - (b) installation of a third single-circuit 500 kV line, including communications system between Guddu and Multan;
 - (c) installation of a second single-circuit 500 kV line between Multan and Lahore via Gatti;
 - (d) installation of a third single-circuit 500 kV line between Jamshoro and Guddu (Jamshoro-Rahim Yar Khan) including links at Moro and Dadu, and switching stations at Moro and Rahim Yar Khan (with funds provided partially by Loan 3147-PAK and from the Power Sector Development Project, Loan 3764-PAK, and with the remainder of financing provided by bidders and WAPDA's own funds);
 - (e) extension and reinforcement of existing 500 kV substations at Lahore, Gatti, Multan and Guddu with associated facilities including reactive compensations, communication and control equipment;
 - (f) extension and reinforcement of existing 500 kV substations at Jamshoro with associated facilities including reactive compensations, communication and control equipment (financed under French Protocol); and
 - (g) consultancy services to assist and train WAPDA's staff in the design, construction, operation and maintenance of the 500 kV network.

16. **Physical Achievements.** Table 1 below summarizes physical achievements of the project. The construction of Hub-Jamshoro 500 kV transmission lines I and II was delayed mainly due to longer than usual time it took to arrange cofinancing from IsDB following a proposal made by a Saudi firm. However, both lines were completed on time to evacuate energy from the HPC. They were commissioned on January 7, 1996 and October 28, 1996 respectively. The third Guddu-Multan line was commissioned on December 8, 1994, while the communications system on this line was commissioned on November 22, 1995. The second Multan-Lahore line via Gatti was constructed in two sections, Gatti-Lahore was energized on October 14, 1993, and Multan-Gatti section was energized on March 1, 1995. The extension of 500 kV substations at Guddu, Multan, Lahore and Gatti was accomplished with 99% of work completed. The substations were commissioned on September 23, 1996.

Table 1: Physical Achievements

Unit	Description of the Item	SAR Target km	Actual km
Transmission Line	First Hub-Jamshoro	200	180
	Second Hub-Jamshoro	200	180
	Third Guddu-Multan	312	313
	Second Multan-Lahore	300	316
	Third Jamshoro-Guddu	N/A	645
Substations	Lahore	Additional bays, shunt reactors, transformers and circuit breakers	Substantially completed
	Gatti		
	Multan		
	Guddu		

17. The Jamshoro-Guddu transmission line and the related substations at Moro and Rahim Yar Khan are not expected to be completed until end-1999, within the project implementation period of the ongoing PSDP Loan. Two contracts for stubs and steel towers awarded to the same contractor were terminated following default, and the new bids have been opened on April 16 and April 28, 1997 and are currently under evaluation. The contract for conductors is also pending resolution of a dispute between the joint venture partners, one of whom is said to be bankrupt. The procurement of the following material for this transmission line has been completed: (a) supply of 16,300 kg E&M strength insulators (financed under Loan 3147-PAK); (b) supply of 8,200 kg of E&M strength insulators (financed under Loan 3147-PAK); (c) supply of hardware (financed under Loan 3147-PAK); (d) supply of accessories (financed under Loan 3147-PAK); and (e) supply of dampers (financed under Loan 3147-PAK). Supply of shield wire (financed by WAPDA) is expected to be completed in August 1997. The line construction contracts have been awarded and foundation construction is in progress; but this work will be held up due to the delay in receipt of the stubs and steel towers. The expected date of completion for the transmission line is June 1999. Other ongoing activities include:

- (a) the remaining work on the SCADA system at the Jamshoro substation is expected to be completed by June 1997; and
- (b) the addition of auto-transformers at Guddu substation (financed under a French Protocol) is expected to be completed in December 1997.

18. **Studies.** As a condition of loan effectiveness, WAPDA was required to carry out a study of the impact of high moisture, salt and dust in the coastal areas on the network elements. This study was carried out and the study recommendations were used in the development of design specifications for the network elements.

19. **Environmental Objectives and Achievements.** Yellow Cover review of environmental aspects noted that WAPDA was making good progress in taking into account environmental impacts of its facilities. No significant adverse impacts were expected from the construction of the new transmission lines in the existing corridors and the expansion of existing substations. However, the environment division (EMTEN) recommended an environmental review for the design of HPC-Jamshoro lines by a qualified environmental specialist, including field reconnaissance of the rights of way to assure that the development would not adversely affect sensitive ecological areas, archeological or historic sites and human settlements. No such study was mentioned in the final approved project documents. As a result, there is no recorded information on environmental or social aspects, either in the Bank supervision reports or the quarterly progress reports from WAPDA. However, in accordance with standard procedures agreed with the Bank, WAPDA would: coordinate the routing of lines with local authorities to minimize their impact; provide compensation when land is required for supporting facilities; ensure that equipment provided would have limited noise level; incorporate adequate safety standards to minimize the risk of electrocution; and ensure that transformers to be used would not contain PCB's (polychlorinated biphenyl). The only study that was done pertained to the safety of the conductors, insulators and towers in the adverse coastal environment with high pollution and salt content in the atmosphere.

20. **Financial Objectives and Performance.** To ensure that adequate funds were available for the implementation of WAPDA's investment program, the agreements between WAPDA and the Bank for the ongoing operations include two major financial covenants. The Internal Cash Generation (ICG) covenant required WAPDA to generate annually from internal sources at least 40% of its capital expenditures, averaged over the previous, current and ensuing year, taking into consideration changes in working capital. WAPDA was also required to maintain coverage from revenues of at least 1.5 times its debt service requirements.

21. WAPDA's overall financial performance during project period was satisfactory. The ICG exceeded the required 40% in all years except FY94 when it fell to 28%, while its debt service coverage index fell to 0.9, mainly due to the retirement of its second bond issue, which it was unable to rollover in unfavorable market conditions. A tariff increase of 24% in November 1994 improved WAPDA's financial performance and enabled it to meet the financial covenants during FY95. While its debt-equity ratio has been satisfactory, WAPDA has had to resort to substantial short-term borrowing in recent years, in part due to its high levels of receivables, and difficulties in mobilizing long-term financing. In order to meet its revenue requirements, as well as to remain in compliance with the financial covenants, WAPDA has increased tariffs annually. Beginning in mid-1996, rather than increase tariffs on an annual basis, WAPDA has resorted to monthly tariff increases in order to meet its cash requirements, as well as to soften the impact on consumers. The monthly increases started in August 1996 at 1.43 percent and gradually increased to 2 percent in December 1996. While appreciating the approach of monthly increases in order to mitigate their impact, the Bank expressed its concern that the present increases will not be adequate for WAPDA to generate sufficient resources to meet its obligations, including financing of its planned investment program and debt servicing, and meeting the financial covenants. A latest supervision mission (of May 1997) reported that without a further tariff increase during FY97, the projected year-end result would be a self-financing ratio of 34.5 percent and debt service coverage ratio of 1.0, both substantially below the levels agreed under the various World Bank loans.

22. WAPDA's overall accounts receivables increased steadily over the project period, averaging at around two months of sales for private sector collection, and until recently, six months of sales for government receivables (against the agreed three months), and amounting to about Rs. 19 billion. A major achievement was the GOP decision in 1995 to deduct at source from government budgetary allocations and withhold payments due to WAPDA from Government agencies for adjustment against arrears. This adjustment has enabled WAPDA to meet the agreement with the Bank, and improve its financial performance, and has helped install a certain discipline in financial relationships. The coverage of this effort will be expanded to include recoveries from all government consumers. The major area of concern, that still needs to be addressed, however, is the arrears in accounts receivables from the Federally Administered Tribal Areas (FATA), Karachi Electric Supply Company and Balochistan tubewells. WAPDA recognizes that this is a difficult problem to tackle in view of the current prevailing practices. Stricter enforcement measures are required together with the firm support from GOP, and WAPDA is considering a plan to make Area Electricity Boards (AEBs) more accountable. A latest Government decision (of 1997) on metering tubewell consumers and removing the subsidy to FATA consumers would, if implemented vigorously, enhance WAPDA's finances.

23. **Institutional Development Objectives.** WAPDA's technical staff is well qualified and competent, and was able to undertake the project in a systematic and professional manner. However, procurement-related expertise, especially in the areas of contract management, project monitoring and control systems, was at times lagging resulting in substantial implementation delays in some of the project's components. Due mainly to staff turnover, some difficulties were experienced under the project in the preparation of bid documents, following Bank guidelines, and preparation of bid evaluations in a timely, objective and transparent manner. WAPDA has agreed to hire management consultants to assist in the improvement of its managerial operational and financial efficiency.

24. Although WAPDA has a comprehensive training program with eleven training establishments in eight cities, which provides training for the managerial, technical and accounting staff, one of the major components of the project was to provide training for WAPDA professional staff in the areas where local expertise is insufficient. However, the training of WAPDA staff in the design, construction, operation and maintenance of the 500 kV network has not taken place. WAPDA has traditionally arranged external training of its staff through equipment supply contracts only, not necessarily focusing on specialized training related to transmission lines and substation management. WAPDA used limited project funds to finance training provided by equipment suppliers, and provided training to lower cadres at its training centers. The project objective was to provide more specialized training to enable the mid-

level and senior technical and management staff to be at the cutting edge of technology and management. Given GOP's reluctance to use Loan funds in pursuing such training, the institutional objectives related to this aspect were only partially met, using, in particular, bilateral grant funds.

D. Major Factors Affecting the Project

25. **Factors Not Subject to Government or Implementing Agency Control.** A number of factors that caused delays in project implementation were beyond the control of the GOP and WAPDA. Unprecedented rains and floods, particularly in 1992 and 1994, caused significant delays in delivery of material to construction sites. As a consequence of damage suffered by the existing Jamshoro-Guddu transmission line in the local cyclone in 1992, the third Jamshoro-Guddu line was rerouted which caused some change in design and hence, delay. Adverse law and order situation in some parts of the country, together with the default of the contractor for the supply of stubs and steel towers, delayed the construction of some of the transmission lines.

26. **Factors Subject to Government Control.** GOP procedures required the issue of a "no objection certificate" (NOC) on a case by case basis from the Standing Freight Committee for the use of non-national vessels. This procedure took considerable time, and no attempt was made to provide a blanket NOC for Bank-financed procurement. Similarly, opening of letters of credit was subject to considerable delays, mainly awaiting the State Bank of Pakistan to nominate one of the three nationalized commercial banks, despite the availability of the Special Account. Although WAPDA routinely seeks bidder's financing for equipment, arranging bank guarantees has not been easy. The major factor in the delay in implementation, however, was the lengthy process for finalization of cofinancing agreement with the IsDB, before which, the work on two transmission lines between HPC and Jamshoro could not begin, nor could the decision on funding of the Third Jamshoro Guddu transmission line be taken. However, as mentioned earlier (para 16), both lines were completed on time to evacuate energy from the HPC, and completion of the Third Jamshoro-Guddu transmission line is expected during implementation of the PSDP.

27. **Factors Subject to Implementing Agency Control.** Delays in approval of import licenses and in clearing imported goods from customs, mainly due to lack local currency allocations for the project due to cash flow problems, caused delays in project implementation. Delays in implementation were encountered both on the transmission lines and substation extension components primarily due to procurement problems arising from: not observing procurement rules and procedures; inadequate attention to bid document preparation; lack of objectivity and transparency in bid evaluations; and the time taken to make award recommendations. Despite the experience with Bank procurement procedures and the agreement on standardized bid documents, it took 15 months for one contract to be signed, counting from the day the bidding was first announced, and for another it took almost a full year. The process of bid evaluation and awarding of contracts was particularly rife with problems, and the Bank was frequently called upon to act on contractors' complaints and insist on correcting the errors. In the majority of cases the Bank considered WAPDA and its consultants at fault, primarily for failure to observe the procurement rules and guidelines.

E. Project Sustainability

28. The project was successful in enhancing WAPDA's capacity in transmission and distribution of power through its extended and modernized 500 kV national network, especially in critical periods of low hydel capacity and increased demand for thermal power. In order to sustain these and other benefits of the project, WAPDA will need to provide adequate maintenance budgets, technical and personnel resources and conduct all the necessary actions to realize the full asset life of the investments, as detailed in the Operation Plan (Appendix A, Annex 3) which was agreed during the ICR mission.

29. **Economic Rate of Return (ERR):** Based on the assumptions detailed below³, the revised ERRs are estimated at 9.3 percent and 12.2 percent for the two scenarios of electricity prices. These are in line with the Staff Appraisal Report (SAR) estimates of 8 percent and 14 percent, respectively, for the corresponding price scenarios. The assumptions used for the ERR calculations in this ICR are the same as in the SAR. Total costs include: actual FY90-96 WAPDA investments⁴ expressed in economic costs⁵ actual operations and maintenance expenditures; and (actual) incremental fuel cost, converted to border price equivalent. As in the SAR, incremental electricity sales up to three years after FY96 were attributed to the investments incurred during FY90-96, and thus included as the benefits for the ERR calculations. Following the SAR (Annex 5.1, pages 2 and 3), two scenarios were used for electricity prices: (i) actual average price during FY90-96 expressed in 1989 terms, and maintained at the FY96 level for subsequent years; and (ii) actual average price between FY90-96, and between FY96-99, average price reflecting the real increase required to meet the financial covenants, and maintained at FY99 required level for subsequent years. Actual fuel costs and sales during FY96 for WAPDA system were distorted from the normal trend⁶ – fuel costs rose abnormally (by 33 percent compared to an average of 22 percent during FY90-95), while sales growth was depressed (only 5.4 percent in FY96, compared to an average growth of 7.7 percent during FY90-95). Actual incremental fuel costs and sales in FY96 were thus replaced by the average increment during FY90-95, for the purposes of these ERR calculations. The ERR calculations are illustrated in Table 9.

F. Performance of Bank and Cofinanciers

30. Bank preparation and appraisal of the project was consistent with the energy sector policies of the GOP and was based on WAPDA's plan for the extension and reinforcement of the national 500 kV network. The SAR identified specific actions that were essential to meet project objectives, and thus provided an overall framework for undertaking this project. During the course of previous projects, the Bank and WAPDA agreed on a standardized set of procurement procedures, from preparation of bidding documents to awarding of contracts and contract monitoring. The overall performance of the Bank during preparation and supervision was satisfactory. Considerable efforts were made by the Bank to assist WAPDA improve bid documentation, and to ensure that procurement guidelines were observed. There were, however, a few instances of delays in communicating Bank decisions and 'no-objections'. On one occasion, the review and clearance of bid documents had taken over one year due to the complexity of preparing bid documents for turnkey projects (for which the Bank had no sample bidding document at the time), and the slow response by WAPDA. Despite representations by WAPDA regarding Bank disagreement with WAPDA on award decisions, exclusion of bids for reasons of non-responsiveness, and recommendations for rebidding, these decisions were made correctly in conformity with Bank procurement guidelines. To streamline Bank's efforts in enhancing WAPDA's procurement capability (as recorded in the June 1996 Bank mission's *aide-memoire* for all power sector portfolio), measures have been agreed to improve and streamline the process. Follow-up action is necessary to

³ In the economic analysis of the SAR, it was indicated that benefits were expressed in economic terms by applying a standard conversion factor of 0.85 to electricity prices. However, in Annex 5.1, the ERR computation did not apply this conversion factor to electricity prices. Therefore, such conversion was also ignored for the ERR calculations in this ICR.

⁴ Private sector investments, as well as additional sales resulting from these investments, were not included in the analysis, since private investments are still evolving. In particular, only one private project (the Hub project) had started operations in 1996, while investments are ongoing at about 16 private plants. ERR calculations based on actual private investments during FY90-96, and sales resulting from these investments alone, would have thus artificially distorted the results.

⁵ Net of taxes and duties, and local component discounted by the same standard conversion factor as in the SAR.

⁶ International fuel oil price increased from about US\$70/ton to about US\$110/ton in the first half of FY96, but have subsequently fallen back to the previous levels. This temporary distortion led to an abnormal increase in WAPDA's fuel cost in FY96. Since the SAR used the levels of FY96 costs and benefits as the basis for all subsequent years, an adjustment was required to remove such distortion.

ensure that the necessary improvements take place, including structured training for WAPDA's procurement staff. Project files do not have information on the performance of cofinanciers, hence no assessments have been attempted in this report.

31. WAPDA made formal representation in 1997 claiming three instances where the Bank released the last ten percent payments, in 1994, for supplies prior to certification of acceptance of material by WAPDA. Inquiries have revealed, however, that the Bank acted correctly making these payments only after receiving confirmation from WAPDA's bankers who were acting on the instructions of WAPDA.

32. The Bank carried out eight supervision missions maintaining continuity of experienced staff. The missions reviewed critical aspects of the project, identified factors impeding implementation and suggested remedial actions to be carried out by WAPDA. The frequency of missions was adequate. However, due to the large agenda of each mission, supervising three to four projects during each visit, and the law and order situation in some of the project areas, it is judged that the missions had insufficient time to carry out detailed reviews and site visits. On one occasion, the Bank was able to convince WAPDA management to undertake a pilot scheme to test introduction of new equipment in the transmission system.

G. Borrower Performance

33. WAPDA has successfully established the capability to transmit power at full capacity on the north-south axis with reduced losses and improvements in reliability of supply, voltage profiles, power factor in areas served by the substations and the transient stability of the network. This is especially significant in low-water season because with the extension of its 500 kV network and commissioning of the HPC. WAPDA is also able to compensate for the losses in hydro-electric power capacity. WAPDA undertook the project with full commitment for the obvious gains it had to offer, but its performance suffered due to a number of external constraints and internal inefficiencies, which caused project implementation delays. In spite of the above problems in procurement, WAPDA has been able to achieve the project objectives and was able to have the transmission facilities completed in time to evacuate energy from the HPC.

34. WAPDA's procurement management for some of the contracts related to this project and the law and order situation in some of the project areas were the major source of delays in the implementation of some of the project components. The situation deteriorated during the last two years of the project mainly with the procurement process of the equipment required for the third Jamshoro-Guddu and the turnkey contracts for supply and installation of substations: Bid documents deviated from agreed formats, and lacked clarity in conditions of contract and specifications, *inter alia*, conditions regarding joint ventures and insurance. This entailed considerable efforts by the Bank to improve bid documents prior to clearance. In one case, which was also reviewed by the Operations Procurement Review Committee, the Bank insisted on re-bidding due to bidder's deviation from bid conditions relating to insurance. The Committee warned that unless something was done about insurance aspects, specifically about consequential and indirect damages, problems with bids are bound to continue. Validity of bids was extended well beyond the original periods, in some cases, to over one year. Delays in finalizing award decisions resulted from the time taken to reach award decisions by the procurement staff and the WAPDA tender committee (The Competent Authority), the need to deal with contractor complaints, and the delays in providing clarifications to the Bank. There is little delegation by the Competent Authority of procurement responsibilities to senior managers.

35. Often bid evaluations did not follow Bank procurement guidelines, specially with regard to minutes of bid opening, interpretation of bid conditions, which evoked complaints from the bidders. Among them were allegations of partiality to some suppliers, of attempts to thwart entry of new suppliers to Pakistan, and declaring bids non-responsive without adequate justification. On some occasions, the Bank disagreed with WAPDA's evaluations, insisting on reversal of award decisions and even re-

bidding. The response to clarifications sought by the Bank took, in some cases, four to five months. Opening of letters of credit and establishing of bank guarantees took sometimes exceptionally long time. As no blanket exemption was sought or granted for use of foreign vessels, applications were made to the Standing Committee on Freight for each case causing additional delays. No attempt was made to resolve these matters despite the project being externally financed.

36. While WAPDA benefited from the professional experience gained through managing the project, further improvement in WAPDA's management skills, specifically in the areas of procurement, contract administration, revenue mobilization and human resources development is necessary. It is creditable, however, that despite many procurement problems, WAPDA was able to complete implementation of the project as appraised within the project period. If such problems could be avoided, the potential for improvement in WAPDA's project management performance would be great. Overall, the performance of WAPDA is considered satisfactory.

H. Assessment of Outcome

37. The following are the major achievements of the project: (a) enhancement of an efficient transmission system for conveying power from hydel generation facilities in the north, and thermal facilities in the south to major consumption centers; (b) incorporation of the first privately owned and operated thermal power plant (HPC) into the national transmission network; (c) reduction in transmission losses; (d) improvements in voltage stability and the power factor. In addition WAPDA's institutional capacity for the expansion of the bulk transmission network was enhanced. Due to the delay in completion of the third Jamshoro-Guddu transmission line, full advantage of the north-south transmission axis will not be realized until 1999. Nevertheless, the project greatly improved the transmission capacity along the axis, and enhanced WAPDA's ability to provide reliable power supply in all seasons. Overall, the project met its objectives and the implementation is considered satisfactory.

I. Future Operation

38. In order to sustain the benefits of the project over the life of the assets, an operational plan was formulated in agreement with WAPDA, which identifies the technical, financial and institutional arrangements necessary for the operation of the network at its maximum efficiency. The operational plan (Appendix A) describes the indicators to be used in measuring the performance of the transmission lines, substations and other installed facilities. In addition, the plan identifies staffing, technical and financial resource requirements that WAPDA needs to allocate on an annual basis for the operation and maintenance of these assets, provides timetables for monitoring the progression in achieving the performance targets, and lists the agreements reached between the Bank and WAPDA on follow-up actions.

J. Key Lessons Learned

39. A number of key lessons learned should be used in the design and implementation of future Bank-financed projects, and should be agreed prior to project approval:

- (a) **Sectoral Policies:** Promotion of the private sector in the production and operation of power plants remains an attractive option to meet the growing demand for power in Pakistan;
- (b) **Management:** To promote efficient project management, appropriate powers and responsibilities should be delegated to senior managers of WAPDA.
- (c) **Administrative Procedures:** Administrative procedures that hinder efficient project implementation should be amended for externally-financed projects. (Blanket

exemptions should be granted to the use of shipping vessels of member countries of the World Bank for Bank-financed procurement. Measures to facilitate opening of letters of credit should be agreed with the GOP/Bank of Pakistan for anticipated foreign currency requirements based on SAR estimates, and one commercial bank should be identified for such transactions. WAPDA should have the use of funds in the Special Account to meet necessary expenditures

- (d) **Procurement:** Efficiency, economy and transparency of procurement administration needs to be institutionalized in WAPDA. Standard bidding documents approved for use in Pakistan or agreed with Bank should be used exclusively with explicit and unambiguous conditions of contract and specifications. Bank procurement guidelines should be followed exclusively in procurement management. Bid awards should be done within the original bid validity period. The procurement process should be made transparent and objective, and the confidentiality of the bidding process should be maintained. WAPDA procurement staff should receive periodic training to upgrade their skills. Senior managers of WAPDA should be given procurement responsibilities.
- (e) **Revenues and Cash Requirements:** Adequate budget provision should be made to meet operational requirements, and efforts to mobilize revenue should be enhanced. (Adequate budgets are required for operational needs of WAPDA. Adequate local currency allocations should be provided for obtaining import licenses and for payment of customs duties and taxes. Revenue mobilization should be done through a mix of appropriate tariffs, cost reduction measures including reduction of losses, and efficient billing and collection. Arrears in accounts receivables should be reduced through enforcement of sanctions against all delinquent consumers, and recovery of dues from all government consumers at source. The structure, powers and responsibilities of AEBs should be changed to enable them to act as agents responsible for bulk power purchase and distribution with efficient operation, billing and collection. Pilot operations to appoint private sector companies for distribution should be tested).
- (f) **Training:** Structured training for senior, middle and operational staff should be agreed at project start. Project technical assistance funds dedicated for training should not be reallocated for other purposes. (Senior and middle level managers should be provided training in the management of 500 kV transmission networks. Training curricula at WAPDA's training institutes should be reviewed and made more focused and more responsive to current needs.)

IMPLEMENTATION COMPLETION REPORT
PAKISTAN
TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT
(Ln.3147-PAK)

Part II - Statistical Tables

Table 1: Summary of Assessments

A. <u>Achievement of Objectives</u>	<u>Substantial</u>	<u>Partial</u>	<u>Negligible</u>	<u>Not applicable</u>
Macro Policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sector Policies	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial Objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Institutional Development	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poverty Reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Gender Issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other Social Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Public Sector Management	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private Sector Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B. <u>Project Sustainability</u>	<u>Likely</u>		<u>Unlikely</u>	<u>Uncertain</u>
	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
C. <u>Bank Performance</u>	<u>Highly Satisfactory</u>		<u>Satisfactory</u>	<u>Deficient</u>
Identification	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Preparation Assistance	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Appraisal	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Supervision	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. <u>Borrower Performance</u>		<u>Highly Satisfactory</u>	<u>Satisfactory</u>	<u>Deficient</u>
Preparation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Implementation		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Covenant Compliance		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Operation (if applicable)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. <u>Assessment of Outcome</u>	<u>Highly satisfactory</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u>	<u>Highly unsatisfactory</u>
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Table 2: Related Bank Loans/Credits

Cr./Ln. No. and Title	Purpose	Yr. of Apprv.	Status	Comments
A. Preceding Operations				
Cr. 213-PAK WAPDA Power Project (WAPDA I)	Upgrading capacity of Transmission Network	1970	Closed (12/31/78)	Completed with delay of five years.
Ln. 1208-PAK Second WAPDA Power Project (WAPDA II)	Finance part of 500-kV Trans. System, connecting hydro in north and thermal gen. in south	1976	Closed (9/30/82)	Successfully completed, with 1 year delay.
Cr. 968-PAK Third WAPDA Power Project (WAPDA III)	Finance 4-year tranche of program for development. of secondary transmission	1979	Closed (12/31/85)	Successfully completed but with 3 year delay.
Ln. 2499-PAK Fourth WAPDA Power Project (WAPDA IV)	Finance 4-year tranche of program for development of secondary transmission.	1985	Closed (12/31/92)	Successfully completed, but with 3 year delay. PCR dated 6/21/95.
Ln. 2556-PAK Fifth WAPDA Power Project (WAPDA V)	Assist WAPDA in reinforcement of EHV power transmission network reducing transmission losses	1985	Closed (12/31/93)	Completed but with a delay of 3 years. Guddu-Jamshoro section completed in August 1995.
Ln. 2698-PAK Kot Addu Combined Cycle Power Project (WAPDA VI)	Installation of 200 MW additional generating capacity at Kot Addu Power Station.	1986	Closed (6/30/93)	Completed with two years delay. PCR dated 11/27/95.
Ln. 2792-PAK Power Plant Efficiency Improvement Project (WAPDA VII)	Finance program for rehabilitation of 7 power plants and addition of combined cycle generation at 2 power plants.	1987	Closed (6/30/94)	Completed with two years delay. ICR dated 3/6/96

Cr./Ln. No. and Title	Purpose	Yr. of Apprv.	Status	Comments
B. Following Operations				
Ln. 3148/Cr. 2078-PAK Rural Electrification Project (WAPDA IX)	Extending the supply of electricity to new villages and settlements; connecting to the grid settlements of electrified villages; expanding consumer connections; reinforcing and rehabilitating existing distribution network; extending electricity supply to tubewells; mapping of all villages and settlements; and installing load management schemes.	1989	Ongoing after substantial delays in start-up.	Original Closing Date 12/95; extended to 6/97.
Ln. 3764-PAK Power Sector Development Project (WAPDA X)	Restructuring and privatization component to implement a Strategic Plan including reorganization and corporatization of WAPDA; investment component to implement a timeslice (1995-1998) of WAPDA's investment program.	1994	Ongoing	Closing Date 6/99
Ln. 3965-PAK Ghazi Barotha Hydropower Project (WAPDA XI)	Assist GOP in its efforts to: (a) develop domestic energy resources and reduce load-shedding in a cost effective and environmentally sustainable manner; (b) reinforce and complement the reform program for the power sector; (c) strengthen WAPDA's capability to address environmental and resettlement issues related to hydropower projects; and (d) further rationalize the use of electricity.	1995	Project approved 12/19/95 and made effective 6/27/96	Closing date 6/2002
C. Related Loans				
Ln. 2552-PAK Energy Sector Loan	Finance GOP's program for policy reform and inst. development during Sixth Five Yr. Plan (FY83-88).	1985	Closed (12/31/88)	Successfully completed.

Cr./Ln. No. and Title	Purpose	Yr. of Apprv.	Status	Comments
Ln. 3107-PAK Second Energy Sector Loan	Finance GOP's program for policy reform and inst. development during Seventh Five Yr. Plan (FY89-93)	1989 & 1991	Closed (12/31/94)	ICR prepared. Performance Audit Report under preparation by OED.
Ln. 2842-PAK Refinery Energy Conservation and Modernization Project	To improve operational efficiency at NRL by reducing energy consumption, increasing crude processing capacity, and modifying the output mix to better match product demand.	1987	Ongoing	The balancing and modernization components have been completed; Closing date extended to June 30, 1996 to allow for completion of captive power plant utilizing exhaust gases
Ln. 3252-PAK Corporate Restructuring and System Expansion Project	Finance program for restr./privatization of SNGPL, and expansion of its transmission and distribution network capacity by about 50%. Under the project, SNGPL constructed a pipeline between Multan and Kot-Addu for supplying natural gas to the power station	1990 & 1991	Ongoing	
Ln. 3500-PAK Domestic Energy Resources Development Project	Accelerate development of hydrocarbons by PS resources, delivery to consumers, enhancing commercial orientation of public-sector entities, and GOP regulation/policy-making	1992	Ongoing	
Ln. 2982-PAK Private Sector Energy Development Project (PSEDP I)	Assist GOP in mobilizing private sector financing for energy investments and develop institutional framework for sustaining private sector investment/operations in the sector	1988	Ongoing	Implementation of private sector projects was substantially delayed during FY90-93; construction of Hub Power Project is now completed and operating satisfactorily. Closing Date extended to 12/31/99 (to correspond with PSEDP-II)
Ln. 3812-PAK Second Private Sector Energy Development Project (PSEDP-II)	To replenish the PSEDF established under Ln. 2982-PAK for financing private sector investments in energy and infrastructure projects.	1994	Ongoing	

Table 3: Project Timetable

Steps in Project Cycle	Date Planned	Date Actual
Identification / Preparation	--	See note
Appraisal	--	June 1989
Board Presentation	--	December 18, 1989
Signing	--	February 2, 1990
Effectiveness	May 3, 1990	November 2, 1990
Amendment of Legal Documents	--	May 1995
Project Completion	June 30, 1995	December 1999 (est.)
Loan Closing	December 31, 1995	December 31, 1996

Note: Project identification and /preparation efforts were undertaken as part of supervision activities for ongoing projects at that time. MIS records on time recording reflect this also (See Table 12).

Table 4: Loan/Credit Disbursements: Cumulative, Estimated and Actual
(US\$ millions)

	Appraisal Estimate	Actually Disbursed	Percentage Disbursed	Cumulative Disbursement
FY 1990				
July-Dec 89				
Jan-June 90	2.6			
FY 1991				
July-Dec 90	9.6			
Jan-June 91	14.0	6.6	4.05	6.6
FY 1992				
July-Dec 91	17.0	4.2	6.66	10.8
Jan-June 92	23.0	12.5	14.36	23.3
FY 1993				
July-Dec 92	21.0	11.2	21.25	34.5
Jan-June 93	22.0	17.5	32.08	52.0
FY 1994				
July-Dec 93	22.0	9.0	37.65	61.0
Jan-June 94	14.8	7.9	42.50	68.9
FY 1995				
July-Dec 94	8.0	4.8	45.48	73.7
Jan-June 95	8.0	18.6	56.97	92.3
FY 1996				
July-Dec 95	0	19.3	68.88	111.6
Jan-June 96	0	13.2	77.03	124.8
FY 1997				
July-Dec 96	0	27.3	93.88	152.1
Jan-June 97	0	7.8	98.70	159.9

Date of final disbursement: May 22, 1997.

Table 5: Key Indicators for Project Implementation

I. Key implementation indicators in SAR		Estimated	Actual
1. HPC-Jamshoro 500 kV transmission line			
(a) No. of circuits		2	2
(b) Line length of each		200 km	180 km
2. 3rd Guddu-Multan, 2nd Multan-Lahore 500 kV			
(a) Line length (3rd Guddu-Multan)		312	313
(b) Line length (2nd Multan-Lahore)		300	316
3. 3rd Jamshoro-Guddu 500 kV transmission line		-	645
4. Extension of Substations			
(a) Guddu	(i) No. of lines to be terminated	1	1
	(ii) No. of bays	1	1
	(iii) No. of shunt reactors	1	1 set + 1 (spare)
	(iv) No. of circuit breakers	3	3
	(v) Auto transformer	-	1 set
(b) Multan	(i) No. of lines to be terminated	2	2
	(ii) No. of bays	1	1/3+2/3
	(iii) No. of shunt reactors	1 set	1 set
	(iv) No. of circuit breakers	3	3
(c) Gatti	(i) No. of lines to be terminated	2	2
	(ii) No. of bays	1/3	1/3
	(iii) No. of shunt reactors	1	1 set
	(iv) No. of circuit breakers	1	1
(d) Lahore	(i) No. of lines to be terminated	1	1
	(ii) No. of bays	1	1
	(iii) No. of shunt reactors	-	-
	(iv) No. of circuit breakers	3	3
(e) Jamshoro	(i) No. of lines to be terminated	-	3
	(ii) No. of bays	-	2
	(iii) No. of shunt reactors	-	2 sets + 1 (spare)
	(iv) No. of circuit breakers	-	5
(f) Moro	(i) No. of lines to be terminated	-	3
	(ii) No. of bays	-	2
	(iii) No. of shunt reactors	-	2 sets + 2 (spare)
	(iv) No. of circuit breakers	-	5
(g) Rahim Yar Khan	(i) No. of lines to be terminated	-	3
	(ii) No. of bays	-	2
	(iii) No. of shunt reactors	-	2 sets + 1 (spare)
	(iv) No. of circuit breakers	-	5

Table 6: Key Indicators for Project Operation

I. Key operating indicators in SAR/Presidents Report	Estimated	Actual
1. None	--	--
II. Modified indicators		
1. None	--	--
III. Operation Plan indicators		
1. Completion of the Jamshoro-Guddu T/L by 1999	December 1996	December 1999
2. Completion of switching substations at Moro and Rahim Yar Khan along with Jamshoro-Guddu T/L	December 1996	December 1999
3. Stable voltage profile with minimal losses, tripping and/or faults	Not available	Monitoring required against standards
4. Adequate operations and maintenance budget	Not awarded: cash flow problems	Annual adequate provision required
5. Standardized procurement management	At project start	--
6. Training	Overseas training for senior and middle-level managers	Structured training program required
7. Privatized (initially on a pilot basis) power distribution	Proposed but not done	Pilot privatization of distribution required

Table 7: Studies Included in Project

Study	Purpose as defined at appraisal/redefined	Status	Impact of study
Impact of Coastal Climate on Transmission Network	Design Specifications	Completed	Appropriate Design
Automated Accounting and Financial Management System	To improve financial management	Completed	Not fully implemented.
Actuarial Study	To determine self insurance contributions	Completed	--

Table 8A: Project Costs

Presentation of appraisal estimates follows the format shown in the SAR and actual results are given for each item to facilitate comparison

Item	Appraisal estimate (US\$ million)			Actual/latest estimate (US\$ million)		
	Local costs	Foreign costs	Total	Local costs	Foreign costs	Total
1. HPC-Jamshoro T/L	54.10	43.10	97.20	33.95	82.18	116.13
2. Guddu-Lahore T/L	71.80	47.80	119.60	20.30	73.77	94.07
3. Jamshoro-Guddu T/L	0	0	0	122.40	84.10	206.50
4. Substations	27.80	31.00	58.80	76.91	123.31	200.22
5. Consultancies and training	20.70	3.60	24.30	25.44	0	25.44
Base Cost	174.50	125.50	300.00	279.00	363.36	642.36
Physical Contingencies	8.40	6.20	14.60	0	0	0
Price Contingencies	48.20	30.20	78.40	0	0	0
Total Project Cost	231.00	162.00	393.00	279.00	363.36	642.36
Interest During Construction	70.10	0	70.10	64.77	0	64.77
TOTAL COST	301.10	162.00	463.10	343.77	363.36	707.13

Table 8B: Project Financing

Presentation of appraisal estimates follows the format shown in the SAR and actual results are given for each item to facilitate comparison

Source	Appraisal estimate (US\$ million)			Actual/latest estimate (US\$ million)		
	Local costs	Foreign costs	Total	Local costs	Foreign costs	Total
IBRD/IDA						
3147-PAK	0	162.00	162.00	0	160.44	160.44
3764-PAK	0	0	0	0	18.3	18.3
Cofinanciers						
IsDB	0	0	0	0	65.00	65
French	0	0	0	0	27.92	27.92
Other external sources						
Bidder's	111.70	0	111.70	0	91.70	91.70
Domestic contribution						
WAPDA's own resources	189.40	0	189.40	343.77	0	343.77
TOTAL	301.10	162.00	463.10	343.77	363.36	707.13

Table 9: Economic Costs and Benefits**Case 1: Economic Rate of Return****9.34 percent**

Fiscal Year	Capital Expend. Local Rs. million	Capital Expend. Foreign Rs. million	Actual O&M Rs. million	Incremental Fuel Cost Border Price	Incremental Sales Gwh	Price in Real 1989 Ps/kWh	Incremental Revenue Rs. million	Net Benefits Rs. million
1989						94.44		
1990	4756.0	6738.2	2350.8	259.4	2139	98.54	2107.9	-11996.7
1991	3769.2	7180.1	1026.7	1229.1	4603	97.19	4473.7	-8733.6
1992	3699.0	10843.8	1911.9	2103.9	7285	96.81	7052.6	-11505.9
1993	4464.2	10341.0	2136.8	2239.4	9290	89.91	8352.6	-10827.8
1994	4548.1	12236.3	2664.1	3492.1	10149	87.22	8852.0	-13986.7
1995	3768.4	8750.9	3223.0	3973.5	13050	86.62	11303.9	-8411.9
1996	4929.7	9606.7	3818.6	5251.8	14943	101.67	15192.5	-8414.1
1997			3818.6	5676.3	17159	101.67	17445.0	7950.2
1998			3818.6	6126.4	19507	101.67	19832.7	9867.8
1999			3818.6	6603.4	21996	101.67	22363.6	11941.7
2000			3818.6	6603.4			22363.6	11941.7
2001			3818.6	6603.4			22363.6	11941.7
2002			3818.6	6603.4			22363.6	11941.7
2003			3818.6	6603.4			22363.6	11941.7
2004			3818.6	6603.4			22383.6	11941.7
2005			3818.6	6603.4			22363.6	11941.7
2006			3818.6	6603.4			22363.6	11941.7
2007			3818.6	6603.4			22363.6	11941.7
2008			3818.6	6603.4			22363.6	11941.7
2009			3818.6	6603.4			22363.6	11941.7
2010			3818.6	6603.4			22363.6	11941.7
2011			3818.6	6603.4			22363.6	11941.7
2012			3818.6	6603.4			22363.6	11941.7
2013			3818.6	6603.4			22363.6	11941.7
2014			3818.6	6603.4			22363.6	11941.7
2015			3818.6	6603.4			22363.6	11941.7
Total	29934.6	65696.0	89585.2	142609.7			474794.1	146968.0

Case 1: Based on actual average electricity revenues expressed in 1989 Terms and maintained at the FY96 level for subsequent years.

Case 2: Economic Rate of Return

12.18 percent

Fiscal Year	Capital Expend. Local Rs. million	Capital Expend. Foreign Rs. million	Actual O&M Rs. million	Incremental Fuel Cost Border Price	Incremental Sales Gwh	Price in Real 1989 Ps/kWh	Incremental Revenue Rs. million	Net Benefits Rs. million
1989						94.44		
1990	4756.0	6738.2	2350.8	259.4	2139	98.54	2107.6	-11996.7
1991	3769.2	7180.1	1026.7	1229.1	4603	97.19	4473.7	-8733.6
1992	3699.0	10843.8	1911.9	2103.9	7285	96.81	7052.6	-11505.8
1993	4464.2	10341.0	2136.8	2239.4	9290	89.91	8352.6	-10827.6
1994	4548.1	12236.3	2664.1	3492.1	10149	87.22	11303.9	-13988.7
1995	3768.4	8750.9	3223.0	3973.5	13050	86.62	15192.6	-8411.9
1996	4929.7	9606.7	3818.6	5251.8	14943	101.67	18428.3	-8414.1
1997			3818.6	5676.3	17159	101.67	24413.3	8933.5
1998			3818.6	6126.4	19507	101.67	26266.9	14468.4
1999			3818.6	6603.4	21996	101.67	26266.9	15845.0
2000			3818.6	6603.4			26266.9	15845.0
2001			3818.6	6603.4			26266.9	15845.0
2002			3818.6	6603.4			26266.9	15845.0
2003			3818.6	6603.4			26266.9	15845.0
2004			3818.6	6603.4			26266.9	15845.0
2005			3818.6	6603.4			26266.9	15845.0
2006			3818.6	6603.4			26266.9	15845.0
2007			3818.6	6603.4			26266.9	15845.0
2008			3818.6	6603.4			26266.9	15845.0
2009			3818.6	6603.4			26266.9	15845.0
2010			3818.6	6603.4			26266.9	15845.0
2011			3818.6	6603.4			26266.9	15845.0
2012			3818.6	6603.4			26266.9	15845.0
2013			3818.6	6603.4			26266.9	15845.0
2014			3818.6	6603.4			26266.9	15845.0
2015			3818.6	6603.4			26266.9	15845.0
Total	29934.6	65896.0	89585.2	142609.7			546714.4	218888.4

Case 2: Based on actual average electricity revenues expressed between FY90-96 and between FY96-99, average revenue reflecting the real increase to meet the financial covenants, and maintained at FY99 required level for subsequent years.

Table 10: Status of Legal Covenants

	Covenant Class	Status	Description of Covenant	Comments
Agreement: Guarantee				
3.01	02	C	GOP to cause federal and provincial agencies to settle bills within three months.	
Agreement: Loan				
5.01 (b)(i)	01	Soon	GOP to have accounts and financial statements including special accounts audited by independent auditors.	Audit completed, and the audit report is being sent to the Bank
5.01 (b) (ii)	01	C	GOP to furnish audit reports on project accounts, including separate opinion on SOEs.	
5.02 (a)	02	C	WAPDA to finance 40% of average annual capital expenditures from internal sources.	Not expected to comply within FY97
5.03 (a)	02	C	WAPDA to maintain 1.5 times debt service coverage ratio.	

Status:

- C Complied with
- CP Compliance after delay
- NC Not complied with
- SOON Compliance expected in reasonably short time
- CP Complied with partially
- NYD Not yet due

Covenant Class:

- 01 Accounts/audit
- 02 Financial performance/generate revenue from beneficiaries

Table 11: Compliance with Operational Manual Statements

Project preparation, appraisal, negotiations and Board presentation were carried out in accordance with all Bank policies.

Table 12: Bank Resources: Staff Inputs

Stage of project cycle	Planned		Revised		Actual	
	Weeks	US\$	Weeks	US\$	Staff Weeks	US\$'000
Preparation to appraisal	--	--	--	--	See note	See note
Appraisal	--	--	--	--	2.7	6.3
Negotiations through Board approval	--	--	--	--	7.0	12.6
Supervision	--	--	--	--	77.9	220.1
Completion	--	--	--	--	3.4	11.7
TOTAL	--	--	--	--	91.0	250.7

Notes:

- 1 MIS data shows information beginning in 1990 only. This reflects that identification/preparation activities were undertaken as part of supervision activities for ongoing projects (Ref. Table 3).
- 2 US Dollar amounts include salaries and travel costs.

Table 13: Bank Resources: Missions

Stage of project cycle	Month/year	Number of persons	Days in field	Specialized staff skills	Performance rating		Type of problem
					Implementation status	Development objective	
Through appraisal	n.a	n.a	n.a	n.a.	-	-	-
Appraisal through Board approval	June 1989	4	n.a.	EC, PE, FA, CO	-	-	-
Supervision	May 1991	3	29*	PE, FA	2	1	LC
	June 1992	3	3*	PE, FA, CO	2	1	FP
	Mar 1993	2	22*	PE, EE	2	1	PR
	Nov 1993	3	16*	PE, EE, PA	2	1	FP
	May 1994	2	17*	PE, PA	S	S	FP
	April 1995	3	20*	PE, FA, PA	S	S	LC
	April 1996	2	16*	PE, FA	S	S	PM
Completion	Nov 1996	1	6	ME		-	-

Note: MIS data shows information beginning in 1990 only. This reflects the fact that identification and preparation activities were undertaken as part of supervision activities for ongoing projects.

* Indicates number of days in field for all projects supervised by the mission.

Key:

- PE: Power Engineer
- FA: Financial Analyst
- ME: Municipal Engineer
- PA: Project Advisor
- EC: Economist
- EE: Economist
- CO: Consultant
- LC: Compliance with Legal Covenants
- FP: Financial Performance
- PR: Procurement Progress
- PM: Project Management Performance

PAKISTAN

Transmission Extension and Reinforcement Project (Ln 3147-PAK)

Implementation Completion Report Preparation Mission

*Aide Memoire*⁷

1. A World Bank mission comprising Chandra Godavitarne (Consultant) visited Lahore and Islamabad during November 5 through 11, 1996 to discuss arrangements for preparation of the Implementation Completion Report (ICR) for the Transmission Extension and Reinforcement Project which is scheduled for closure on December 31, 1996. The mission had discussions with officials from the Government of Pakistan (GOP), Water and Power Development authority (WAPDA), and their consultants. A list of persons met is given in Annex 1. The mission held a wrap-up meeting with the Managing Director, Transmission and Grid Stations and his staff. This *aide memoire* summarizes the findings and recommendations of the mission, which are subject to confirmation by Bank management. The mission wishes to record its appreciation for the courtesies and cooperation extended by WAPDA.

The Mission

2. The mission's objectives were to : (a) brief the concerned officials of the process for preparation of the Implementation Completion Report (ICR), (b) discuss and agree on the person(s) from WAPDA that would provide the coordination, the scheduling and support for the preparation of ICR, including the inputs required from WAPDA, and (c) obtain a preliminary evaluation from WAPDA of the project implementation experience.

3. The objectives and rationale for the preparation of ICRs are to make an independent assessment of the experience of project implementation relating to design and preparation, implementation, status of completion and operation of the assets created, and to make an assessment of the projects' developmental impact, sustainability of the investments, the Borrowers' and the Banks' performance, so that lessons may be learnt for use in future operations. Bank procedures require that the ICR be prepared no later than six months after the close of the Loan

4. It was agreed that every effort will be made to adhere to complete the ICR by end-March 1997. The Chief Engineer, E.H.V (South) will coordinate the preparatory support, liaise with the Bank and be responsible for the preparation of the Borrower's Assessment on behalf of WAPDA.

⁷ The Aide Memoire and Annexes have been updated on June 9, 1997 to reflect current information on project implementation.

A. The Project

5. **Project Objectives:** The project objectives were to: contribute to the implementation of the Core Investment Program (CIP) for FY 89 - 93 through: (a) extension and reinforcement of the 500 kV network to ensure adequate and effective evacuation of power from the main thermal power generation centers at Guddu and Multan to the major load centers in the middle and northern regions of the country; (b) extension of the transmission link between the 1,300 MW Hub Power Complex (HPC), the first major power project to be financed, constructed and operated by the private sector, and the national 500 kV network, and (c) continue institution building efforts indicated in the Banks' earlier lending operations by strengthening WAPDA's capabilities for implementing, operating and maintaining an efficient and economic transmission system.

6. **Project Description:** The project, as appraised was to comprise:

- (a) installation of two single-circuit 500 kV lines, about 200 km each, connecting the Hub Power Complex and Jamshoro;
- (b) installation of a third single-circuit 500 kV line, about 312 km, between Guddu and Multan, and a second single-circuit line of about 300 km, between Multan and Lahore via Gatti;
- (c) extension and reinforcement of existing 500 kV substations at Lahore, Gatti, Multan and Guddu with associated facilities including reactive compensation, telecommunication and control equipment; and
- (d) consulting services to assist and train WAPDA's staff in the design, construction, operation and maintenance of the 500 kV network.

7. **Project Cost:** The total cost of the project, including price and physical contingencies and customs duties, was estimated at US\$393.0 million equivalent, of which taxes and duties were estimated at about US\$153.7 million equivalent. The total financing required for the project, including interest during construction of US\$70.1 million equivalent, was about US\$463.1 million. Of the total financing required, US\$162.0 million was to be in foreign exchange, and the remaining US\$301.1 million was to be local costs.

8. **Project Financing:** The Bank Loan of US\$162.0 million was made to WAPDA with GOP as the guarantor. WAPDA would bear the interest rate risk and any cost overruns. GOP would bear the foreign exchange risk and provide the repayment guarantee to the Bank, for which WAPDA would annually pay 3-1/2 percent on the outstanding loan amount to the GOP, representing the foreign exchange insurance premium which is collected by the State Bank of Pakistan. The Loan would cover 100 percent of the foreign exchange requirement and represents about 35 percent of the total financing required. Of the local cost requirements, about US\$189.4 million equivalent would be financed by WAPDA from internal resources, and the balance amounting to US\$111.7 million equivalent through local borrowings.

9. **Project Preparation:** The design and engineering of the 500 kV grid, totaling about 1,012 km, and substations were prepared by WAPDA with the assistance of their local consultants (NESPAK) who had been retained by WAPDA in previous projects for the engineering design and project management of the 500 kV network. In view of the high moisture, salt and dust content in the coastal areas, WAPDA was required to hire, as a condition of Loan effectiveness, internationally experienced consultants to assist and advise on the design of the 500 kV networks in these areas. This study was carried out by NGK Japan.

10. The national 500 kV grid has been planned to withstand faults without system separation, line overloading, cascade tripping or loss of load. To ascertain adequate design for each new extension of the 500 kV network, including the proposed project, specific studies were carried out in the areas of: load flows for normal and emergency conditions and in typical cases of generation during low water and high water seasons; short circuits; transient and steady state stability; reactive power management for improvement of system power factor; mechanical and electrical design for conductor selection; tower structure and substation layout and control; metering and relaying scheme in association with telecommunication requirements; and integration into the system control and data acquisition (SCADA) network.

11. **Project Implementation:** The management and supervision of construction of the project is performed by WAPDA with the assistance of their consultants (NESPAK). Implementation responsibility is assigned to Chief Engineers who have Project Directors who are responsible for the various elements of the works. NESPAK is the designated 'engineer under the contract', and is responsible for day to day project management with the WAPDA staff.

12. The issuance of bidding documents for at least 25 percent of requirements for towers and earthing material was set as a condition of effectiveness of the Loan. Bid document preparation was expected to be a routine matter as bidding documents standardized in previous projects were to be used. Despite this, WAPDA was not able to carry out procurement efficiently due to factors both within and outside its control. Some of the external factors that resulted in delays include: approvals from the standing freight committee for the use of non-national vessels, approvals of import licenses, opening of letters of credit, delayed clearance of goods from customs and obtaining import licenses due to the lack of local currency allocations for the project, finalization of the cofinancing agreement with the Islamic

Development Bank (IsDB), procedures to provide guarantees for bidder's finance, and default of the contractor responsible for supply of stubs and steel towers. WAPDA terminated the contracts for the supply of tower material. on August 20, 1996 due to contractor's inability to supply the material as per terms of the contracts.

B. Project Implementation and Completion Status

13. **Project Revision:** The legal agreement provides that no withdrawals would be made from the Loan for the construction of the two single-circuit 500 kV transmission lines from HPC to Jamshoro until financial commitments for the construction of the Hub Power Complex are satisfactorily completed. As WAPDA had not finalized the financing arrangements, the construction of the two 500 kV transmission lines from the HPC to Jamshoro commenced only in May 1995, after financing was finally secured in December 1994. This led to a project revision, in May 1995, to finance the Third Jamshoro-Guddu 500 kV transmission line using funds from Loan 3147-PAK and the Power Sector Development Project (Loan 3764-PAK). This additional transmission line was not expected to be completed by December 31, 1996, the closing date of Loan 3147-PAK, and is not strictly part of this project.

14. The project, as implemented, comprises the following components:

- (a) Installation of two single-circuit 500 kV line, (each about 180 km), directly connecting the HPC and Jamshoro (co-financed by the Islamic Development Bank and Loan 3147-PAK in the amounts of US\$65 million and US\$17.18 million, respectively);
- (b) Installation of a third single-circuit 500 kV line (about 313 km), including ground wire wrapped optical fiber (GWWOP) communication system between Guddu and Multan (financed fully under Loan 3147-PAK);
- (c) Installation of a second single-circuit 500 kV line (about 316 km), between Multan and Lahore via Gatti (financed fully under Loan 3147-PAK);
- (d) Installation of a third single-circuit 500 kV line of about 645 km between Jamshoro and Guddu (Jamshoro-Rahim Yar Khan) including link at Moro and Dadu and switching stations at Moro and Rahim Yar Khan.
- (e) Extension and reinforcement of existing 500 kV substations at Lahore, Gatti, Multan and Guddu with associated facilities including reactive compensations, communications and control equipment (financed fully under Loan 3147-PAK);
- (f) Extension and reinforcement of existing 500 kV substations at Jamshoro with associated facilities including reactive compensations, communications and control equipment (financed under French Protocol).

- (g) Consultancy services to assist and train WAPDA's staff in the design, construction, operation and maintenance of the 500 kV network.

15. The amendment, referred to above, provided for the installation of a third single-circuit 500 kV transmission line (about 645 km) between Jamshoro and Guddu (Jamshoro- Rahim Yar Khan) including links at Moro and Dadu, and switching stations at Moro and Rahim Yar Khan, financed partially under Loan 3147-PAK and Loan 3764-PAK, bidder's financing and WAPDA's own funds.

16. **Status of Project Implementation:** On the whole, project implementation is satisfactory. Due to various factors within and outside its control, WAPDA has not been able to adhere to the procurement plan agreed at project start.

17. Delays have occurred primarily due to the late agreement on the funding arrangements for HPC and the consequent decision to include in the project, the Third Jamshoro-Guddu transmission line. Some factors affecting the implementation schedule have been outside the control of WAPDA, namely, the time taken: to obtain no objection certificate (NOC) from Standing Freight Committee to use foreign flag vessels, for the State Bank of Pakistan to nominate a bank to issue the letters of credit, and to obtain the letters of credit. Under WAPDA's control were priorities in local currency allocation for the project that resulted in delayed customs clearance and obtaining import licenses, better procurement planning and contract administration anticipating the in-country conditions, and bid conditions that require suppliers to bear costs of opening letters of credit and lack of price variation for raw material used in the manufacture of materials.

18. The status of implementation, activities completed or to be completed by Loan closure, and plans to complete the remaining activities for the various components are described below:

Activities Completed:

19. The following activities have been completed:

- (a) **Hub-Jamshoro 500 kV Transmission Lines I and II** have been commissioned on January 7, 1996 and October 28, 1996, respectively;
- (b) **Third Guddu - Multan 500 kV transmission line** was commissioned on December 8, 1994. The GWWOP communications system on this line was commissioned on November 22, 1995.
- (c) **Second Multan - Gatti - Lahore 500 kV transmission line** was constructed in two sections. The Gatti-Lahore section was energized on October 14, 1993, and the Multan-Gatti section was energized on March 1, 1995.

- (d) **Extension of 500 kV substations at Lahore, Gatti, Multan and Guddu** were commissioned on September 23, 1996; 99 percent of the outstanding works have been completed by December 1996.

Ongoing Activities:

20. The following activities are ongoing:

- (a) The remaining work on the SCADA system at the Jamshoro substation is expected to be completed by end-June 1997.
- (b) Addition of auto-transformers at Guddu substation, financed under a French Protocol, is expected to be completed in December 1997.
- (c) Construction of switching substations at Moro and Rahim Yar Khan has not commenced. The award decision is pending final review of bid evaluations by the WAPDA Competent Authority.
- (d) **Training of WAPDA staff**, utilizing project funds of about US\$2.3 million, in the design, construction, operation and maintenance of the 500 kV network has not taken place. WAPDA has traditionally arranged external training of staff on specific aspects through equipment supply contracts only, and not necessarily focusing on specialized training related to transmission lines and substation management. Funds provided under the project were for more specialized training to enable the middle and senior technical and management staff to be at the cutting edge of technology and management. WAPDA has completed foreign training of Switchgear Group under Contract 1150-31 (Lot I and III) with actual expenditures to be reimbursed by IBRD against allocated amount of US\$2.3 million.
- (e) **Studies:** As a condition of loan effectiveness, WAPDA was required to carry out a study of the impact of high moisture, salt and dust in the coastal areas on the network elements. This study was done and the study recommendations were used in the development of design specifications for the network elements.

21. **Third Jamshoro - Guddu 500 kV transmission line** is still under construction, having started late, in May 1995, after the financial arrangements for the HPC were finalized. It was not contemplated that the construction of this line would be completed by the closing date of Loan 3147-PAK, as it is also financed out of the proceeds of Loan 3764-PAK. However, construction has delayed considerably. The contractor who was to supply stubs and steel towers has defaulted on two contracts. It has taken two years from signature of the contract to its termination for default. As per advice of the Bank, bids on retendering of contracts 1150-21A and 1150-21B for supply of steel towers are currently on sale, with bid opening dates of April 16 and April 28, 1997 respectively. The supply of conductors is also held up awaiting financial closure with the Canadian supplier, for want of guarantees to be provided by WAPDA. Bids for the grid stations at Moro and Rahim Yar Khan were opened on December 1, 1996 and are under evaluation. Despite the optimistic projections made earlier, it is now reported that this line is expected to be completed only in late 1999. There is the real prospect that line construction contractors would become idle waiting for tower material, generating claims. A detailed account of the procurement and implementation status is provided in Annex 2.

22. **Revised Project Cost:** The latest revised total project cost estimate is US\$642.4 million, excluding interest during construction, comprising US\$279 million local costs and US\$365 million foreign costs.

23. **Revised Project Financing:** The agreement with the Islamic Development Bank (IsDB) in December 1994, also provided an additional US\$65 million for financing the HUB- Jamshoro transmission lines. This IsDB's funding released US\$36 million from the Loan 3147-PAK, which the Bank agreed could be used to finance the 645 km third single-circuit 500 kV transmission line between Jamshoro and Guddu including associated works. This transmission line and associated works are financed through Loan 3147-PAK (US\$31.0 million), Loan 3764-PAK (US\$18.3 million) and WAPDA's own financing. The extension and reinforcement of existing 500 kV substation at Jamshoro and associated works are financed out of a French Protocol (US\$28 million). The current financing plan (in US\$ millions) is indicated below:

IBRD loans:	3147-PAK	160.5
	3764-PAK	18.3
French Protocol		27.9
IsDB		65.0
WAPDA (excluding bidder finance)		279.0
Bidder's finance		91.7

	Total	642.4

24. On the basis of the above estimates and excluding bidder's finance, WAPDA would finance US\$279 million or 43.3 percent of the total project cost through internally generated funds.

25. **Disbursements:** Disbursement from the Loan up to the end of January 1997 was US\$154.16 million. WAPDA estimates that all but about US\$1.0 million of the Loan will be disbursed by Loan closure. For completion of the remaining works, WAPDA would require about US\$5.5 million for the tower material, about US\$29.2 million for conductors, US\$57 million for the Moro and Rahim Yar Khan switching stations, and Rs 5,000 million for the line construction contracts, and custom duties/taxes etc., totaling US\$91.7 million and Rs 5,000 million.

26. **Compliance with Covenants:** Over the project period, WAPDA has substantially complied with the two major financial covenants. These relate to financing 40 percent of its capital investments through internal cash generation, and not to incur additional debt unless its revenues are at least equal to 1.5 times its debt service requirements. Compliance in respect of the internal cash generation covenant was not achieved only in FY93. WAPDA has complied with the audit covenant during the project period, except for FY95.

C. Financial Management

27. **Tariff Increases:** WAPDA has annually increased tariffs to meet its revenue requirements as well as to remain in compliance with the financial covenants under this and other Loans from IBRD. The estimated tariff increase for FY97 was about 14 percent. Rather than increase tariffs once annually, WAPDA has resorted to increasing tariffs more frequently to meet its cash requirements as well as to soften the impact on consumers. Tariffs have been increased this fiscal year in August, September, October and November by average monthly increases varying between about 1.4 percent to 1.8 percent.

28. **Cost Reduction Measures:** There is recognition of the need to avoid frequent and relatively large tariff increases through the introduction of measures to reduce operational costs, particularly, when losses are in excess of 24 percent. While there is every intention to undertake this task, there is a degree of skepticism over the extent of cost reduction possible and the prospects for its achievement in the prevailing climate. The mission believes that, despite the prevailing country conditions, there is plenty of scope for improvements. While there are definite gains to be achieved through reduction of costs, the cost and benefit of specific actions will be analyzed in the preparation of such a plan. This task is yet to commence in earnest, and would require more serious attention of WAPDA.

29. **Accounts Receivables:** Arrears in accounts receivables have not changed substantially from the Rs. 19.0 billion reported early in 1996. A major achievement, however, was the GOP decision, in 1995, to deduct at source the dues from Provincial Government consumers, through which these arrears have been reduced, and a certain discipline installed. The coverage of this effort will be expanded to include recoveries from all government consumers. The major area that remains to be addressed is the arrears in accounts receivables from domestic, commercial and industrial consumers. WAPDA recognizes that this a difficult area to tackle in the prevailing environment, and stricter enforcement measures are required with the support of GOP. WAPDA has plans to make the Area Electricity Boards (AEB) more accountable rather than be confined only to billing and collection. In

this regard, supply in bulk to the AEB's is an option under consideration. GOP support is vital if WAPDA is to achieve progress in this area.

D. Operation Plan

30. The mission discussed with WAPDA the plans for operation of the transmission lines and substations installed under the project, to assure that the benefits of the project would be sustained until the end of their useful life. As part of the ICR process, WAPDA will prepare the Operation Plan which would cover institutional arrangements for effective operation of the assets, performance indicators, targets, arrangements to assure adequate annual fund allocations for operation and maintenance, and indicative timetables for WAPDA and the Bank to monitor the achievement of the monitoring indicators. A draft Operation Plan prepared by WAPDA is attached as Annex 3. WAPDA will refine and finalize this Operation Plan by end-March 1997.

E. Clients' Evaluation

31. WAPDA is satisfied with the implementation progress achieved despite the various difficulties it has faced - some of which are beyond its control. Among the reasons attributed to delays are: the time taken to obtain NOC from Standing Freight Committee and establish letters of credit, local currency shortages resulting in non-clearance of material from customs for long periods and payment of import license fees, performance of materials suppliers and construction contractors, delays in line construction due to lack of right of way, the law and order conditions, particularly in Punjab and Sind areas that hampered transport of material, and heavy rains during the years 1992 and 1994. The major delay has been caused by the default of one contractor who was to supply stubs and steel towers for the Third Jamshoro- Guddu transmission line.

32. WAPDA also attributes some delay to the Bank's performance in the area of procurement decisions. The examples quoted are: Bank decision on the contract for the supply of spacer dampers took over six months, and the Bank's insistence on re-tendering the contract for extension of the existing 500 kV substations. WAPDA also indicated three instances where it appears that the Bank has released the last ten percent payment for supplies under letters of credit prior to certification of acceptance of material. However, this case will be examined to ensure that there has been no fraud, before making a formal representation.

F. Conclusions

33. Partial benefits of the investments made under the project have been realized, even though the Third Jamshoro-Guddu transmission line is being substantially delayed. The additional transmission capacity has facilitated transmission of power from the south to the north of the country where the load centers are located. The full utilization of the benefits of the HPC would be achieved on the completion

of the above transmission line. The project also facilitated improvement in the voltage profile and power factor in areas served by the substations, and the transient stability of the network.

34. In order to sustain the benefits of the project over the life of the assets, WAPDA would need to:

- (a) provide adequate annual maintenance budgets, and technical and personnel resources required;
- (b) conduct systematic reviews of the achievement of performance indicators and conduct efficiency tests to reduce the high level of losses in the transmission and distribution network;
- (c) identify further needs for strengthening any areas of the network to obtain improved system efficiency; and
- (d) review periodically power demand projections in view of the changing use patterns of consumers.

Attachments:

- Annex 1 List of Persons Met
- Annex 2 Status of Implementation of the Third Jamshoro-Guddu 500 kV
Transmission Line and Substations
- Annex 3 Operational Plan

November 11, 1996 (Modified)

PAKISTAN

Transmission Extension and Reinforcement Project (Ln 3147-PAK)

Implementation Completion Report Preparation Mission

List of Persons Met

Government of Pakistan

Mr. Saleem Sethi, Deputy Secretary (WB), Economic Affairs Division
Mr. Sahibzada Masood Ali, Joint Secretary, Ministry of Water and Power

Water and Power Development Authority (WAPDA)

Mr. Akbar Khan, Managing Director, Transmission and Grid Stations
Mr. Aftab Ahmad Khan Leghari, Managing Director (Distribution)
Mr. Nabi Hussain, General Manager, Transmission and Grid Stations
Mr. Rizwan Ali Shah, General Manager, Finance (Corporate)
Mr. Iqbal Khan, Chief Economist
Mr. Pir Mian Jan Said, Chief Engineer, EHV (South)
Mr. A. M. Rajput, Director (P&D) E.H.V (South)
Mr. Ch. Muhammad Hussain, Senior Budget & Accounts Officer, EHV (South)

NESPAK

Mr. Amjad Javed, Project Coordinator
Mr. Mahmood ul Hassan Khan, Principal Engineer

PAKISTAN

Transmission Extension and Reinforcement Project (Ln 3147-PAK)

Implementation Completion Report Preparation Mission

Status of Implementation of the Third Jamshoro - Guddu 500 kV Transmission Line and Substations

Financing

Foreign exchange requirements for materials for the construction of this transmission line are met from IBRD Loans 3147-PAK, Loan 3764- PAK and bidder's finance in the amounts of US\$31.0 million, US\$18.3 million and US\$91.7 million, respectively. The construction of the line is being financed out of WAPDA's own resources.

Estimated Completion Date

This line is now scheduled for completion by December 1999.

(i) Status of Procurement of Line Materials

Contract No. 1150-21 (Package I) for supply of stubs and steel towers (financed through Loan 3764-PAK): A contract was signed on August 18, 1994 with Demas Demir, Turkey for the supply CIF Karachi at a price of US\$12.6 million. The contractor has defaulted without commencing any supply, and the contract was terminated on August 20, 1996. As per advice of the Bank, the contract was retendered and new bids were opened on April 16, 1997. The Engineer's estimate is now US\$18.3 million.

Contract No. 1150-21 (Package II) for supply of steel towers (financed under Loan 3147-PAK): A contract was signed on March 22, 1995 with Demas Demir, Turkey for the supply CIF Karachi at a price of US\$3.8 million. The contractor has defaulted without commencing any supply, and the contract was terminated on August 20, 1996. WAPDA has now reinvited tenders for stubs and steel towers to be financed under Loan 3764-PAK and on the basis of bidders' financing. Bids have been opened on April 28, 1997. The Engineer's estimate is US\$5.5 million.

Contract No. 1150-22 (Item 1) for supply of 16,300 kg E&M strength insulators (financed under Loan 3147-PAK): A contract was signed with Mitsui & Co, Japan on April 14, 1996 at a price of US\$21.0 million, and with a variation order issued on April 27, 1996, the revised contract value is US\$24.2 million. All the insulators have been delivered.

Contract No. 1150-22 (Item 2) for supply of 8,200 kg of E&M strength insulators (financed under Loan 3147-PAK): A contract was signed with EMCO, Pakistan on March 28, 1996 for ex -works contract price of US\$0.3 million plus Rs10.2 million. A variation order issued on April 27, 1996 revised the contract value to US\$0.4 million plus Rs11.8 million. One hundred percent of the order has been delivered.

Contract 1150-22 (Item 3) for supply of hardware (financed under Loan 3147-IN): The contract was signed with Sicamex, France on May 23, 1996 for the supply CIF Karachi at a price of FrF13.5 million. One hundred percent of deliveries have been completed by December 1996.

Contract 1150-23 for supply of conductors (financed through bidder's financing of US\$29.2 million): A contract signed with Alcan-CCL Consortium on October 29, 1995 is still not operative as WAPDA has not been able to arrange a bank guarantee from the National Bank of Pakistan and the Habib Bank Ltd.

Contract No. 1150-24 (Item 1) for supply of accessories (financed under Loan 3147-PAK): A contract was signed on September 19, 1995 with Dulmison, Thailand for the supply CIF Karachi at a price of US\$0.7 million. A variation order issued on April 27, 1996 revised the contract price to US\$0.8 million. The full order has been delivered.

Contract No. 1150-24 for supply of dampers (financed under Loan 3147-PAK): A contract was signed on September 19, 1995 with Dulmison, Thailand for the supply CIF Karachi at a price of US\$2 million. A variation order issued on April 27, 1996 revised the contract price to US\$2.3 million. All items have been delivered.

Contract No. 1150-25 for supply of shieldwire (financed by WAPDA): A contract was signed with Chemical Complex Ltd./China Shenyang Corporation Consortium on November 7, 1996 for ex-works contract price of Rs22.74 million. Complete ordered quantity is scheduled to be delivered by August 4, 1997.

(ii) Status of Line Construction Contracts

Line construction is planned as four contracts. Progress, as of June 1997 is as follows:

(a) **Jamshoro-Moro-Dadu Line Section I (255 kms):** Contract signed on November 7, 1995 with PCC-NEIE China Joint Venture at a price of Rs673.6 million. Route checking for the whole section has been completed. Construction of foundations is in progress and so far, 170 out of 595 conventional foundations, and 18 out of 115 pile foundations have been completed.

(b) **Moro-Goth Qazi Line Section II-A (170 km):** Contract was signed on November 15, 1995 with Ramzan-Beijing Joint Venture at a price of Rs321.2 million. Route checking has been completed. Foundation work is in progress. So far, 199 out of 355 conventional foundations, and 44 out of 103 pile foundations have been completed.

(c) **Goth Qauzi Mahar- Rahim Yar Khan Line Section II-B (160 km):** A contract was signed on January 10, 1996 with Henan China at a price of Rs202.0 million. Route checking for the whole section been completed. Construction of foundations is in progress. About 253 out of 411 conventional foundations, and all of the pile foundations (without pile caps) have been completed.

(d) **Linking of Rahim Yar Khan Substation with Third Guddu-Multan 500 kV Line Section III (60 km):** A contract signed on November 7, 1995 with Potential Engineers at a price of Rs. 376.3 million. Route checking for 55 km have been completed. Thirty out of 58 conventional foundations, and 28 out of 46 Indus River crossing pile foundations (without pile caps) have been completed.

(iii) Extension of 500 kV Substations at Lahore, Gatti, Multan and Guddu

(a) **Contract No. 1150-31 for extension of substations in Lahore, Gatti (Lot I) and Guddu (Lot III)** was signed on February 3, 1994 with Cogelx-Alsthom, and for **extension of Multan substation (Lot II)** was signed on February 3, 1994 with Siemens. Commissioning of extension works for all the substations was completed on September 23, 1996; 99 percent of outstanding works have been completed.

(b) **Contract No. 1150-32 for extension of 500 kV bays at Jamshoro substation** has been financed out of a French Protocol. A contract was signed on January 30, 1993 with Merlin Gerine, France at a price of FrF104.1 million plus Rs85.5 million. A variation order (for temporary energization through the middle breaker of bay 4 at Gatti 500 kV substation) was signed on August 23, 1993 for FrF0.9 million plus Rs2.3 million. All extension work has been completed, and all equipment and the new 500 kV bays have been energized, and the commissioned substation was handed over to WAPDA in June 1995. Work on shifting of lines was completed in November 1995. The remaining work on SCADA is expected to be completed in June 1997.

(c) **Contract 1150-35 for addition of three 150 MVA, 500/220 kV auto-transformers at Guddu substation** (financed under the French Protocol) was signed on February 23, 1995 with Cogelx-Alstom, France at a price of FrF43.0 million plus Rs24.0 million. This work is expected to be completed in December 1997.

(d) **Moro and Rahim Yar Khan Switching Substations:** Bids have been opened on December 1, 1996. WAPDA has requested bidder's finance for this contract. Award of contract is yet to be finalized.

PAKISTAN
Transmission Extension and Reinforcement Project (Loan 3147-PAK)
Operations Plan

<i>ITEM</i>	<i>PRESENT STATUS AND FUTURE PLANS</i>	<i>PERFORMANCE INDICATORS</i>	<i>TARGET DATE</i>
Project Construction Completion	<p>1. The Third Jamshoro-Guddu 500 kV transmission line is likely to be considerably delayed due to the non-availability of tower material and conductors, and the delay in completing the grid stations. Bids for construction of substations (Moro and Rahim Yar Khan) are under evaluation. Bids on re-tendering for towers against contracts 1150-21A and 1150-21B have been invited and are scheduled for opening on April 16 and 28 respectively.</p> <p>2. Extension work of the existing 500 kV substations at Lahore, Gatti, Multan and Guddu are almost complete..</p> <p>3. Contract 1150-35 for addition of 3x 150 MVA, 500/220 kV autotransformer bank (T 3) for the Guddu substation is being financed through a French protocol. The contract with Cogelex Alsthom, France was signed on February 23, 1995, and the work is expected to be completed by December 1997.</p> <p>4. Bids for the Moro and Rahim Yar Khan substations (switching stations) are due on December 1996. The award of contract and the construction works are expected to be substantially delayed, and expected to be completed no earlier than 1999.</p>	<p>- IBRD's decision on the issue of termination of Contracts 1150-21 Packages I and II for steel towers, and the procurement procedure and financing for Contract 1150-21 Package II.</p> <p>- WAPDA obtains bank guarantees for EDC, Canada to come to financial closure on Contract 1150-23- Supply of Conductors.</p> <p>- Contingency plan prepared by WAPDA for expediting critical and alternative arrangements for evacuation of power to the north of the country.</p> <p>- Annual budgetary allocations by WAPDA to assure timely payments against transmission line contracts financed from WAPDA's own funds.</p>	<p>April 16 and 28, 1997</p> <p>June 30, 1997</p> <p>March 1999</p> <p>Immediate</p>
		<p>Full completion and commissioning of sub-stations.</p>	<p>June 30, 1997</p>
		<p>-Adequate budgetary allocations by WAPDA have to assure timely payments for the local component to the contractor.</p>	<p>Immediate</p>
		<p>- The contractor provides a project schedule for the remaining works.</p> <p>Financial closure on the bidder's financing arrangements including provision of guarantees as required.</p>	<p>March 31, 1997</p> <p>June 30, 1997</p>

PAKISTAN
Transmission Extension and Reinforcement Project (Loan 3147-PAK)
Operations Plan

ITEM	PRESENT STATUS AND FUTURE PLANS	PERFORMANCE INDICATORS	TARGET DATE
Project Operations. Institutional Arrangements	<p>WAPDA Overall</p> <p>1. WAPDA to make adequate budgetary allocations to meet operation and maintenance costs - currently considerably under-funded.</p> <p>2. WAPDA needs to provide adequate capital funds for strengthening transmission and distribution lines, and strengthening of substations, to ensure system reliability and stability.</p> <p>3. Financial obligations under the private power purchase agreements are creating cash flow problems in WAPDA. Cost recovery (tariffs, billing and collection) performance, and cost reduction through efficiency improvements are weak, leading to cash flow problems for capital works and O&M activities. Billing and collection performance and cost reduction plans will be implemented in a serious manner.</p> <p>4. Project management weaknesses have led to inefficiencies in procurement and construction completion. Project management needs to be improved.</p>	<p>1. Realistic estimating and allocation of O&M budgets consistent with requirements.</p> <p>2. WAPDA provides internally generated funds, secures multi- and bilateral funds, or encourages private sector investments.</p> <p>3. WAPDA enters into formal contractual arrangements with GOP for its operations, and also makes contractual arrangements with the Area Electricity Boards to achieve a greater degree of accountability. Concurrent action on (a) tariff increases, as required; (b) improved billing and collection performance including disconnections enforcement (with the support of GOP and Provincial Governments); (c) formulation and implementation of cost reduction measures, and increase cost recovery.</p> <p>4. Managing Director (Transmission and Grid Stations), Chief Engineers and Project Directors to improve project monitoring and oversight, and improve response time for decision-making on implementation matters.</p>	<p>July 1, 1997</p> <p>Annually</p> <p>July 1, 1997</p> <p>Continuous</p>

PAKISTAN
Transmission Extension and Reinforcement Project (Loan 3147-PAK)
Operations Plan

<i>ITEM</i>	<i>PRESENT STATUS AND FUTURE PLANS</i>	<i>PERFORMANCE INDICATORS</i>	<i>TARGET DATE</i>
<p>Project Operations. Institutional Arrangements</p>	<p>Project Specific</p> <p>1. Though the third Jamshoro-Guddu transmission line was not part of the original project, it is nonetheless important for evacuation of power to the load centers. It's completion is considerably delayed, and its completion date cannot be forecast with certainty, even though it is projected to be completed in late 1998. The procurement of tower material could easily take up to two years. The provision of guarantees to the Canadian suppliers of conductors has been under process for many months. Efforts will made to resolve all outstanding issues.</p> <p>2. Alternative means to evacuate power to the north needs to be finalized, due the delays mentioned above.</p> <p>3. Completion of the transmission lines, and substations, as originally formulated, has improved WAPDA's capacity to transmit power to the north of the country further strengthening needs will be studied.</p>	<p>1. New tendering for procurement of tower material. The guarantees required for the Canadian supplier to commence supply of conductors have to be resolved immediately.</p> <p>2. Adequate budgetary allocations should be made to meet payments to suppliers and contractors.</p> <p>3. Comparison of before and after status should be done including: energy transmitted, reduction in the level of system losses, and frequency of faults.</p>	<p>June 30, 1997</p> <p>Immediate but no later than June 30, 1997</p> <p>Annually</p>

IMPLEMENTATION COMPLETION REPORT

PAKISTAN

**TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT
(Ln. 3147-PK)**

Borrower's Evaluation

U.F. 96



Pakistan Water And Power Development Authority

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14-03-97

The World Bank
International Bank for
Reconstruction & Development
World Bank Building
20/A Bank Road, Islamabad.

Subject:- TRANSMISSION EXTENSION AND REINFORCEMENT PROJECT
LOAN 3147 PAK PREPARATION OF THE IMPLEMENTATION
COMPLETION REPORT.

Ref: World Bank Aide Memoire of Jan 17, 1997 received
through G.M.Coordination letter No. GM(C)T-30
dated 2.2.1997.

Kindly find enclosed the followings with
regard to Completion of Implementation Completion report
(ICR) by the World Bank.

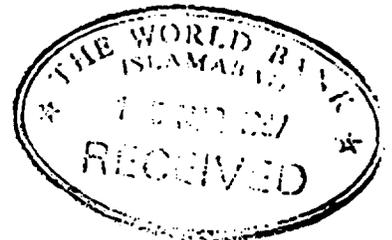
1. Copy of Aide Memoire of World Bank Mission of November 4, 1996 on preparation of (ICR) with our comments marked on it clearly.
2. Copy of Annex: No.2 of Aide Memoire duly marked, with latest status of Implementation regarding Third Jamshoro-Guddu 500KV T/L and Substations.
3. Revised draft operation plan with our comments marked on it.
4. Borrower's evaluation including assessment of project implementation experience project results and the operational

[Signature]
(FIR MIAN JAN SAID)
CHIEF ENGINEER EHV SOUTH.

D.A. AS ABOVE.

CC.

1. Managing Director (T &Gs)WAPDA Lahore.
2. General Manager GSC WAPDA Lahore.
3. Director (P&D)EHV South WAPDA Sukkur.
4. Master file.



Borrower's evaluation including assessment of project implementation experience, project results and the operational plan.

1. Borrower's Assessment

(a) Project Objectives

Development and Control of Power System in Pakistan except for the power network of Karachi and its environs is the responsibility of Pakistan Water and Power Development Authority (WAPDA). The main objective of the power development programme during the Seventh Plan and subsequent years is to provide adequate generation, transmission and distribution facilities in the system to fulfil the targets fixed in the industrial, agricultural and social sectors of the economy. This could be achieved by increasing the system generation and transmission capability which would not only cater for the normal growth of loads in all parts of the WAPDA's power system but also overcome load sheddings being carried out.

In order to meet the increasing power needs of Pakistan a number of generation schemes have been planned in the seventh five year plan. Though main emphasis was on indigenous resources but due to acute shortfall of hydel power in low water months, thermal power requirement significantly increased. Due to the availability of limited resources in the public sector, Government of Pakistan for the first time decided to allow the construction of a 1292 MW thermal power station at the mouth of Hub River near Karachi in the private sector. In addition to this more thermal generation was also planned in south. In view of thermal generation coming up in 1993-94 and onward in south and power complex at Hub River, a third circuit of 500 kV between Jamshoro and Multan and a second circuit of 500 kV between Multan and Lahore via Gatti and two circuits between Hub and Jamshoro to transmit this power to north were essentially necessitated.

The project envisaged the construction of 1012 kilometers long 500 kV transmission line along with installation of additional line bay facilities and shunt reactors at Jamshoro, Guddu, Multan, Gatti and Lahore substations.

(b) Design & Scope

The Project has been designated as Transmission Extension and Reinforcement Project and comprises of the following:

- (i) Installation of two single circuit 500kV Transmission Lines, about 180 km each connecting the Hub Power Complex and Jamshoro.
- (ii) Installation of a third single circuit 500 kV line about 313 km between Guddu and Multan and a second single circuit 500 kV line of about 316 km between Multan and Lahore via Gatti.
- (iii) Installation of 3rd Jamshoro-Guddu 500 kV transmission line of about 645 km (Jamshoro-Rahimyar Khan including links at Moro and Chachran).
- (iv) Extension and reinforcement of existing 500 kV Substations at Lahore, Gatti, Multan and Guddu with associated facilities including reactive compensation telecommunications and control equipment and
- (v) Extension and reinforcement of existing 500 kV substation at Jamshoro with associated facilities including reactive compensation, telecommunications and control equipment.

The component (i) has been co-financed by IDB and IBRD to the effect of US \$ 65 million and US \$ 17.18 million respectively. Supply of material (except insulators, hardware and grounding material) and construction of transmission line have been undertaken by Saudi Cables Co. Marketing (SCCM) of Saudi Arabia.

The foreign exchange requirements for the components (ii) and (iv) of the project are fully financed through IBRD loan No. 3147-Pak and the component (iii) is partially financed through IBRD loans No. 3147-Pak & 3764-Pak. The component (v) is financed by French Protocol.

(c) Implementation

The following arrangements were made to effectively implement the Project:

- (i) WAPDA appointed a Chief Engineer/Project Director to oversee the implementation of the Project on behalf of Authority.
- (ii) WAPDA engaged NESPAK as Consultants to carry out necessary engineering and construction supervision.
- (iii) Total Project was divided in various components for independent planning and execution.

- (iv) Various contract packages were prepared for the procurement of materials and works through international competitive bidding. These packages were prepared according to IBRD guidelines.
- (v) In order to effectively monitor the Project, CPM networks were developed and progress was continuously reviewed by WAPDA and the Consultants in order to determine the bottlenecks and take corrective measures.
- (vi) WAPDA mobilized all requisite resources in shape of manpower, funds and equipment for completion of the Project in a sound and efficient manner.
- (vii) A system of regular reporting was established at all levels of Project management.

(d) Operation Experience

WAPDA has a strong and efficient team of Engineers and Technicians to operate and maintain transmission lines and substations. The organization to perform these jobs is known as Grid System Operation (GSO) which is headed by a General Manager Operation and Maintenance activities are being supervised by the Four Regional Chief Engineers stationed at Islamabad, Lahore, Multan and Hyderabad. To ensure maximum availability of 500 kV transmission lines, WAPDA has trained its crews for hot line maintenance as well.

Originally, route of the Second 500 kV Multan-Guddu and Guddu-Jamshoro Transmission Line was selected in parallel and in vicinity of the already existing 500 kV transmission line. During April, 1992, due to local cyclone both the transmission lines collapsed near Guddu. As such, it was decided by WAPDA to modify the route of Jamshoro-Guddu Transmission Line to obtain an approximate separation of 4 km between the existing and the new line. Therefore the route of 3rd Jamshoro-Guddu T/L under construction has been finalized on the left bank of Indus river. Design of the window of the Transmission Lines towers has been reviewed to meet the requirements of hot line maintenance. As such, the design of tower, for this transmission line is suitable for hot line maintenance.

2. Evaluation of Borrower's Own Performance

WAPDA has generally performed all obligations required for completion of the Project. Efforts were made to mobilize adequate human and financial resources diligently and efficiently to achieve the targets. However, various factors created

serious constraints on the completion of work both for transmission line and substation. Some of the major reasons causing delay were as under:

- (i) Adverse law and order situation in certain areas and default of the supplier of tower steel in fulfilling his contractual obligations have adversely affected the construction of Jamshoro-Guddu Section of the transmission line.
- (ii) Unprecedented rains and floods particularly in 1992 and 1994 resulted in delays in delivery of material at site.
- (iii) Shortage of local currency component led to in bonding of various line material. Exbonding of this material resulted in delays in delivery of material at site.
- (iv) Procedural delays in establishment of Letter of Credit and Import licenses.
- (v) Procedural delay in reallocation of funds by IBRD from Hub-Jamshoro to 3rd 500kV Jamshoro-Guddu Transmission Line.

3. Evaluation Of Bank Performance (And Co-financiers)

To meet with the scarcity of funds a loan No. 3147 Pak amounting to US\$ 162.00 million was obtained from IBRD to finance Transmission Extension and Reinforcement Project. The procedure of withdrawal of fund was through submission of withdrawal application for each and every job done, to the World Bank, which directly transferred the amounts into the bank accounts of respective contractors/suppliers. The mode of payment by withdrawal applications was 100% of invoice in case of supplier's contract and 80% of invoice in case of construction contracts. The loan was regulated by certain general conditions of the agreement, which were supposed to contribute in achieving an efficient administrative and financial practices on the part of WAPDA and in making timely payments against withdrawal applications on the part of the Bank to achieve above objective. This was because of the consideration that the timely payment to the contractor is a *sin qua non* for the timely completion of the Project. Further as per loan conditions revolving fund account was also maintained with NBP for an amount of US\$ 6 million. The invoices of the contractors/suppliers below US\$ 1.2 million have been met from this bank A/C. Overall we have not faced any serious problem in making disbursements through withdrawal application or revolving fund account maintained with NBP.

4. Plan for Operational Phase of the Project

The Project consists of the followings major physical components with present status.

1.	2nd 500kV Multan-Gatti-Lahore T/Line	316 km	Present Status
	i) Multan-Gatti Section	222 km	Completed on 1.3.1995
	ii) Gatti-Lahore Section	94 km	Completed on 14.10.1993
2.	3rd 500kV Multan-Guddu T/Line.	313 km	Completed on 8.12.1994
3.	3rd 500kV Jamshoro-Guddu T/Line	645 km	Expected on 31.03.1999
4.	Extension of 500kV Lahore S/S		Completed on 26.6.1996
5.	Extension of 500kV Gatti S/S		Completed on 2.7.1996
6.	Extension of 500kV Multan S/S		Completed on 30.8.1996
7.	Extension of 500kV Guddu S/S		Completed on 12.8.1996
8.	Extension of 500kV Jamshoro S/S		Completed on 14.6.1995
	Overall project completion date		31.03.1999 (Expected)

Partial completion of the Project has increased the Transmission line capability of WAPDA System. The Project will improve the reliability of supply between South and North regions. During the low water months when the hydel generation reduces drastically all the thermal stations are required to operate at maximum to meet the power requirements of major load centers located in the central region of the Country. 500 kV Transmission lines are needed to transmit the bulk of power from South to Central region during low water months and from North to South region during high water months.

The facilities installed under the Project are being operated and maintained by experienced and trained crews of Grid System Operation organization headed by a General Manager with four regional Chief Engineers. Engineers and Technicians responsible for operation and maintenance of the Project have been trained locally as well as abroad. Load flow studies are being conducted regularly by General Manager Planning Power to assess and envisage the primary transmission system required for the dispersal of added generation in the country for the future years. On the basis of load flow studies future projects in Transmission line Substation etc. are identified.

Four engineers/technicians under this Project, have received training for operation and maintenance of the Substations in France. Training is also being imparted by M/s Cogelx/Alstom of France for the operation and maintenance of fault and event recorder installed at 500kV substations in Pakistan. As such, the implementation of the Project has strengthened WAPDA's institutional capability.

IMAGING

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