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PROJECT COMPLETION REPORT

PAKISTAN

RESERVOIR MAINTENANCE FACILITIES PROJECT
(LOAN 2247-PAK)

JUNE 15, 1992

Agricultural Operations Division
Country Department III
South Asia Regional Office

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CURRENCY EQUIVALENT

US\$1 = £0.606

ACRONYMS AND ABBREVIATIONS

BCM	- Billion Cubic Meters
ha	- Hectare
km	- Kilometer
KW	- Kilowatt
M	- Million
B	- Billion
MCM	- Million Cubic Meters
MW	- Mega Watt
CRR	- Chief Resident Representative
ECNEC	- Executive Committee of the National Economic Council
GOP	- Government of Pakistan
IBDF	- Indus Basin Development Fund
IRC	- Indus River Contractors
LC	- Letter of Credit
O&M	- Operation and Maintenance
ODA	- (British) Overseas Development Administration
NOC	- No Objection Certificate
OED	- Operations Evaluation Department
PC-1	- Project Concept - 1
SAR	- Staff Appraisal Report
PCR	- Project Completion Report
USAID	- U.S. Agency for International Development
TDF	- Tarbela Development Fund
WAPDA	- Water and Power Development Authority

FISCAL YEAR

JULY 1-JUNE 30

Office of Director-General
Operations Evaluation

June 15, 1992

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Project Completion Report - Pakistan
Reservoir Maintenance Facilities Project
(Loan 2247-PAK)

Attached, for your information, is a copy of a report entitled "Project Completion Report on Pakistan - Reservoir Maintenance Facilities Project (Loan 2247-PAK)", prepared by the South Asia Regional Office. No audit of this project has been made by the Operations Evaluation Department at this time.

Attachment

A handwritten signature in black ink, appearing to be "A. Khan", is written over the word "Attachment".

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PROJECT COMPLETION REPORT

PAKISTAN

RESERVOIR MAINTENANCE FACILITIES PROJECT
(LOAN 2247-PAK)

PREFACE

1. This Project Completion Report (PCR) reviews performance under the Reservoir Maintenance Facilities project for which a Bank Loan of US\$10.2 million was made in December 1983. The project was co-financed by UK Overseas Development Administration (ODA) grant of UK£8.5 million, which was later increased to UK£8.9 million during the project implementation. The loan closing date was extended twice by one year to June 30, 1991. To accommodate final disbursements, the loan accounts were kept open for about five months beyond the closing date. The last disbursement was made on December 3, 1991 and the undisbursed balance of \$211,092 (2% of the loan amount) was cancelled as of that date. The UK ODA grant part of the project is still on-going and is expected to take about two more years for the grant to be fully disbursed.
2. The PCR was prepared by a Bank Consultant (familiar with dams safety aspects) for the Agriculture Operations Division incorporating Chapter II of the PCR prepared by the Borrower. The preface, the evaluation summary, and Tables 2a, 2b, 3 and 4 (part IV) were prepared by Bank staff. The Bank staff also made several modifications and editorial changes to enhance the clarity and improve the sequence of the report.
3. A copy of the draft PCR was sent to the Government of Pakistan, Economic Affairs Division and the ODA during early January 1992 for information and comments. Their comments are duly incorporated in the PCR.

PROJECT COMPLETION REPORT

PAKISTAN

RESERVOIR MAINTENANCE FACILITIES PROJECT

(LOAN 2247-PAK)

EVALUATION SUMMARY

Objectives

1. The basic objectives of the project were to improve and strengthen the capability of WAPDA to safely operate, maintain and monitor the Tarbela, Mangla and Chasma dams projects and related facilities efficiently, by providing the needed buildings (workshops and warehouses), the Operation and Maintenance (O&M) and dam safety equipment, monitoring instrumentation, and technical assistance for carrying out dam safety inspections and overseas training of WAPDA personnel in O&M of dams and dam safety monitoring.

Project Costs

2. The total project cost was \$42.2M (18.0M in local currency and 24.2M in foreign exchange) including \$15.6M equivalent in taxes and duties. The Bank loan of \$10.2M together with UK (ODA) grant of £8.5M (about \$14M equivalent) provided the foreign exchange costs. The UK grant part of the project is still on-going and WAPDA has estimated that it will take about two more years for the grant to be fully disbursed. The project costs at closure of the UK grant are estimated at about \$35M instead of \$42.2M due to reduction in the local costs of buildings and the taxes and duties.

Implementation Experience

3. Important differences between the planned and actual implementation were the delayed project start, slow procurement and the two extensions of the Loan Closing date. Firstly the loan effective date slipped by four months due to delay in approval of the project's PC-1 by the GOP Executive Committee of the National Economic Council (ECNEC). Secondly, finding a replacement for the Chief Engineer O&M of Tarbela caused delays in initiation of the project activities, specially of procurement. Other main causes of procurement delays were the delayed preparation and approval of technical specifications and bid documents, evaluation of bids, processing of letters of credits, (LC) involving rather cumbersome procedures, and delayed No Objection certificates (NOC) issued by GOP.

4. Due to serious efforts by the project organization and the Bank missions and the experience gained by WAPDA, procurement accelerated in 1987 and even more so thereafter. However, because of prolonged delays at the beginning

coupled with the procurement of the needed additional equipment for dam safety as identified by the dam safety inspections and approved in 1989, WAPDA could not catch up with the planned schedule and the loan closing date had to be extended to June 30, 1991.

5. Most of the buildings (comprising new workshops and warehouses) were not built because WAPDA could buy existing buildings from Indus River Contractors (IRC) at nominal prices. The rehabilitation of existing buildings and construction of new parking sheds for equipment and vehicles were satisfactorily completed with some delays which did not effect project results. The dam safety inspections and training of WAPDA personnel in dam safety monitoring were assessed by GOP/WAPDA to be highly successful and greatly contributing to dam safety.

Results and Sustainability

6. While the project as financed by Bank has been successful in meeting its objectives of strengthening WAPDA's capability to present level of preparedness for O&M of dams, dam safety monitoring and for undertaking remedial measures as necessary, the continued success/impact of the project will depend on WAPDA's prompt actions in meeting the deficiencies created from time to time in staff and the O&M budget, and in retaining the required trained personnel. The Tarbela dam inspections provided under the project, resulted in very valuable recommendations for the repairs and remedial measures which increased the safety of the dam and provided for efficient dam safety monitoring. It is essential that GOP/WAPDA continue the annual and periodic dam safety inspections and place only qualified and experienced engineers and technicians for the O&M and safety monitoring of the dams.

Lessons Learned and Recommendation

7. Lessons from project implementation which are relevant to other similar Bank-financed projects, in particular, those involving large procurement activities, are that: (i) the Government should present the No Objection Certificates (NOC) of the equipment, at Negotiations, (ii) the project's authority should appoint a special procurement officer from the start of project implementation, and (iii) there should be an understanding between the Bank and parallel Cofinanciers regarding the exchange of information.

PROJECT COMPLETION REPORT

PAKISTAN

RESERVOIR MAINTENANCE FACILITIES PROJECT (LOAN 2247-PAK)

PART I

PROJECT REVIEW FROM BANK'S PERSPECTIVE

1. PROJECT IDENTITY

Project Name:	Reservoir Maintenance Facilities Project
Loan No:	2247-PAK
RVP Unit:	EMTAG
Country:	Pakistan
Sector:	Agriculture
Subsector:	Irrigation

2. BACKGROUND

2.1 The Indus Irrigation System is the largest contiguous irrigation system in the world, comprising three major storage reservoirs, 19 barrages and headworks, 12 large link canals, 43 canal commands and about 90,000 water courses. The total length of the canal system is about 50,000 km. with water courses, farm channel and field ditches running another 1.6 Mkm. An extensive drainage network of about 15,000 km. has also been constructed into the system command area. The system serves about 12 M ha or 60% of the total cultivated area of Pakistan and accounts for approximately 90% of its agricultural production.

2.2 The Pakistan Indus Irrigation System as is today has been affected by and is the outcome of the partition of the Indian Subcontinent in 1947. At the time of partition, the Indus System supported about 50 M people (about 40 M people in Pakistan and 10 M in India). Through the 1960 Indus Water Treaty which allocated the water of the three eastern rivers of Punjab (Ravi, Beas and Sutlej) to India and those of the three western rivers (Indus, Jhelum and Chenab) to Pakistan, the replacement works to transfer water from the western rivers to replace the water of the eastern rivers allocated to India consisting of Mangla Dam on the Jhelum river, eight link canals and six barrages, including Chasma, were built with the Indus Basin Development Fund (IBDF), supported by international donors. The replacement works were completed by the Pakistan Water and Power Development Authority (WAPDA) on behalf of the Government of Pakistan (GOP) in 1971 on schedule.

2.3 Following the pattern of the IBDF, the Tarbela Development Fund (TDF) was established in 1968 with foreign exchange contributions from several industrialized countries and a Bank Loan, to construct the Tarbela Dam on the Indus for supplementing the Indus dry season flows for irrigation and for generating hydro-electric power. The Tarbela is the largest earth filled dam in the world (with the volume of earth fill three times larger than the Aswan High Dam of Egypt), with several of its complex features designed to withstand very large discharges and high velocity of flows never before experienced in any other dams. As a consequence, during its first reservoir filling in the summer of 1974, damages occurred to the power and irrigation tunnels, stilling basins, service spillway plunge pool and flip bucket structures, and sink holes were discovered in the impervious blanket and the upstream face of the dam. Extensive repair and remedial work was immediately launched by WAPDA with funding from TDF (administered by the Bank) and has been pursued continuously until today. Two supplemental fundings to the TDF were raised for this purpose. The TDF has recently been closed at the end of December 1991.

2.4 Reservoirs created by the Tarbela, Mangla and Chasma are the principal water storage facilities of Pakistan. They are very important structures, critical for the economic well-being of Pakistan. They are expensive structures but their benefits in terms of raising agricultural production and generating electricity and flood control are also immense. The Tarbela Dam, costing over \$2 B in 1973, has a live storage of 11.4 BCM, and an initial installed capacity of 1.4 MKW (presently 1.75 MKW); Mangla Dam, costing \$687 M in 1967, has a live storage of 6.59 BCM and an installed capacity of 800,000 KW, and although Chasma Barrage, (Barrage is sometimes called Diversion Dam; for simplicity Chasma Barrage will be afterwards called Chasma Dam), costing \$119 M in 1971, has the smallest reservoir capacity among the three, only 620 MCM, and produces no electricity, but because it re-regulates the flows downstream of Tarbela, it provides storage releases several times larger than its reservoir capacity. Without any doubt, these dams deserve the best care in their operation and maintenance (O & M) for ensuring their safety and dependable performance. Any major damages leading to failure of any of them would be catastrophic, involving the loss of a large number of human lives and costly properties. The GOP and the Bank thus attached great importance to dam safety on these projects which was also very much in line with emphasis given on dam safety by the US Congress legislation (PL92-367) of August 1972, by the International Congress on Large Dams (ICOLD) for dam projects around the world since 1976 and Bank Guidelines for Safety of Dams (1977).

3. PROJECT OBJECTIVES AND DESCRIPTIONS

3.1 The project was to finance a five-year (FY84 to FY88) program to strengthen WAPDA's capability to safely operate and maintain the Chasma, Mangla and Tarbela dams and related facilities. The project would:

- (a) provide the required buildings (through construction of needed new workshops and warehouses, equipment and vehicle parking sheds and a training center and renovation of existing workshops, and warehouses);

- (b) provide additional O & M equipment and replace worn-out and obsolete items at Mangla and Chasma and provide equipment, vehicles, tools, spare parts and supplies required at Tarbela, to ensure dependable O & M and safety of the three facilities;
- (c) provide technical assistance in training in Pakistan of middle managers, supervisors, and engineers in stores and procurement organization and management, workshop organization, and maintenance and records management;
- (d) provide overseas training, and study tours for WAPDA engineers and technicians; and
- (e) provide technical assistance in carrying out dam safety inspections of the Tarbela Dam and facilities.

3.2 The total project cost estimate was \$42.2M (18.0M in local currency and 24.2 M in foreign exchange) including \$15.6M equivalent in taxes and duties and the Bank front and fee of \$159,739. The Bank loan of \$10.2M together with the UK grant¹ of £8.5M (about \$14M equivalent) would cover the foreign exchange costs of the project (the UK grant was later increased to £8.9M during project implementation).

4. PROJECT DESIGN AND ORGANIZATION

4.1 During the repair and remedial activities of the Tarbela, WAPDA and the Bank were already thinking of how the dam should best be operated and maintained. In early 1981 WAPDA explored the possibility of Bank involvement in O & M of Tarbela. Following the discussions with Bank supervision missions of Tarbela, WAPDA began preparation of the list of equipment, spare parts, monitoring instruments, workshop and warehouse needs, technical assistance and other requirements specifically for Tarbela. During the Bank appraisal mission in May-June 1982, the project concept and design was expanded to include the needs of the Mangla and Chasma Dams. The Bank was closely involved in the overall concept and project preparation from the beginning. The project was not intended to break new ground. Its basic objectives were to strengthen WAPDA O & M capabilities and its existing organizations for providing safety to the three dams.

4.2 The O & M of Chasma, Mangla and Tarbela are the responsibility of WAPDA. For Chasma and Mangla, regular O & M programs have been underway for a number of years and the transition from construction to O & M has been generally smooth. In addition to routine inspection and maintenance by the projects O & M staff, periodic dam safety inspections have been made at Chasma and Mangla by WAPDA's Dam Safety Organization (later the name was changed

^{1/} UK grant is handled by the British Overseas Development Administration (ODA).

The UK and ODA are used interchangeably in the PCR.

to Dam Monitoring and Safety Organization). Performance of both the Mangla and Chasma Dams has been relatively trouble free except for the need to repair a portion of the Chasma floor in 1982.

4.3 At the time of the project preparation, repair and remedial works for the Tarbela Dam were on-going but it was expected that these works would gradually be finished and phased out while O & M activities would be increasing. The timing of the project has proven to be correct; the completion of repair work at Tarbela should coincide with completion of this project, making WAPDA fully equipped to take on full O & M responsibility.

4.4 Satisfactory O & M necessitates: (a) good organization with strong management and trained personnel; (b) readily available necessary equipment (including monitoring instrumentation), tools, spare parts, materials and supplies; (c) adequate funds, including foreign exchange, available as needed; (d) technical support, including manuals and drawings of project facilities as well as assistance of technical specialists when needed; and (e) supplemental construction support available on contractual basis for large periodic or emergency maintenances. The project strove to strengthen and support WAPDA in (a) and (b). As regards (c), WAPDA has often not been able to obtain adequate funds for satisfactory O & M, hence the Loan Agreement for the project (Section 3.01) required GOP assurance in providing adequate funds. This matter is further discussed in para. 7.1. With regard to (d), the O & M manuals, and detailed drawings are available at all the three dam sites. Pakistan also has dam specialists specifically involved in the design and construction of all the three dams. The project also provided specialized training (locally and overseas), in O&M and dam safety monitoring for a sizeable number of WAPDA engineers. As regards item (e), Pakistan does not have contractors with large equipment commensurate with work on large dams like Tarbela and Mangla. For this reason, the project provided WAPDA with a large number of pieces of appropriate equipment to enable it to carry out periodic and emergency maintenance by force account.

5. PROJECT IMPLEMENTATION

5.1 The critical differences between planned and actual project implementation were its delayed start, slow procurement and two-year extension of the closing date. Firstly, the loan effective date slipped by four months from July 12, to November 15, 1983 due to the delay in approval of the project's PC-1 by the GOP Executive Committee of the National Economic Council (ECNEC). Secondly, the replacement of Chief Engineer O & M of Tarbela caused delays in initiation of the project activities, especially of procurement, and thirdly, the 1984/85 foreign currency allocation by GOP for project expenditures was inadequate (\$1.1 M as against \$3.5M equivalent requested by WAPDA). Most of the allocation (\$1.05M) was used to import equipment financed under UK grant; its procurement was managed by the Crown Agent from UK and started off well. Other main causes of procurement delays were the preparation and approval of specifications and bid documents, the evaluation of bids and the opening of letter of credit (LC) which involved several time consuming steps and cumbersome procedures. By mid 1986 the delays had caused the project to slip behind the planned schedule by about 18 months. Loan

disbursement was only \$249,000 at the end of March 1986 as compared with the appraisal estimate of \$ 6.4M.

5.2 In April 1986, the Bank included a procurement engineer and a dams specialist in the supervision mission, and in subsequent missions the Bank began to take detailed scrutiny of the procurement process and pinpointing problems on what went wrong and how they should be corrected. It is worth mentioning a few important points observed by Bank supervision missions and which WAPDA was asked to remedy, as they were probably problems common to most Bank projects in Pakistan:

- (a) delays in evaluation of bids;
- (b) delays in issuing import licenses, letters of credit, and No Objection Certificates;
- (c) non-receipt of suppliers acceptance letters; and
- (d) delays by suppliers in providing performance bonds.

Besides asking WAPDA to try to resolve the problems in (a) and (b), the mission recommended that WAPDA telex suppliers to send acceptance letters and performance bonds within 14 days and 30 days respectively or risk cancellation of their orders, and in future WAPDA should incorporate specific stipulations in the bidding documents requiring the letter of acceptance and performance bond to be submitted promptly on receipt of supply order, but not later than 30 days thereafter. As regards the No Objection Certificate (NOC) issued by GOP for all equipment and supplies to be imported it is recommended here that GOP should consider issuing certificates on the list of equipment submitted by the project authority after the approval of PC-I instead of on an item-by-item basis which is time consuming causing much delay. Also, the Bank should consider having the Government present the NOC of the identified and listed equipment, during the Negotiations.

5.3 Due to experience gained by WAPDA project staff and serious efforts by the project organization and the Bank missions, procurement accelerated in 1987 and even more so thereafter. However, because of prolonged delays at the beginning coupled with the procurement of the needed additional equipment for dam safety as identified by the dam inspections (para 5.6) and approved in 1989, it was not possible for WAPDA to catch up with the planned schedule and the loan closing date was extended twice for one year each, to June 30, 1991.

5.4 Except for initial delays in submission of the annual O & M programs and related proposed budget (ref: Section 2.07 of Project Agreement), and progress and audit reports (Section 2.04 (b) and 4.01 (b) of Project Agreement), from 1986 onward these were received in a timely manner. WAPDA's performance in this connection was above average for projects in Pakistan.

5.5 With regards to the buildings, in 1985 WAPDA was able to negotiate the purchase of the required workshop buildings and warehouses at reasonable prices (about Rs4.5M) from the Indus River Contractors (IRC), thus eliminating the need for the construction of these new buildings included in the project

at appraisal, indeed a good move. The Bank agreed to finance 35% of their local costs, same as stipulated in the Loan Agreement. The renovation of old workshop and warehouse buildings and the construction of parking sheds for vehicles and equipment were completed by local contractors in early 1989, about three years behind the appraisal estimate. The training center was finally not built but was setup in the old office building which IRC handed over to WAPDA. The overall costs of the buildings category were much reduced. At the end, only \$ 108,660 was disbursed against \$750,000 earmarked in the loan. The remaining amount was utilized for the procurement of the needed additional equipment as identified by the Dam Safety inspections.

5.6 As regards technical assistance and the dam safety inspections, in June 1986 WAPDA signed an agreement with TAMS Consultants Inc. providing for specialists for the inspections of the Tarbela Dam. TAMS being the design and supervising consultants for the Tarbela was obviously the appropriate choice for the purpose. The first inspection was carried out during the high reservoir level in August/September 1986; the second inspection in June 1987 during low reservoir level. Both inspections identified some areas which needed additional repairs and strengthening, in particular the left rock abutment, downstream floor and apron and rock channel of the Dal Derra Weir, service spillway gates, intake structures of tunnels 1 and 2, and outlet control structures of tunnel 4 of Tarbela Dam. Additional equipment, including seismic monitoring devices, dam instrumentation, testing/sampling and survey equipment and other equipment necessary for dam safety measures, was identified during inspections for procurement. Later, Bank approved their procurement under the project within the loan amount (\$10.2M), while the repair and strengthening works were taken up under the TDF.

5.7 Also in August 1987, WAPDA engaged HARZA Engineers Inc. to provide services in placing its engineers and professionals for training in O&M and dam safety monitoring with appropriate overseas organizations and in trainee administration. The first batch of 13 trainees was sent to the US in October 1987 to be trained in the various specialized subjects related to O & M and safety of dams, such as drilling and grouting, sonar/echo sounding, heavy equipment and vehicle maintenance and repair, workshop organization and management, and four senior engineers were sent on study tours in the U.S. to observe and learn the overall spectrum of O & M of dams. Later WAPDA sent two more professionals for training in resettlement/environmental subjects and two engineers for specific training in seismology, instrumentation and seismic monitoring at Lamont-Doherty Geological Observatory of Columbia University. In all, 21 professionals have been trained.

5.8 The overseas training was originally planned at appraisal for 30 engineers and nine technicians for a total of 116 man-months, at the cost of about \$700,000 including contingencies, or about \$6,000 per man-month (mm) inclusive of travel to and from overseas. However, WAPDA proposed in 1986 to considerably reduce the training under the project as some training was being undertaken with USAID assistance. Finally as aforementioned only 21 engineers were sent for training abroad under the project. GOP has an established policy to utilize loan and credit for technical assistance only in the event that grants are not available.

5.9 The overseas training cost was apparently greatly underestimated. The actual cost of training 21 engineers for 32.3 mm came up to about \$406,000 or \$12,570 per mm or about twice the estimate. The breakdown of actual cost per man-month was: per diem \$3,150/mm; tuition and training fee \$6,300/mm; consultant services (HARZA) \$ 1,800/mm, out of pocket expenses (medical insurance, local travel, etc.) \$ 220/mm; and travel to and from destinations about \$1,100/mm. The breakdown costs of each item did not seem out of line except for the tuition and training fee for specialized training. The U.S. Bureau of Reclamation's charges at \$2,000 to \$2,300 /mm were the lowest. Firms specialized in specific subject such as Raytheon Ocean System of Rhode Island (for echo sounding training) charged \$10,740/mm and Aerial Mapping Corp (for aerial survey training) charged \$20,000/mm. The charges though appear excessive could possibly be justified due to training being one on one basis and usage of some specialized equipment such as sea-going boats or airplanes. In the end, however, there was still some money (about \$394,000) left under training category because the number of trainees for each subject was reduced and only engineers and not technicians were sent for overseas training. However, the number of subjects trained was not reduced.

5.10 With regard to the technical assistance for providing specialists to train WAPDA staff at the Tarbela O & M organization and in the WAPDA Training Academy in subjects such as procurement and store organization and management, workshop organization, and deep diving inspection, as well as for training mechanical engineers in UK on workshop maintenance and management, WAPDA requested ODA to assist in providing these specialists in June 1988. ODA is still considering the request. In the mean time WAPDA utilized facilities in the country to train its mechanics at Tarbela workshop and surveyors at the Survey of Pakistan.

6. PROJECT RESULTS

6.1 The project was relatively simple as compared with several other projects in Pakistan. It was the first project related to O & M and dam safety in Pakistan. At times it necessitated complicated evaluations of dam safety and assessment and identification of dam safety equipment and monitoring instrumentation. It consisted of three main categories -- buildings, equipment (including spare parts and vehicles and monitoring instrumentation) and technical assistance, including training.

6.2 Buildings As mentioned earlier, new workshops and warehouses were not built because WAPDA could buy existing buildings from Indus River Contractors (IRC) at reasonable prices. Bank agreed to disburse 35% of the purchase price, same percentage as for new buildings and rehabilitation. The rehabilitation of existing buildings and the construction of new parking sheds for equipment and vehicles were satisfactorily completed with some delays which did not affect project results. All buildings were put into use right after their completion. In the end only \$108,660 was spent out of \$750,000 provided in the loan. The remaining fund was used for providing additional equipment, dam instrumentation for seismic monitoring, survey and sampling equipment, and other necessary equipment for dam safety, recommended by dam inspections (para 5.6).

6.3 Equipment There were some changes under this category:

- (a) in June 1985, GOP/WAPDA asked to expand the project to embrace assistance for the strengthening of O & M capability at Hub Dam and Khanpur Dam including provision of equipment; after several discussions ODA agreed to include this in its grant;
- (b) due to GOP restrictions (passed in 1986) on the import of vehicles using loan proceeds, vehicles (about \$1.6M) originally planned to be procured using the Bank loan had to be taken off the procurement list and WAPDA requested ODA to provide them instead under UK (ODA) grant which was agreed; and
- (c) in late 1986, it was discovered that the proposed spare parts for gates and hoists (\$128,000) which were originally destined to be procured under UK grant was a mistake, as gates and hoists were not UK made and the grant was tied to procurement of only UK manufactured goods; these items were then transferred to the Bank loan; also some equipment (milling machine, barge conveyor, communication system etc) amounting to \$480,000 equivalent were dropped from ODA original list;
- (d) the dam safety inspection teams (para 5.6) identified and recommended additional equipment for dam safety including dam instrumentation, survey and sampling equipment, seismic monitoring devices, and the same were included and procured under the Bank loan.

6.4 With all these changes, in the end, the actual amount spent for equipment was increased from \$8M to \$8.9M for Bank loan and from £8.4M (\$13.8M equivalent) to £8.9M (\$14.7M equivalent) for UK grant. The Bank loan remained constant at \$10.2M; the increased costs for additional equipment were taken from the unused amounts of the building and technical assistance categories. UK grant increased by £0.4M from £8.5M to £8.9M (\$14.7M equivalent). These changes were necessary and they made for a better project and effective use of the loan.

6.5 Technical Assistance and Training Bank loan provided for employing international consultants (TAMS) for two Tarbela inspections and HARZA for providing services in placing and administering trainees for overseas training. The Tarbela inspections resulted in very valuable recommendations for the repairs and remedial measures which strengthened and increased the safety of the dam as well as for providing additional equipment and instrumentation needed for dam safety. The training was assessed by GOP/WAPDA to be highly successful and greatly contributing to dam safety. All the subject matters planned were covered, only the number of trainees for overseas training was reduced.

6.6 At the closing date the money used for technical assistance under the Bank loan totaled \$660,000 while the training spent about \$410,000, as compared with the estimates at appraisal of \$500,000 and \$800,000 respectively. The technical assistance for dam inspections exceeded the

estimate while the training aspect spent less. The remaining money (about \$230,000) was used for procurement of additional equipment for the project (para 6.4). The technical assistance and overseas training under the Bank loan were highly successful, and met the objectives set out at the appraisal. As mentioned in para 5.10, however, the technical assistance and training under UK grant has not started. WAPDA has utilized available facilities in the country to train its engineers and technicians in the meantime.

6.7 Overall The project costs are estimated to be reduced from \$42.2M to about \$35M. The main reductions are in the local costs of buildings equipment, vehicles and spare parts - (see PART IV Table 4). The latter comprised duties and taxes, port handling, local transport to project sites and administration etc. A part of the reduction was attributed to the lowering of duties and taxes on imported equipment during the period of project implementation, while the other was due to the over estimation at the time of appraisal. The Bank loan remained the same (\$10.2M) with small sum (about \$211,000) left unused when the loan account closed. The UK grant has been increased from £8.9M (\$14.7M equiv) and to date about £5.0M (about \$8.25M equiv.) has been disbursed.

6.8 The project was designed at appraisal to consist heavily of equipment procurement at 91% of the project costs, of building new workshops and warehouses and rehabilitation of old ones at 5% and, of technical assistance and training at 4%. In the end when the project would be fully completed (UK grant part of the project is still on-going and may not close before another two years), because of the procurement of additional equipment, the equipment category would be increased to approximately 95%, while the shares of the buildings and technical assistance and training would be reduced to about 1% and 4% of the project costs respectively. Although the overall project has yet to be completed because of the uncompleted items under the ODA grant, the majority of equipment, vehicles and spare parts are currently available at the three dams, the key personnel have been trained abroad, the workshops, warehouses, sheds for equipment and vehicles were completed and ready when the repair work at Tarbela was phasing out and the O & M was phasing in. The timing of the project was right. Since the project is not fully completed, it is estimated that currently about 85% of the project objectives has been met.

7. PROJECT SUSTAINABILITY

7.1 There is no reason why the project results could not be sustained--the necessary equipment, vehicles, and spare parts are there at the sites, the O & M staff in adequate numbers are available and key staff are trained, and GOP has promised adequate funding for O & M. However, the risks are high and are all pointing to the problems in adequate funding and personnel. In the past the Government was often short of funds. Budgets approved early in the year were not always provided. Equipment has life. After 8-10 years, some equipment and instrumentation will lose its useful life and will need to be renewed, requiring repeated capital investment. Also in Pakistan, personnel are rotated too fast. No one knows how many of the 21 engineers trained under the project will still be performing O & M task at the three dams after a few years. It would be wishful thinking if one-half the number of trained key

staff would still be working at these dams five years from now. Furthermore, for nearly four decades, WAPDA has been training a very large number of its engineers, technicians, and other professionals, but only a small number is now remaining with WAPDA. A substantial number must have retired but probably an even larger percentage had left for the private sector and for working abroad. WAPDA will have to continue training its staff relentlessly.

7.2 The problems above are real and need to be tackled because of the importance of these projects to Pakistan. Although one is not expected to resolve all, the following recommendations should be worth considering:

- (a) GOP should allow WAPDA to keep a percentage of its annual revenue from the sale of electric energy at Tarbela and Mangla, for satisfactory O & M, dam safety, and equipment renewal including permanent equipment (e.g. gate and hoist, turbine, generator, switch yard equipment). The amount considered satisfactory for O & M would be about 1% of the current costs of dam and appurtenant structures.
- (b) GOP/WAPDA should slow down in-staff rotations particularly the trained staff. An understudy should be placed/attached overlapping at least six months with the trained staff who is destined to be transferred. Also WAPDA will have to continue training its staff to replace loss in personnel.
- (c) Even after the loan is closed, Bank should still require that WAPDA send its annual O & M program together with the proposed expenditures for O & M of the Tarbela, Mangla and Chasma during the subsequent fiscal year to the Bank (Section 2.07 of Project Agreement). This should continue for many years until Bank is confident that adequate funding will be provided in the future.

7.3 The Bank is known all over the world as the Administrator of the IBDF and the TDF. It can not avoid sharing the blame, if any of these dams fails or is seriously damaged. Bank should send at least an experienced engineer to participate in the annual inspection and periodic inspection (every five years with international specialists involved) conducted by WAPDA Dam Safety and Monitoring Organization. This will be a small but invaluable investment to the Bank.

7.4 Like most developing countries, in Pakistan generally the best engineers are not placed in O & M activities but in construction where there seems to be more glory. However, the three dams are the largest and the most important structures in Pakistan. WAPDA should be urged to place its best qualified and experienced engineers for their O & M and safety.

8. BANK PERFORMANCE

8.1 Bank paid a great deal of attention and attached much importance to the project from its inception and preparation and through out the implementation. It spent 21 staff weeks for identification, preparation and pre-appraisal and

about 53 staff weeks on appraisal until completion of negotiations. Altogether, there were 16 supervision missions during project implementation. Because of the type of the project (O and M, and dam safety) all missions except one consisted of only one Bank staff member--engineer or dam specialist. In all 220 man days were spent in the field, averaging 14 man-days per mission. Intervals between mission averaged about six months, which was good.

8.2 Bank invited ODA representatives to join every supervision mission and to participate in wrap-up meetings which ODA did, and several resolutions and decisions concerning UK grant were resolved at the meetings to the satisfaction of all concerned. Through these missions and meetings ODA was kept abreast of the project implementation portion of the Bank loan, and the Bank also obtained some limited information on the portion of UK grant. Although UK is the cofinancier, the financing is on a parallel and not on jointly basis. It is understood that ODA did not undertake supervision missions in the same way as the Bank -- leaving mission Aide Memoires of understanding between mission, WAPDA and GOP/Ministry of Water and Power each time, for follow up action by WAPDA. ODA had a full time representative in Pakistan who looked after all ODA's projects on a continuous basis. Due to the nature of parallel financing, there was no agreement nor understanding on the exchange of information on a regular basis. During supervision missions, Bank learned of some information concerning UK grant portion in so far as it concerned or interrelated with the Bank's portion and some from the progress reports. For these reasons, this PCR covered in less detail the ODA part of the project (also the UK grant is still on-going). Currently Bank has no guidelines on how to deal with projects with parallel financing with respect to the exchange of information. More thinking will have to be done on how the exchange of information should be carried out in harmony with the parallel cofinanciers. Increasingly parallel cofinancing is to be expected.

8.3 Bank did a good job at every stage of the project from the inception, preparation, appraisal, and throughout the implementation until completion. The preparation was carried out mainly by WAPDA with the Bank missions reviewing it. During implementation/supervision a great deal of attention was placed on procurement of equipment and spare parts which represented over 90% of the project costs. Several administrative problems affecting delays such as the issuing of No Objection Certificates, import licenses, LC, transport clearance, receipt of suppliers' acceptance letter, and performance bonds were identified by supervision missions and WAPDA was urged to resolve them diligently. Also following the missions' suggestions, WAPDA, in late 1988, appointed a Special Procurement Officer to expedite procurement processing and delivery. This was a good move and in retrospect should have been undertaken from the beginning of the project. It should be a good lesson for other projects which involve large procurement works to follow. Attention was also paid to technical assistance and training with the end result that its implementation was smooth and successfully completed. In sum, Bank performance was technically competent, thorough and highly satisfactory (see also para II.5.1).

9. BORROWER PERFORMANCE

9.1 WAPDA was the project implementer. All the three dams had been constructed under the jurisdiction of WAPDA. Mangla was completed in 1967, and Chasma in 1971. Hence, WAPDA has gained experience in the O & M of Mangla and Chasma for over two decades. The repair and remedial works of Tarbela Dam have now been completed under the TDF which has recently been closed at the end of December 1991. While the Tarbela was undergoing repairs, the O & M of its unaffected and undamaged features were proceeding as usual by WAPDA. Therefore, WAPDA was well conversant with the O & M of Tarbela as well and knew exactly what was needed in terms of equipment, vehicles, spare parts, technical assistance and training. The project preparation thus became relatively easy for WAPDA as well as for the Bank which were heavily involved with these dams for a long time. During appraisal the Bank mission received excellent cooperations and assistance from WAPDA and the Bank's consultants for Tarbela (Sir Alexander Gibb & Partners).

9.2 In the first two and a half years of the project (1984 until mid 1986) the project implementation suffered serious delays due to:

- (a) four month slippage in loan effectiveness because of late approval of project PC-I;
- (b) shortage of funds in 1984/85 budget;
- (c) change of the Chief Engineer O & M of Tarbela; and
- (d) staff lacked experience in the preparation of tender documents and procurement processing, especially for ICB.

9.3 After the initial weak period, the implementation started to improve quickly and should have been able to regain substantially the lost time had it not been because additional equipment and instrumentation for dam safety as identified by the dam inspections (Aug./Sept. 86 and June 87) had to be procured. After serious scrutiny of the identified additional equipment and instrumentation, Bank approved the list of this equipment and agreed to meeting its costs during late 1988, without increasing the total loan amount. GOP approved and issued the No Objection Certificates for it in February 1990 over a year later. The fact of the matter is procurement in Pakistan, especially for ICB, involves too many administrative steps of bureaucratic red tapes, each of which takes time and effort to accomplish. An experienced procurement officer/expediter appointed for each project with large procurements would thus be of great help in project implementation.

9.4 With regards to UK grant, WAPDA submitted the list of O & M equipment requested for strengthening the safety of the Hub and Khanpur Dams, as new addition to the project to ODA in late 1987. ODA fielded its experts to review the requirements, specifications of equipment in late 1988. As late as February 1990, Bank supervision mission (ODA participated) expressed concerns for expediting:

- (a) procurement of deep diving equipment, training facilities and technical assistance for underwater inspection of dams (under UK grant);
- (b) procurement of equipment related to safety of Hub and Khanpur dams; and
- (c) procurement of hydraulic dredger for Chasma (also a new request to ODA, additional to the project).

These and other reasons explain why the UK/ODA grant will have to be extended beyond the Bank loan closing date. About £5.3M (\$8.75M equiv.) of the grant was spent as of July 15, 1991. It may take about two more years to spend the remaining £3.6M (\$5.9M) to complete the UK grant.

9.5 Considering all changes and additions discussed above, WAPDA had done well in implementing the project, in particular the Bank loan. In fact it is assessed that its performance of the Bank loan was above average of projects in Pakistan.

10. PROJECT RELATIONSHIP

10.1 Bank and WAPDA have enjoyed excellent relationships for over four decades. Its relationship on this project was no different. Bank advice and recommendations regarding the project were generally well received and acted upon. UK representative, ODA, and the Bank maintained good cooperation and relationship throughout. WAPDA and ODA also enjoyed cordial relationships.

10.2 Although ODA did not participate in the project appraisal, it accepted the project as designed and participated in every supervision mission including the wrap-up meeting with GOP. It received the aide memoirs that the Bank missions presented to GOP at the wrap-up meetings but not the supervision reports. On the other hand because ODA looked after its part of the project on a day to day basis or rather on a problem solving basis through a representative posted in Pakistan, Bank had less information of ODA grant. It learned of ODA grant activities from ODA representative at the wrap-up meetings and through information and data (mainly financial information) mentioned in the progress and audit reports. It would be desirable if an understanding on the exchange of information between ODA and Bank were established early in the project implementation process.

10.3 The other governmental organization with which the Bank had a relationship in connection with the project was the Ministry of Water and Power. The Additional Secretary (Water) generally chaired the wrap-up meetings. Bank, ODA and WAPDA enjoyed good relationships and support of the Ministry on the project.

10.4 WAPDA maintained a reasonable official relationship with GOP agencies which issued no objection certificates, import licenses, letters of credit, etc. As agreed with Bank supervision mission, in early 1989, WAPDA appointed a Special Procurement Officer to look after and expedite the procurement

processes. A lesson learned from this is that for future projects with major procurement activities, it would be desirable to appoint an experienced procurement officer/expediter from the start.

11. CONSULTING SERVICE

11.1 Both TAMS and HARZA consulting firms are well known to WAPDA and Bank for a long time. HARZA was general consultant to WAPDA on all Indus Basin Project work and the reviewer of Tarbela work. TAMS was the project consultant for the design and the Engineer for the supervision of construction of the Tarbela. Under the project, TAMS Consultant Inc. was engaged to carry out the inspection of the Tarbela Dam in 1986-87. Two inspections were undertaken, first in August/September 1986 during the high reservoir level and second in June 1987 during the low water level in the reservoir. The inspections resulted in valuable recommendations for some additional strengthening measures for dam safety including detailed analysis of the associated technical problems, in particular:

- (a) stability measures against the developing scour and erosion of bed rock and rollcrete toe downstream of the Dal Darra Weir;
- (b) the strengthening of Tarbela spillway gates as required based on dynamic analysis;
- (c) measures to correct the dissolved gypsum problem at the right abutment of Tarbela Dam;
- (d) preventive ventilation measures against high concentration of Radon in the drainage and inspection galleries; and
- (e) provision of additional equipment required for implementing strengthening measures, dam instrumentation, seismic monitoring, survey and sampling equipment, etc. and spare parts.

The strengthening works for Dal Darra Weir were carried out under the TDF and the identified additional monitoring equipment and instrumentation were procured under this project. TAMS services were highly technical and fully satisfactory.

11.2 HARZA Engineering Company was engaged by WAPDA (August 12, 1987 Agreement) to provide services required for the overseas training of WAPDA staff. In all 21 engineers were trained in O & M and dam safety and related subjects at the U.S. Bureau of Reclamation, Columbia University and at several specialized companies. The cost of overseas training estimated at appraisal was too low; the actual cost per man-month amounted to about twice the estimates. The actual tuition/training fee per man-month was high because of specialized training on one to one basis. (para 5.8). However, the training was a success and was appreciated by GOP/WAPDA. The services of HARZA were fully satisfactory.

12. PROJECT DOCUMENTATION AND DATA

12.1 As mentioned before, the project was relatively simple with only few covenants and conditions, consequently the legal agreements viz the Loan Agreement and the Project Agreement were similarly simple but adequate. There were no problems in implementing the agreements through out the project implementation.

12.2 Section 2.07 of the Project Agreement requires that WAPDA shall furnish to the Bank for its review by February 1 of each year, a detailed annual O & M program for the three dams together with budget proposals and proposed expenditures in local and foreign currency for O & M of these dams during the subsequent fiscal year, including capital expenditures for permanent O & M facilities. It is recommended that compliance with this section should continue until such time that the Bank is satisfied that the O & M program and the budget are appropriate and will continue perpetually. According to Section 5.02 of the Project Agreement, the Bank has the legal right to ask for this obligation until the loan is terminated, i.e. fully repaid.

12.3 Referring to Section 3.02 (a) and (b) of the Loan Agreement, the Bank can also participate in the periodic inspections of the dams, either the annual inspection or the five year periodic inspection or both. It is recommended that the Bank sends at least a representative to participate in these inspections.

12.4 The Staff Appraisal Report provided a useful framework for both the Bank and GOP/WAPDA to operate during project implementation in particular for the part of the project financed by the Bank loan. The quarterly, semi-annual and annual reports contained some information on the ODA grant. There were sufficient data, information and reports readily available for the preparation of the PCR on the part of the Bank loan, but less on the part of the UK/ODA grant. As recommended, (para 10.2) there should be an understanding between Bank, and cofinancier regarding the exchange of information at the start of the project.

PART II

PROJECT REVIEW FROM BORROWER'S PERSPECTIVE²

1. PROJECT DESIGN

1.1 The project was initiated with a clear purpose of beefing up the capability of the Operation and Maintenance Organizations of the big reservoirs by providing the Borrower financial help to buy the required new

^{2/} The report was prepared by WAPDA and submitted to World Bank.

equipment and instrumentation and the spare parts, improve the workshop facilities and provide foreign training to personnel. The foreign component of the cost of the whole project consisted of two parts; a loan under the World Bank amounting to US\$ 10.2 million and a grant of £8.9 million offered by ODA of United Kingdom.

Loan provided for the following items:-

- Construction and renovation of workshop buildings.
- Purchase of equipment and spares.
- Technical assistance and training.

UK Grant provided for the following: -

- Purchase of equipment and spares.
- Technical assistance and training.

1.2 The project commenced in 1983 and the part financed by World Bank Loan was completed on June 30, 1991. The part financed by UK Grant is still in progress.

1.3 The funds provided for various components under the loan and the grant were adequate. Initial provision for some of the items within the whole package was considered inadequate and was increased by the World Bank by reappropriation of funds during the currency of the project on request of the Borrower. Similarly in year 1988 it was observed that there was a saving of £2.555 million in the total allocation of £8.9 million under UK grant. Govt of Pakistan/WAPDA therefore requested ODA to allocate funds from the surplus amount for the strengthening of O&M capabilities at the Khanpur and HUB Dam. This request was favorably considered and ODA agreed to include the proposed allocation in its grant.

1.4 The acquisition of the new equipment has obviously enhanced the capability of the staff kept at the reservoir sites to operate, maintain and monitor the works. Moreover, the purchase of the spare parts of the old machinery has usefully contributed towards maintaining the old construction equipment in the working order. Such equipment includes machines like dumpers, loaders, dozers, graders, drilling rigs etc. The life of these machines has been prolonged by replacement of parts, which otherwise would have been scrapped by now.

2. PROJECT IMPLEMENTATION

2.1 It has been observed that payments to the suppliers under the loan through Letter of Credit have been creating difficulties both for the Borrower as well as the suppliers. The delays in the opening of LCs have been very frequent, due to the involvement of several agencies, eg. the purchaser, Chief Resident Representative of WAPDA at Karachi, Controller of Import and Export, State Bank of Pakistan or its authorized banks.

2.2 The procurement under International Competitive Bidding involves the following steps:

- (i) Preparation of specifications and bid documents.
- (ii) Transmittal of specifications and bid documents to the World Bank.
- (iii) Bank's clearance of the specifications and bid documents.
- (iv) Invitation of Bids.
- (v) Opening of Bids.
- (vi) Transmittal of comparative statement of bids to the Bank with recommendations.
- (vii) Bank's clearance of recommendations.
- (viii) Award of contract.
- (ix) Establishment of Letter of Credit and obtaining Bank's commitment.
- (x) Delivery at site.
- (xi) Issuance of Acceptance Certificate and release of 20 percent Retention Money.

Steps (i) to (viii) take about nine months. Step (ix) i.e. the opening of Letter of Credit has been very time consuming. According to the laid down procedure, a copy of the purchase order is sent to WAPDA Chief Resident Representative at Karachi who applies to Chief Controller of Imports & Exports for obtaining import license. After the import license has been received, application for opening of Letter of Credit is submitted to the bank authorized by the State Bank of Pakistan for this purpose.

2.3 For the purchases made from the countries which have different currency from the US Dollar, the value shown on the import license is arrived at by converting the currency of the supplier's country to US Dollar using conversion rate prevailing on the date the import license is obtained. The same value is transferred to the Letter of Credit which is usually established after several weeks. During this period if the value of US Dollar depreciates as compared to the contract currency, the value of LC established falls short of the contract value. In such cases the LC remains in-operative till such time that the value of LC is enhanced and IBRD commitment is obtained thereof. For the revision of LC, the whole procedure adopted for opening of LC has to be repeated.

2.4 It normally takes three months to get the LC established and operative after the purchase order is placed. During the implementation of the project in many cases, the LC established could not be utilized due to any of the following reasons:

- (i) Value of LC deficient, needing revision.
- (ii) Suppliers request for extension of delivery period.
- (iii) Shortage found in the consignment received.

In the situations as at (iii) above, the shortfalls are made good several months later. By that time, validity of LC as well as that of the IRRD Commitment gets expired. To get them revalidated, a lot of time is consumed, delaying the completion of procurement.

2.5 Other factors which contributed to delays are:-

- (a) The Government regulations do not permit import of some of the equipment/material under the import policy. While there are other items which can be imported only by getting permission from the Ministry of Commerce. In many cases a lot of time had been consumed to get No Objection Certificate (NOC) for their import.
- (b) During the currency of the project the Controller of Import and Export revised their regulations according to which it became essential for WAPDA to get itself registered as an importer. The grant of import license had been withheld till the registration had been made. For some of the cases, the time lost due to this requirement was as much as ten months.
- (c) WAPDA reorganized administrative set up of its Karachi based representative handling the imports. Some of its staff was shifted from Karachi to Lahore. The Lahore Office dealt with the import permit/license etc. The staff left at Karachi handled opening of LCs, custom clearance, and transportation of goods to the consignee. The work at both the offices was adversely affected for a period of about two months due to this change.
- (d) First Periodic Inspection of Tarbela Dam had been carried out in year 1986. According to the recommendations of the Inspection Team, it became necessary to purchase additional equipment for the safety of the Dams. Accordingly a request was made to the World Bank to allow purchase of certain additional equipment from the existing funds of the loan for which the Bank had been very kind and approved the request of the Borrower. However, it required re-appropriation of funds provided for different heads within the loan. The reappropriation proposal had to be approved from the World Bank as well as Government of Pakistan. About six months were lost to meet this particular administrative requirement.
- (e) Before the commencement of the Project, it had been thought that normally a case of procurement starting from inviting tender to release of payment to the supplier after acceptable delivery of goods to the site would take about nine months. It had been assumed that LC would be established within one month from the date of award of contract. It was assumed that NOC for the items

requiring permission of the Ministry of Commerce would be obtained within two weeks. These assumptions did not work and much more time was consumed to meet the procedural formalities.

2.6 During the currency of the Project, a special officer was assigned for pursuing opening of LCs, getting NOCs etc. on the advice of the World Bank. This arrangement improved the progress appreciably.

2.7 The procedure of the procurement under UK grant was different. The Crown Agents, on behalf of ODA, gather quotations of the equipment to be purchased from UK market and forward to WAPDA with their comments. Upon approval of a particular quotation, they place the order on the firm. The supplier ships the goods on FOB basis consigned to WAPDA's CRR Karachi who arranges clearance from the custom authorities and despatches the consignment to the ultimate consignee. The Crown Agents make payment of cost to the supplier equal to 95% of the total cost when the shipment has been made. The remaining payment is made after the acceptance of the goods by the ultimate consignee.

3. PROJECT RESULTS

3.1 The purpose of the Project was to improve the capability of WAPDA both of staff and the equipment, to maintain and monitor the projects efficiently for providing dam safety, by its own resources, after the international contractors leave the project on completion of their contracts. With this objective in view new equipment and spare parts of the existing equipment were purchased. About twenty engineers and other technical hands were provided training under the loan outside the country to enhance their knowledge and technical know-how.

3.2 It has been observed that the engineers who had been imparted foreign training are handling their respective jobs with increased confidence. However the utilization of amount provided for technical assistance under UK grant is limited to proposed training of divers locally by UK experts, advisory services of a UK expert on workshop management and organization and training of mechanical engineers in UK on workshop maintenance and management. Some of the training facilities are available in Pakistan which have been utilized. The surveyors have been trained by Survey of Pakistan Islamabad, and mechanics have been trained in training cell operating at Tarbela workshop.

3.3 Finances were also provided to meet the cost of First Periodic Inspection of Tarbela Dam Project carried out in year 1986-87. Thus the Reservoir Maintenance Facilities Project (RMFP) has greatly contributed towards its objective.

4. PROJECT SUSTAINABILITY

4.1 With the assistance provided under the Project the capability of O&M Organization has been greatly improved and hopefully the present level of

long time provided the deficiencies created from time to time in staff as well as the equipment are made-up promptly and the organization is kept intact in its present form in the time to come.

4.2 The importance of these dams is fully realized and inspite of financial constraints funds essentially required for the maintenance of these vital structures would continue to be provided as are being done currently.

5. BANK PERFORMANCE

5.1 The Bank and ODA have been very helpful in all stages of the project i.e. inception, preparation, pre-appraisal, appraisal and implementation. The guidance extended contributed towards a very useful project. There have been requests at a couple of times to increase certain allocations within the loan agreement which have always been agreed by the Bank. Request for providing additional equipment under UK grant was also acceded to. The constant monitoring of the utilization of the loan during implementation and frequent advice by the Bank's Mission have been a great contribution in successful completion of the project.

6. BORROWER PERFORMANCE

6.1 During the early stages of the project a lot of time had been consumed to arrive at the final shape of the contract documents for the purchase orders keeping in view Bank's proposals and WAPDA regulations. But once the basic issues were settled the project started moving ahead smoothly.

6.2 The main weakness of the Borrower has been its inability to get the Letter of Credit established promptly. This is because of the involvement of several offices as has been described in previous pages of this report. Another factor effecting the performance of the Borrower adversely has been necessity to extend the validity of LCs for cases where there have been shortages in the consignment received and which were made up after passage of several months. The Borrower had to go through the whole procedural drill again for the revision of the LCs. In the face of these difficulties the performance of the Borrower could be rated as satisfactory.

6.3 Delays in the completion of some of the purchase orders under the project suggest that some of the conditions applicable to the contracts should be changed as follows:

- The option for selecting shipping and insurance companies should be left with the supplier instead of forcing him to utilize the services of specified firms.^{3/}
- Action on purchase of an item should not be initiated before ascertaining that the item was importable under the policy of the

^{3/} This is agreement with the World Bank guidelines for procurement.

Government of Pakistan. However, the World Bank could keep a check on this by holding its approval for placing purchase order unless the Borrower certifies that the item is on free import list or No Objection Certificate has been obtained.^{4/}

- The payment should not be made through LC instead, the World Bank should directly make payment to the supplier on receipt of acceptance certificate from the Borrower.^{5/} As mentioned already the process of procurement starting from tendering and ending at receipt of goods and release of payment to the supplier contains numerous procedural steps to be followed with different organizations which results in delays. But, during the implementation of the project, due to mutual cooperation between the buyer and other agencies, the project has successfully reached completion. It is specially worth mentioning that the World Bank has been very kind and has not acted simply as a money lending agency but has been advising on different matters which resulted in expediting the procurement process leading to the successful completion of the project.

7. PROJECT RELATIONSHIP

7.1 WAPDA enjoyed good relations with World Bank and ODA throughout the currency of the project. The advice of the bank during project preparation, appraisal and implementation have been a great help. Again the assistance provided by ODA and the Crown Agents who procured and supplied equipment to project sites reduce a lot of WAPDA work.

PART III

CONCLUSIONS AND RECOMMENDATIONS

1. CONCLUSIONS

1.1 The project as financed by Bank has been successful. While the objectives to improve and strengthen WAPDA's capability to safely operate,

^{4/} This is solely the responsibility of the Borrower. Bank has no information on free import list nor which item of goods has or has not received the No Objection Certificate. Infact items being financed under the project were agreed during negotiations and no restriction should be imposed for their import.

^{5/} Bank can and will undertake to make direct payment to supplier after it receives the Application for Withdrawal (Form 1903) from the Borrower, instructing it to do so, together with documentation showing evidence of the amount due.

maintain and monitor the dams are met; the continued success/impact of the project will depend on WAPDA's prompt actions in meeting the deficiencies created from time to time in staff and the O&M budget, in retaining the trained personnel, and in keeping the organization intact in its present level of preparedness.

1.2 The Tarbela Dam inspections resulted in providing added strengthening measures for dam safety as well as additional equipment and instrumentation required for dam safety. The completed project provided more dam safety related equipment and dam monitoring instrumentation than that assessed at appraisal. Much less money was spent on buildings as the same was arranged by other means and the money saved under this category was transferred for the procurement of the additional equipment and instrumentation. The overseas training of the local professionals is recognized and concluded as a great success in imparting the needed knowledge on the effective O&M of major dams and their safety.

1.3 UK (ODA) grant part of the project is still on-going, ODA agreed to include in its grant vehicles transferred from Bank loan provision and to procure O&M equipment for Hub Dam and Khanpur Dam as additional to the project. ODA is still considering the requests from WAPDA for the provision of expatriate specialists to impart training in deep diving inspection of WAPDA staff in Pakistan. Up to July 1991, ODA grant of about £5.0M (\$8.25M equiv.) was disbursed. The grant amount has increased from £8.5M (\$14M equiv.) to £8.9M (\$14.7M). WAPDA estimated that it will take about two more years (about June 31, 1993) for the grant to be fully disbursed.

1.4 The total project cost is estimated to be \$35M as compared with \$42.2M at appraisal.

1.5 In absence of the completion of ODA grant part of the project at this stage, it is assessed that currently about 85% of the project objectives have been met. There is no reason to doubt that the project will not achieve the full objectives and successes when it is fully completed.

2. RECOMMENDATIONS

2.1 In the future GOP should consider issuing the No Objection Certificates (NOC) on the list of equipment submitted by the project authority after the approval of the project PC-1, instead of on an item-by-item basis which is time consuming causing much delay in procurement (para I.5.2). The Bank should also consider having the Government presented the NOC of the identified and listed equipment during the Project Negotiations.

2.2 For projects which involve large procurement activities, the project authorities should be encouraged to appoint a special procurement officer/expediter from the start of project implementations as procurement in Pakistan, especially for ICB, involves many administrative steps, each of which is time consuming (Paras I.8.3, and I.9.3).

2.3 GOP should let WAPDA keep a certain percentage of its annual revenue from the sale of electricity generated at Tarbela and Mangla Dams, for satisfactory O & M, and dam safety measures including the equipment and instrumentation renewal. An amount approximately one percent of the current costs of the dam and appurtenant structures is considered adequate (para I.7.2).

2.4 GOP/WAPDA should continue the annual and periodic dam safety inspections. Bank should continue sending a representative (engineer/dam specialist) to participate in the annual inspections of Tarbela, Mangla, and Chasma even after this project loan closure (para I.7.3).

2.5 WAPDA should place its best qualified and experienced engineers and technicians for the O & M and safety monitoring of the three dams (para I.7.4)

2.6 Bank should establish guidelines concerning the exchange of information between parallel cofinanciers and the Bank (para I.8.2), and there should be an understanding established between the Bank and parallel cofinanciers regarding the exchange of information, before the start of the project implementation (para I.12.5).

2.7 Section 2.07 of Project Agreement which requires WAPDA to furnish to the Bank detailed annual O & M program and budget for the subsequent year should continue in force until such time that Bank is satisfied that the O & M program and the budget are appropriate and will perpetually continue (para I.12.2).

2.8 In order to maintain its competent O&M capability, deficiencies created from time to time in staff as well as equipment should be made up promptly and the O&M organization be kept intact in its present form for years to come (para II.4.1).

PART IV
STATISTICAL INFORMATION

1. PROJECT TIMETABLE

<u>Item</u>	<u>Date Planned</u>	<u>Date Revised</u>	<u>Date Actual</u>
Identification ^{1/}			July 1981
Preparation			1981 by GOP
Project Brief			January 27, 1982
Appraisal Mission ^{2/}	May 1982		May 13-June 6, 1982
Loan Negotiations	Early Jan 83	Late Jan 83	Jan. 27-Feb. 2, 1983
Board Approval			March 15, 1983
Loan Signature			April 12, 1983
Loan Effectiveness	July 12, 1983		November 15, 1983
Project Completion	June 30, 1988	June 30, 1990	Not yet completed ^{3/}
Loan Closing	June 30, 1989	June 30, 1991	June 30, 1991 ^{4/}

Comments

1. Originally the project was known in early 1981 as the Tarbela O&M Project.
2. During the appraisal mission the project concept was expanded to include the needs of the Mangla and Chasma reservoirs and the project's name was changed to Reservoir Maintenance Facilities.
3. Bank financed part of the project completed June 30, 1991. UK grant part is still on-going.
4. Loan account kept open until October 31, 1991.

Table 2(a)

2. LOAN DISBURSEMENTS

(a) World Bank Loan

Bank/GOP Fiscal Year & Semester	-----Appraisal Estimate-----		-----Actual-----		Percent Disbursed
	<u>Disbursement</u>	<u>Cumulative Disbursement</u>	<u>Disbursement</u>	<u>Cumulative Disbursement</u>	
<u>1983/1984</u>					
As of December 31, 1983	0.15	0.15	0.151	0.151	1.5
As of June 30, 1984	1.10	1.25	-	-	1.5
<u>1984/1985</u>					
December 31, 1984	1.25	2.50	-	0.151	1.5
June 30, 1985	1.50	4.00	-	0.151	1.5
<u>1985/1986</u>					
December 31, 1985	1.65	5.65	-	0.151	1.5
June 30, 1986	1.50	7.15	0.098	0.249	2.4
<u>1986/1987</u>					
December 31, 1986	1.25	8.40	0.634	0.883	8.7
June 30, 1987	0.50	8.90	1.309	2.192	21.5
<u>1987/1988</u>					
December 31, 1987	0.50	9.80	1.660	3.852	8.7
June 30, 1988	0.40	9.80	1.426	5.278	51.7
<u>1988/1989</u>					
December 31, 1988	0.20	10.00	1.033	6.311	61.9
June 30, 1989	0.20	10.20	0.774	7.085	69.5
<u>1989/1990</u>					
December 31, 1989			0.495	7.580	74.3
June 30, 1990			0.773	8.353	81.9
<u>1990/1991</u>					
December 31, 1990			0.985	9.338	91.6
June 30, 1991			0.651	9.989	98.0

COMMENTS

Disbursements were standing still for 2 1/2 years after the withdrawal of the Front-end Fee (\$0.151M), because:

- (a) date of loan effectiveness was delayed by four months due to delay in the approval of the project PCI by ECNEC;
- (b) replacement of Chief Engineer O & M Tarbela caused delays in initiation of project activities;
- (c) the 1984/85 foreign currency allocation by GOP for the project was far short of the budget requested by WAFDA, and the amount provided was used mainly for the procurement of equipment under UK grant;
- (d) there were prolonged delays in resolving differences on specifications and tender documents for equipment procurement between Tarbela staff and WAFDA central procurement cell in Lahore and Bank staff;
- (e) the procurement processes in Pakistan were complex requiring several channels of clearance such as no objection certificate, import license, transport clearance. The disbursements started picking up after Bank and WAFDA pinpointed and began to resolve bottlenecks in procurement processes and WAFDA staff gained experience in procurement.

Table 2(b)

(b) UK Grant (in \$ equivalent)

<u>Fiscal Year & Semester</u>	<u>---- Appraisal Estimate ---</u>		<u>----- Actual -----</u>		<u>Percent Disbursed</u>
	<u>Disbursement</u>	<u>Cumulative Disbursement</u>	<u>Disbursement</u>	<u>Cumulative Disbursement</u>	
<u>1983/84</u> June 30, 1984	1.346	1.346	-	-	-
<u>1984/85</u> June 30, 1985	3.017	4.363	1.808	1.808	1.29
<u>1985/86</u> June 30, 1986	4.304	8.667	1.741	3.550	25.35
<u>1986/87</u> June 30, 1987	3.883	12.550	1.735	5.285	37.75
<u>1987/88</u> June 30, 1988	1.450	14.00	1.077	6.362	45.44
<u>1988/89</u> June 30, 1989	-	-	1.028	7.390	52.78
<u>1989/90</u> June 30, 1990	-	-	0.305	7.695	54.96
<u>1990/91</u> June 30, 1991	-	-	0.401	8.096	57.83
<u>1991/92</u> June 30, 1992	-	-	3.604 ^{1/}	11.700	79.59
<u>1992/93</u> June 30, 1993	-	-	3.00 ^{1/}	14.700	100.00

^{1/} Estimated by GOP/WAFDA

Table 3

3. Project Implementation

	<u>Completion Date</u>	
<u>World Bank Loan</u>	<u>Appraisal Estimate</u>	<u>Actual</u>
Buildings, (Workshops, Warehouses Training Center)	6/30/85	6/30/87
Equipment and Materials	2/28/87	6/30/91
Vehicles	1/31/87	-
Spare Parts	2/28/87	6/30/91
Technical Assistance	1/31/88	3/31/90
Training (Overseas)	6/31/85	3/31/90
 <u>UK Grant</u>		
Construction Equipment	2/28/87	10/31/89
Workshop Equipment	2/28/87	8/31/91
Miscellaneous Equipment	2/28/87	11/30/89
Communication & Electrical Equip.	2/28/87	8/31/91
Vehicles	1/31/87	6/30/90
Spare Parts	2/28/87	in progress
Technical Assistance	6/31/85	not started
Training (in Pakistan)	6/31/85	in progress

4. Project Costs and Financing

A. Project Costs

<u>Item</u>	<u>Appraisal Estimate</u>			<u>Actual</u>		
	<u>Local Costs</u>	<u>Foreign Costs</u>	<u>Total</u>	<u>Local Costs</u>	<u>Foreign Costs</u>	<u>Total</u>
	US \$ M			US \$ M		
Buildings	1.35	0.75	2.10	0.25	0.10	0.35
Equipment, Vehicles Spare Parts, & Supplies	16.60	21.80	38.40	9.65 ^{a/}	23.40 ^{a/}	33.05
Tech Assistance	0.05	0.70	0.75	0.10 ^{a/}	0.85 ^{a/}	0.95
Training	-	0.80	0.80	-	0.40 ^{a/}	0.40
Front End Fee	-	0.15	0.15	-	0.15	0.15
Total	18.00	24.20 ^{b/}	42.20	10.00	24.90 ^{c/}	34.90

^{a/} includes estimated expenditures under UK Grant to be incurred during 1991-93

^{b/} Bank loan = \$10.2, UK grant = \$14.0 equivalent

^{c/} Bank loan = \$10.2, UK grant = \$14.7 equivalent

B. Project Financing

<u>Item</u>	<u>GOP/WAPDA</u>		<u>Bank Loan</u>		<u>UK Grant</u>		<u>Percentage</u>
	<u>Appraisal</u>	<u>Final^{1/}</u>	<u>Appraisal</u>	<u>Final</u>	<u>Appraisal</u>	<u>Final^{1/}</u>	
Buildings	1.35	0.25	0.75	0.10	-	-	1.00
Equipment, Vehicles Spares & Vehicles	16.60	9.65	8.00	8.679	13.80	14.51	95.70
Technical Assistance	0.05	0.10	1.30	1.060	0.20	0.19	3.87
Front End Fee	-	-	0.15	0.150	-	-	0.43
Total^{2/}	18.00	10.00	10.20	9.989	14.00	14.70	100

^{1/} Estimated

^{2/} Total project costs are estimated to be \$34.9M, with GOP/WAPDA contribution of \$10.00 M (reduced by \$8M), Bank loan contributions of \$10.20 M (constant), and UK grant contribution of \$14.70M (increased by \$0.7M).

Table 5

5. Status of Covenants

<u>Agreement Section</u>	<u>Covenant</u>	<u>Status</u>
<u>Loan Agreement</u>		
3.02 (a)	O & M to be in accordance with appropriate standards and practices	Complied
3.02 (b)	Facilities to be periodically inspected in accordance with sound engineering practice and with schedules acceptable to the Bank	Complied 1st inspection 8-9/86 2nd inspection 6/87
<u>Project Agreement</u>		
2.01	WAPDA to furnish training plan by Dec. 31, 1984	Complied with in May 1985
2.02	WAPDA to employ consultants acceptable to the Bank	Complied TAMS employed for dam inspections and HARZA for assistance in training
2.05 (d)	WAPDA to furnish project completion report not later than six months after the loan closing date (i.e. not later than Dec. 31, 1991)	Complied
2.07	WAPDA to furnish annual program and budget proposals by February 1st each year (beginning February 1, 1984)	Complied

Table 6

6. Use of Bank Resources

A. Staff Inputs (staff weeks)

	<u>FY 82</u>	<u>FY 83</u>	<u>FY 84</u>	<u>FY 85</u>	<u>FY 86</u>	<u>FY 87</u>	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>	<u>FY 91</u>	<u>Total</u>
Prep & Preappraisal	16.2	4.4	-	-	-	-	-	-	-	-	20.6
Appraisal	17.7	29.1	-	-	-	-	-	-	-	-	46.8
Negotiation	-	5.9	-	-	-	-	-	-	-	-	5.9
Supervision	-	2.5	17.2	4.0	11.6	22.7	14.0	12.1	11.0	11.0	106.1
TOTAL	33.9	41.9	17.2	4.0	11.6	22.7	14.0	12.1	11.0	11.0	179.4

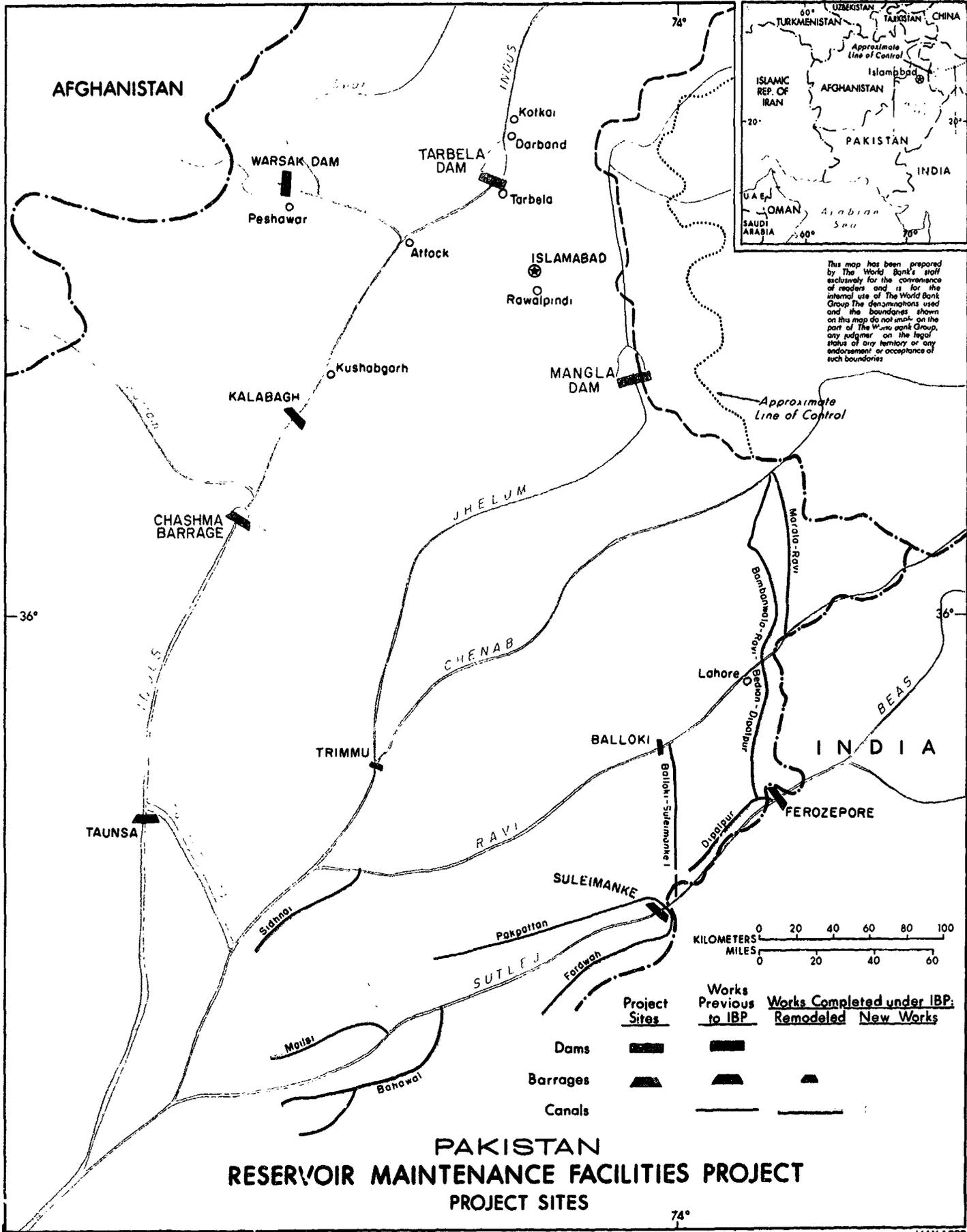
B. Missions

<u>Stage of Project Cycle</u>	<u>Year</u>	<u>Number of Persons</u>	<u>Days^{1/} In field</u>	<u>Speciali- zation Represented</u>	<u>Rating</u>	<u>Problem</u>
Preparation		08/81		1	10	Engineer
Preparation	11/81	1	10	Engineer	-	-
Project Brief	01/82	1	-	Engineer	-	-
Preappraisal		02/82		1	11	Engineer
Appraisal	05-06/82	5	30	Engrs., Econ. Procure, & Ln. Off.	-	-
<u>Supervision</u>						
Mission No. 1	12/83	1	18	Engineer	1	O (a)
Mission No. 2	03/84	1	9	Engineer	1	O (a)
Mission No. 3	05/84	1	9	Engineer	1	O (a)
Mission No. 4	09/84	1	8	Engineer	2	F, Pr
Mission No. 5	11/84	1	20	Engineer	2	F, Pr
Mission No. 6	03/85	1	9	Engineer	2	F, Pr
Mission No. 7	09/85	1	21	Engineer	2	Pr
Mission No. 8	03/86	3	15	Engrs, Econ,	2	Pr
Mission No. 9	11/86	1	14	Dam Spec.	2	Pr
Mission No. 10	09/87	1	14	Dam Spec.	2	Pr
Mission No. 11	06-07/88	1	14	Dam Spec.	2	Pr
Mission No. 12	12/88	1	9	Dam Spec.	2	Pr
Mission No. 13	03/89	1	9	Dam Spec.	2	Pr
Mission No. 14	01/90	1	10	Dam Spec.	2	Pr
Mission No. 15	12/90	1	10	Dam Spec.	2	Pr
Mission No. 16	05/91	1	9	Dam Spec.	2	Pr

^{1/} Most missions were combined with supervision of other projects. Numbers of day were those spent on this project.

Types of Problems: F = Financial, M = Managment, Pr = Procurement, T = Technical, O = Others
 (a) Effective date slipped 4 months and replacement of Chief Eng. O & M Tarbela.

MAP SECTION



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**PAKISTAN
RESERVOIR MAINTENANCE FACILITIES PROJECT
PROJECT SITES**

