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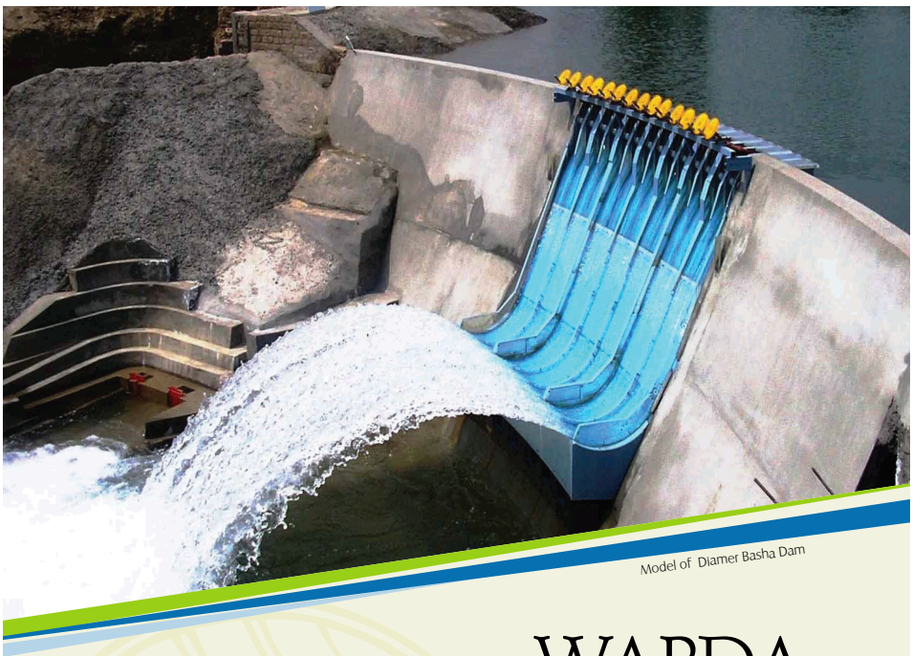

Model of Diamer Basha Dam

WAPDA

ANNUAL REPORT 2007-08

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY

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AUTHORITY

WATER WING

POWER WING

FINANCE AND ADMINISTRATION

ORGANIZATION CHART

AUTHORITY

Shakil Durrani
Chairman

Syed Raghib Abbas Shah
Member (Water)

Fazal Ahmad Khan
Member (Power)

Ch. Abdul Qadeer
Member (Finance)

Secretary Wapda

Member & M.D. (Water)

GM (P&D)
GM/PD Tarbela/GBHP
GM (Central) Water
GM (Technical Services)
GM (Projects) North
GM (Projects) South
GM (Finance) Water
GM (C&M) Water
GM (Projects) NA
GM (Hydro Planning)
GM (Neelum Jhelum)

Member & M.D. (Power)

GM (Hydel)
GM (Finance) Power
GM (Training)
CE/Principal
Engg: Academy Faisalabad

Member Finance

GM (Admn)
Chief Auditor
GM (CCC)
DG (S&GA)
DG (Finance) B&C

Director (PR)
Director (Vigilence)

ACKNOWLEDGEMENT

The Annual Report of Water and Power Development Authority (WAPDA) for the year 2007-08 has been prepared for submission to the Government of Pakistan in terms of Section 21 (1) of the WAPDA Act, 1958. An Overview of the activities of WAPDA, a chapter on the Indus Basin Settlement Plan, executed by Authority on behalf of the Government of Pakistan and "Water Resources and Hydropower Development -Vision 2025", have been included.

The Authority wishes to place on record its appreciation of the valuable services rendered by its officers, staff and consultants in achieving substantial progress on its projects, thus enabling it to fulfill its statutory obligations. At the same time, Authority deeply appreciates the close cooperation and help extended by various departments and agencies of Federal and Provincial Governments without which it would not have been possible to achieve the quantum of progress recorded in this report.

During the year under review, the management continued to focus on the following major policy initiatives: Improvement in Operational Efficiency: WAPDA Hydel Power Stations produced 28,225 million KWh net energy during the FY 2007-08 which is 33.2% of the total Hydel-Thermal Generation Mix of the Power System. The up keep of generating units was properly focused upon to ensure high availability and reliability of cheap hydropower. However, the hydrological conditions were not as favourable as in the previous years.

Revival of WAPDA as a Development Organization: It is indeed gratifying that WAPDA has undertaken Vision-2025 Programme comprising a comprehensive integrated Water Resources and Hydro Power Development Programme, which will boost up the economy of Pakistan. This has also revived WAPDA's primary developmental role as laid down in WAPDA's charter of duties. Studies on Dasu (4000 MW), Lawi (70 MW), Spat Gah (545 MW), Palas Valley (386 MW), Kohala (1100 MW) Keyal Khawar (122 MW), Bunji (5400 MW), Basho (28 MW) and Phandar (80 MW) hydropower projects are in progress. WAPDA will soon start working on Studies of Thakot and Patan (each 2800 MW) hydropower projects. The construction of Neelum Jhelum (969 MW) hydropower project has commenced and pre-construction activities are in progress, whereas , Golen Gol Hydropower Project is also ready for implementation.

Ghazi Barotha Hydropower Project is a major run of the river project, environmentally sustainable power project, designed to meet the shortage of hydropower at peak demand. It has a generation capacity of 1450 MW. All the five units have been commissioned and are in operation.

To meet water demands of huge agriculture sector of Pakistan, WAPDA is working on various Water Sector Projects which include Raising of Mangla Dam (additional 2.88 MAF Storage), Gomal Zam Dam (0.892 MAF live storage), Satpara Dam (15.8 MW and 0.051 MAF live storage), Kurram Tangi Dam (83.4 MW and 0.90 MAF live storage), Mirani Dam (0.152 MAF live storage) has been inaugurated in November 2006 and is in operation. Moreover, Sabakzai Dam (0.0147 MAF live storage) has also been inaugurated in September 2007 and is in operation. Rainee Canal (Phase-I), Kachhi Canal (Phase-I) and Greater Thal Canal (Phase-I) and Allai Khwar Hydropower Project, Khan Khwar, Duber Khwar and Jinnah Hydropower Project are under implementation. WAPDA has also taken initiative on RBOD-I covering area of Shikarpur, Dadu, Larkana in order to provide outfall facilities to the existing and proposed drainage project to improve environmental and water conditions in Manchar and Hamal Lakes, rehabilittion of existing drainage system. Increasing agriculture production in an area of 542,500 acres. The works include RBOD Indus Link, RBOD Extension up to Miro Khan Zero Point, Rehabilitation of Rato Dero, Miro Khan and Shahdadkot, Remodelling of MNVD while RBOD-III covering the area of Nasirabad, Jaffarabad Districts of Balochistan and Jacobabad, Larkana Districts of Sindh has to provide the direly needed effluent disposal facilities for existing and proposed drainage projects, the work would increase crop production of agricultural land wasted due to ponds of water, increase in cropping intensity and environment condition will improve over gross commanded area of 287,106 hectares.

To meet with the future requirements, WAPDA is working on studies of various projects; namely Akhori Dam (600 MW and 6.0 MAF live storage) - Munda Dam 740 MW and 0.67 MAF live storage)-Sukleji Dam (160 KW and 34000 MAF live storage) - Nai Gaj Dam (2.3 MW and 0.130 MAF live storage)-Naulong Dam (3.5 MW and 0.147 MAF live storage) – Hingol Dam 9640 KW and 0.816 MAF live storage), Chashma Right Bank Canal (Lift Cum Gravity), Winder Dam, Sehwan Barrage, Ghabir Dam, Tank Zam Dam, Khadeji Dam, Daraban Dam, Darwat Dam and Papin Dam. While studies on Diamer Basha Dam and Kalabagh Dam have been completed. Process of pre-qualification of contractors for constsruction of Diamer Basha Dam has been initiated and the construction would start in the year 2009.

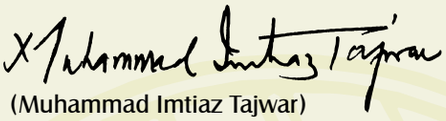
Besides WAPDA has signed four projects for the Carbon Credits, namely Dubair khwar, Allai Khwar, Golen Gol and Jinnah Hydropower Projects which is first in the country to make efforts for reduction in Global warming, besides setting an example for others.

In addition to this, special studies/research has been initiated to check on Glacial Melting due to Global warming and future strategy to store/conserve water likely to flush out of Glacier melting.

WAPDA further highlighted the importance of power generation through coal and in this regard a study was initiated to provide water to Thar Coal area for meeting the water requirement for Coal Power Generation. Thus making an effort to Fuel Mix in Power Generation. Experts were sent abroad to gain expertize/emphasize in making the large dams with RCC structures.

WAPDA has put forward numerous projects as mentioned above in both the fields of hydropower and water sector, so that Government of Pakistan can have a choice of projects from which projects can be picked for implementation depending upon the requirement, finance viability and the time in which the project is required to be online.

WAPDA's earnest endeavours are reflective of the commitment to support the national economy and poverty alleviation through improved Hydel-Thermal Mix of power generation, provision of electricity at affordable rates and above all perspective planning and timely execution of projects to meet water and power demands of growing population, agriculture and industry.



(Muhammad Imtiaz Tajwar)
Secretary WAPDA

FOREWORD

Public Relations Division takes pleasure in presenting the 50h issue of Annual Report of the Pakistan Water and Power Development Authority (WAPDA).

This prestigious document is released to fulfill the statutory requirements of WAPDA Act 1958.

WAPDA has made credible progress on various water and hydropower projects in hand during the financial year 2007-08. The creditable achievements of the authority have profound reflection on implications for socio-economic development of the country.

Authenticity and reliability of accounts has been the corner stone in documenting the annual performance of the Authority while pen-picturing its achievements.

Keeping in view the enormous scope and range of the activities in the year under review, tables, charts and illustrations have been incorporated to make the report more comprehensible.

Every possible effort has been made to produce a comprehensive and a valuable document for the benefit of the policy-makers, the researchers and all those associated with the relevant fields. Valued comments of the beneficiaries and readers in general are the best gauge to assess the degree of success in accomplishing the objectives of presenting this report.

(Raza ul Haq Siddiqui)
Executive Editor

WAPDA IN 2007 - 08

AN OVERVIEW

An analytic overview of the performance of WAPDA including its operational and development activities during the year ending June 30, 2008 is given below:

Water Wing

The projects completed by the Water Wing under Indus Basin Settlement plan and those with WAPDA for operation and maintenance purpose are functioning satisfactorily.

The work initiated in the previous years for water development activities gained a momentum during 2007–08.

Under the Water Resources and Hydropower Development Programme – Vision 2025, work on Mangla Dam Raising Project, Gomal Zam Dam, Satpara Dam, Kurram Tangi, Greater Thal Canal, Rainee Canal and Kachhi Canal along with some other study projects continued. Mirani Dam and Sabakzai Dam achieved completion level and already inaugurated. Work on Neelum Jhelum Hydroelectric Project has been started while studies on Diamer Basha have been completed.

The Hydro Planning Organization also progressed in carrying out planning and investigation works of studies at sites made available for the purpose with the attention focused on the Fast Track Priority Projects to harness the available potential for hydropower development under Vision – 2025 Programme.

The International Sedimentation Research Institute, Pakistan (ISRIP) remained engaged on the assignments undertaken.

The International Waterlogging and Salinity Research Institute (IWASRI) continued work on 8 ongoing research studies. The Institute published 15 research and 6 internal reports.

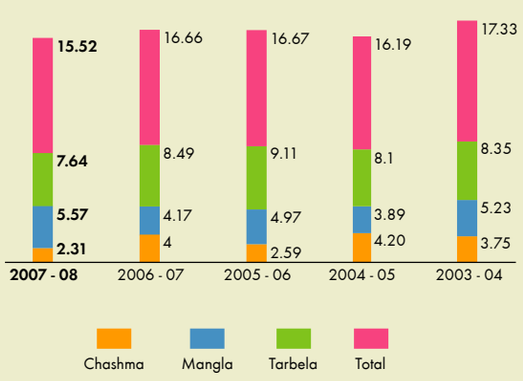
Irrigation releases from three reservoirs Tarbela, Mangla and Chashma registered constant trend. Collectively, 15.52 Million Acre Feet (MAF) of water was released from these reservoirs in response to irrigation indents, in current financial year.

Power Wing

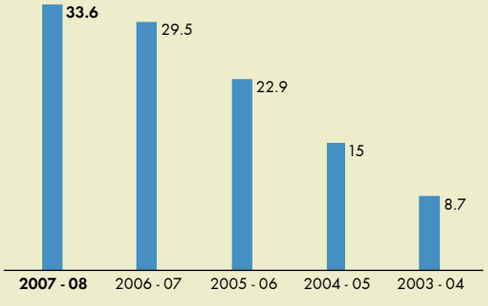
WAPDA's 13th Hydroelectric Power Stations produced 28255.177 MkWH of electricity energy during the year under report.

The implementation work of three hydropower projects, namely, Allai Khawar, Khan Khawar and Duber Khawar in Kohistan area of NWFP is progressing satisfactorily.

Water Releases from Wapda Reservoirs (MAF)



PSDP / ADP Allocations (Rs. in billion)



PERFORMANCE AT A GLANCE 2007 - 08

SECTOR	SUBJECT	2007 - 2008
Public Sector Development Programme (PSDP/ADP) (Million Rs.)	Water	33,682
	Total	**33,682**
POWER	Installed Generating Capacity (MW) Hydel (WAPDA)	6,444
	Total	**6,444**
	Generation (MKWHs) WAPDA Hydel	28.22
WATER	Water Releases from Reservoirs (Million Acre Feet) Tarbela Mangla Chashma	 7.64 5.57 2.31
	Total	**15.52**
	Completed Scarps/Drainage Project (No) Area covered (Million Acres)	70 18.3

THE AUTHORITY

WAPDA CHARTER

HUMAN RESOURCES

AUTHORITY FUND

AUTHORITY

Wapda Charter

The Pakistan Water and Power Development Authority (WAPDA) was established through an act of parliament in February 1958 for integrated and rapid development and maintenance of water and power resources of the Country. This includes controlling soil salinity and water logging to rehabilitate the affected land in order to strengthen the predominantly agricultural economy of the country.

As per the charter, amended in March 1959 to transfer the existing electricity departments from the federating units to it, WAPDA has been assigned the duties of investigation, planning and execution of projects and schemes for:

- Generation, Transmission and distribution of power,
- Irrigation, water supply and drainage,
- Prevention of water logging and reclamation of saline land,
- Flood control and
- Inland navigation.

Under the later on developments, vis-à-vis the "Energy Policy 1994", setting up of thermal power generation projects has been shifted to the private sector. Similarly, as a result of restructuring of the Power Wing in the recent years, the utility part has been corporatised into independent companies. This shift from convergence to divergence has given birth to 13 entities to operate in different zones. These are National Transmission and Dispatch Company (NTDC), four thermal power generation companies (GENCOs) and eight distribution companies (DISCOs). The present status of these companies is of corporate public limited entities under the Umbrella of WAPDA, ultimately to go privatized as planned. The Residual Power Wing is therefore now responsible for major hydro-electric power projects and schemes in operation and to come up along such up-coming private sector projects in the private sector under the reviewed "Energy Policy 2000".

Human Resources

The Authority comprises of a Chairman and three members, one each heading water, power and finance wing. The Member (Finance) also enjoys the control of administration.

The Members oversee the affairs of their respective wings through General Managers for the streamlined operations in their respective areas.

During past 49 years of its operations, WAPDA has developed its human resource as a reservoir of knowledge, competence and expertise through training and experience gained at the accomplished projects and remaining associated with diversified development activities. Presently, the human resource number is around 1,45,000. These include professionals, specialists, scientists, economists, administrators, accountants and skilled workers for planning, building, managing and operating various projects. Power wing being the developer and custodian of the largest and most significant utility service in the country employs over eighty nine per cent of the human resource followed by water wing and common services.

Water Wing

Member (Water) controls the water wing which is divided into north, central and south zones. These zones cover, in general, North West Frontier Province (NWFP), Punjab, Sindh and Balochistan respectively. The activity of water wing involves execution of surface and sub-surface water development and drainage-Salinity Control and Reclamation Projects (SCARPs). Chief Engineers and Project Directors at various levels are responsible for effective and timely implementation of Water Wing Projects.

Power Wing

Member (Power) controls the Power Wing, through General Managers, Director Generals, Chief Engineers in the field of planning, finance, grid system operation, grid system construction, thermal operation, hydro-electric power, coordination and WAPDA Power Privatization Organization.

Member Power also holding the Office of Chief Executive Officer PEPCO supervises the functioning of Corporatized Entities i.e. nine distribution companies (DISCOs), four generation companies (GENCOs) and one National Transmission & Dispatch Company (NTDC). Every Corporatized entity is headed by a Chief Executive who has under him a host of technical and non-technical, skilled and non-skilled work force.

WAPDA has an elaborate setup headed by a General Manager for training of its officers and officials at different levels covering all the wings of the organization.

Finance

Member (Finance) is responsible for the functioning of the departments of Finance, Internal Audit and Budget and Accounts headed by Chief Auditor (Internal Audit) and Director General Finance (B&C). He also exercises administrative control over General Manager (Central Contracts Cell), Director General (Taxes), Secretary WAPDA and Director Public Relations.

General Manager (Admn) is vested with the responsibility for overall administration and services. He has two Director Generals to assist him, one each for Services and General Administration, and Medical Services. General Manager Monitoring and Surveillance has a Director General and a Chief Engineer (Monitoring) with him. He also handles matters relating to Wafaqi Mohtasib's office.

Secretary WAPDA in addition to looking after day-to-day affairs of the Secretariat, prepares minutes of the Authority's meetings, maintains records of its decisions and issues its directives and coordinates among the three Wings besides monitoring and implementation of Authority's decisions.

Authority Fund

The Authority Fund consists of the following:

- Loans and grants obtained from the federal and provincial governments
- Sale proceeds of WAPDA Bonds
- Loans obtained by the Authority with general sanctions of the government
- Foreign aids and loans obtained from he IBRD, ADB and other international loan giving agencies on such terms and conditions as may be approved by the government
- Sale of power
- All other sums received by the Authority

To achieve the goal of financial self-sufficiency, WAPDA is also required to finance part of its power development programme through funds raised from revenue surplus of the Electricity Operation Branch. The extent to which funds are raised through self-sufficiency is determined by the Federal Government.

Since FY 1974-75, the Federal Government is meeting the budgetary requirements of accelerated programme of SCARP and, from FY 1976-77, for smooth execution of the projects, the Government of Pakistan also assumed the responsibility of funding Surface Water Projects.

The annual allocation for Water Development Schemes comprising Surface Water Development Projects like Chashma Right Bank Canal Project and Pat Feeder Canal Project, Drainage and Reclamation projects as well as National Drainage Programme are earmarked in Public Sector Development Programme (PSDP) as interest bearing loans and advances from the Federal Government. The funds are made available to WAPDA as grant for financing General Investigation Schemes to provide research based future planning for exploring the best use of water and fight against twin menace of water logging and salinity.

The Ministry of Water and Power provides funds from its current expenditure budget, for continuous and recurring nature research schemes such as Mona Reclamation and Experimental Project, Lower Indus Management (LIM), Hydrology & Research (H & R) and Perspective Planning Organisation (PPO), while operation and maintenance of Khanpur and Hub Dam projects is carried out through interest free loans of Finance Division.

Funds for other schemes belonging to provinces are provided by the respective governments to WAPDA which acts as the executing agency on their behalf. Under an arrangement, approved by the Federal Government, Water Development Projects completed by WAPDA, after initial run for one year, are transferred to respective provincial governments for their operation and maintenance. Schemes under National Drainage Program (NDP) are being executed by respective Provincial Irrigation and Drainage Authority (PIDA) except inter provincial schemes or schemes under participating agreement with PIDA by WAPDA. These schemes will also be maintained by the respective provinces through financing out of their own kitty. The federal government provides Cash Development Loans (CDL) for drainage projects while grant funds through foreign loans and cash development loans in rupees. However, with effect from July 1, 1988, WAPDA's Development Programme are earmarked for dams (storages) canals and engineering studies through Public Sector Development Program (PSDP). The debt servicing liability in respect of power schemes is that of WAPDA which is also responsible for discharging its debt liability in respect of expenditure incurred on electrification of SCARP tubewells installed by it.

In FY 1987-88, the federal government permitted WAPDA to float WAPDA Bonds for Public subscription. Profit on all issues is being paid to the bond holders regularly.

Further, for various hydro electric power projects in NWFP; i.e. Khan Khwar (72 MW), Allai Khwar (121 MW) and Duber Khwar (130 MW); WAPDA required considerable finances. Since WAPDA's First Sukuk Issue proved to be a great success, it was decided that another sum of Rs.8.00 Billion be raised through Sukuk. Therefore a company named "WAPDA Second Sukuk Company Limited" was established as WAPDA's wholly owned subsidiary to act as Special Purpose Vehicle (SVP). The company was incorporated on 4th June 2007. This will provide comfort for raising funds for the completion/development of Khwar Hydro Electric Projects of WAPDA.

WATER WING

WATER DEVELOPMENT

INDUS BASIN SETTLEMENT PLAN

TARBELA DAM

GHAZI BAROTHA HYDROPOWER PROJECT (GBHP)

CHASHMA HYDEL POWER STATION

MANGLA DAM RAISING PROJECT

DIAMER BASHA DAM PROJECT

PLANNING AND DESIGN (WATER)

NEELUM-JHELUM HYDROELECTRIC PROJECT

WATER CENTRAL

WATER SOUTH, WATER NORTH, WATER NORTHERN AREAS

Mangle Dam and Lake

WATER DEVELOPMENT

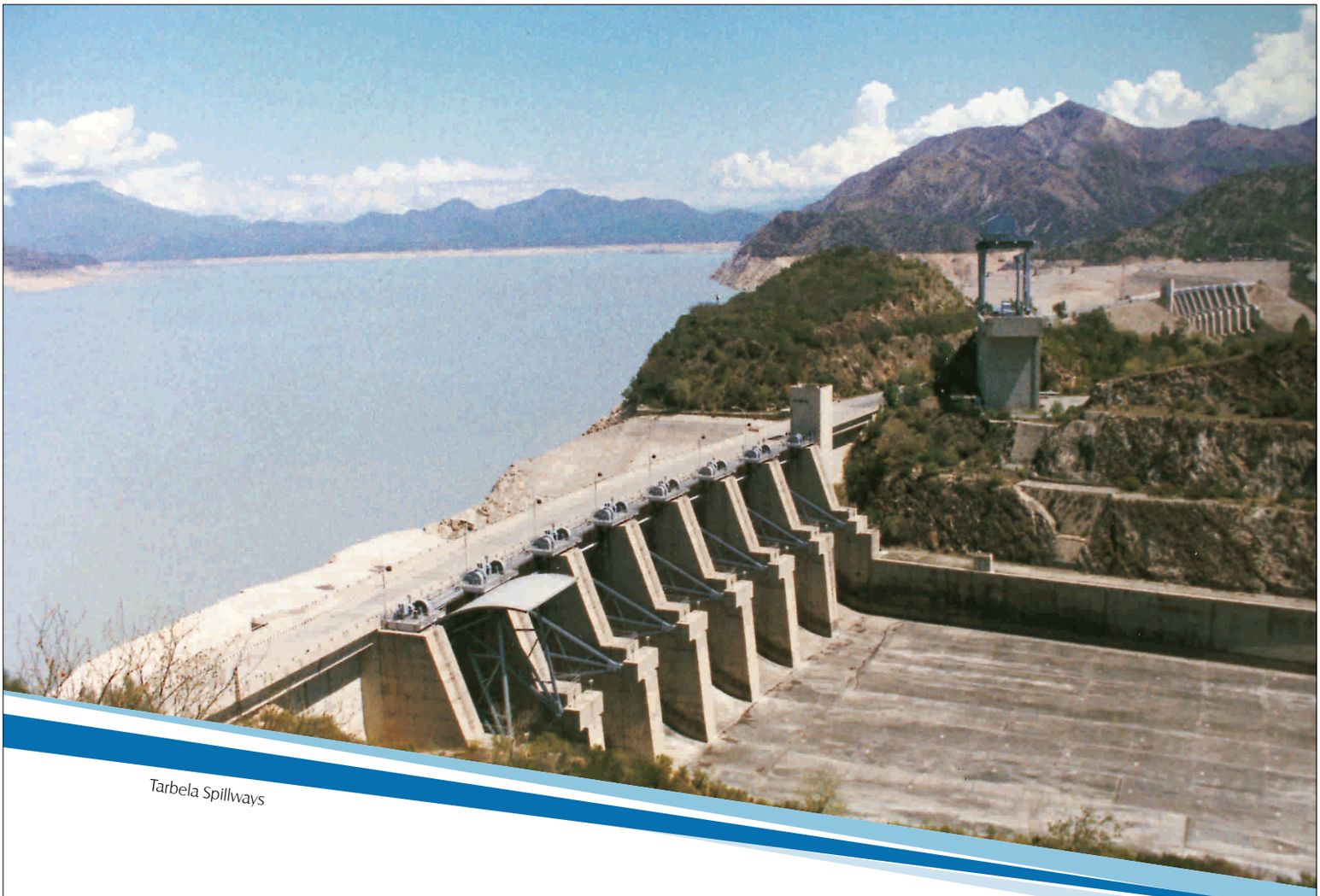
Pakistan is graciously bestowed with a bounty of water resource. The snow-clad peaks of the mountain ranges, in the North, generate the fortune. The descending snow-melt and monsoon water flow into the country's largest Indus river and its tributaries.

Passing through the plateau and the plain, across the Indus Valley, the rivers embrace the Arabian Sea, in the South.

Irrigated agriculture being backbone of the country's economy, the sector is the major use of water, consumption to continue to dominate water requirements. About 106 Million Acre Feet (MAF) out of 157 MAF of surface water is being, annually, diverted to the Indus Basin Irrigation System. This is around a century old world's largest man-made canal system. It provides irrigation facilities to 365 million acres. The country has a large cultivable land base of 77 million acres. Hence the irrigated land base at present corresponds to 465 per cent of the total cultivable area. Around 48 MAF is pumped from ground water. Direct rainfall contributes less than 15 per cent of the water supplied to crops.

With increasing population, Pakistan is fast heading towards a situation of water shortage. Per capita surface water availability, which was 5,560 cubic meters in 1951, had reduced to 1400 cubic meters in 2000. The country would have reached the stage of "Water starvation" by year 2012. This calls for rapid development of additional water resource to bring the potential over 22 million acres of virgin land under plough. In the face of existing three storages (Tarbela, Mangla and Chashma) rapidly losing their capacities due to excessive sediment, 5.8 MAF or 34 percent to lose by year 2010, more water storages for timely and adequate irrigation releases to maximize crop production has become all the more important.

WAPDA's role in the field of arresting waterlogging and salinity aims at the life-saving action for Pakistan's agriculture which remains backbone of the national economy. During past 48 years, WAPDA has executed 64 Salinity Control and Reclamation Projects (SCARPs) at a total cost of Rs.37.8 billion covering an area of 18.32 million acres of the affected land to put the waterlogged and saline acreage back into production.



Tarbela Spillways

This section of the Annual Report covers achievements of the following organizations through which WAPDA's Water Wing operates:-

- Indus Basin Settlement Plan
  Mangla Dam
  Chashma Barrage
  Tarbela Dam
- Ghazi Barotha Hydropower Project
- Planning and Design
- National Drainage Programme (NDP)/Water Central
- Water (North)
- Water (South)
- Technical Services
- Water (Northern Areas)

Tanda Dam

SALIENT FEATURES OF COMPLETED PROJECTS

Project	Cost Rs. (Million)	Technical Data	Objectives
Chablat Kas Lift Irrigation Scheme completed in 961	0.40	Pumping Water from Chablat Kas near Hassan Abdal involving lift of about 90 ft.	Provision of irrigation facilities for 1,400 acres
Rawal Dam Completed in 1962	21.20	Type: Stone masonry gravity dam. Height: 113.50 ft. Length: 700.00 ft. Live storage capacity: 4,300 acre ft.	Provision of 20 million gallons per day of potable water to Rawalpindi/Islamabad and irrigation of small area.
Guddu Barrage Completed in 1962	474.80	Type: Gate Controlled weir with navigation lock. Width 64 spans of 60 ft. each Maximum Discharge capacity: 1.2 million cusecs.	Controlled irrigation supplies (including extension) for 2.9 million acres in Jacobabad, Larkana and Sukkur districts of Sindh and Nasirabad district of Balochistan.
Tanda Dam Completed in 1965	66.80	Type: Earthfill Dam. Height: 115 ft. Length: 2,340 ft. Outlet capacity: 2,000 cusecs	Irrigation of about 3,200 acres in Kohat Valley.
Karachi Irrigation Project (Hub Dam) Completed in 1983	1,022.60	Type: Earthfill Dam. Height: 151 ft. Length: 21,360 ft. Reservoir capacity: 106,000 acre ft. Spillway capacity: 458,000 acres	Irrigation of 21,000 acres in Lasbela and 1,000 acres in Karachi District. Drinking water supply of 89 MGD for Karachi and 15 MGD for industries in Balochistan.
Khanpur Dam Completed in 1984	1,385.00	Type: Earth-cum-rockfill Dam. Height: 167 ft. Length: 1,547 ft. Reservoir Capacity: 106,000 acre ft. Spillway capacity: 166,000 cusecs	Irraigation of 36,470 acres in Attock, Rawalpindi and Abbottabad districts and supply of 131 MGD of water to Islamabad, Rawalpindi, POF Wah and Industries around Taxila.

PROJECTS COMPLETED BY WAPDA UNDER INDUS BASIN SETTLEMENT PLAN

Project	Main Technical Features	Objectives
Mangla Dam on River Jhelum (12th largest dam in the world)	- Type: Earthfill - Height: 380 ft. (above river bed) - Length: 10,300 ft. - Gross storage capacity: 5,88 MAF - Live storage capacity: 5.34 MAF - Main Spillway capacity: 1,010,000 cusecs - Emergency Spillway Capacity: 2,30,000 cusecs - Lake area: 100 sq. ft.	- Water Storage for supplementing irrigation supplies - Hydropower generation: 1,000 MW from ten units of 100 MW each - Incidental flood regulation completed in 1967
Tarbela Dam on River Indus (The largest rock and earthfill dam in the world)	- Type: Earth and rockfill. - Height: 485 ft. (above river bed) - Length: 9,000 ft. - Gross storage capacity: 11.6 MAF - Live storage capacity: 9.7 MAF - Main Spillway capacity: 6,50,000 cusecs - Auxiliary Spillway Capacity: 8,40,000 cusecs - Lake area: 100 sq. miles	- Water Storage for supplementing irrigation supplies - Hydropower generation - Units 1 to 4 = 700 MW in 1977 - Units 5 to 8 = 700 MW in 1982 - Units 9 to 10 = 350 MW in 1985 - Units 11 to 14 = 1728 MW in 1992-93 - Repair remedial and additional works completed in 1983 - Reservoir works completed in 1977
Link Canals (Eight) - Trimmu-Sidhnai - Sidhnai-Mailsi - Mailsi-Bahawal - Rasul-Qadirabad - Qadirabad-Balloki - Balloki-Sulemanki - Chashma-Sulemanki - Taunsa-Panjnad Link Canals Remodelled (Three) - Marala-Ravi - Bambanwala-Ravi-Bedian-Depalpur (BRBD) - Balloki-Sulemanki-I	These link canals comprise a total of 389 miles and have 400 principal structures with discharge capacities varying between 4,100 cusecs and 21,700 cusecs. Besides a total of 1,02,900 cusecs can be diverted through these link canals.	Completed progressively between 1965 and 1970. These canals are meant to transfer water of three western rivers, namely Chenab, Jhelum and Indus to the canals dependent on the three eastern rivers, namely Sutlej, Beas and Ravi.
Barrages/Syphon - Sidhnai on River Ravi - Qadirabad on River Chenab - Rasul on River Jhelum - Chashma on River Indus - Marala on River Chenab - Mailsi Syphon on River sutlej	These barrages and siphon comprise a total length of over three miles (16,926 ft.0 with combined design capacity of 4.38 million cusecs to facilitate aggregate diversion of 1,02,900 cusecs into the link canals.	Completed progressively between 1964 and 1971. These barrages are aimed to provide river control for diverting water from three western rivers to the three eastern rivers.

Tarbela Dam Project

INDUS BASIN SETTLEMENT PLAN

Conceived to resolve the water dispute between the two neighboring countries, Pakistan and India agreed upon the historic Indus Basin Settlement Plan (IBSP) in consonance with the Indus Basin Treaty signed between the two parties in 1960 under the auspices of the World Bank.

The IBSP acknowledges the proprietary rights of Pakistan over water of the three Western rivers, namely, Chenab, Jhelum and Indus and provides water of the three Eastern rivers Sutlej, Beas and Ravi to India. In order to feed the irrigation network of Pakistan, which is the largest man-made canal system in the world, in absence of the eastern rivers gone to India, an elaborate civil works programme was devised. The so designed Indus Basin Project (IBP) gave birth to two large dams (Tarbela and Mangla), five barrages, one gated syphon and eight inter – river link canals. Remodeling of three existing link canals formed part of this project to convey water of the western rivers for diversion to irrigation canals off-taking from the eastern rivers. The IBP involved largest civil works ever undertaken in this part of the world at that point of time.

WAPDA, in its infancy, executed all the sixteen IBP components within the stipulated period of time, of a decade except Tarbela Dam completed in 1974 on behalf of the Government of Pakistan. The replacement system came to flourish the agriculture in Pakistan in the following years, sustaining the country's agriculture-oriented economy and generation of low-cost hydro-electric power from multipurpose Tarbela and Mangla Dam projects.

All the projects when completed were handed over to the respective provincial irrigation departments except for Tarbela and Chashma Dams, Chashma Barrage and Chashma-Jhelum Link Canal which remain with WAPDA for operation and maintenance (O&M) purposes.

Mangla Dam

The first IBP component, among the world's 12th biggest dams of its type, Mangla Dam was built across river Jhelum, about 60 miles south-east of the Federal Capital Islamabad. The main structures of the project included four embankment dams, two spillways, five power-cum-irrigation tunnels and a power station. Provision of 40 feet rising of dam had been kept at the time of its construction. Keeping in view the economical and environmental viability the dam is being raised 30 feet against the provision of 40 feet. The construction activities are in progress.

The 10,300 feet long and 454 feet high (above core trench) main dam has a reservoir of 97.7 square miles area behind it. Its present gross storage capacity is 4.674 million acre feet (MAF) and live storage 4.542 MAF. Since first impounding in 1967, sedimentation to the extent of 1.208 MAF has reduced the gross water storage capacity of the dam from 5.88 MAF to 4.674 MAF (nearly 20.5 percent). Its main spillway is capable of discharging 870,000 cusecs at designed conservation level 1,202 feet SPD. This capability has been reduced to 749,947 cusecs due to 5 feet raising of sill level during Mangla Dam Raising Project as provided in design. The emergency spillway can discharge 230,000 cusecs at 1,228 feet SPD i.e. at highest flood level.

Operation and Maintenance

The reservoir was operated according to the irrigation requirements as per instructions of Indus River System Authority (IRSA). It was filled up to conservation level i.e.1,202 feet SPD on August 16, 2007 (gross capacity of 4.674 MAF).The minimum draw down level of 1,040 feet SPD was reached on April 02, 2008. The peak inflow 99,800 was recorded on August 14, 2007 at reservoir level 1201.35 feet SPD. Total rainfaill 28.07 inches was recorded during the year under report. The main spillway did not operate during 2007-08.

Monitoring and Surveillance

A total of 1,120 instruments were installed in the project structure to observe the pore water pressure, settlement of the fill/foundation and lateral displacements. The observed readings remained within permissible limits. The boiling points appearing through foundation sandstone beds of main dam and Sukhian dam were closely monitored and the seepage intensities recorded and found within permissible limits.

Seismicity

The micro seismic network remained operative satisfactorily. The seismic data collected through eleven stations. VHF Telemetry Seismic Network indicates that the project is located in a highly active geotectonic environment. During the report period as many as 1,459 seismic events were recorded within 500 kms. Out of these, 580 were located around Mangla (50 kms radial distance). However, no significant change in seismicity level was observed.

Raising of Mangla Dam may increase pore pressure at seismogenic depth which may lead to an increase in seismic activities for occurrence of some significant earthquake. To evaluate the earthquake hazards to the project structures, strong motion accelographs have been installed in and around the project area. These instruments are in operation and recording the data.

The comparison of reservoir level, averages of inflows, outflows, outflows through turbines and energy generation of Mangla for the fiscal year 2006-07 and 2007-08 is shown in the following tables:

Major Works

- Sand Blasting and painting of Intake Gates No.2 and 5 were carried out under Mangla Dam Raising Project Contract
- Seals of East side servomotors of Inlet valve of Unit No.8 have been replaced
- Dredging in front of Intake Tunnels No.1 to 5 has been carried out

Financial Benefits

The IRSA indented 5.57 MAF of storage releases for irrigation purpose during the report year against 4.17 MAF during the previous year. Mangla Power Station generated 4,687.33 million kilowatt hours (MkWh) of electricity. The project benefits till June 30, 2008 are given in table 2.3.

Hydel Training Centre Mangla

To meet the training requirements of employees of Hydel Organization only one training center at Mangla is functioning at present where seven junior engineers and 97 officials have been imparted training during the year under report. 44 officials participated in Departmental

LEVEL OF MANGLA (on 15th of each month)

Month	2006-07	2007-08
July	1181.45	1194.25
August	1201.40	1201.65
September	1202.05	1200.00
October	1192.60	1179.35
November	1181.10	1160.60
December	1159.70	1123.50
January	1141.05	1109.65
February	1123.00	1101.00
March	1115.35	1046.75
April	1168.30	1082.10
May	1178.90	1100.40
June	1179.75	1138.20

Monthly	2006-07	2007-08
Average Inflows (Cusecs on M.D.B)	31,394	24,578
Average Outflows (Cusecs on M.D.B)	29,997	26,284
Average Outflows through turbines (Cusecs on M.D.B)	29,194	26,193
Energy Generation (MKWh)	6.151	4,687

WATER AND POWER BENEFITS OF MANGLA DAM (1967-68 TO 2007-08)

Table 2.3

YEAR	Storage Releases MAF	Total Generation MkWh
1967-68 to 1979-80	58.32	37,150.56
1980-81	4.15	3,877.59
1981-82	5.30	4,090.23
1982-83	4.82	4,917.61
1983-84	5.35	4,162.51
1984-85	5.39	3,884.61
1985-86	4.56	4,637.65
1986-87	4.84	5,937.22
1987-88	4.88	6,039.65
1988-89	4.97	5,307.27
1989-90	5.03	5,621.31
1990-91	3.76	5,738.18
1991-92	4.68	5,944.04
1992-93	3.23	5,780.09
1993-94	5.37	5,022.53
1994-95	5.10	6,809.77
1995-96	3.94	6,977.29
1996-97	4.98	5,665.63
1997-98	4.36	6,103.72
1998-99	5.10	4,778.53
1999-00	4.21	3,184.77
2000-01	4.13	2,799.95
2001-02	3.54	3,398.89
2002-03	5.57	5,363.17
2003-04	5.23	5,058.94
2004-05	3.89	4,218.53
2005-06	4.97	5,442.94
2006-07	4.17	6,150.91
2007-08	5.57	4,687.33
Total:	**189.41**	**1,78,751.42**

Promotion Examinations conducted under control of this training center. In addition, 18 students of Engineering Universities have completed their internship from Hydel Training Centre Mangla.

Following courses were conducted for the employees of Hydel Organization:

"Jr. Engineer Induction Course (TC-01), Advance Operators Training Course (TC-061), Basic Operators Training Courses (TC-050), Basic Craftsman training course (Electrical – TC-060), Basic Craftsman training course (Mechanical – TC-060), Ministerial Training Course (Jr. Clerks/ Sr. Clerks/ Assistants) (M-01), Training Course of Store staff (S-01), Training Course of Telephone staff (TL-01), Training Course of Drawing staff (TL-01), computer office application course (CA-01) for local staff and Internship Training course for student Engineers".

CHASHMA BARRAGE

Chashma Barrage is located on River Indus. Since its commissioning in 1971, the Barrage has been functioning satisfactorily as Barrage-cum-reservoir providing diversion facilities for C.J.Link Canal on its left side and Chashma Right Bank Canal on the right. The reservoir also functions as a re-regulatory storage for the releases from Tarbela, which during the year 2007-08 enabled the reservoir to store about 2.310 MAF of water and released 2.376 MAF. During the year about 77.722 MAF of irrigation water was received in Chashma Reservoir out of which 77.656 MAF was released downstream River Indus at Chashma Barrage, 3.948 MAF into C.J.Link Canal and about 2.62 MAF diverted into Chashma Right Bank Canal. The downstream releases through Chashma Barrage gates were to the extent of 34.238 MAF, through Chashma Power House were 36.313 MAF after generating energy and 0.669 MAF for the cooling requirement of Chashma Nuclear Power Plant of Pakistan Atomic Energy Commission Kundian, which returned back to the river.

The 27th Annual Inspection of Chashma Barrage and its allied structures including river training works was carried out during January-2008 by Dams Safety Organization. A team from Survey and Hydrology Directorate Tarbela carried out the vertical movement survey of the Barrage structure. Routine maintenance and upkeep of the Barrage structure and its accompaniments continued during the year. The regulation of the Barrage was carried out as per indents received from IRSA.

Chashma Barrage Benefits

Since commissioning of Chashma Barrage, 65.088 MAF of water was released from the storage and benefits worth Rs.34,047 million have been attained. Year-wise break-up is detailed in the following table.

CHASHMA JEHLUM LINK CANAL

Indented irrigation water requirement of Punjab were met by diverting 3.948 MAF of Indus flows into river Jehlum through C.J.Link Canal. The canal was run and regulated for 202 days during the year 2007-08.

The link canal is earthern channel passing through sandy area. Its filling portion from RD 160 + to RD 215+ is causing huge seepage which ultimately resulted into waterlogging and affected the adjoining low lying areas of Adhikot, Chan and Rangpur villages.

Year (July to June)	Storage Releases (MAF)	Benefits (Rs. Million)
Upto 1992-93	16.19	3,238
Upto 1993-2000	22.00	6,600
Upto 2001-2005	17.991	16,192
2005-2006	2.594	2,335
2006-2007	4.003	3,603
2007-2008	2.310	2,079
Total:	**65.088**	**34,047**

Note: Upto 1991-92, the benefits have been worked out at the rate of Rs. 200/- per acre foot, for 1992-2000, these have been calculated at the rate of Rs. 300/- per acre-foot, but thereafter, the benefits have been assessed at the rate of Rs.900/- per acre-foot.

Chashma Barrage

To overcome this situation, WAPDA installed 25 tubewells of 3 cusecs each during 1971 in Adhikot area and 15 tubewells of 1.5 cusecs each in Chan area during 1975 to combat waterlogging. These tubewells are being operated and maintained by Punjab Irrigation Department. Besides, 21 centrifugal pumps having discharge capacity of 5.15 cusecs were also installed at five different pumping stations in 1985 to minimize the affects of waterlogging and salinity. These centrifugal pumps are being operated and maintained by WAPDA and its allied infrastructures.

Moreover, PC-II Proforma to study the problems caused by operation of C.J. Link Canal and to propose mitigation measures for rehabilitation of the canal and adjoining areas was got approved by Chief Engineer (P&I), WAPDA Sunny View, Lahore. The proposed study is being carried out by P&I, IWASRI and ISRIP organizations of WAPDA.

Maintenance of four regulators, structures, bridges and banks of the canal continued during the report period. Heavy rains developed deep cuts and erosion of banks at several locations along the canal, which were immediately taken care of through the department resources. The plantation of Gul-e-Abasi, Narki and Sarkanda in eroded reaches was carried out through departmental labour during the period under report.

A view of Tarbela Spillway in operation

TARBELA DAM

Tarbela Dam, built under the historic Indus Basin Settlement Plan, has greatly enhanced the agriculture and industrial potentials of the country. It has now a major support to the country's economy.

The total cost including Power Units 1 to 14 was US $ 2.63 billion with local and foreign currency components in almost equal proportions. The Rupee cost was met entirely by Pakistan Government while Tarbela Development Fund (TDF) was established in 1968 to take care of the foreign currency requirements. The balance amount available from Indus Basin Development Fund (IBDF) was diverted to RDF and bilateral loan agreement was signed with European Countries, Canada and USA. Later in 1980, agreement with Saudi Arabia, Kuwait and Abu Dhabi had to be entered to augment the fund.

Project Benefits

Self sufficiency in food has nearly been achieved thus helping in accelerating the pace of country's economic development. Billions of units of hydro-electric energy generated at Tarbela Power Station have reduced the gap between supply and demand and also saved hand some amount of foreign exchange of the country's exchequer required otherwise for thermal power generation besides helping to keep the overall tariff down.

During the report year, about 7.644 MAF of water was released from the storage, worth Rs.6879.600 at a rate of Rs.900 per acre foot, while value of 14937.631 million KWHs of power generation amounts to Rs.4481.29 million at Rs.0.30 per KWH. Contribution of about Rs.233,263.238 million has been recorded in terms of direct benefits from water releases and power generation during the last 33 years of operation.

Survey And Hydrology

(i) To monitor MB, MC and MD sections of MED u/s face of Tarbela Dam at stations 26+00, 46+00 was conducted during August 2007. Interpretation of record shows no new development or re-development of sinkholes or crack in the area.

(ii) Auxiliary Dam-1, SONAR survey was conducted on August 18, 2007.

Monitoring of Tarbela Reservoir Operation

- Peak inflow of 325,000 Cfs was recorded on June 16, 2008 at reservoir level of 1,435 feet.
- Maximum discharge was 292,700 on August 4, 2007.
- Total rainfall of 45.4 inches was recorded during the year under report.

- The Indus river inflow fluctuated between 15,400 and 325,000 Cfs during the period under report.

- Total inflow run-off was 57.845 MAF

The reservoir reached its maximum conservation level i.e. 1,550 ft. on August 20, 2007 and remained on the same level up to September 9, 2007.

The depletion of the reservoir started on September 10, 2007 to meet IRSA irrigation demand and depleted up to 1369.00 feet on March 11, 2008

Important Events

- Tunnels No. 5, Auxiliary and Service Spillways were operated to meet IRSA demand.

- Tunnel No.4 was operated on June 25, 2008 to flush out the sediments trapped in its vicinity. As much as 7.644 MAF water was released from the Tarbela reservoir.

Performance of Embankment Dams

The performance of Main Embankment Dam upstream blanket remained satisfactory during 2007. There was general reduction in pore pressure potential values. However, some higher potential values observed along the Main Dam toe and locally on the left side of coffer dam 'C ' within the range of 0.1 to 0.3 percent potential. The Tarbela outlets discharge effect on foundation pore pressure was less this year as compared to the previous year at similar outflow condition poor pressure along the main dam d/s toe were less in 2007 as compared to 2006.

No sink hole has appeared in the upstream blanket after 1986. Newly installed piezometers at MB-Section and poor pressures in the picture nylone tube of DFSD and pneumatic piezometer at sinkhole location indicated stability in the MB section sinkhole location.. Silent response of gauges during reservoir filling 1535 to 1550 feet. Sudden rise and fall in gauge readings was within the instrument accuracy range. Available information from other sections of main dam also indicated their satisfactory performance.

The X-A Section of Auxiliary Dam-I where the washed zone had developed in the core in 1990 remained stable. Physical inspection during low reservoir period did not reveal any settlement at the upstream face at elevation 1500 ft where formation of sink holes was expected due to physical movement in the core. Seepage from foundation measurement at the adit portal was same in 2006 and 2007.

The foundation of Auxiliary Dam-2 generally behaved satisfactory. The record foundation pressures were higher and the seepage less by 0.04 cusecs in 2006 as compared to the year 2005 when assessed at Reservoir level 1550 ft.

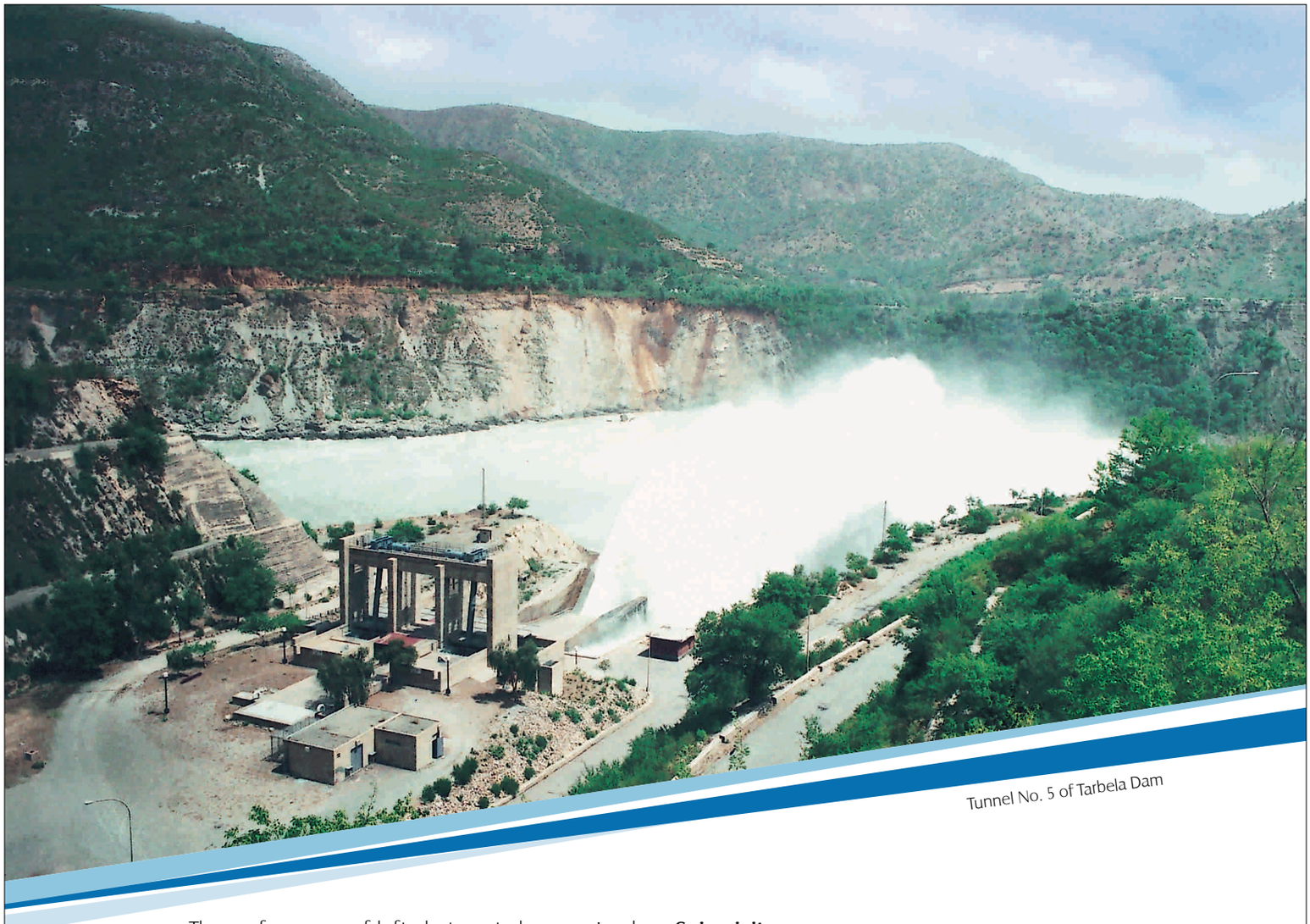
The statement of embankment fills has reduced considerably and continues at negligible rate. Horizontal movement generally responds elastically to the cyclic loading and unloading of Reservoir.

WATER AND POWER BENEFITS FROM TARBELA DAM

Table: 2.6

Year July - June	WATER		POWER		Total Benefits (Rs. Million) (3)+(5)
	Releases (MAF)	Benefits (Rs.Million)	Generation (MKWH)	Benefits (Rs.Million) @ Rs.0.30/- per unit	
1	2	3	4	5	6
1975-76	3.33	666.00	---	---	666.00
1976-77	9.07	1,814.00	138.30	41.49	1,855.49
1977-78	10.00	2,000.00	3,367.20	1.010.16	3,010.16
1978-79	8.71	1,742.00	3,726.00	1,117.80	2,859.80
1979-80	9.91	1,982.00	4,123.00	1,236.90	3,218.90
1980-81	10.63	2,126.00	4,128.80	1,238.64	3,364.64
1981-82	11.33	2,266.00	4,200.50	1,260.15	3,526.15
1982-83	9.12	1,824.00	5,228.20	1,568.46	3,392.46
1983-84	9.18	1,836.00	7,450.80	2,235.24	4,071.24
1984-85	9.24	1,848.00	7,253.94	2,176.18	4,024.18
1985-86	9.76	1952.00	7993.59	2398.08	4350.08
1986-87	9.98	1,996.00	8,121.23	2,436.36	4,432.36
1987-88	7.52	1,504.00	9,402.64	2,820.79	4,324.79
1988-89	11.12	2,224.00	10,378.22	3,113.47	5,337.47
1989-90	7.32	1,464.00	9,981.50	2,994.47	4,458.47
1990-91	6.19	1,238.00	11,356.00	3,406.80	4,644.80
1991-92	5.93	1,186.00	11,765.00	3,529.50	4,715.50
1992-93	6.31	1,893.00	13,955.00	4,186.50	6,079.50
1993-94	9.41	2,823.00	12,956.26	3,886.88	6,709.88
1994-95	5.39	1,617.00	14,765.19	4,429.55	6,046.55
1995-96	8.17	2,451.00	14,822.36	4,446.71	6,897.71
1996-97	9.15	8,235.00	14,230.17	4,269.05	12,504.05
1997-98	8.60	7,794.00	15,084.90	4,525.47	12,319.47
1998-99	9.04	8,136.00	16,377.84	4,913.35	13,049.35
1999-2000	8.708	7,837.00	14,747.64	4,424.29	12,261.49
2000-2001	8.689	7,820.10	12,811.24	3,843.37	11,663.47
2001-2002	8.206	7,389.00	13,495.05	4,048.52	11,437.52
2002-2003	8.664	7,797.60	14,676.694	4,403.01	12,200.61
2003-2004	8.358	7,522.20	1,519.76	4,535.93	12,058.13
2004-2005	8.103	7292.70	12308.00	3692.40	10985.10
2005-2006	9.119	8207.10	15822.97	4746.75	12953.85
2006-2007	8.497	7647.30	16131.596	4839.48	12486.78
2007-2008	7.644	6879.600	14937.631	4481.29	11360.89
TOTAL	**280.458**	**131006.200**	**340856.846**	**102257.038**	**233263.238**

NOTE: Up to FY 1991-92 the benefit of water releases have been worked out at the rate of Rs. 200 per acre foot, from 1992-93 to 1996-97 at the rate of Rs.300 per acre foot and thereafter from 1996-97 at the rate of Rs.900 per acre foot.



Tunnel No. 5 of Tarbela Dam

The performance of left abutment also remained satisfactory during the impounding of reservoir in 2006. Seepages reduced in the lower adit system by 0.43 cfs.

In light of the POE recommendations during the third and fourth periodic inspection the grouting works were carried out in RGA-3 and RGA-5 to strengthen the grout curtain in order to lower down the pore pressure near the core/rock contact area under a phased programme since 1996, the grouting operations achieved up to two third of the total programme since 1996, the remaining grouting would be completed in 2006 low reservoir period if availability of the reservoir stay below 1400 ft for sufficient period persists.

Spillways and Tunnels

The service and auxiliary spillways were operated on July 24 and August 8, 2007 for the first time during the period under report with a maximum discharge of 97,500 and 173,300 on July 26 2007 and August 13/14-2007 respectively. Patch work at monolith joints in front of bay No.08 of auxiliary spillway repaired in 2005 remained intact after 2007 spillway operation.

Tunnel No.4 remained close during 2007 whereas tunnel No.5 worked intermittent from May 27, 2007 with maximum discharge of 77,600 on June 1, 2007, the behaviour during all operations was satisfactory except abnormal voice "Tuck sound" during raising gate B (R/S) tunnel No.4 and from gate A (L/S) tunnel No.5.

Seismicity

During the year 2007, a total of 1,938 earthquakes including 322 local seismic events (within 160 km around Tarbela) were recorded by the Tarbela Seismic Observatory.

As many as eight earthquakes were felt at the Project with mild intensity ranging between II and IV and magnitude ranging 3.8 to 6 on Recter scale.

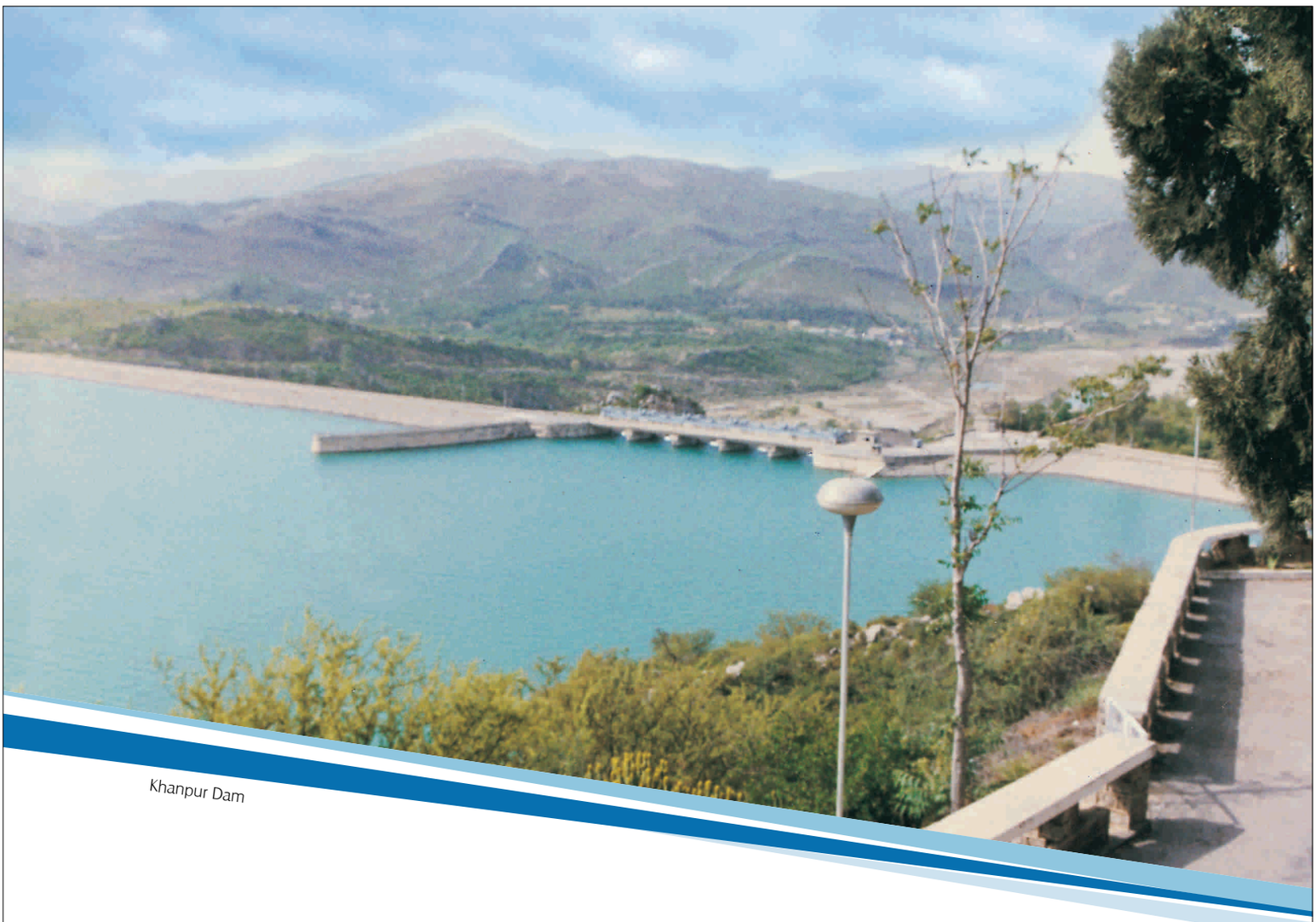
Nucleus Clearance Cell

The Tarbela Dam Resettlement Organization set up on July 1, 1967 was closed on June 30, 1985 and the Nucleus Clearance Cell was established on July 1, 1985 to clear the outstanding liabilities of the organization. No award was announced during the year under report.

Court Cases

Out of 4 pending appeals in the Supreme Court of Pakistan, no appeal case has been decided during the report period. Similarly, out of 13 pending cases in the Peshawar High Court, one has been decided whereas one appeal was filed during the year under report.

In addition, the Court of learned Additional District Judge Swabi dismissed one reference case titled Saddiq Khan Vs LAC and other affectee of Tarblela Dam besides finalizing eight execution and miscellaneous cases by different courts. Moreover, certain complaints of Tarbela



Khanpur Dam

Dam affectees, received through different Government agencies were attended and replied accordingly.

Khanpur Dam Project

The Khanpur Dam Project is an Irrigation and municipal/industrial water supply project located on the Haro river 50 km north west of Islamabad. The current live storage capacity of Khanpur Dam Reservoir is 94,070 acre-feet. In addition to supplying water for irrigation and municipal purposes, Khanpur reservoir is also used for fish production and as such known as recreational spot for the people of surrounding areas.

Four periodic inspections of Khanpur Dam were carried out by a panel of experts through the Dam Safety Organization in November 2007.

Routine monitoring activities of Khanpur Dam Project were carried out during the year. Data collected from various monitoring instruments was processed and sent to DSO for further analysis.

The spillway of Khanpur Dam was successfully operated in March/April 2007 and September 2007.

Water Supply

In the year 2007-08, Khahnpur Dam supplied 101,262.22 acre feet of water to its beneficiaries. Out of which 65,433.06 acre feet was supplied to irrigation sector and 35,829.16 acre feet to municipal/industrial sectors.

Rs.50 million were paid by Capital Development Authority (CDA) in November 2007 as water charges for the supply of water from Khanpur Dam Project.

Purposes

i) Irrigation

Rawalpindi and Attock districts of Punjab and Haripur district of NWFP.

ii) Municipal and Industrial Supplies

Rawalpindi city and Cantonment, CDA Islamabad heavy industry Taxila and PMO (Defense)

GBHP Power House and Spillway

GHAZI BAROTHA HYDROPOWER PROJECT (GBHP)

Introduction

The shortage of electrical power at affordable cost has long been identified as one of the main hurdles to the industrial and economic growth of Pakistan. The demand for electricity is growing rapidly and requires a considerable increase in the rate at which new generating capacity is introduced. Presently demand is met through a mix of thermal and hydroelectric plants. The percentage of thermal power generation has continued to increase in recent years, with a noticeable impact on unit cost of generation. WAPDA has continually sought to maximize the country's capacity for Hydropower generation and reduce the dependence upon thermal power generation. Ghazi Barotha Hydropower Project with a generation capacity of 1450 MW and an average energy output of 6600 GWh is a large, renewable and emission free source of energy towards WAPDA's Vision 2025 goals.

The Project

Ghazi Barotha Hydropower Project is located on the Indus river downstream of Tarbela Dam. The Project utilizes the hydraulic head available between the tailrace at Tarbela Dam and the confluence of the Indus and Haro Rivers for power generation. In this reach Indus River drops by 76m in a distance of 63 km. This Project possesses the minimum of environmental and social impacts.

Ghazi Barotha Hydropower Project consists of three main components. The Barrage, the Power Channel and the Power Complex. The Project utilizes the normal Tarbela Dam releases to provide year round maximum power generation during the daily hours of peak demand, including the months of May and June when reservoirs of Mangla and Tarbela Dams are historically at their lowest. This enhances the capacity of the whole power system by providing much needed relief in the form of cheap hydel energy.

The Barrage

The Barrage located 7 km downstream of Tarbela Dam, provides a pond which re-regulates the daily discharge from Tarbela by diverting the flow into the Power Channel. The principal features include 20 No. standard bays, 8 No. undersluices and 8 No. head regulator bays in addition to rim embankments, fuse plug and dividing island.

The Barrage can pass the design flood of 18,700 cumecs, equivalent to the flood of record, through the

standard bays and undersluices at the normal pond level of El. 340 m. The fuse plug has been provided to pass the extreme flood up to the capacity of Tarbela's spillway and tunnels equaling 46,200 cumecs.

The Power Channel

Ghazi Barotha Hydropower Project holds the record for the biggest concrete lined channel in the world. The channel is 51.90 km long with a concrete lining and design flow of up to 1600 cumecs at a water depth of 9 m and a bottom width of 58.4 m.

The Power Channel has a nearly contour alignment with hills on the left side and the land naturally draining towards the Indus River on the right side. The Power Channel intercepts fifty three nullahs (natural drains) of which twenty-seven major nullahs have been passed over the Power Channel by providing super-passages. The remaining twenty four minor nullahs are being discharged into the Power Channel through individual inlets whilst one nullah is passing underneath the channel through a culvert.

In addition to the thirty four road bridges, including bridges for both Islamabad-Peshawar Motorway and the G.T road, there are 12 pedestrain crossings over the Power Channel.

The main railway line joining Rawalpindi to Peshawar also crosses the power channel and required the construction of the second longest single span railway bridge in Pakistan. This may be the last riveted bridge of its type, constructed in Pakistan.

The Power Complex

The Power Complex having two headponds with a combined live storage capacity of approximately 25.5 million cubic meter is sufficient for the daily requirement of 4 hours peak generation. This means that in May and June when there is reduced generation from Tarbela and Mangla power houses, due to low reservoir levels, Ghazi Barotha Hydropower Project provides peak production of 1450 MW.

The five generating units in the Powerhouse are each fed by a 10.6 m diameter steel lined penstock. Each of the five 290 MW Turbo Generators can take a peak flow of 460 cumecs.

Power Complex has been provided with a self priming siphon spillway of 1600 cumecs

GHAZI BAROTHA HYDROPOWER PROJECT
PRINCIPAL PROJECT DATA

Table 2.7

Components	
Diversion Structure (Barrage)	7 km downstream of Tarbela near Ghazi/Khalo
Power Channel	Lined passing through district Haripur of NWFP and Attock of Punjab.
Power House	Near Barotha village
Purpose	Power generation
Barrage	**Metric Units**
Normal pond level	340.0 m
Design flood discharge capacity	18,700 cumecs
Survival flood capacity	46,200 cumecs
Embankments	
Fuseplug, Rim and Dividing Island	
Standard Bays	
No. of openings	20
Crest level	332.2 m
Head Regulator	
No. of openings	8
Crest level	330.0 m
Undersluices	
No. of openings	8
Crest level	326.0 m
Power Channel	
Design flow	1,600 cumecs
Longitudinal bed slope	1:9,600
Length	51,906 m
Full supply depth	9 m
Bed width	58.4 m
Side slope	IV;2H
Lining thickness	135 mm
Structures	
Road bridges	34
Railway bridge	1
Pedestrain	12
Crossings Superpassages	27
Drainage Inlets	24
Escapes	5
Culverts	1
Power Complex	
Normal pond level	334 m
Live volume	25.5 Mm3
Syphon Spillway	
Discharge capacity	1600 cumecs
Crest level	334.5 m
Intake	
No. of openings	10
Crest level	305.5 m
South Sill	
No. of openings	3
Sill level	323 m
North Sill	
No. of openings	10
Sill level	321 m
HYDROMECHANICAL EQUIPMENT	
Penstocks	
Number	5
Diameter	10.6 m
Length	222 m
Turbine	
Type	Francis
Number	5
Full Gate output	295 MW
Generators/Transformers	
Number	5
Continuous	3x107.5 MVA
Rated output	
Rated voltage HV:LV	515 3:18 KV
Switchyard	
No. of 500 KV Bays	6

GBHP Tail Regulator - water flowing into forebay

capacity, having energy dissipation in a stilling basin and a baffle chute.

The power transmission is through 500 KV double circuit lines to WAPDA's national grid system.

Mechanical and Electrical Equipment

The installed power generating capacity is 1450 MW consisting of five units each of 290 MW. The units have a design flow of 400 cumecs at optimum gate opening and 460 cumecs at full gate opening for a design head of 69 m.

The principal items of power equipment are as follows:

- Five 257/295 MW Francis turbines each with a 290 MW generator which together have a combined power generating efficiency of 94%.
- Five three-phase banks of transformers, each single-phase unit being 107.5 MVA.
- 500 KV conventional outdoor switchgear configured in one-and-a-half breaker arrangement.
- 12 cranes with lifting capacities from 6 to 450 tons.

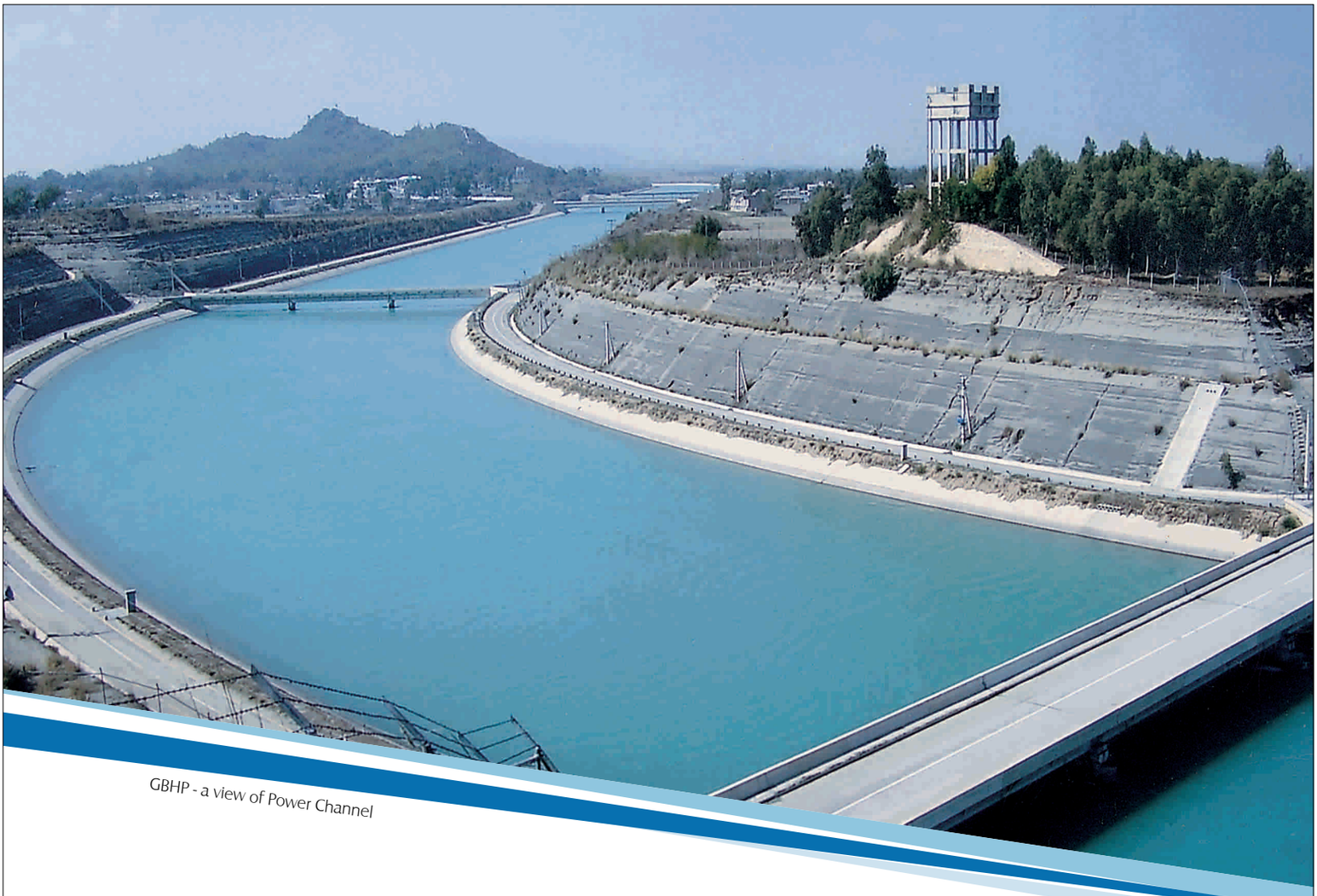
With a project which is spread over such large area, it was considered necessary both for safety and efficiency that it should be monitored and controlled centrally. This has been achieved by providing two independent distributed control systems (DCS) one each at the Barrage and Power Complex which share information through an optic fiber cable link.

Environmental, Resettlement and Social Aspects

The guiding principle for Ghazi Barotha Hydropower Project has been to maintain close contact between the engineering and environmental planners, social scientists, the local community groups and NGOs, right from the feasibility stage to Project construction.

This process allowed the planning teams to identify and avoid or mitigate, all potentially serious, adverse environmental, social and archaeological effects. The locations for Barrage and Power Complex as well as the alignment of the Power Channel have been selected in such a way that it avoids where possible, the disruption of villages, cultural properties and other infrastructures. However, only 110 dwellings were affected, and for them three resettlement villages have been established in the vicinity of the Project area where all the basic amenities like water supply, sewerage, schools, mosques etc. have been provided by WAPDA to the affected households resulting no out of area resettlements.

A Project NGO, namely Ghazi Barotha Taraqiati Idara (GBTI), was established and funded by WAPDA to assist in mitigating the genuine public concerns on the matters



GBHP - a view of Power Channel

relating to land valuation and compensation, displacement of affectees and resettlement, loss of livelihood, employment and other social and environmental concerns. In addition to this, GBTI has implemented an integrated regional development plan and carried out development activities in the project affected areas.

Project Implementation

In the Feasibility Report, the time for Project implementation of Civil and M&E contracts was estimated as 63 months starting from 01 April 1993. With the approval of PC-1 of Preparatory Works including land acquisition, relocation, resettlement, construction of colonies and other infrastructure for the Project were commenced in 1995. The implementation of the Project ultimately came to fruition with the inauguration ceremony of the Commissioning of Unit No. 1 and Unit No. 2 on 19 August 2003 by the President of Pakistan. The work on the commissioning of other units continued and Unit No. 5 was commissioned in April 2004. The construction of the North Headpond was completed in December 2004, thus completing the implementation of the Project works.

Project Financing

The PC-I of the Project was approved by Government of Pakistan in July 1994 at a total cost of Rs. 89840 million. The total cost which has been incurred on the Project is Rs. 96957 million.

The project has been funded by WAPDA supported by the following international lending agencies:

- World Bank
- Asian Development Bank
- Japanese Bank for International Cooperation
- Kreditanstalt fuer Wiederaufbau (KfW)
- European Investment Bank
- Islamic Development Bank

This Project is an important component of Pakistan's power system. The least cost status of the Project remains valid for the full range of sensitivity analysis performed. The Project has highly favourable economic parameters, it has an EIRR of 22.19% and FIRR of 13.76%. The economic and financial returns have shown that the Project forms a part of the least cost generation expansion plan for Pakistan.

Chashma Power House

CHASHMA HYDEL POWER STATION

Introduction

Chashma Hydel Power Station is located on the River Indus close to Right embankment of Chashma Barrage. It is now head hydel power station utilizing available head of 04 meters to 13 meters. Bulb type turbines have been installed here and it is the 1st one of its type in Pakistan. It is run-of-river plant and its operation/loading is dictated by the releases down stream Chashma Reservoir being controlled by the Indus River System Authority (IRSA).

Operation Availability

The installed capacity of Chashma Hydel Power Station is 184 MW, consisting of eight units each of 23 MW. The operational availability of the units during the year has been as under:

Operation	:	79.93 %
Stand by	:	05.28 %
Maintenance	:	06.37 %
Forced Outage	:	08.42 %

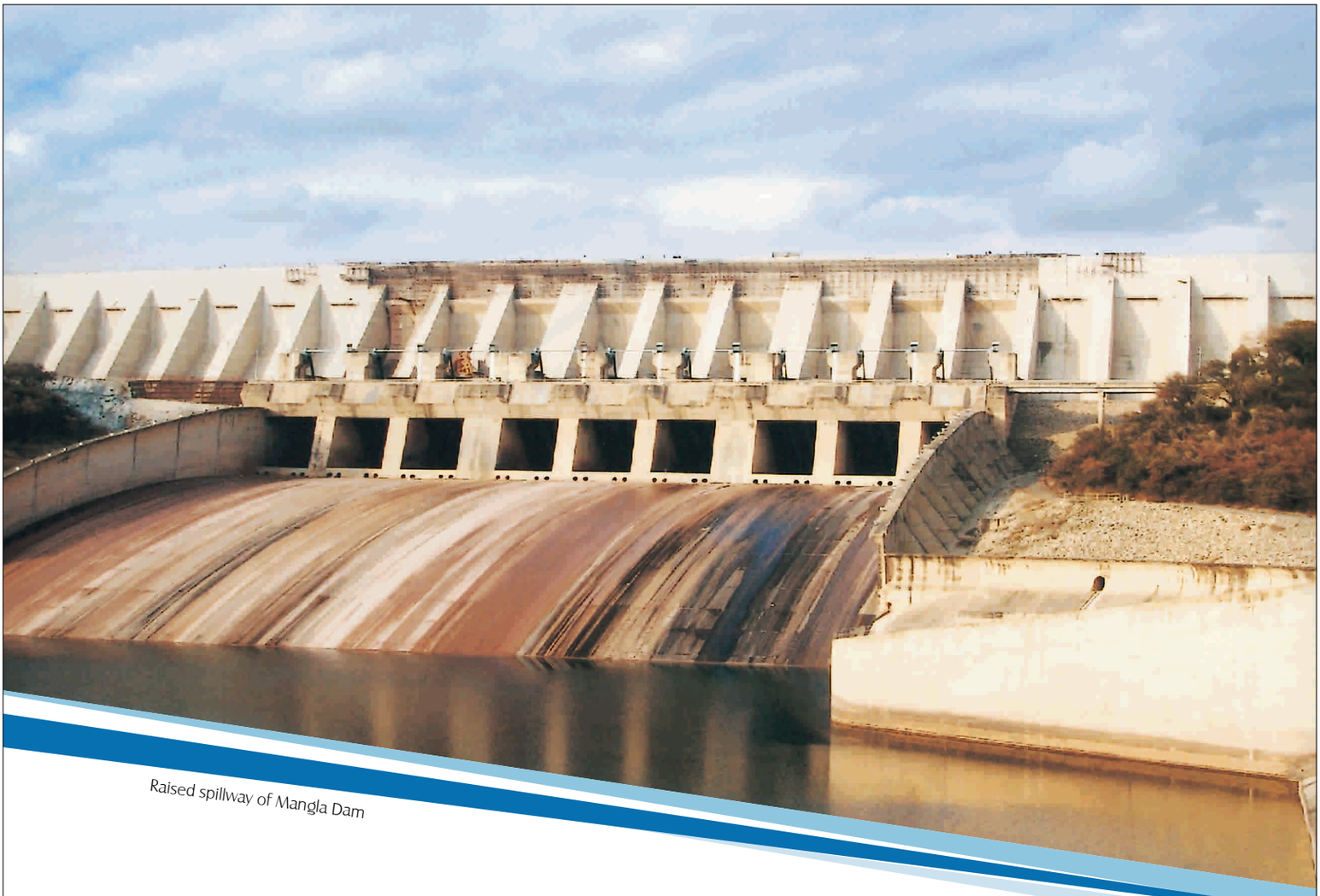
The energy generation during the year 2007-08 was recorded as 987.494 MKWh. The energy generation is affected by the huge trash at the intake of the powerhouse that is being tackled successfully. All the available trash disposal resources are best coordinated to minimize the generation loss for obtaining optimum output. The removal of trash is being handled with the following installed equipment:

1. Trash Rack Cleaning Machines
2. Mobile Crane
3. Dragline
4. Monorail Cranes

Huge quantity of trash removed during the year under report through above-mentioned equipment is as follows:

No. of trolleys	:	3221	(1 trolley = 8m3)
No. of Dumpers	:	913	(1 Dumper = 11 m3)
Total	**:**	**35811 m3**	

The major activities besides removal of trash was the rehabilitation of the powerhouse after the flooding incident occurred in January 2008. All the restoration activities were carried out successfully by the WAPDA engineers and staff effectively.



Raised spillway of Mangla Dam

MANGLA DAM RAISING PROJECT

Mangla Dam Raising Project is a mega water sector project which is being implemented on fast track under Vision 2025 Programme for Water Resources and Hydropower development.

On completion of the project, the average annual water availability for irrigation releases would increase by 2.9 million acre feet and the average annual energy output is estimated to increase about 12 percent of the present energy production. The raising project will also generate employment opportunities and give a fillip to socio-economic activities in the area besides increased flood alleviation and increase of quality food fishes.

PC-I COST

The PC-I was approved by ECNEC on March 27, 2003 with a cost of Rs.62,533 million. In view of the substantial increase in the cost of land acquisition, the approved PC-I Performa is being revised by WAPDA and MJV Consultants. The revised PC-I amounting to Rs.101.384 billion is under process for approval from Planning Commission.

PHYSICAL STATUS

The overall physical progress of the Mangla Dam Raising Project till June 30, 2008 is 72.80 percent. The status of balance work of Mangla Dam Raising Project is 27.20 percent. The Contractor submitted revised schedule showing the revised completion date as April 30, 2009 against the original completion date of September 19, 2007.

A brief status of Preparatory Works, Dam Raising Works and Resettlement Activities is given below:

Progress of Preparatory Works

Construction of the Saddle Embankment (Contract MDR-02) has been completed since September, 2004.

The Contract for the Construction of Bridge over Bong Canal and Powerhouse Bypass Road (Contract MDRP-06) was awarded to M/s Gammon-Sarwar Joint Venture, Rosalinda on 10 July 2003 and was scheduled to be completed on 09 January 2005. The Contractor failed to complete the works on the scheduled completion date. The works are still in progress but at very slow pace. The overall actual percentage progress of works on the Bridge and Bypass Road up to 30th June 2008 was 85 percent against the planned 100 percent.

Dam Raising Works

The Contract for the Construction of Main Works (Contract MDR-10) of Mangla Dam Raising Project was awarded to a joint venture of one Chinese and five Pakistani

Down stream view of Mangla Dam spillway

contractors (CWE JV) on June 14, 2004 for an amount of Rs. 13.793 billion. The joint venture is lead by Chinese Contractor namely China International Water and Electric Corporation (CWE). The local contractors in CWE JV include DESCON Engineering, Sardar M. Ashraf D. Baluch, Interconstruct and Sachal Engineering Works. The construction was scheduled to be completed in 39 months by September 2007.

The major components of the dam raising works comprise raising of the main and ancillary works and main spillway head works besides constructing a control weir upstream of the emergency spillway. Construction of an 18 km long Mirpur Bypass Road is also included in the contract.

By the end of the reporting year, foundation preparation, filling works at different reaches along upstream and downstream shoulder and crest filling of Main dam, Sukian Dyke and Jari dam works remained in progress.

Main Spillway closes the gap between the Main Dam and the West Embankment. The total length of Main Spillway is 1297 feet (395 m) having three segments namely the gate structure having a length of 504 feet, right abutment gravity wall having a length of 480 feet and left abutment gravity wall of 313 feet length. There are nine orifices each having dimensions of 40 feet high and 36 feet wide.

Major works include raising of all nine slabs by 5 feet each, strengthening of 12 buttresses of gate structure, construction of six buttresses at left abutment gravity wall and ten buttresses at right abutment gravity wall and raising of head wall by 32 feet from EI 1234.00 to 1266.00 feet with the raising of sill slabs by 5 feet, the dimensions of each orifice have become 35 feet high and 36 feet wide. All these works have been completed in March 2008.

The overall actual percentage progress of main works, achieved up to 30th June 2008, was 67.20 percent against the planned progress of 88 percent.

Resettlement Related Activities

A very attractive resettlement package has been agreed by the Government of Pakistan for affectees of Mangla Dam Raising. Compensation of land will be paid at market price and 15 percent compulsory acquisition allowance will be given. Compensation of houses will be based on replacement cost plus ten percent allowance. A New City will be developed adjacent to Mirpur city with modern infrastructure and public amenities to resettle the Mangla Raising affectees. In addition, four small towns will be developed on periphery of the reservoir for affectees of those areas. The infrastructure development of the New City and the four towns will be at the project cost. The affectees will get plots of 5 marla to 1 kanal size on payment of cost of the land. The resettlement package

Work in progress on Mangla Dam Raising Project

also includes vocational training of males and females to improve their earning capacity.

Survey of the affected land and houses for assessment of compensation is in progress by joint teams of WAPDA, Consultants and GoAJK. Land for the New City near Mirpur and four small towns on the reservoir periphery has been earmarked and development works have been started.

Development of New City had already been started with award of contract for construction of 21 km long primary and secondary roads(Contract MDR-24) for a sum of Rs. 1,026.5 million to M/S Habib Rafiq (Pvt.) Limited on April 23, 2005. The contractor has mobilized at site and construction works of roads/culverts are in progress. The progress of work uptill June 30,2008 is 79.50 percent against the planned 100 percent.

The Contract for the construction of Vocational Training Institute (VTI) at New City (Contract MDR-22) was awarded to M/s Shaikh Javaid Ahmed-Engineers & Contractors on 26 March 2006 and was scheduled to be completed on 01 April 2007. Site clearance, leveling and general excavation works were in progress up to 30 June 2008. Overall progress was 68 percent against the planned 100 percent.

Upgradation of existing Female Dastkari Schools, execution of civil works in Mirpur, Islamgarh and Dudial Dastkari Schools has been completed. Repair and renovation work of Mirpur and Islamgarh Dastkari Schools has been completed.

An amount of Rs.0.306 million has been paid to about 150 female students during years 2004-05, 2005-06 and 2006-07.

Vocational training for males from outside sources Training at Construction Machinery Training Institute (CMTI) Islamabad started in January 2003. So far, 119 affectees completed their training.

MDR-25 contract was awarded to M/s HRL Pvt Ltd on October 17, 2006. Bulk excavation for development of plots, formation of embankment, laying of water supply and sewerage pipes, construction of culverts and laying of sub base were in progress. Overall progress was 56 percent against the planned 76 percent.

MDR-26 Contract was awarded to KKP (Pvt.) Ltd. on May 22, 2006. Islamgarh Town Roadway cutting in progress. Jointing of distribution network (110 mm & 75 mm OD) is in progress. Cleaning and grubbing of graveyard completed. Erection of boundary wall started. Chakswari Town: Construction of Main, Collector and Inner roads in addition to bulk excavation for development of plots is in progress. Overall progress is 48.0 percent against 88.0 percent.

MDR-27 Contract was awarded to KKP (Pvt.) Ltd on

November 18, 2006. Dudial Town: Reaming of additional tubewell competed. Roadway excavation is in progress. Laying of RCC pipes for 14 pipe culverts in sector "A" completed.

Siakh Town: Fixing of steel reinforcement for Ground Storage Water Tank in progress. Drilling of tubewells is in progress. Overall progress is 56.0 percent against 76.0 percent.

MDR-28 Contract was awarded to M/s Sheikh Javaid Ahmed Engineers & Contractors on February 21, 2006. Construction of public buildings in Sectors A, B, C, and City Center including Mosques and Allied Residences, Shopping Centers and Primary & Secondary Schools are in progress. Overall physical progress is 43.0 percent against 100.0 percent.

MDR-29 Contract was awarded to M/s Shaikh Javed Ahmad on March 10, 2007. Construction work of Hospital is in progress. General excavation for Gymnasium, Community Center and Public Toilets in Sector E is mostly completed while general excavation for Police station and Post Office at new location started and is in progress. Construction of column foundation in one portion of Degree College for men is in progress. Overall physical progress is 18.0 percent against 80.0 percent.

MDR-32 Contract was awarded to Friends Engineering Company on May 17, 2006. Excavation, concrete, masonry and plaster works for Jari Outlet Pump house has been completed. Cement mortar lining for all the pipes of Transmission Main has been completed while trench excavation, laying of pipes, welding of pipes are in progress. Excavation and blinding concrete for Water Storage Tank have been completed.

Excavation work for intake connection at Jari Outlet has been completed. Overall progress is 52.0 percent against 89.0 percent.

MDR-33 Contract was awarded to M/s DESCON on August 28, 2006. Excavation work for Cascade Aerator, Filter Block, Clear Water Tank, Chemical Building, Office Control Building, Chlorination Building, Generator Room and Guard Room has been accomplished. Concrete work of Generator Room, Office Control Building, Cascade Aerator, Chemical Building completed while concrete work for clear water tank, filter block and machine work is in progress. Masonry works of office control building and generator room completed. Plaster and flooring work of office control building is in progress. Overall progress is 45.0 percent against 100.0 percent.

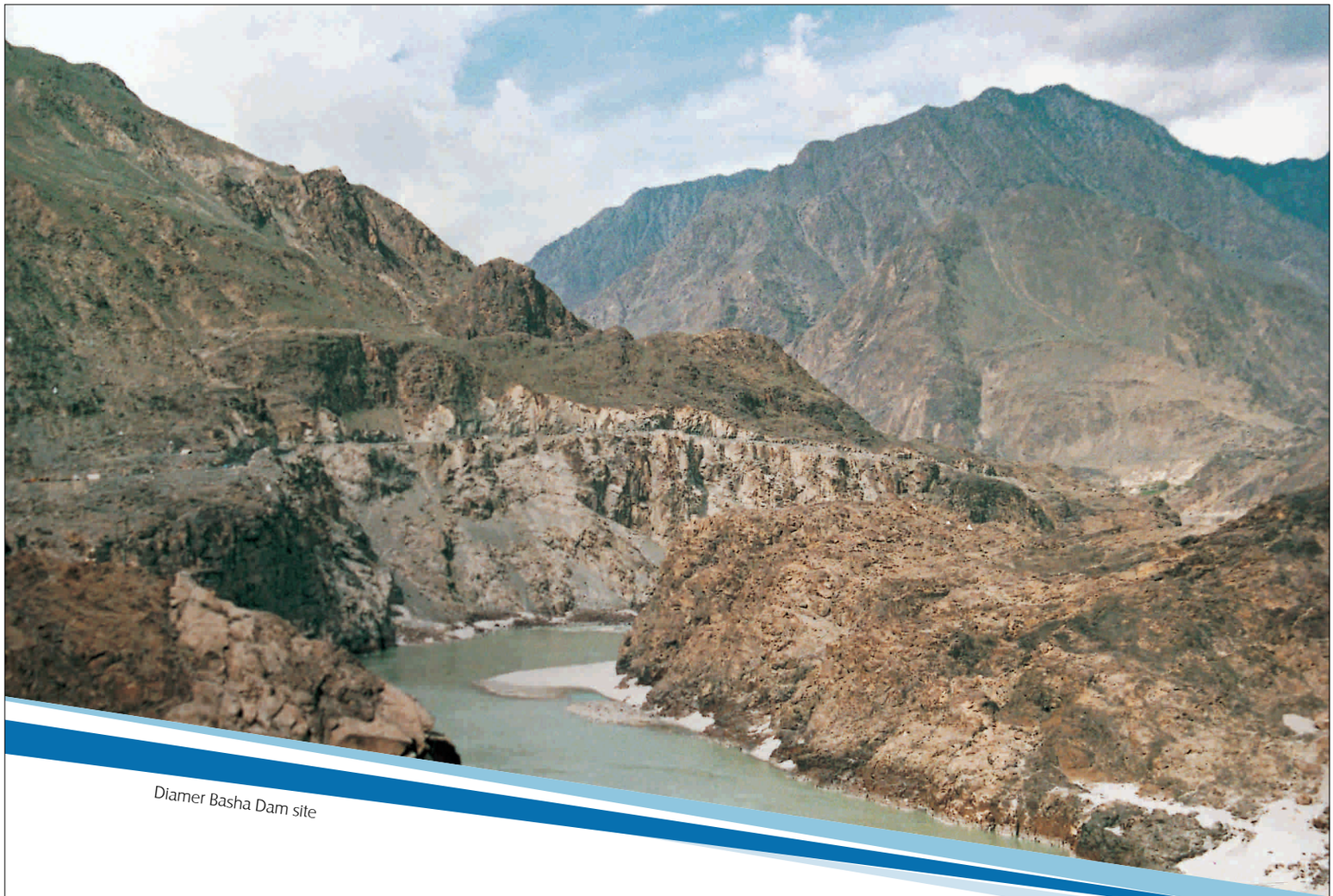
MDR-34 Contract was awarded to; m/s Habib Rafiq with the commencement date of August 9, 2007. Casting of food, plinth beam and columns of generator room completed. Brick masonry of transformer room has also been completed upto roof level. Lean concrete for Grit Channel STP-1 and Grit channel of Lift station # 2 has been completed. Base slab and walls of Box culvert across Nullah Diversion have also been completed. General cutting and filling for Access Road (ODI to OD2) is in progress. Footing of Chlorination building is complete and columns are in progress. Concrete work of Raft foundation of Oxidation Ditch # 3 is in progress. Casting of walls of oxidation Ditch # 2 and 3 is in progress. Erection of formwork of office control building is in progress. Overall progress is 8.0 percent against 44.0 percent.

RD-35 Contract was awarded to M/s KKP (Pvt.) Ltd. on April 19, 2007. Islamgarh Town: Plastering for allied residences of Imam, Muezzin and Khadim remained in progress while electric conduits in all the residences were completed. General excavation for Boys High School and VTS remained in progress. Brick masonry for shopping center, basic health unit and police station have been completed up to lintel level. Shuttering for roof of post office and basic health unit has been completed while reinforcement is in progress while foundation excavation for social center is in progress. Overall progress is 10.0 percent against 50.0 percent.

MDR-36 Contract was awarded to M/s KKP (Pvt.) Ltd. on June 5, 2007. Dudial Town: Brick masonry work on basic health unit, police station and residences is in progress. Siakh Town: General excavation for police station, basic health unit, social center and secondary school for girls has been completed. General excavation for Boys Secondary School is in progress. Brick work on basic health unit and post office is in progress. Overall progress is 8.0 percent against 50.0 percent.

MDR-38 Contract was awarded to M/s PEL (Pvt.) Ltd. on September 14, 2007. First lot of cable conductors, transformers and steel structures were delivered at Islamgarh site. Inspection and testing of 17,132 insulators was carried out by M/s EMCO Lahore and the material is ready for delivery. 1760 structure poles, 315 transformers and 1008 light fixtures with bulbs have been delivered at site. Out of 359 poles, foundation of 186 poles have been concreted so far at Islamgarh Town. Overall progress is 8.0 percent against 100.0 percent.

Contract MDr-21 for construction of Dhangali Bridge was awarded to M/s Husnain Cotex Ltd. on May 26, 2004 at a price of Rs.214 million. The bridge was scheduled to complete in three years by May 25, 2007. However, the contractor could achieve only 14 percent progress in four years. All the 56 piles on right side and 16 out of 56 piles left side were concreted. Because of non-performance of the Contractor, the contract of M/s Husnain Cotex was terminated on April 4, 2008. WAPDA has taken-over the Contractor's machinery and equipment at site and the remaining works will be carried out at the Contractor's risk and cost.



Diamer Basha Dam site

DIAMER BASHA DAM PROJECT

LOCATION

The proposed dam is to be located on river Indus, about 315 km upstream of Tarbela Dam Project, some 165 km south west of Gilgit and about 40 km west of Chilas. Geographically, the proposed Project is located between longitude 73o to 75 E and latitude 33o to 38o N and is bound by the districts of Kohistan, Diamer, Gilgit and Chitral, lying respectively to the south, east, north and west.

ENGINEERING STUDIES

MOTREAL ENGINEERING COMPANY (MONENCO) OF CANADA (1982-84)

Motreal Engineering Company (MONENCO) OF Canadian International Development Agency completed during 1981-84 Conceptual Feasibility Report of Basha Dam Project. It proposed zoned earth rock fill dam with central core and concrete cut-off to bed, with an installed capacity of over 3400 MW and gross storage 7.3 MAF. This report was got reviewed by WAPDA through a Panel of Experts (PoE) in 1988. They recommended to improve the level of Conceptual Feasibility Report, considering alternate layouts and to be accomplished in two stages of: Stage I, Upgradation of Feasibility Report; and Stage II, Review of Upgraded Feasibility Report, Detailed Engineering Design, Tender Design, Tender Drawings/Documents.

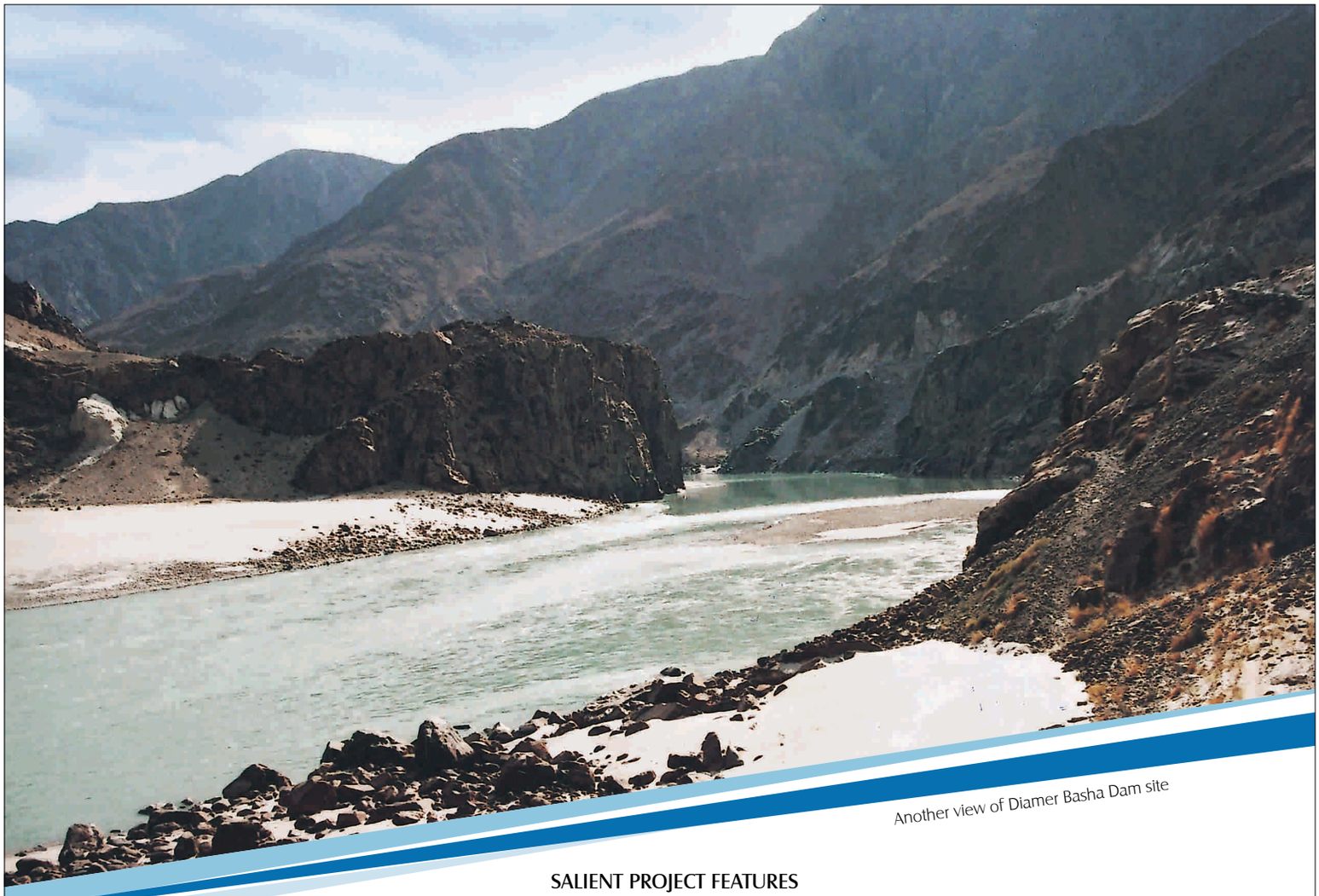
NEAC'S FEASIBILITY REPORT (2002-04)

After approval of WAPDA's Vision 2025 Programme in 2000, in July 2002 WAPDA engaged Local Consultants NEAC (JV) (NESPAK and ACE) for upgradation of MONENCO's Conceptual Feasibility Report. NEAC's Feasibility Report was submitted to WAPDA on August 31, 2004 with following proposed project:-

- A roller compacted concrete (RCC) gravity dam at Axix-D (refer Map of Alternate Dam Axes)
- Two underground power houses of equal capacity on each bank with an aggregate capacity of 4500 MW through 12x375 MW units.

REVIEW OF NEAC'S FEASIBILITY REPORT AND TENDER DESIGN BY DBC (2005-08)

WAPDA, on July 11, 2005 signed Consultancy Agreement with Diamer Basha Consultants (DBC), a Joint Venture of: Lahmeyer International GmbH, Germany, National Development Consultants, Lahore, BARQAAB Consulting Services (Pvt.) Limited, Lahore and Pakistan Engineering Services, Lahore in association with AMEC, Canada.



Another view of Diamer Basha Dam site

The assignment of DBC comprised 'Review of Feasibility Report, Engineering Design, Tender Drawings/Documents of Diamer Basha Dam Project'. DBC commenced Consultancy Services in September 2005 and the assignment was completed on June 30, 2008.

Initially (May 2006) DBC proposed a Roller Compacted Concrete (RCC) dam with integrated powerhouse. The proposed dam was of slightly reduced height and integrated powerhouse eliminated large underground works. Importantly, for critical Geo-technical reasons, the dam was proposed to be shifted to site C d/s about 1 km downstream of Axis-D recommended by NEAC.

DBC's proposal was got reviewed by a PoE in September 2006. Consequently, WAPDA instructed DBC to discard the concept of integrated powerhouse and further develop and improve the design of two underground power schemes of equal capacity on the Left Bank (LB) and Right Bank (RB).

By the end of December 2007, DBC re-established the technical feasibility as well as completed tender design of the project

SALIENT PROJECT FEATURES

LOCATION:	40 km downstream of Chilas
HYDROLOGY:	
Catchment Area	153,200 km2
Mean Annual:	
River Flow	62 billion m3
Total Estimated Sediment Load	196 million tones
MAIN DAM:	
Maximum Height	272 m
Type:	Roller Compacted Concrete (RCC)
DIVERSION SYSTEM:	
	2 No. Diversion Tunnels (right side) 1 No. Diversion Channel (right side) Upstream and Downstream Cofferdams
MAIN SPILLWAYS:	
Crest Level	E1 114.5 m above mean sea level (masl)
No. of Gates	14
Size of Gates	11.5 x 16.24 m
RESERVOIR:	
Full Reservoir Level	E1 1160 m above mean sea level (masl)
Minimum Operating Level	E1 1060 m masl
Gross Storage	10.0 BCM (8.1 MAF)
Live Storage	7.9 BCM (6.4 MAF)
OUTLETS:	
Low Level	2
Flushing	5
FLUSHING TUNNEL:	
Right Bank	1 (through conversion of one diversion tunnel
Left Bank	1 (underneath the power intake)
POWERHOUSE(S)	
Total installed Capacity	4500 MW (2 x 2250 MW)
Location and Type	Underground, one each on right and left side
No. of Units	12, (6 x 375 MW in each power house)
Average Annual Generation	
i. At Diamer Basha	18097 GWh
ii. Additional at Tarbela	1111 GWh
iii. Total	19208 GWh
PROJECT COST:	
Estimated Cost March 2008	US$ 12.6 Billion (Foreign Exchange of US $ 4.1 billion)

with a configuration quite different from the one proposed by NEAC. The project implementation has been proposed through five contact lots.

PROPOSED PROJECT IMPLEMENTATION

Contract Package

Implementation of the dam appurtenant is proposed through international competitive bidding comprising the following five lots:-

Lot No.	Description
Lot 1.	Concrete Dam and related structures including diversion tunnels and permanent access bridge
Lot 2.	Underground works and related structures (Left and Right Banks)
Lot 3.	Hydromechanical equipment and hydraulic steel structures
Lot 4.	Power Plant Generation Equipment (Left and Right Bank)
Lot 5.	Electrical High Voltage Equipment and Power Plant Electrical Equipment (Left and Right Bank)

Prequalification of Contractors

For Lot 1, 2 and 3 prequalification of contractors will be completed before floating of tenders.

Implementation Schedule

Since Diamer Basha Dam Project will be a mega project with almost unique dimensions, its implementation will be major challenge. It will have to be completed through very competent and resourceful international contractors supported by adequate and timely financing. The expected construction period is to extend over about 10 years from 2009-18 (refer Tentative Timeframe for overall implementation).

Environmental Impacts

The project will have the following environmental impacts to be mitigated/managed through a Resettlement Action Plan.

Household affected	4135 No.
Agricultureland submerged	2660 Acres
Area Under Reservoir at EL 1160 amst	28500 acres
Population affected	28640
Number of villages affected	31 No.

IMPACT ON CULTURAL HERITAGE

It is expected that the reservoir created by the dam will inundate a very large number of rock carvings, inscriptions and petrography in the vicinity of Chilas. This impact on cultural heritage will be mitigated/managed through a plan devised in consultation with Pakistan Department of Archaeology and Museums and Heidelberg Institute of Germany researching on rock carvings in the Northern Areas since 1984.

PRELIMINARY WORKS

In order to launch the prject construction, some essential preliminary works will have to be completed before hand as explained in the following:

Up-gradation of KKH from Havelian to Dam Site

Moving heavy equipment, machinery and materials to the dam site will be over the Karakoram Highway (KKH). It was completed in 1978 over a length of about 810 km from Hassanabdal on GT Road to Khanjrab Pass bordering China. In most of its reaches, it does not meet the required standards for a two lane highway. Limited pavement width, negative slopes (Overhangs), sharp curves, stressed pavement conditions, frequent landslides and inadequate drainage are the major constraints. These would need to be addressed before active construction of the dam could commence. National Highway Authority (NHA) has been given the task for 'Upgradation of KKH from Havelian to Dam Site, for a length of about 324 km.

KKH Relocation

An existing section of KKH, about 100 km from Shatial to Raikot Bridge is likely to be submerged in the lake created behind the dam. This will have to be relocated at a higher level along the reservoir periphery. Overall relocation for the length of about 140 km could be completed before start of reservoir impounding in 2016. However, its first segment of 35 km from Shatial to Thor nullah will have to be completed before start of dam construction. This will be essential to provide a bye-pass to existing KKH around the dam site during active construction.

Thakot Bridge

The existing suspension bridge over river Indus on KKH at Thakot is about 30 years old having insufficient capacity to meet the future requirements of traffic. At present only one way traffic is allowed over the bridge. To serve the needs of the project, a new bridge of required standard at Thakot is essential. NHA is also responsible for construction of Thakot Bridge and it is also under implementation.

Project Colony

For the administrative and construction supervision staff of WAPDA and Consultants, a project colony is being planned in Thor Valley about 15 km upstream of the dam site. Essential infrastructure in this colony will have to be readied by the time of awarding the contract for Lot 1 in 2010.

PROJECT COST

DBC have estimated the project cost corresponding to price level of March 2008. The overall financial outlay including direct and indirect costs, escalation and interest during construction is estimated as US $ 12.6 billion.

BENEFITS OF THE PROJECT

- 6.4 Million Acre Feet (MAF) Live Storage of water
- 4500 Mega Watts (MW) of cheap hydroelectric power

- Huge economic activities in Northern Areas (NA) and North Western Frontier Province (NWFP)
- Employment opportunities for locals
- Development of skills for locals
- Development of tourism
- Royalty to NA and NWFP
- Development of Fishing
- Construction of Model Villages for resettlement of affectees
- 5 Marla plot to each family free of cost, in Model Villages
- Up-gradation and widening of 323 km of KKH
- Periphery road on right side of the reservoir
- Flood alleviation benefits

DAMS SAFETY ORGANIZATION (DSO)

In order to ensure the safety of its dams, Mangla, Tarbela, Warsak, Khanpur, Hub and Chashma Barrage, WAPDA has established a comprehensive monitoring system. Project surveillance staff is responsible for observation, collection and monitoring of performance data while Dams Safety Organization (DSO) is responsible to review/analyze and interpret the data to detect any area under distress. DSO also carries out annual inspection of the projects, a comprehensive inspection report containing observations and recommendations is prepared. Similar services are being provided to Simly Dam, a project of Capital Development Authority (CDA), on deposit work basis. Periodic inspections, normally carried out on five yearly basis by a team of independent experts, are also arranged. The organization also reviews the design aspects of WAPDA projects at planning and design stages. On special requests by Federal Government, DSO provides expertise for the technical problems of federal projects and small dams of the provincial governments.

Tarbela Dam

Monitoring of the dam remained in progress by review, analysis and interpretation of data supplied by project authority. Bi-annual performance reports at low and high reservoir were issued. According to hydrographic survey 2007, the gross storage capacity of the reservoir has reduced from 11.62 MAF to 8.07 MAF. The rate of loss is 0.104 MAF per annum.

Khanpur Dam

The periodic inspection of the project was carried out through independent dam experts from October 23 to 27, 2007. The final report containing recommendations suggested for implementation to ensure safety of the project was issued and transmitted to concerned offices for information and action. The instrumentation, movement and sedimentation data was discussed and analyzed in detail. The annual inspection of the project is scheduled in November, 2008. Monitoring of the project remained in progress. Biannual performance reports were issued. The original gross storage capacity of reservoir has been reduced from 1,07,076 AF to 94,070 AF. The rate of loss is 700 AF per annum.

Mangla Dam Project

The annual inspection for the year 2007 was carried out from November 13-17 at reservoir level + 1161 ft. Within two weeks after inspection, the salient findings and recommendations were issued for implementation. Mangla Dam raising is close to its completion. The maximum conservation level will be raised from 1202 ft to 1242 ft on completion thus an additional 2.88 MAF of water can be stored in the reservoir.

As per hydrographic survey conducted in the year 2005, the sediments have reduced the original reservoir capacity from 5.88 MAF to 4.67 MAF. The rate of loss is 0.031 MAF per annum.

Chashma Barrage

The annual inspection of the project was carried out in January, 2008. Inspection report was issued in April, 2008. The hydrographic and degradation surveys were recommended to find out present storage capacity of reservoir and scour depth of downstream river channel. Analysis of data and performance evaluation of structures remained continued during the year.

Warsak Dam

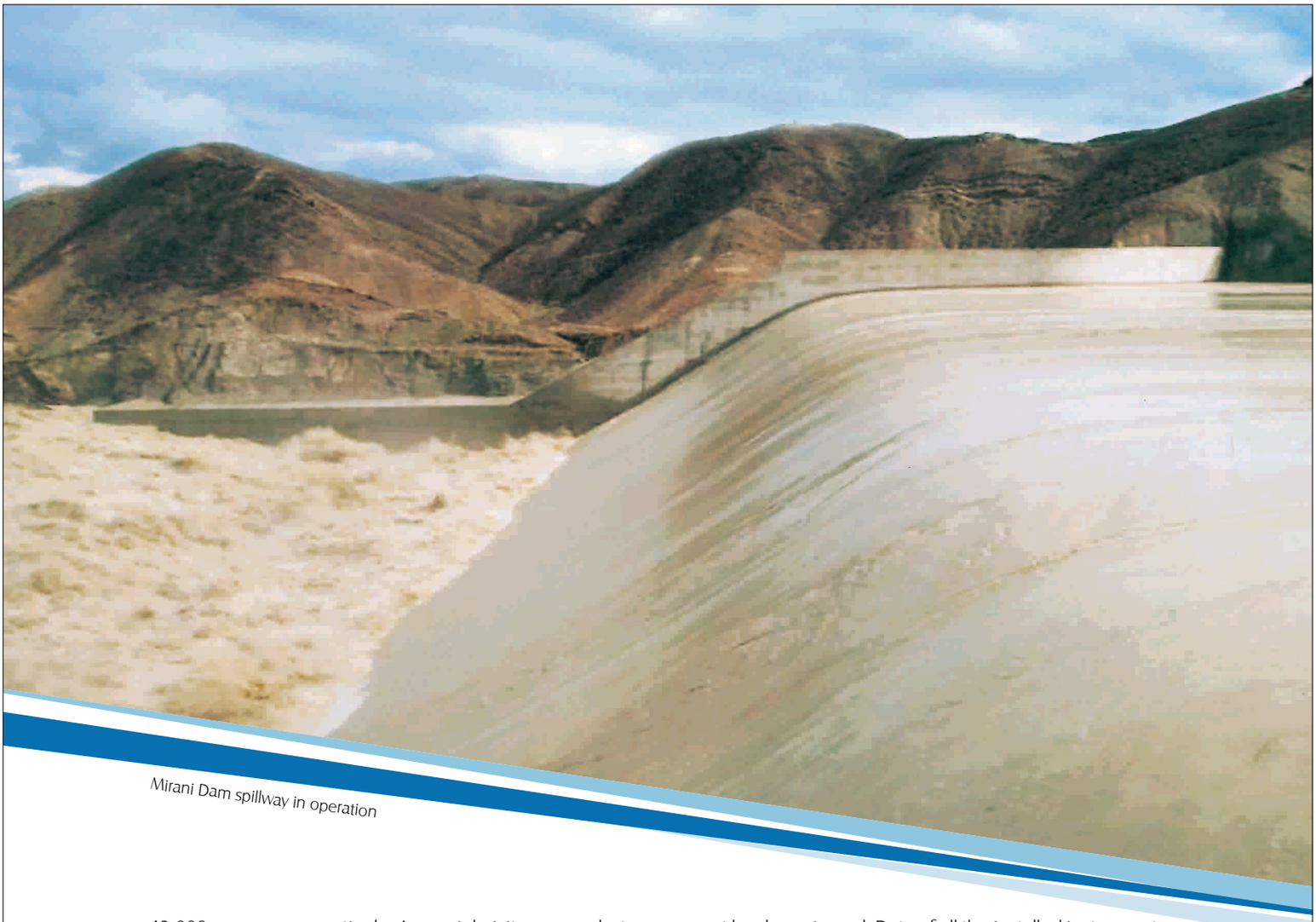
The 3rd periodic inspection of the project is scheduled from October 13-18, 2008. Terms of reference, cost estimates and team of experts to carry out inspection have been finalized. The intake structure was inspected to know the extent of cracks, identify the cause and propose remedial measures. The power house unit 2 was shut down and dewatered for inspection by DSO and CDO jointly in order to investigate causes of damages in draft tube and proposed remedial measures. Analysis and evaluation of the project remained in progress. Bi-annual performance reports have been issued.

Simly Dam

Maximum conservation level was 2295 ft. However, during 2007, the reservoir rose to El. 2310 ft for the first time in the history of the project after the construction of auxiliary spillway. Maximum conservation level can be raised to El.2315 ft during the year 2008. The performance of structures remained satisfactory. Analysis and evaluation of piezometric and seepage data continued and two bi-annual performance reports were issued. A special visit on request of project authority was carried out to check the physical condition of Upper Stilling Basin, dewatered for this purpose.

Hub Dam

The 2007-annual inspection was carried out from August 20 to 24, 2008. Spillway came into operation when the reservoir level went above spillway crest elevation 339.0 ft with maximum inflow and outflow of 151,000 and



Mirani Dam spillway in operation

42,000, cusecs respectively. A special visit was made to the project to identify the damages occurred at downstream of spillway tail race channel due to passing of 2007 flood. Remedial measures were recommended for the safety. Analysis and evaluation of data remained under study. Bi-annual performance reports have been issued.

Mirani Dam

Just after completion, the dam experienced a flood of 500,000 cusecs at maximum conservation level of 244 feet. Soon after this, a super flood of 833,000 cusecs intercepted of which 421,000 cusecs passed through the spillway resulting in rise of reservoir level to 271.40 feet i.e. 27.4 feet above the spillway crest. The dam played a very important role in minimizing damages at the downstream area by absorbing a significant quantity of flood peak in the reservoir.

Joint inspection by consultants, contractors and DSO engineers was carried out from June 5-7, 2008 to examine the pre-flood conditions of the project. The inspection report has been issued. Data of all the installed instruments was analyzed to check the performance of structures.

Ghazi Barotha Hydropower Project

Baseline inspection of the project has been scheduled in 2008. Terms of reference were finalized. EOI submitted by M/s NESPAK and NDC were evaluated for pre-qualification of the firms. Thereafter, request for proposal was invited. The inspection will be conducted during 2008-09.

Central Material Testing Laboratory

In collaboration with UNDP, WAPDA has established Central Material Testing Laboratory for Soil Mechanics, Rock Mechanics, Soil Dynamics, Concrete, Steel and Chemical testing. State of the art field testing equipment is also in function. All the sections of CMTL remained in operational during the year 2007-08. Field investigation also remained very active and productive. The earning of the CMTL remained 37.341 million with status of self-sufficiency.

Mustard Crop in reclaimed land

PLANNING AND DESIGN (WATER)

Planning and Design Division consists of the following formations:

- Water Resources Planning Organization (WRPO)
- Planning and Investigation Organization (P&I)
- Hydrology and Water Management (H&WM)
- Dams Organization
- Central Design Office (CDO)

A brief description regarding achievements of these formations is as under:

Water Resources Planning Organization (WRPO)

WRPO is responsible for preparing, reviewing and updating Water Sector Development Plans, carrying out social and environmental studies, economic analysis of various irrigation and drainage projects, undertaking perspective water resources planning and policy studies, furnishing briefs, comments and technical notes for WAPDA and Federal Ministry of Water and Power. This organization consists of the following:

a) Irrigation and Drainage Directorate (I&D)
b) Computer Application Directorate (CAD)
c) Agriculture Directorate
d) Economic Directorate
e) WAPDA Environmental Cell (WEC)

The various studies completed by these directorates during the year 2007-08 are described below:

a) Irrigation and Drainage Directorate (I&D)

The primary functions of this Directorate are Planning and Review of Water Resources, Flood Protection and Management, Hydropower Planning, Irrigation and Drainage Schemes to be launched within the country. In addition, proposals, plans and concept papers regarding water sector development floated by various national and international agencies are reviewed. During the year under report, one hundred and twenty six (126) PC-I and PC-II proformae and reports, including thirty seven (37) for Hydropower and Water Resources Projects, Four (04) Irrigation and Drainage Schemes, fifty five (55) PC-Is for Flood Protection and Flood Management Schemes received from Federal Flood Commission (FFC), Ministry of Water & Power, Government of Pakistan pertaining to four provinces of Pakistan (Punjab, Sindh, NWFP, Balochistan), FATA and Azad Jammu & Kashmir and sixteen (16) different Technical Reports were reviewed and comments offered thereon. Fourteen (14) cost estimates for daily wages staff received from sister organizations of P&D Division (Water) involved in Survey & Investigation works were rechecked.

Director (I&D) being the focal person for WRPO, remained involved also in the updation of WAPDA Web Site during the year.

b) Computer Application Directorate (CAD)

Computer Application Directorate (CAD) manages the application of Computer Packages, Programs and Models to plan, design, analyze and interpret field surveys, solve intricate statistical/mathematical problems and evaluate water resources planning and development projects, particularly WAPDA Water Vision-2025 Projects. The following studies/assignments were carried out during the year under report:

- **The Study "Evaluation of Agricultural Benefits of Rainee Canal Project":**

A study on "Evaluation of Agricultural Benefits of Rainee Canal Project" is being conducted through the IBMR from the funds provided by the GM (South), Water, WAPDA. The Agro-economic farm survey of the project area has been conducted for collection of basic data required for the canal command model and report is being prepared. Work on Rainee Canal model has almost been completed and results are being interpreted for issuance of report.

- **The Study of "Evaluation of Agricultural Benefits of Greater Thal Canal" Project based on the Additional Scenario:**

An additional study based on revised parameters/data was conducted and report has been submitted to project authority. Additional funds for the revised study were provided by GM (Central), Water, WAPDA.

- **Agricultural Impact Study of Kalabagh Dam Project:**

As desired by GM (P&D), a study was completed to assess the agricultural benefits of Kalabagh Dam Project, using the IBMR model. The study was based on the datasets of the year 2001 and an exercise to demonstrate the potential application of IBMR for evaluation of future storage reservoirs on the Indus River System and will lead to development of a comprehensive proposal for a study for other future on-line storage projects to be added in the system.

- **Evaluation of Kachhi Canal Project:**

The proposal for evaluation of Kachhi Canal Project through Computer Modelling Study has been submitted to GM (Central) for application and funding. At present, the proposal is under process for approval from project authority. The work will be started after its formal approval.

- **Proposal for the World Bank Indus 21-WCAP:**

In connection with the World Bank Aid Memoire for Indus 21 Water Sector Capacity Building and Advisory Services Project (Indus 21 WCAP), a proposal/PC-II on "Upgrading of Tools, Water Resources Databases, Management System and Model" was prepared. This study is to be conducted under Sub Component B12 of Component B of Indus 21-WCAP.

- **Establishment/Maintenance of Water Resources Database Management System:**

A computerized Water Resources Database Management System has been established to provide all the relevant datasets like hydro-meteorological, hydro-geological, agro-economic and environmental data needed for modification of IBMR in particular, and for other water sector planning studies in general. The entry of discharge data of various barrages and daily hydrological data of all rivers/reservoirs in data base system from July, 2006 to June, 2007 is in progress.

- **WAPDA Website:**

The information was collected from the organizations under the jurisdiction of General Manager (P&D) to modify WAPDA Website. The same will be sent to General Manager (C&M) and Director General (IS) for updating.

- **Technical Assistance:**

CAD provided technical assistance to other sections of WRPO as well as General Manager (P&D) in repair/maintenance of computer hardware/software systems as and when required.

c) Agriculture Directorate

Agriculture Directorate prepares Nation-wide water sector development plans, review policies and programmes laid down for agricultural development. It also contributes the expert support to other organizations of WAPDA at various stages of project planning, implementation and monitoring.

The progress achieved during the year 2007-08 is as under:-

- Prepared PC-II Proforma on 'Water Resources Management for Agriculture Production".

- Review of five technical reports and comments offered thereon. Preparation of speech for Chairman WAPDA regarding "Agricultural and Livestock Production through Marketing and Agriculture Business".

- Prepared following seven technical papers for presentation in National and International Seminars:

  - Private tubewell pumpage of marginal water quality in Pakistan.
  - Agricultural geography of Pakistan – present situation and trends.
  - Role of agriculture sector – performance and issues.
  - Sustainable land management in Balochistan.

- Land management for sustainable irrigated agriculture.
- Background paper on potential of Pakistan – Egypt Bilateral Cooperation in Agriculture Sector.
- Reviews and implementation status of WAPDA's Development Plans (1964-2008).

- Furnished crop yields of Pakistan at three scenarios i.e. at the time of independence (1947-48), at the time of Indus Water Treaty (1060-61) and at 2005-06 level to the Planning Commission, Islamabad.

d) Economic Directorate

The Economics Directorate has an important role in WRPO. This section deals mainly with economic aspects pertaining to development of water sector programmes/ projects. It is responsible for carrying out project economic and financial analysis i.e. B.C. Ratio, NPV, EIRR and NK Ratio besides unit costs in addition to working out possible project benefits. It also extends support to other WAPDA formations in the economic aspects of their studies.

In addition, comments/suggestions were offered on the following PC-I/PCII and pre-feasibility/feasibility studies:

PC-I

- Winder Dam Project.

- Implementation of the Environmental Management Plan for Chashma Right Bank Project Stage-III.

- Balochistan Torrential Flood Disposal into Hamal Lake RBOD-III.

- Greater Thal Canal Project (Revised).

- Duber Khwar Hydropower Project (130 MW) First Revision January 2008.

PC-II

- International Waterlogging and Salinity Research Institute including Mona Reclamation Experimental Project, Bhalwal and Lower Indus Water Management and Research, Hyderabad.

- Master Plan on Small Dams and Rainwater harvesting/Recharge Project.

- Detailed Study of Mangla-Marala Link Canal Project.

- Detailed Engineering Design and Preparation of Tender Documents for Harpo Hydropower Project.

Pre-Feasibility Studies

- Palas Valley/Spat Gah Hydropower Complex (Socio-Economic) Volume-2.

- Winder Dam Project.

Feasibility Studies

- Mangla Marala Link Canal Project

- Winder Dam Project.

Hydropower Project/Flood Schemes

- Kumblima Hydropower Project.

- Lawi Hydropower Project.

- Sukleji Dam Project.

- Augmentation of RBOD-II Project works to create for Flood Havocs.

Papers/Briefs

- Economics of Dam Raising.

- Role of Agriculture – Performance of issues.

- Farm Budget of major crops.

- Water Costing for Irrigated Agriculture.

- Water Economics and Water Financing.

- Compiled the salient features of Five Year Plans (Second Five Year Plan 1960-65 to Eighth Five Year Plan 1993-98).

e) WAPDA Environmental Cell (WEC)

WAPDA Environment Cell (WEC) was created in 1987 to provide a focal point for handling environmental assignments and to develop an environmental information system to support planning, designing and operation of projects in WAPDA.

The Asian Development Bank (ADB) provided assistance for the strengthening of WEC under the Project SEMWRP "Strengthening Environmental Management for Water Resources Development in WAPDA Project with the overall objective to ensure that WAPDA's water sector projects are environmentally sound and result in sustainable socio-economic development.

WEC through a field office at Barotha is currently carrying out social and environmental monitoring of Ghazi Barotha Hydropower Project (BGHP) in line with 19 protocols (10 environmental and 9 social aspects) developed and revised for this purpose. These protocols primarily focused on monitoring of groundwater, surface water, housing replacement, resettlement, spoil bank development, hiring of labour, social changes and agricultural development in the impact areas. A Supplementary Environmental and Social Study for Management of the Flood Plain and Water Releases for GBHP was also coordinated by WEC. With the commissioning of the project, WEC-Barotha is now engaged in the monitoring of the post project.

Cotton Crop in LBOD area

WEC has carried out a number of studies such as EIA of CRBC, Stages-I and II. IEE of CRBC Stage-III, EMP of CRBIP, IEE of Mangi Dam Project. IEE of Sabakzai Dam Project, EIA of FSR Project Bahawalnagar, IEE of Naulong Storage Dam, Rehabilitation of Manka and Kappar Dams of D.G. Khan, N.W. Canal Remodeling Project. Environmental Monitoring of Evaporation Ponds of SCARP-Vi, Preliminary Environmental Study of Skardu Carryover Dam Project. Environmental Studies of Kachhi Canal with Barrage at Mithankot. EIA of Kachhi Canal off-taking from Taunsa Barrage, Preliminary environmental Examination of DMP, RAP of Sabakzai Dam Project, Environmental and Social Assessment (ESA) of 220 KV Kassowal Grid Station and Associated Transmission Line, Initial Environmental Examination (IEE) of Gurha Utam Singh Dam Project, Nai Gaj Dam Project etc.

WEC also reviewed and commented upon EIA report of Mirani Dam Project, EIA and RAP of Rainee Canal Project, Diamer-Basha Dam Project, Kurram Tangi Dam Project, Country Strategy Note (CSN) for Pakistan IUCN report on downstream Kotri requirements. Cholistan reservoir and Nara Remodeling (LBOD)-I Project. Sehwan Barrage Complex Feasibility Report, Vol-III HARPO Hydropower Project, feasibility study vol-I etc. Chashma Right Bank Canal (Lift-cum-Gravity) Project. EIA and RAP Study and Environmental Impact Assessment of Abbasian Hydropower Project, EIA and RAP (Medium report), Naulong Dam Project, Second part of South Asian Environment Outlook SAEO (2007), Palas Valley/Spat Gah Socio-Economic report of Hydropower project complex (Vol-III) Project Planning Report detailed engineering design and tender documents of Nangol Dam Project (Medium Report) EIA Report on Golen Gol hydropower Project, pulse report, January 2008. Bali conference on climate change, large dam and their environmental impact (SCENARIO IN PAKISTAN) making of reserve area in dams, national capacity self assessment, working paper for up dating the National Research Agenda on Waterlogging and Salinity (IWASRI), Dasu Hydropower project, technical memorandum TM-EUA 2 AQUITIC ECOLOGY.

WEC is presently engaged in carrying out Social & Environmental Monitoring of Ghazi Barotha Hydropower Project. Coordinating Supplementary Environmental and Social Study for Management of Indus Flood Plain and Water Releases etc. of GBHP, Environmental Assessment of Chashma – Jhelum Link Canal Project, environmental monitoring and evaluation of CRBC-III.

WEC also represented a research paper "generation and disposal of sold waste at Model Town Central Park". This was presented on 3 June, 2008 and it was granted the status of key paper.

Miscellaneous

- Paper titled "Hydel Power Generation – A low carbon Energy proposed for prosperous Pakistan' was

A rich wheat crop in reclaimed area

prepared and presented on "World Environmental Day, June 7, 2008" Engineering Congress, by Dr. Allah Bakhsh Sufi and Attia Designer. This paper was acknowledged at "Key Paper" and it was lauded as a commendable effort.

- Preparation for one day seminar on "Water Costing" planned by WRPO, P&D, WAPDA, remained in progress.

- Paper titled "Potential of irrigation in Pakistan – Limits and Conditions", by Dr. Allah Bakhsh Sufi, prepared for presentation in the "Water Costing" Seminar to be held in August, 2008.

- Two papers titled "Educational Capacity Building in the Water Sector' and "Integrated Water Resources Management in Pakistan" were prepared by Dr. Allah Bakhsh Sufi Chief Engineer (WRPO) and young engineers of WRPO. These papers were submitted to PANCID for presentation in ICID workshop "Capacity Building and Training in Water Sector; the Role of Young Professionals" Aiwan-e-Iqbal, Lahore October 17 & 18, 2008.

- WRPO prepared three papers for presentation on "WATER TRIBUNE – EXPO ZARAGOZA, 2008" an International Exposition of 2008 held in Zaragoza from June 14 to September 14, 2008. The Theme "Water and Sustainable Development". The following three topics were prepared and submitted:-

i. Agriculture production through conjunctive use of water submitted to Secretary, Ministry of Water and power.

ii. Land management for sustainable irrigated agriculture submitted to Member (Water).

iii. Water Economics and Water Finance – Pakistan, prepared by Chief Engineer (WRPO).

Hydrology and Water Management Organization (H&WM)

H&WM is responsible for management of water from the Indus River System, country's richest water and power sources, through its various formations.

- Hydrology and Research (H&R) Directorate

- Pakistan Snow & Ice Hydrology Project:

Pakistan Snow & Ice Hydrology Project is aimed at producing inflow forecasts for Tarbela, Mangla Reservoirs and River Kabul at Nowshera on seasonal as well as on short-term (10 daily) basis. The inflow forecasts help in the operation of the reservoirs in a more effective manner so as to optimize benefits from Irrigation and Hydropower Generation.

A net work of 20 automated Data Collection Platforms (DCP's) has been installed in the Upper Indus Basin (UIB),

including a master station at Badoki in outskirts of Lahore for receiving data from these DCP's. The DCPs collect and transmit hourly real time hydro-meteorological data on snow pack condition, precipitation, air temperature, relative humidity, wind and solar radiation within an effective hydrologic elevation band of 2500-5400 meters above sea level in the mountain ranges of Hindukush, Karakorum and Himalayas. The Meteor Burst Communication System (MBCS) is being used for transmission of this real time data to the Master Station. This communication system uses meteor trails in the troposphere for reflecting radio wave signals to establish data communication.

A computer based Watershed Model has been acquired from the University of British Columbia (UBC) Canada and is calibrated for the sub catchment of Upper Indus Basin (UIB). Using the UBC Watershed Model, flow forecasts for Mangla, Tarbela Reservoirs and Kabul River at Nowshera on seasonal and 10-daily basis for Kharif Season-2007 and Rabi Season 2007-2008 have been developed and issued to IRSA, Tarbela Dam and Mangla Dam Projects for their use. Forecasts are compared with observed inflows to check/update the flow forecasting system. The flow forecasting for Kharif season 2008 is in progress.

High altitude hourly and daily meteorological data collected from the Upper Indus Basin network is secured at different storage places and is also published in hard and soft copies. Annual Reports comprising daily data from 20 UIB stations for the period 1994 to 2006 have been published.

O&M of Telemetric and Hydromet Network For Flood Forecasting and Warning System:

Hydrology and Research Directorate is operating and maintaining a telemetry net work comprising 24 remote stations established under the Flood Protection Sector Project Programme (FPSP-I) and 20 new remote stations established under flood protection programme (FPSP-II) The directorate aims at to further strengthening of the existing system by densification of the existing net work. A real time data on river level and catchment rainfall is automatically collected and transmitted through this network during the flood season using meteor-burst communication system. This data is then processed and immediately supplied to Flood Forecasting Division (FFD) of Pakistan Meteorological Department (PMD), Lahore for use in computer models for timely issuance of Flood Warning. The network is supported by developing/updating rating curves at key installed locations for discharge measurements during flood season.

This directorate also maintains a network comprising 12 climate stations located in central Punjab. Data comprising minimum and maximum temperatures, relative humidity, rainfall and evaporation is collected manually from this network. Data from these stations is being published on annual basis.

Surface Water Hydrology Project (SWHP)

Surface Water Hydrology Project, WAPDA, is responsible for the collection, analysis, processing and publication of the hydro-meterorological, sediment and chemical data of major rivers and nullahs of Pakistan on annual basis. This includes discharge, sediment, rainfall, climatological and chemical data collection from a widely scattered network of 77 hydro-met stations monitored on regular basis. In addition, 55 No. hydro-met sites entrusted to the project by various WAPDA formations working on different Water Resources Projects for specific time period are also being operated and maintained. Moreover, as per PC-II for strengthening of hydrological work in the provinces of Balochistan and NWFP 06 out of 14 Nos. hydrological sites have been activated.

The hydrologic data gathered from network of hydro-met station shall be the basic information required for the future planning and designing of water resources development schemes, preparation of feasibility reports in respective areas.

During the year 2007-08, nine annual publications were completed and hydrological data from its 91 No. stream gauging and 41 climatological stations (regular and deposit work) located in far flung areas throughout the country was collected for Mangla, Tarbela, Ghazi Barotha and for other various WAPDA formations.

Water Resources Management Directorate (WRMD)

The coordination between WAPDA, Indus River System Authority (IRSA), Federal and Provincial Governments for release of water to meet the irrigation and power needs from the existing IBP reservoirs, operation and maintenance of WAPDA's Manual Telecommunication network (HF Radio Communication System) for administrative needs of these projects through water management covering Indus Basin Irrigation System and Flood management etc are basic functions of WRMD. WAPDA has established Flood Warning Stations at specified sites on main rivers and its tributaries. WAPDA has constructed its own huts for accommodating staff and sensitive/precious electronic equipment at all sites with the provision of at least three Wireless Operators at each station to keep the HF Radio Communication System in operation round the clock to provide the river inflow and reservoir data on hourly basis specially during flood season. Moreover, this Directorate also deals with systematic collection compilation and publication of the historic rivers and canal discharge data of the Indus Basin. This directorate also helps IRSA in preparation of seasonal operation criteria for the existing reservoirs Chashma, Mangla and Tarbela. A Flood Information Centre also works round the clock in room No. 227-WAPDA House, Lahore under WRMD during flood season June 16 to October 15.

According to salient operation features, annual canal head diversion of the Indus Basin System in post – Tarbela period (1976-77 to 2006-07) increased by about 18 percent

Nai Gaj Dam Project site

and 09 percent respectively compared to average of pre-Mangla (1960-61 to 1966-67) and post Mangla (1966-67 to 1975-76) periods. Corresponding increased in Rabi period were of the order of 30 percent and 18 percent respectively.

Significant assignments accomplished for the year 2007 are as under:

- River level and rain data observed/collected on hourly basis was transmitted not only to reservoir operation authorities but also provided to FFC, IRSA, PMD, Army PCIW, PIDs and Flood related agencies.

- Performance during the Flood Season 2007 of HF Radio Communication System remained satisfactorily. Transmission of data remained effective round the clock and not a single observation of any site was missed.

- Six reports were published on river and canal discharges data. Canal withdrawals, Rim stations inflows and Reservoir Operational data was provided to several government, semi government and consultants.

PLANNING AND INVESTIGATION ORGANIZATION

The Planning & Investigation Organization has been entrusted with planning of water resources projects in Pakistan, which includes preparation of Reconnaissance, Appraisal, Pre-Feasibility, Feasibility Studies and detailed engineering design for development of water resources schemes in Pakistan. The Survey works are carried out by Survey Divisions located at Peshawar, Faisalabad and Dadu while Geological Investigation works are carried out by the Geological Investigation Division, Lahore. Agriculture and Economic studies are carried out by Director Economics and Statistics. Planning activities carried out during the year 2007-08 under vision 2025 programme are briefly described below:

Winder Storage Dam Project:

An earth core rockfill dam with 102 ft height and 1700 ft length is proposed across Winder River about 125 Kms from Lasbela city and about 66 kms from Uthal in Balochistan. The reservoir area of the dam is 1.65 sq. miles (1056 acres) with dead storage of 36483 AF. The live storage is 36167 AF. The main objectives of the dam are irrigated agriculture development of 10,000 acres land and provision of drinking water facilities to the local population. The cropping intensity in the area will increase from 9.1% to 82% per annum. PC-II Proforma amounting to Rs. 38.876 million was approved by DDWP on Oct. 10, 2005 for Feasibility Study of the Project. Feasibility study has been completed in July 2007. EPC documents have been prepared and PC-I submitted to Ministry of Water and Power for obtaining approval of Planning Commission.

Nai Gaj Dam Project:

The Nai Gaj Dam Project located on Nai Gaj at the terminal ridge of the Kirthar Range and is about 67 Kms from Dadu. The dam will be an earthfill and rockfill type

with height of 150 feet and length 3840 feet. The reservoir area of the dam is estimated as 3266 acres with gross storage capacity of 0.174 MAF. The live storage will be 0.130 MAF. The construction of proposed Nai Gaj dam will not only help in attenuation of floods due to hill torrents but also help to irrigate cultivable lands of about 40000 acres available in the vicinity of the Nai Gaj Dam Project and development of agro forestry. In addition the project will also generate power to the tune of 2.3 MW. Feasibility Report of the project was completed in 2006. M/s NESPAK have been engaged for detailed engineering design and tender documents. The studies will be completed in 18 months ending in March 2009.

Sukleji Dam Project:

Sukleji Dam is located across Sukleji River about 70 Kms west of Shoran, Tehsil Sunny of Bolan District in Kachhi Plain of Balochistan. An earthfill dam 110 ft height and 1466 ft length is proposed across Sukleji River. Reservoir area of the dam is estimated as 1400 acres with gross storage capacity of 42,000 AF of water of and live storage capacity is 34,000 AF. Main objectives of the dam are irrigation of about 10,000 acres CCA and provision of drinking water facilities to local population. PC-II Proforma amounting to Rs. 38.852 million was approved by DDWP on Oct. 10, 2005 for carrying out Feasibility Study, Detailed Engineering Design and Tender Documents of the Project. The consultants of the project M/s Barqaab have proposed the shifting of dam site further upstream having more hydropower generation potential and more storage capacity for attention of floods and bring additional area under command.

Kurram Tangi Dam Project:

The proposed project site is located across Kurram River in North Waziristan Agency about 32 km North of Bannu city in NWFP. The objective of the Kurram Tangi Dam Project is to store flood water of Kurram and Kaitu rivers to use it for supplementing the existing irrigated areas of 278,000 acres and also irrigated agriculture development of about 84,380 acres of new area under perennial irrigation and development of hydropower generation of 83 MW. The Feasibility Study of the Project was completed in June 2004. The detailed engineering design and tender documents were completed in March, 2005. PC-I Proforma amounting to Rs.17.205 billion has been approved by ECNEC. Redesigning for raising of dam and related structures to accommodate 1.2 MAF storage capacity has been completed in 2006-07. Model studies for the project component are being carried out.

Akhori Dam Project:

Akhori Dam is an off-channel storage dam proposed across Nandana Kas, a left bank tributary of River Haro, which will be fed from surplus flows of Tarbela through 37 kms long conveyance channel with discharge capacity of 60,000 cusecs. The stored water will be used to supplement the existing irrigation system of Indus Basin. An earth and rockfill type dam with 400 feet height and 3.23 miles length is proposed near Akhori village on Nandana Kas. An area of 65,976 acres will come under reservoir for a gross storage of 7.60 MAF of water. The dam will have a live storage of 6.00 MAF. The feasibility study of the Project has been completed in Nov. 2005 under an approved PC-II Proforma for Rs.194.804 million. The PC.I for land acquisition and resettlement, submitted for approval in April, 2006 while PC-II amounting to Rs.8180 million for the detailed design and tender documents has been prepared and submitted to Ministry of Water and power for obtaining approval of Planning Commission.

Naulong Storage Dam Project:

Naulong Dam Project is proposed to be constructed on Mula River at Sunt about 30 km from Gandawa City, District Jhal Magsi, Balochistan. An earthfill type dam of 138 feet height and 2510 feet length is proposed to store 124,000 acre feet water of which 99,000 acre feet will be live storage available for irrigation of 32000 acres of land. The feasibility study of the Project completed in 1996 by WAPDA. Review of feasibility study, preparation of Detailed Engineering Design and Tender Documents initiated in December 2006 and will be completed in a period of 24 months. A joint venture lead by Pakistan Engineering Services (PES) was appointed as consultants of the Project on December 13, 2006 and the studies would be completed in December 2008.

Hingol Dam Project:

The dam site is located on Hingol River in district Lasbela near Aghor in Balochistan province at a distance of 233 kms north-west of Karachi and about 8 kms north of Kund Malir where the River falls into the sea. The dam will be an earthfill type with 130 feet height and 1300 feet length to store 967600 AF of water of which 449000 AF will be live storage for irrigation. The main objectives of the project are irrigation of 100,000 acres land, hydropower generation of 300 KW, provision of 10 cusecs of water for local use and development of fish industry and recreation. Feasibility study was completed in 1992. PC-II Proforma amounting to Rs.78.230 million was approved on 2.8.2001 for detailed engineering design and tender documents of the project. Preparation of Detailed Engineering Design and Tender Documents has been initiated in December 2006, which will take 24 months. A joint venture comprising M/s National Development Consultant, Ease-Pak and Electra was appointed as Consultants of the project in December 2006.The studies are scheduled to be completed in December 2008.

Chashma Right Bank Canal (CRBC) Lift-Cum-Gravity Project:

The Project area is located in D.I. Khan Division of NWFP. The Feeder Canal will off take from Headrace Channel of Chashma Hydropower Project at Chashma Barrage. The main objective of this project is irrigated agriculture development of 286,000 acres land through

lift cum gravity canal from Indus River. The Detailed Engineering Design, Tender Documents and PC-I of the Project has been completed on February 29, 2004 under an approved PC-II Proforma amounting to Rs.135.00 million. The approval of PC-I is under process. EIA & RAP of the project has been cleared by EPA, NWFP. The project will be taken up for implementation after approval of updated PC-I.

Feasibility Study of Causes of Waterlogging and Remedial Measures along Chashma Jhelum Link Canal Project:

P&I organization along with IWASRI, WEC and ISRIP initiated the Feasibility Study in April 2007. Draft reports have been supplied by ISRIP, P&I, WEC and CDO which are being reviewed by the Drainage Expert engaged for the study. Final feasibility report will be submitted by the end of October 2008.

Munda Multipurpose Dam Project:

A concrete faced rock fill dam with 700 feet height is proposed across Swat river in Mohmand Agency (FATA) NWFP. The dam has a gross storage capacity of 1.29 MAF. The dam will have an installed capacity of 740 MW and it will bring 25155 acres of land under irrigation. Feasibility of Munda dam was completed in March 2000. Revised PC-II amounting to Rs.648.00 million has been submitted to Ministry of Water and Power for obtaining approval of Planning Commission to carry out detailed engineering design and preparation of tender documents.

WAPDA Model Studies Cell:

WAPDA Model Studies Cell was established in late 1983 at Irrigation Research Institute, under a Memorandum of Understanding signed between WAPDA and Irrigation & Power Department, Govt. of Punjab. This research-oriented formation of WAPDA is responsible for carrying out hydraulic model studies of Water and Power Projects of WAPDA. Right from 1983 upto the year 2008, this organization has performed a number of model study works of different WAPDA projects. For the last many years this WAPDA Cell is conducting exclusively the model studies of WAPDA projects which are included in the Vision 2025 Programme. Following is a summary of WAPDA projects whose model study works were conducted in WMSC:

- **Diamer-Basha Dam Project:**

During the year 2004, WAPDA Cell was entrusted with the model study of the project, in the feasibility stage, comprising the following 2-models:

1.	Comprehensive Model of the Project	Scale 1:80
2.	Sectional Model of Spillway	Scale 1:50

After accomplishment the model study programme according to the objectives laid by the Design Consultants, the models retained/maintained till November, 2006, when new design consultants were appointed by the WAPDA for tender designing of the project. In December, 2006, the design consultants submitted a detailed TOR for diversion works. The model studies for diversion arrangements section model of spillway and comprehensive model of the Project have been completed.

- **Kurram Tangi Dam Project:**

The model study of the project was entrusted to WAPDA Cell by (P&I) Organization. Following two models were constructed and tested according to the objectives as laid by the design consultants M/s. Kurram Tangi Dam Consultants:

1.	Comprehensive Model of Kurram Tangi Dam Project	Scale 1:40
2.	Model of Kaitu River and Weir	Scale 1:20

Model study on model at Serial Number 1 has been completed with the revised design of the project.

- **Dasu Hydropower Project:**

Most recently the model study programme of the project comprising the following 2-model has been entrusted to WAPDA Cell by Hydro-planning Organization of WAPDA:

1.	Comprehensive Model of the project comprising all features	Scale 1:80
2.	Sectional Model of the Spillway	Scale 1:50

- **Other Model Study Works in WAPDA Cell:**

After completion of the Model Study Programme on the following physical models, the models are being maintained in the WAPDA Cell on request of sponsoring agencies of WAPDA for any emergent study arising during designing and construction stage:

1. Physical model of Dabair Khwar Hydropower Project
2. Physical model of Khan Khwar Hydropower Project
3. Physical model of Allai Khwar Hydropower Project
4. Physical model of Golen Gol Hydropower Project

Hydrogeology Directorate, WAPDA

Hydrogeology Directorate, WAPDA, Lahore is responsible for collection, evaluation and compilation of groundwater data which provide a dependable basis for planning, programming and development of groundwater throughout Pakistan. Hydrogeology Directorate, WAPDA, Lahore was allocated Rs.44.00 million from PSDP during 200708 to carry out hydrogeological investigations in District Nowshera.

During course of hydrogeological investigation in district Nowshera from July 2007 to June 2008, thirteen number test holes, twenty three number tubewells, 280 number electrical resistivity probes, hydrogeological survey in an area of 850 sq. km, fourteen number observations wells and eight number aquifer tests have been completed.

Dasu Hydropower Project site

The project has been completed June 30, 2008.

Deposit works for different Government/semi Government departments and different WAPDA formations were also carried out during the financial year 2007-08.

As deposit works for different Government/semi Government and different WAPDA formations two number test holes were drilled and ten number tubewells along with their development and testing and rehabilitation of two number tubewells were completed during the period under report. 283 electrical resistivity probes were conducted for 100 water supply schemes for different Government/Semi Government departments and different WAPDA formations during the fiscal year 2007-08.

DAMS ORGANIZATION

Besides processing technical matters and coordination of activities on dams, this organization is also responsible for supervision of the execution of Mangla Watershed Management Project through Project Director. This organization assists the Technical and Financial Evaluation of Proposal submitted by Consultants for water sector and hydropower projects as Member of Standing Review Committee (SRC).

Mangla Watershed Management Project

The primary objective of this Project is to reduce the sediment load flowing into Mangla Reservoir by way of improved methods of land use and implementation of watershed management practices in the catchment area located upstream and Mangla Dam Reservoir. Useful life of the reservoir has increased to 172-years against initial estimate of 110-years. The Project has improved the socio-economic conditions of the people living in the area through improvement of land, increasing agriculture and forest products, enhancement of sub-soil water resource and ultimate reduction of run-off to control the flood hazards, conservation of natural resources i.e. environmental protection and up-gradation of socio-economic conditions of the resident population.

The catchment area of River Jhelum above Mangla Dam covers about 12,870 square miles. Out of the total area, 56 percent lies in Indian-held-Kashmir and balance 5,710 square miles area was in a state of critical erosion as detailed below:

Gujar Khan Murree, Kahuta And Sohawa (Pakistan)	848	Square Miles
Mirpur (AK)	781	-do-
Bagh (AK)	1164	-do-
Muzaffarabad (AK)	640	-do-
Total:	**3433**	**-do-**

Chashma Right Bank Canal

The scheme was originally approved for waterlogged treatment over an area of 3,433 square miles in the catchment area of River Jhelum by the Executive Committee of the National Economic Council (ECNEC) in 1960 for a period of 30 years at a cost of Rs 122.6 million. PC-I for the latest 8th Phase period vis July 2002 to June 2007 amounting to Rs 168.993 million has been approved. The Project is being funded through Public Sector Development Programme (PSDP) viz allocation of the Government of Pakistan.

Now 9th Phase PC-I for an amount of Rs.273.656 million for the next 5-years has been approved by CDWP on April 30, 2008.

The following works namely soil survey planning, afforestation, soil conservation structures, engineering structures, bad land stabilization/treatment of slides, improvement of cultivated lands, planting of fruit trees and extension services are proposed to be completed during 5-years scheme period i.e. 2007-08 to 2011-12 in the critical areas.

Sr. No.	Name of Work	Area to be treated (2007-08 to 2011-12)	Unit
1.	Soil Survey & Planning	300	Sq. miles
2.	Afforestation/Rehabilitation of Failures	35500	Acres (14.200 miles plants)
3.	Supervision & Maintenance of Afforestated Area	1000	Acres
4.	Raising of Forest Plants (WAPDA Nurseries)	13.600	Million
5.	Purchase & Raising of Fruit Plants Local/WAPDA Nurseries	0.100	Million
6.	Soil Conservation Structures (Check-dams, retaining/diversion walls) etc.	10.000	Million Cft.
7.	Construction of Engineering Structures Silt Trap Storages, Spillways, Wire-crate Spurs, Wire-crate Gabions etc.)	620	Nos.
8.	Bad Land Stabilization (Treatment of Slides)	27 Nos.	8100 Acres
9.	Improvement of Cultivated Lands	1937	Acres
10.	Extension Services i.e. Development/Improvement of Springs/Ponds etc.	59	Nos.

Works

Watershed management practices include raising of planting stock in nurseries and plantation in the sub-watershed areas during monsoon and spring seasons, conservation of dry stone check-dams, diversion walls, retaining walls, construction of stone masonry dams, drop spillways, wire-crate spurs, construction of watts and atts (terraces) and field outlets etc. Further improvement of cultivated lands by proper leveling of fields, improvement/restoration through repair of the existing structures present in the catchment area and construction of new field bunds and field outlets for safe disposal of storm water in addition, many types of structures are constructed in a sub-watershed for the purpose of arresting sediments generated from the drainage areas, spillway/silt trap storages, drop spillways etc. are constructed according to the requirements of the site after keeping into consideration the analytical practices, using modern techniques in order to reduce maximum amount of silt to travel in the reservoir area.

Central Design Office (Water)

Central Design Office (Water) offers design services for all the disciplines of civil engineering including irrigation systems, barrages, dams, power houses, flood protection works, roads and bridges, architectural planning and design and structural analysis/ design of all types of buildings.

Review of various civil engineering works designed by other WAPDA formations/ consultants is also carried out, as and when referred. Projects Review Directorate reviews PC-I, PC-II, Feasibility Studies and also works as secretariat for Standing Review Committee (SRC) constituted for clearance of PC-I and PC-IIs. Some of the design jobs accomplished during the year are as follows:

i) Fast Track Projects of Vision 2025

CDO (Water) carried out Engineering design services of the following Fast Track Projects.

- **High Head Hydropower Project (Besham):**

Design of Vehicle Parking Shed:
Design of remedial measures for causeway cum drop structure at RD 17+825 on Access Road to Weir Site, Allai Khwar Hydropower Project.

ii) Normal Assignments

- **Simly Dam Project:**

Comments on silt retention dam at Hotar and Chakka Begwal. Design of gabion check dam. Recommendations for provision of Mobile Crane 50 ton capacity. Design for additional protection works spillway and flexible stone apron at downstream of auxiliary spillway. Preparation of operation and maintenance manual of Simly Dam (Revised). Study regarding water surface profile under anticipated conditions of existing pool level/capacity enhancement.

- **Ghazi Barotha Hydropower Project:**

Design of Multipurpose Hall for Boys/Girls High School and conversion of office into High Secondary School at Barotha Colony. Study/comments on river bed area downstream of Barrage creating ponds. Design of parking shed for heavy vehicles. Vetting of design for construction of 6" dia pipe line over Ghazi Barotha Canal for gass supply. Design of lintel of security guar room. Design of partition for office space at Power house Complex.

- **Tarbela Dam Project:**

Design of Pehur Security Check Post. Design of Seismology Directorate Building. Design for Academic Block of WAPDA Cadet College. Design of Box Culvert (Three Boxes) on main access road. Design for water supply and sewerage system of Flood Monitoring Station.

- **Mangla Dam Organization:**

Design for remedial measures for slided/eroded slope below 1000 SPD berm in front of power House Transformer Bays (1-10).

- **Dasu Hydropower Project:**

Comments on Technical Memorandum TG-GT-03.

- **Golan Gol Hydropower Project:**

Design of bridge at RD 0+285, RD0+995 and RD 5+680. Design of public health and structural design of Residence Cat-II, Colony at koghuzi (Chitral). Design of access road to weir site and standard causeway. Design of Mosque for 90 persons and security guard room. Design of water supply and sewerage system, underground and overhead water tank of colony. Design of 4-Bed Rest House, XEN (Civil) office, shops and primary school.

- **Chashma Jhelum Link Canal Project:**

Design regarding feasibility study, causes of waterlogging and remedial measures and lining of C.J. Link Canal from RD 160+000 to 215+000.

- **Chashma Right Bank Canal Project:**

Design of 2-bed rest house at Mangrotha Head. Design for channelization/connecting of LITRA flood carrier channel on west of main canal crossing CRBC at RD 641+073. Design for strengthening of escape channel No.3, culverts on Zinda pir road crossing of Disty at RD 9+000 and RD 22+000 VR Bridge at Toa Nullah carrier chananel No.22.

- **Rawal Rest House, Islamabad:**

Design of kitchen cabinets, parking sheds and addition of stairs.

- **Kachhi Canal Project:**

Design of 3-bed rest house, triple storied office building and colony internal roads. Design of water supply, sewerage system of O&M colony at Dera Murad Jamali.

Vetting of design for construction of O&M colony, Dera Murad Jamali. Design of boundary wall.

- **Bunji Hydropower Project:**
  Design of cableway (Double Rope System).

- **Wapda Officers' Colony Upper Mall, Lahore:**
  Design for addition and alteration in Khateeb's house. Design for addition and alteration in Bungalow No.40, 49 and SDO Complaint Office.

- **WAPDA Hospital Complex, Lahore:**
  Design for extension of burnt unit.

- **WAPDA Employees Cooperative Housing Society, Lahore:**
  Design of corner shops at Block H-4. Design for sewerage system of Khamba Village. Vetting of design and cost estimation of Jamia Mosque at Block F-2.

- **Diamer Basha Dam Project:**
  Review comments on Contract Documents, Tender Drawings Vol-I & II. Design of security guard room. Design of Parking cum Storage Shed at Chilas and Project Office.

- **Chashma Hydropower Project:**
  Recommendations for provision of boundary wall of Corrugated G.I. Sheets.

- **PAF Base Sukkur:**
  Design for installation of tubewell with Pump Houses.

- **WAPDA Flats, Jail Road, Lahore:**
  Design for kitchen cabinets of 2-bed flats. Recommendations for construction of additional kitchen at WAPDA flats.

- **National Transmission & Despatch Company (NTDC):**
  Design of water supply and sewerage system for residential flats Cat-IV at 220 KV Grid Station University, Islamabad. Design of Parking Shed at 500-KV Grid Station at Jamshoro.

- **Indus Basin Irrigation:**
  Design of Telemetry Office Builting at CMTL, Lahore.

- **Neelum-Jhelum Hydropower Project:**
  Scanning and amending of Location Map of Project Area, project layout plan, GPS grid net, Nauseri Panjkot site plan and site plan of Agar Nullah – Chattar Kalas Zaminabad.

- **WAPDA Engineering Academy, Faisalabad:**
  Design for rehabilitation of damaged parapet wall.

- **Jinnah Hydropower Project:**
Design of overhead water tank/tubewell.

- **Steam Power Station, Faisalabad:**
  Design of boundary wall.

- **Khanpur Dam Project:**
  Design of parking shed for 100 KVA generator.

- **Chashma Barrage C.J. Link Canal:**
  Proposal regarding interval of cross section of C.J. link Canal.

- **WAPDA Sports Complex, Kot Lakhpat, Lahore:**
  Design for fire fighting arrangement at Bachelor Hostel.

- **Thermal Power Stations (TPS):**
  500 MW Combined Cycle Power Station, Nandipur. Design for spillway channel lining. Design of approach road and AR Bridge.

- **Thermal Power Station (TPS) Muzaffargarh:**
  Design of road for oil decanting facility for Units 5 & 6 and Weight Bridge. Design of culvert for crossing of approach road and oil pipe lines.

- **Thermal Power Station (TPS) Pasni:**
  Recommendations/proposals for remedial measures for boundary wall, surface drainage system at power house building, colony and water supply system at Shadikore.

- **Thermal Power Station (TPS) Guddu:**
  Design of school and extension of rest house.

- **Hydel Hydropower Project Rasul:**
  Design of civil works under Contract No.RS-02. Design for remedial measures regarding portion of R.C.C. slab of fore bay.

- **Hydel Power Station (HPS) Chitral:**
  Design of permanent structure at intake.

- **Hydel Power Station (HPS) Warsak:**
  Design of gabion block.

- **Hydel Power Station (HPS) Jabban:**
  Design for addition of residence Cat-II.

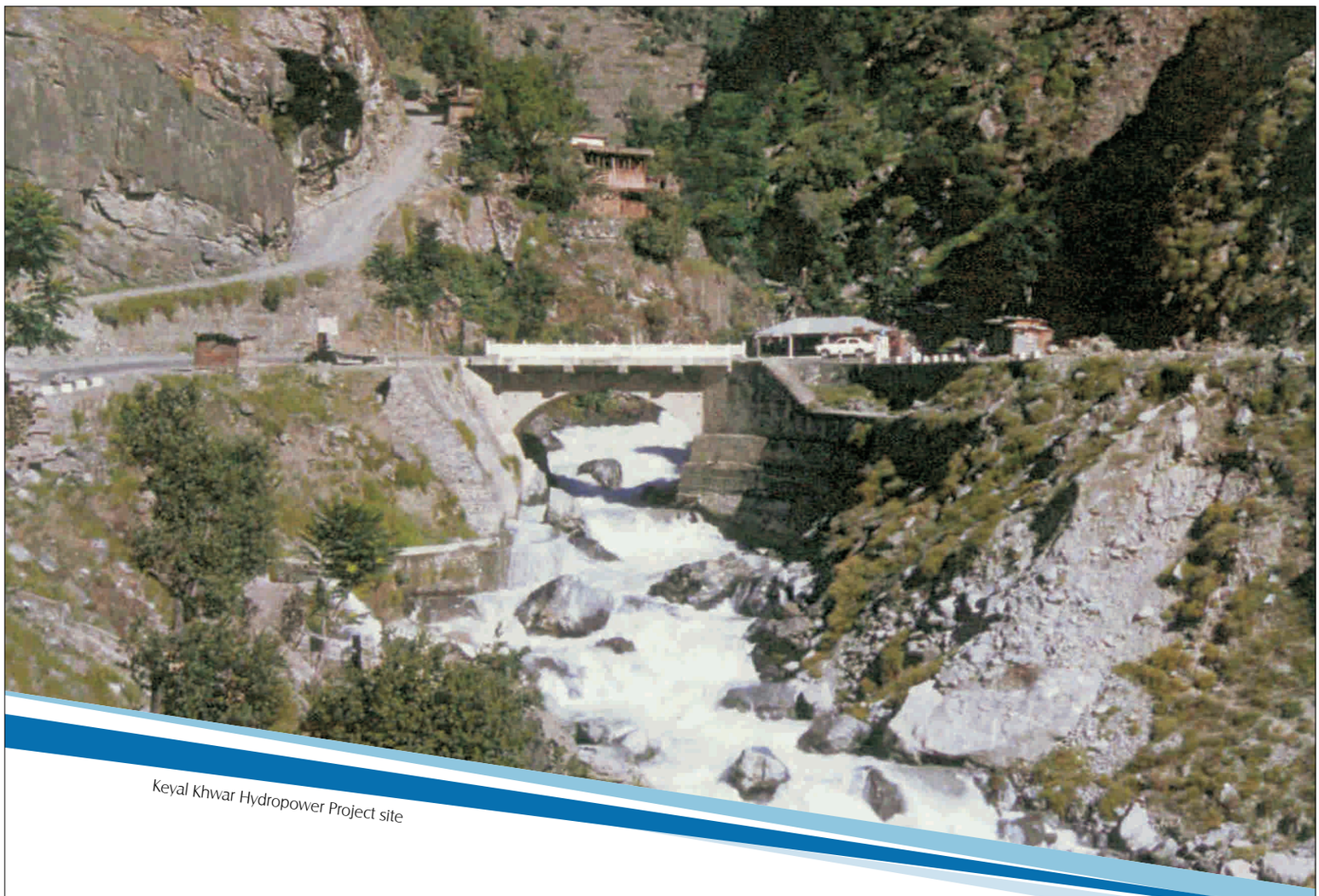
- **Hydel Power Station (HPS) Chichoki Mallian:**
  Design of downstream channel.

MISCELLANEOUS

- Training of Draftsmen and Tracers.

- Training of internees from University of Engineering & Technology, Lahore.

- Preparation of Research Paper on "Hospital Hazardous Waste Management: for celebration of World Water on 22nd March, 2008.



Keyal Khwar Hydropower Project site

- Review and checking of drafting standard into metric system.

- Standard design of residential flats Cat-III, 2 & 3 storeyed (brick masonry) for seismic zone.

Infrastructure for Distribution Companies (DISCOs), Thermal Power Stations,

Hydel Power Stations and NTDC

Architectural and structural design of 63 residential/non-residential buildings were completed. These buildings include offices, residences of different categories, Mosques, hostels, flats, schools rest houses and hospitals etc.

Planning and design of of colonies at Ghotki, Nandipur and Chichoki Mallian was completed during the year.

Project Review

Forty one PC-Is, PC-IIs and Feasibility Reports were reviewed, cleared and comments offered.

Drawings

During the year under report, as many as 743 drawings have been issued.

HYDRO PLANNING ORGANIZATION

This organization is backbone of planning and development of hydropower projects in Pakistan. Pakistan has over 54,343 MW hydropower potentials and 169 billion m3 of flows available for irrigation annually. About 6,500 MW of hydel potential and live storage capacity of 22 billion m3 have been harnessed which are about 12 percent of total hydropower potential and flows available in the country.

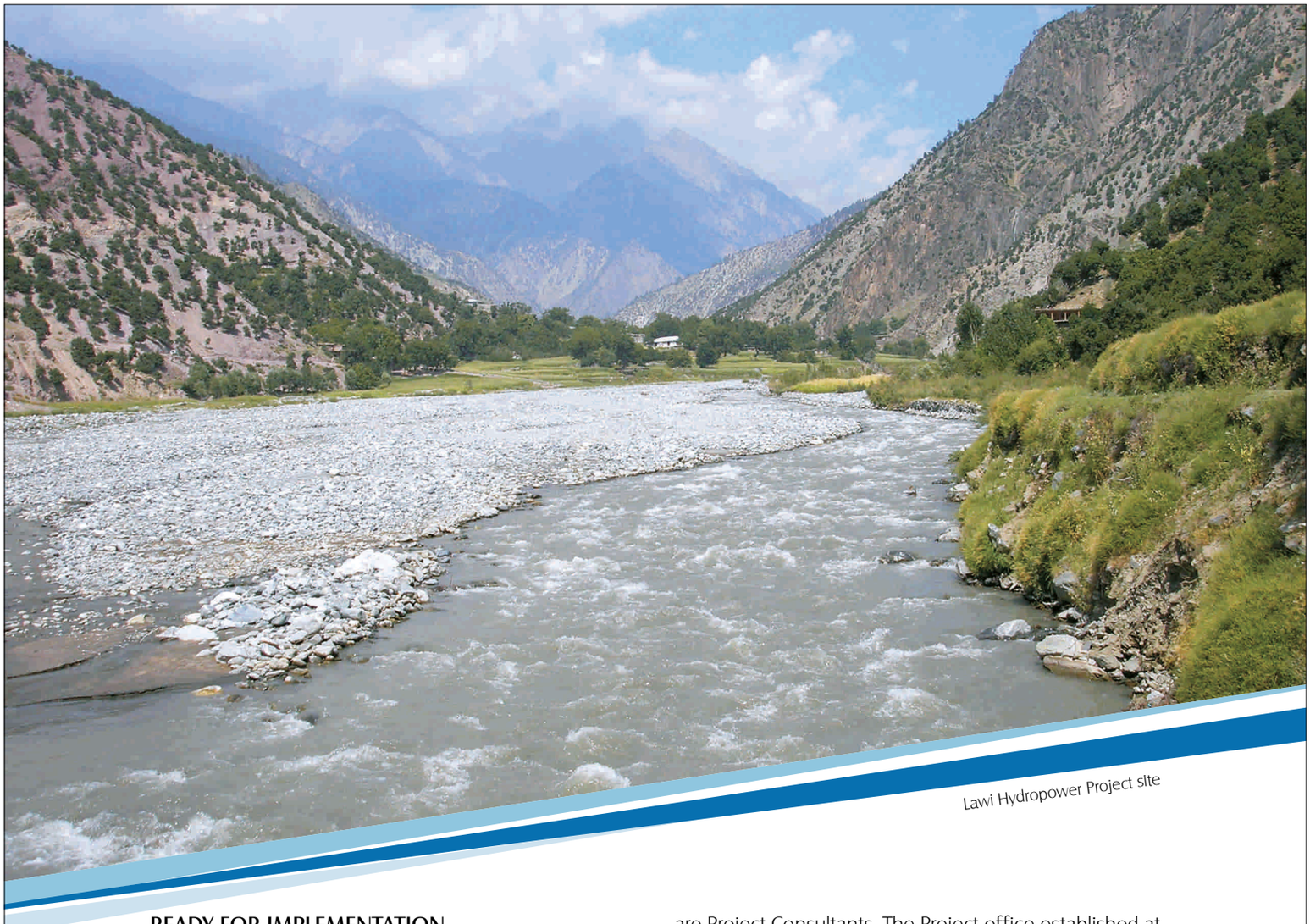
Under Vision 2025 – Programme of WAPDA, about 21000 MW of hydropower potential to be developed up to 2025 has been identified out of which about 18,000 MW to be developed by WAPDA and rest in the private sector.

At present, Hydro Planning Organization of WAPDA has taken up hydropower projects for studies having a total capacity of 17,694 MW. The completion of these studies and detailed design is expected during next three years. Whereas 96 MW Jinnah Hydropower Project has been taken up for construction which will be commissioned in 2010. If these projects are commissioned in 2030 in addition to 5 mega projects already announced by the Government, then it will help to reverse hydel: thermal ratio from 1:2 to 2:1.

The following projects are being undertaken by Hydro Planning Organization:

PROJECT UNDER CONSTRUCTION

i. Jinnah Hydropower Project 96 MW



Lawi Hydropower Project site

READY FOR IMPLEMENTATION

i.	Golen Gol Hydropower Project	106 MW

PROJECTS UNDER STUDIES

i.	Dasu Hydropower Project	4000 MW
ii.	Keyal Khwar Hydropower Project	122 MW
iii.	Spat Gah Hydropower Project	567 MW
iv.	Palas Valley Hydropower Project	621 MW
v.	Lawi Hydropower Project	70 MW
vi.	Bunji Hydropower Project	5400 MW
vii.	Kohala Hydropower Project	1100 MW
viii.	Basho Hydropower Project	28 MW
ix.	Phandar Hydropower Project	80 MW
x.	Thakot Hydropower Project	2800 MW
xi.	Pattan Hydropower Project	2800 MW

Jinnah Hydropower Project (Under Construction)

The project is being constructed on the right side of Jinnah Barrage on Indus River about 5 km downstream of Kalabagh town, 234 km from Islamabad. Its salient features are: Installed capacity 96 MW, Design discharge 2800 m3/sec, Gross head 4.88 m, Annual energy generation 688 million KWh.

The possession of land for the Project (751 acres) taken over with a total cost of Rs. 84 million. M/s Dong Fong Electric Corporation (DEC) of China is the Contractor who mobilized at site on February 18, 2006. Joint Venture consisted of M/s ACE (lead firm), NESPAK, NDC and MWH are Project Consultants. The Project office established at Kalabagh Town, District Mianwali. Chinese staff colony has been completed. Temporary works are complete and permanent works in respect of Power House cutoff curtain, dewatering drainage channels, drilling and installation of wells as well as pumps have also been completed. Besides, Excavation of Powerhouse Pit is 100% complete, Headrace Channel 69.3% complete whereas tailrace channel has been completed to the extent of 85.0%.

Concreting

- Blinding concrete has been completed in various sections of units 1 to 8.

- Structural concrete is in progress in various sections of units 1 to 8.

Golen Gol Hydropower Project (Ready for Implementation)

The project is proposed to be constructed on Golen Gol, a tributary of Mastuj river, 25 km from Chitral in NWFP. Chitral is 381 km from Islamabad. Its salient features are: Installed capacity 106 MW, Design discharge 30 m3/sec, Gross head 435 m, Annual energy 436 million KWh.. Feasibility study completed by HEPO/GTZ in 1997 was updated in 2005 by HPO. PC-I of the project was approved by ECNEC on September 2, 2002 for Rs.7035.88 million (US$ 117 million) with FEC of Rs.2638.80 million (US$ 44 million).

The project is planned to be implemented under following lots:

Lot-1: Construction of O&M staff colony.
Lot-2: Construction of civil works.
Lot-3: Construction of powerhouse and procurement of E&M equipment.
Lot-4: Construction of transmission line and grid station.
Lot-5: Construction Design and Supervision.

Project financing finalized with the help of EAD and Ministry of Water & Power such as:

- Lot-1 through PSDP financing.

- Lot-2 along with Lot-5 Saudi Development Fund will finance at a cost of US$ 40.08 million.

- Lot-3 Kuwait Fund will finance at a cost of US$ 37.00 million. Loan agreement between Government of Pakistan and Kuwait Fund has been signed on March 21, 2007.

- Lot-4 OPEC fund will finance at a cost of US$ 30.00 million.

Cost of 479 kanal of land has been paid and transferred to WAPDA. Acquisition of more land is in progress. Construction of boundary wall of O&M Staff Colony has been completed.

Contract agreement for consultancy services for the preparation of detailed engineering design and tender documents between WAPDA and JV of Pakistan Engineering Services (PES) and M/s Fichtner Germany was signed on June 12, 2007 at a cost of Rs.109.985 million. Study for detailed design and preparation of tender documents will be completed by the end of September 2008.

Expression of Interest (EOI) for prequalification of contractors for civil and E&M works were prepared and vetted by CCC. EOI was published in local newspapers. 18 firms have submitted prequalification documents for civil works (Lot-2 & Lot-3.1). 25 firms have submitted the prequalification documents for E&M works (Lot-3.2 & Lot-4). Evaluation by the Consultants is in progress.

Prequalification documents for hiring of consultants for construction design and supervision has been placed in national newspapers. 7 firms/JV submitted EOI. Evaluation completed and submitted for approval.

Tenders for civil works of O&M staff colony (six lots) have been opened on April 10, 2008. Evaluation completed.

PROJECTS UNDER STUDIES

Keyal Khwar Hydropower Project

The project is located in the Kohistan district of NWFP on the river Keyal Khwar at a distance of 250 km from Islamabad. Salient features of the Project are: Installed capacity 122 MW, design discharge 22 m3/sec, gross head 732 m and annual energy 426 million KWh.

PC-I has been approved by ECNEC for Rs.7066.96 million with FEC of Rs.3032.08 million on June 12, 2002 to be implemented by WAPDA on ICB basis. KFW of Germany has agreed for financing under grant for up gradation of feasibility study. EAD has given clearance for conducting feasibility study through KFW financing. Consultancy agreement signed on March 11, 2006 between WAPDA and Joint Venture of Lahmeyer International of Germany and NDC of Pakistan. Study will be carried out in 15 months period with a total cost of Rs.146.84 million (Euro 2.03 million).

The consultants started their assignment from April 24, 2006 and finalized the feasibility report by incorporating comments of WAPDA, POE and KFW which was submitted in October 2007. EOI for prequalification of consultants for next phase i.e. detailed engineering design, preparation of tender documents and construction supervision has been issued. Five Joint Ventures have submitted EOI on February 2008. Evaluation of EOI for short listing of consultants has been finalized. Preparation of TOR and RFP for next phase is in progress in consultation with KFW expert and is being issued soon. Selection of road route and final design of the preferred road route and preparation of EMP and RAP has been completed.

Kohala Hydropower Project

The project is located near Muzzafarabad in AJK. The powerhouse of the project is located near Barsala about 7 km upstream from Kohala Bridge. Its intake is proposed at 28 km upstream of Muzaffarabad town along upper limb of Jhelum River. The project area is 100 km from Islamabad. The project envisages the diversion of flows of Upper Limb to Lower Limb of Jhelum River through a pressure tunnel of 16 km length. Salient features of the project are: Installed capacity 1100 MW, Design discharge 400 m3/sec, gross head 320 meter and annual energy 4800 million KWh.

PC-II Proforma for preparation of feasibility study, detailed engineering design and tender documents was approved by ECNEC in its meeting held on August 23, 2006. Consultancy contract agreement between WAPDA and Joint Venture of SMEC, Scott Wilson, Sogreah, MAES and EGC were signed on June 26, 2007 at a cost of Rs.312.467 million for preparation of feasibility study, detailed engineering design and tender documents. The study period is 24 months. Consultants mobilized from August 16, 2007. Inception report received from consultants after incorporation of WAPDA comments in January 2008.

Contract for topographic survey work has been awarded. At present, survey team is in field. Estimates for geo-technical investigation at dam site were approved

Kohala Hydropower Project site

and funds transferred. Three rigs mobilized at site. Investigation work is in progress and 416-m drilling has been completed.

Geological mapping is in progress by Consultant Geologist.

Laboratory testing report has been submitted by the consultants and being finalized in the light of comments of Hydro Planning.

Tender documents for audits are in progress.

Sampling for environment quality data has been completed by SUPARCO and sample being analyzed.

Report on project optimization, energy and power calculation, hydrology, neo-tectonic and environment received from consultants have been circulated to WAPDA formations for comments. Design of proposed buildings at dam site and powerhouse is in progress.

Bunji Hydropower Project

Bunji Hydropwer Project is a run of the river scheme, proposed to be constructed on Indus River, 60 km from Gilgit in Northern Areas. Dam site is located about 610 km from Islamabad. The salient features include: Installed capacity 5400 MW, gross head 420 m, Design discharge 1500 m3/sec and annual energy 20750 million KWh.

Pre-feasibility report of the project has been prepared in March 2005. PC-II has been approved by ECNEC in its meeting held on December 14, 2005 at total cost of Rs.832.716 million inclusive of FEC Rs.232.733 million for feasibility study, detailed engineering design and preparation of tender documents.

Consultancy Contract Agreement signed on April 25, 2007 between WAPDA and Joint Venture of Mott MacDonalds Ltd. (Lead Partner), Sogreah Consultants SAS, Nippon Koei Co. Ltd., MM Pakistan (Pvt.) Ltd. DMC Consultants. Consultants mobilized on May 9, 2007. The inception report consisting of 2 volumes was submitted by consultants on August 10, 2007. The comments of inception report were communicated to consultants for incorporation. Survey and field investigations through core drilling, geological mapping, geophysical survey and hydrologic survey in progress. Review of different alternative dam and powerhouse sites are under study by the consultants for final selection of layout. The process of acquisition of building for establishment of field office of WAPDA at Gilgit is in progress, The study will be completed in April, 2010.

Dasu Hydropower Project

Dasu Hydropower Project is a run of the river scheme located 2 km upstream of Dasu village on Indus River, 69 km downstream of Diamer Basha Dam and 345 km from Islamabad. The salient features of the project are: Installed

Lower Spat Gah Valley

capacity 4000 MW, Design head 170 m, Design discharge 2584 m3/sec with annual energy 21000 million KWh.

PC-II was approved by ECNEC on September 29, 2003 for Rs.796.87 million with FEC Rs.100.00 million:

Stage-I:	
Feasibility Study	Rs.540.902 million with FEC Rs.60.00 million.
Stage-II:	
Detailed Engineering Design	Rs.255.876 million with FEC Rs.40.00 million.

A Joint Venture of M/s NESPAK, ACE, MWH and COLENCO in association of Binnie & Partners, as Project Consultants were approved by Authority on June 5, 2005 for preparation of feasibility study (Phase-I). Consultants mobilized on April 10, 2006. Study period is 30 months. Inception report submitted by Consultants on September 19, 2006.

Topographic survey for 10 km stretch completed. Detailed topographic survey for Dam Axis 6 & 5 and powerhouse sites were completed. Geological mapping and Geophysical investigation at Dam Axis 2, 5 and 6 completed. Under-water survey was completed by ISRIP and dry part of River cross section by T&M Division, WAPDA Peshawar.

First phase of drilling has been completed. Second phase of drilling is in progress and 2550 meter drilling completed to-date.

River bed drilling started by Tarbela crew. One hole at Axis-6 has been completed.

Survey of Pakistan completed survey at scale 1: 7500. Construction of hydraulic model is in progress at Axis-5.

Drawing for Model Testing was finalized in light of POE comments and handed over for incorporation.

Environment base line survey during high flow completed by SUPARCO. Draft report received and sent to Consultants. SUPARCO collected data for low flow period during January 2008. Report is still awaited.

Neo-tectonic study report completed by Centre of Excellence in Geology, University of Peshawar.

Contractors have been engaged for two exploratory adits 150 m each. Progress of excavation of adit at Axis is 150 m and 9 m for Chamber and at Axis 6 is 90 m.

Tenders for micro seismic network were completed and sent to GM (Tarbela) for information CMTL has been requested for flat jack testing in adit.

Existing road to Palas Nullah

Palas Valley Hydropower Project

Palas valley is located on Chor Nullah, which is a left tributary of Indus river, 12 km upstream of Patan town in Kohstan District, NWFP and 335 km from Islamabad. The salient features are: Installed capacity 621 MW, Gross head 757 m, Design discharge 101 m3/s, Annual energy 2458 million KWh.

The Government of Pakistan has approved the Project for feasibility study at a total cost of Rs.196.684 million inclusive of FEC 113.888 million. Feasibility study is being carried out under KFW grant of Euro 5 million. Government of NWFP gave consent on August 19, 2005 to carry out feasibility study.

Consultancy agreement between WAPDA and Joint Venture comprised ILF of Germany (Lead Firm), POYRY and ACE was signed on July 29, 2006. Ranking of all potential sites in Palas Valley shall be carried out first of all. Thereafter feasibility study of ranked first site shall be carried out.

The consultants submitted the inception report on November 11, 2006. Comments of POE, HPO, WAPDA and general consultants on the inception report were forwarded to the consultants. POE meeting with WAPDA and consultants to discuss the inception report an up to date progress was held on January 22, 2007 in Frankfurt, Germany.

As per Phase-I Study, Lower Palas Scheme 621 MW is ranked first to be studied to feasibility level. The other identified projects are 398 MW Middle Palas and 157 MW Upper Palas. KfW of Germany has agreed in principal to involve in studies to Phase-II, Feasibility level of Lower Palas Scheme 621 MW for which the consultants have started the studies work. The PoE after visiting site and meeting with WAPDA and PSHC submitted their detailed report on May 30, 2008 to WAPDA, KFW and PSHC. Survey, Investigation, Socio-economic & Environmental studies have been started at site. Phase-II: Feasibility study will be completed in March 2009.

Spat Gah Hydropower Project

Spat Gah is located at a left tributary of Indus River located 8 km downstream of Dasu town, 35 km upstream of Patan town in Kohistan District, NWFP and 374 km from Islamabad. The salient features are: Installed capacity 567 MW, Gross head 740 m, Design discharge 103 m3/s, Annual Energy 2394 million KWh.

The Government of Pakistan has approved the project for feasibility study at a total cost of Rs.177.711 million inclusive of FEC 94.976 million. Feasibility study is being carried out under KFW grant of Euro 5 million. Government of NWFP gave consent on August 19, 2005 to carry out feasibility study.

Consultancy agreement between WAPDA and Joint

Venture comprised ILF of Germany (Lead Firm), POYRY and ACE was signed on July 29, 2006. Ranking of all potential sites in Spat Gah shall be carried out first of all. Thereafter feasibility study of ranked first site shall be carried out.

The consultants submitted the inception report on November 11, 2006. Comments of POE, HPO, WAPDA and general consultants on the inception report were forwarded to the consultants. POE meeting with WAPDA and consultants to discuss the inception report and up to date progress was held on January 22, 2007 in Frankfurt, Germany.

As per Phase-I study, Lower Spat Gah Scheme 567 MW is ranked first to be studied to feasibility level. The other identified projects are 489 MW Middle Gabarband Gah and 252 MW Upper Spat Gah. KFW of Germany has agreed in principle to involve in studies to Phase-II, feasibility level of lower Spat Gah Scheme 567 MW for which the consultants have started the studies work. The PoE after visiting site and meeting with WAPDA and PSHC submitted their detailed report on May 30, 2008 to WAPDA, KFW and PSHC. Survey, Investigation, Socio-economic & Environmental studies have been started at site. Phase II: Feasibility study will be completed in March 2009.

Lawi Hydropower Project

The project is located in district Chitral of NWFP on the river Shishi near Lawi village, about 2 km upstream of Drosh town and at a distance of 165 km from Chakdara. Chitral is 381 km from Islamabad. Salient features of the Project are: Installed capacity is 70 MW, Design discharge 20 m3/sec, Gross head 413 m and annual energy 303 million KWh..

PC-II of the project was approved by CDWP on March 22, 2004 for Rs.90.585 million to carry out the feasibility study.

The Project has been taken up by HPO, WAPDA from September 2005 for preparation of feasibility study through Barqaab, local experts.

The first draft of the report has been completed and sent to GM (P&D) Water, WAPDA for circulation to WAPDA's Standing Review Committee so that they may review the same and offer their comments. Comments from GM (TS) have been received and replies are being prepared. Secretary of WSRC has been requested to arrange the meeting at the earliest.

BASHO HYDROPOWER PROJECT

The project is located along 1 km lower stretch of Basho Lungma, a left tributary of Indus River about 40 km of Skardu town. Salient features of the project are: Installed capacity 28 MW, Gross head 949 m, Design discharge 3.5 m3/sec, Annual energy 135 million KWh.

Feasibility study was completed by HPO, WAPDA in collaboration with GTZ of Germany. PC-II for detailed engineering design and preparation of tender documents has been approved by CDWP in its meeting held on November 27, 2006 for Rs.91.234 million. For appointment of consultants, technical evaluation of the proposals has been discussed in Authority meeting held on December 04, 2007. The Authority has decided to re-float the tender internationally to ensure participation and appointment of foreign as well as local firms for preparation of detailed engineering design and tender documents. Seven firms/joint ventures submitted their EOI documents for pre-qualification. Evaluation of EOI documents has been completed and approved by Member (Water). Draft RFP has been completed and issued to pre-qualified firms/JV after vetting by CCC. Five firms/joint ventures submitted their proposals on closing date. Evaluation of technical proposals is in progress. Study will be completed in18 months.

PHANDAR HYDROPOWER PROJECT

The project area is located between Pander Lake and Chhashi Gol, near the Chhashi village on the right side of Ghizar River in Ghizar District of Northern areas. Phandar lake is located about 160 km north-west of Gilgit town and 772 km north of Islamabad. Salient features of the project are: Installed capacity 80 MW, Design discharge 40 m3/sec, Gross head 237 m and annual energy generation 350 million KWh.

Feasibility study was completed by HPO, WAPDA in collaboration with GTZ of Germany. PC-II for detailed engineering design and preparation of tender documents has been approved by CDWP in its meeting held on April 30, 2007 for Rs.120.376 million. In the light of decision taken in Authority meeting held on December 04, 2007, the tenders were re-floated internationally to ensure participation and appointment of foreign as well as local firms for preparation of detailed engineering design and tender documents. Seven firms/joint ventures submitted their EOI documents for pre-qualification. Evaluation of EOI documents has been completed and issued to pre-qualified firms/JV after vetting by CCC. Five firms/joint ventures submitted their proposals on closing date. Evaluation of technical proposals is in progress. Study will be completed in18 months.

THAKOT AND PATAN HYDROPOWER PROJECTS

PC-II Proforma for feasibility studies of two projects on Indus river has been initiated. Thakot and Pattan Hydropower Projects would utilize he Indus river potential from tail end to Dasu Dam. Thakot and Pattan Projects would be studied for estimated capacity of 2800 MW each.

EXTENSION OF HYDROLOGIC NETWORK (EHN)

Hydro-meteorological data is of primary importance and mandatory for planning of hydropower projects. For

Bunji Hydropower Project site

the year 2007-08, eleven EHN stations were maintained by Surface Water Hydrology Project (SWHP). In total 360 flow measurements and sediment sampling staff gauge readings were taken during the reporting year.

The approval for continuation of EHN stations for the year 2008-09 is being arranged through Member (Power) under O&M budget.

DAMS INVESTIGTION DIVISION (DID) WAPDA LAHORE (HPO)

Dams Investigation Division (DID) under HPO, WAPDA carried out total drilling of 5,885 m for Diamer Basha Dam, Dasu Bunji, Golen Gol and Kohala Hydropower Projects during the year under report.

TOPOGRAPHIC AND MAPPING (T&M) DIVISION WAPDA PESHAWAR (HPO)

T&M division carried out topographic survey for Diamer Basha Dam, Dasu and Bunji Hydropower projects during the corresponding period.

Work in progress on Neelum Jhelum Hydroelectric Project

NEELUM JHELUM HYDROELECTRIC PROJECT

The Neelum Jhelum Hydroelectric Project (NJHEP) has been undertaken as a part of WAPDA's Vision 2025 Programme. The project is major milestone in hydropower generation. It has earned implementation priority in hydropower sector due to its location and the fast growing future power requirements of the country. The project on completion will not only greatly help in mitigating the rising parity of Thermal Versus Hydro in power generation sectors in Pakistan but will also provide an inexpensive source of electricity and give relief to the consumers on existing power tariff.

Salient Features

Dam type	Concrete Gravity
Storage capacity	Storage Volume 8.0 mill. Meter3
Height/Length	47/140 meters
Tunneling (Total 47 Km)	Two each of dia; 7.3 meter 15 km long, One; dia; 9.6 meter 17 km long (Total 47 km)
Installed Power Capacity	969 MW, Four units, @ 242 MW each
Annual Energy	5.150 Billion Electricity Units
Average Head	420 Meters
Design Discharge	280 Cumecs

Power house connected to National Grid by 2 x 500 KV circuit line to Rawat Grid

Feasibility Study

The feasibility study and engineering design of the project was done by M/s Norconsult and Norplan of Norway. The PC-I of the NJHEP was approved by ECNEC in February 2002 at a cost of Rs.84.5 billion with FEC equivalent to Rs.46.66 billion. The detailed engineering and design of the project was prepared by a Joint Venture of M/s NESPAK and Norconsult.

The Project

The project envisages diverting the Neelum river water into tunnel passing through a power house to generate 969 megawatts electricity before out falling into the lower limb of Jhelum River. The total annual generation is expected to be over five billion KWH electricity units at a nominal cost of Rs.3.00 per unit. The overall cost of project is estimated at about 130 billion rupees including a foreign exchange component of Rs.46.5 billion. The project will be implemented over a period of eight years.

Location

The NJHEP is located at latitude 34-20N and longitude 73-40E, in vicinity of the Muzaffarabad, Azad Jammu and Kashmir. The Dam and tunnel intake is at an elevation of 1100 masl, near Nauseri 41 km north of Muzaffarabad city. The power house of the project is at Chattar Kalas, 22 km south of Muzaffarabad near Kohala.

Tendering for Construction and Award of Contract

The initial two ICB tendering/biddings for the project on the basis of "Supplier's Credit" remained successful. ICB tenders were re-invited for the third time in July 2006 after the ECC decision for invitation of bids on the basis of "Buyer's Credit". Three responsive bids were received which were thoroughly scrutinized and evaluated for technical viability.

After finalizing the bid evaluation process the construction of the NJHEP Project has been awarded on July 7, 2007 to the consortium of M/s China Gezhouba Group Company and China Machinery Export Corporation at a cost of Rs.90.9 billion. Construction Agreement was signed on December 19, 2007. Letter of Commencement was issued on January 30, 2008. Contractor is mobilizing (August 2008) at site. Preparatory works and construction of Contractor's camps at Nosadda & Chatter Kalas are in progress.

Project Consultancy for Engineering, Design & Construction Supervision

Neelum Jhelum Consultants (NJC), a Joint Venture comprising MWH International Inc., USA, NORPLAN A.S., Norway, National Engineer Services Pakistan (Pvt.) Limited, Associated Consulting Engineers ACE (Pvt.) Limited, National Development Consultants of Pakistan, have been selected for engineering design and supervision (EDS) as Project Consultants. Consultancy Agreement was signed on May 15, 2008. Letter of Commencement was issued on May 16, 2008. Services have been started since June 03, 2008.

The project will be completed in 93 months.

Land Acquisition

The project envisages acquisition of approximately 2400 kanals of private and State land in the project area in Muzaffarabad District.

So far WAPDA has transferred Rs.705 million to Government of AJ&K as provisional cost of the notified private and state land.

WAPDA has taken possession of 80 percent (up to August 2008) land, remaining is under progress.

Organization and Financing Arrangement

The Government of Pakistan has approved the following administrative and financial arrangement for project:

- Established Neelum Jhelum Hydropower Company for project implementation

- Levy of Neelum Jhelum Surcharge on power tariff for NJHEP @ 10 paisa per unit, providing for 50 percent fund requirements.

Figures In Million Rupees

Financial Status	Local	Foreign	Total
Approved PC-I Cost (under Revision)	*37,835	46,667	84,502
Expenditure up to 30.06.2007	1087	-	1087
Expenditure FY (2007-08)	1727	-	1727
Upto date Expenditure	2814	-	2814

Financial Progress 4% (Mobilization Advance)
Physical Progress 1% (Preparatory Works)

- Balance equity to be arranged through loans, sukuk bonds or purchase from market etc.

As per decision of the GOP, the Neelum Jhelum Hydroelectric Project (NJHEP) is being implemented through establishing the Neelum Jhelum Hydropower Company WAPDA, headed by a Board of Directors. The Chairman of the BOD is Chairman WAPDA, Members of WAPDA Authority and three General Managers are Members. The Chief Engineer/Project Director has his office at Muzaffarabad (AJ&K).

FEC Arrangements

Various international and local financing institutions have shown interest in financing of the project. Negotiations and discussions were held with various financers and banks for financing the foreign exchange component of NJHEP. These included M/s YRM Investments of USA, Citibank, China EXIM bank, M/s Paribas of Paris, Qatar and Kuwait Fund delegations and some local schedule banks of Pakistan.

Indus Basin Irrigation System

Pakistan has agrarian based economy. It has one of the largest contiguous irrigation systems in the world, which is fed by Indus River and its tributaries. The Indus Basin Irrigation System comprises two large reservoirs, 17 barrages for diverting river water into canals, 12 inter river link canals and 46 independent canal commands delivering water to farmlands. The WAPDA controls the operation of reservoirs whereas the operation of barrages is controlled by the Provincial Irrigation Departments.

A Water Apportionment Accord (WAA 1991) exists for distribution of Indus basin waters among the provinces. The Indus River System Authority (IRSA) was established for ensuring distribution of Indus water to be in accordance with WAA 1991. IRSA finalizing the apportionment of water to the provinces as per WAA-1991 and passes decision to the regulating authorities for water releases at dams and barrages. Water into irrigation system is regulated as per decisions of IRSA at dams and barrages being operated/controlled by WAPDA and Provincial I&P department. However, there is no mean of verification of compliance of IRSA decision.

Control Room of Telemetry System at Chashma Barrage

Need for Telemetry System and Approval by ECNEC

There have been growing and repeated complaints by the provinces of misreporting of actual flows/discharges by the local barrage authorities to IRSA. There was no system of verification that instructions of IRSA regarding water distribution have been complied correctly by the local barrage operating authorities. Accordingly a project proposal for installation of a telemetry system on IBIS was submitted by IRSA to Government of Pakistan. In May 2002, the PC-I for the Telemetry Project for Indus Basin Irrigation System (TPIBIS) was approved by ECNEC at a cost of Rs.450 million and also decided that the Project be executed by WAPDA and handed over to IRSA for operation and maintenance (O&M) and that IRSA should build its capacity for O&M.

The Project Features

The Telemetry System has been installed at 24 locations of the Indus Basin Irrigation System for providing real time (on line) information of flows at the dams and barrages minimizing the human interference in data acquisition, its processing and transmission for monitoring at 9 locations by the stakeholder i.e. MoW&P, IRSA, PID's and WAPDA.

The amount of flow/discharge through a dam/barrage is calculated at the respective dam or barrage site by reading the essential parameters of flow equations through electronic sensors. The telemetry system/network comprises about 2,600 electronic sensors for measuring water levels and gate positions at the remote sites that provide the information instantly through programmable logic controllers to the computers for processing and transmission to the main and other monitoring sites (stakeholders) in real time round the clock. The discharge data of the IBIS from the telemetry system is also available on the internet at the Web site www.ibts.gov.pk.

Project Execution and Operation & Maintenance

The TPIBIS was executed by WAPDA through a contract with M/s Seimens Pak Engineering Ltd. at a cost of Rs.285 million. The project on completion and testing was handed over to IRSA for O&M in September 2004. However, IRSA could not build required capacity for the O&M of the system. Therefore, due to improper O&M, the telemetry system did not perform to expectations and various problems cropped up. After the inspection of the system by the Chairman, Prime Minister Inspection Commission (PMIC), entrusted the O&M of the telemetry system to WAPDA. Accordingly, a new organizational set up has been established by WAPDA under the Superintending Engineer TPIBIS. The main monitoring site of the telemetry system is located at the premises of CMTL, WAPDA, Raiwind Road, Lahore.

Appraisal by International Consultant

For checking the authenticity of telemetry data, IRSA started comparing it with data of the existing manual system. As per PC-I, the manual data was declared unreliable in the first instant on numerous counts. To resolve the issue, the MoW&P has appointed an

Chashma Jhelum LInk Canal

International Consultant of World Bank for appraisal of the system and suggesting measures for making the data acceptable by stakeholders. The International Consultant has inspected the system in June 2007. The main overall observation of the International Consultant is that the equipment, technology and system are adequate to the task. He has suggested certain improvements in data handling procedures of the Telemetry System to make the data more authentic and reliable for the stakeholders. Accordingly two working groups namely Co-operative Data Comparison Working Group (CDCWG) and Co-operative Technical Issues Working Group (CTIWG) have been framed which are functioning.

INTERNATIONAL SEDIMENTATION RESEARCH INSTITUTE, PAKISTAN (ISRIP)

ISRIP's objective is to undertake research to manage sediment load through field measurements, laboratory analysis and data processing using modern techniques. ISRIP is also acting as services providing organization and self-sustaining by generating the requisite funds through deposit works. During the report year, ISRIP carried out the following assignments entrusted by WAPDA formations, federal and provincial governmental organizations and consultants:

Continuation of Monitoring of LBOD System

To evaluate the impact of drainage system provided under the Left Bank Outfall Drain System, detailed monitoring of the project was required to be carried out after completion as per recommendation of the World Bank. Under the assignment, ISRIP is carrying out monitoring of canal deliveries, surface drains flows, morphological observations of spinal drain, sediment and water quality measurements in canals and drains, ISRIP is still engaged in monitoring programme.

Remodeling of Chashma Jhelum Link

Chashma Jhelum Link is being remodeled due to sloughing and erosion at different locations especially in its lower reaches. Seepage from C.J Link has also caused severe waterlogging in the areas lying along its both sides from RD 160 to 215. In connection with the feasibility study for establishing the causes for waterlogging and remedial measures along C.J. Link, condition survey for the canal, existing tubewells/pump stations and surface drains was required to be carried out. For this purpose, Chief Engineer (P&I) WAPDA approached ISRIP for carrying out the following scope of work:

i) Condition survey of the existing tubewells, pump stations and surface drains.

ii) Boil sampling downstream head regulator of C. J. Link.

iii) Systematic water and sediment discharge observations (Equilibrium Experiments) to measure/compute velocities, roughness and other key hydraulic parameters and

sediment load by Modified Einstein Procedure (MEP) at selected sties.

iv) Cross-sectional measurements and bed material sampling.

v) Longitudinal water surface and bed profiles observations to monitor meandering bars, freeboard and other hydraulic conditions.

vi) Inflow-outflow measurements to estimate seepage.

vii) Laboratory analysis of sediment samples for sediment concentration and particle size gradation.

ISRIP completed the assignment.

Bunji Hydropower Project

In connection with the pre-feasibility study of Bunji Hydro Power Project, the General Manager (Hydro) Planning WAPDA approached International Sedimentation Research Institute, Pakistan (ISRIP) to carry out the following assignments:

i) Sediment and Bed Transport Sampling of Indus River at Ganji Bridge

ii) Hydrographic survey of Bunji Reservoir area U/s of Shangus village

iii) Sediment sampling at Ganji Bridge and downstream of the dam site – D2c.

ISRIP is still engaged in field activities.

Hydrographic Survey of Chashma Reservoir

Chashma is the largest Shallow water reservoir in Pakistan. The area of the reservoir is about 140 sq. miles (88900 acres). Initially the barrage was designed for gross storage capacity of 97,000 acre – feet at conservation level of 649,000 feet (SPD).

In order to assess the present condition/functioning of the reservoir, Executive Engineer, Chashma Barrage approached ISRIP for carrying out hydrographic survey of Chashma reservoir to evaluate storage capacity. Field work is in progress.

Discharge Measurement of BRBD Canal

In connection with the water distribution, Executive Engineer, Punjab Irrigation Department, Lahore contacted ISRIP to conduct flow measurements at certain locations of BRBD canal and completed the discharge measurements.

SCARPS MONITORING ORGANIZATION (SMO)

Regular Work

Major activities of SCARPs Monitoring Organization (SMO) emcompass to Hydrologic Monitoring (DTW), Water Quality and Soil Salinity Monitoring under the study titled "Land and Water Monitoring/Evaluation of Indus Plain" generating valuable data as detailed below:

Hydrologic Monitoring Activities

A total of 12,874 depth to water table (DTW) points were observed in the entire Indus Basin Irrigated areas during pre and post-monsoon in the fiscal year. 100 Nos. piezometers were installed in Balochistan.

Analysis of Soil and Water Samples

A total of 8,836 soil and 4,597 water samples were collected/provided by SMO staff and private agencies were analyzed in SMO laboratories and analytical results provided to concerned agencies.

Water Quality Monitoring Section

A total of 3,711 water samples were collected from private tubewells, canals, drains, rivers, lakes and ponds and submitted to water laboratory for analysis.

The following three ground water quality reports have been released:

i. Publication on Water Quality of selected drains of Pakistan issued as SM-300.

ii. Water Quality of Cholistan issued under publication No.SM-301.

iii. Ground and Surface Water Quality of Indus Plain (2006-07) under process.

Salinity Survey

Soil salinity survey was completed in Rayya Branch, M.R. Link, CBDC canal commands covering 3.064 million acres and 8,314 soil samples were collected for surface and profile salinity appraisal.

Soil salinity survey report of Lower Jhelum and Rohri North Canal commands were published under Publication No.S&R-59 and 60 respectively whereas draft reports for Rayya Branch, M.R. Link, Central Bari Doab Canal (CBDC) and Rohri South canal commands and data volume are in progress.

INTERNATIONAL WATERLOGGING AND SALINITY RESEARCH INSTITUTE (IWASRI)

International Waterlogging and Salinity Research Institute (IWASRI), WAPDA was established to manage and coordinate the research pertaining to waterlogging, salinity, drainage and related fields. The institute continued with its research in collaboration with international and national organizations.

Research work under the approved PC-II on eight on-going research studies continued. The institute published

its Annual Report highlighting progress on various research studies. Six internal reports and 15 technical research papers were also published during the year. Some of the major research activities undertaken are summarized below:

USE OF SALINE LAND FOR DEVELOPMENT OF COMMUNITY LIVELIHOOD (CROPS, GRASSES TREES, FISH-PONDS, LIVESTOCK AND HONEY BEES ETC)

Approximately 6.3 million hectares of land in the Indus Basin irrigation system, having arid and semi-arid climatic conditions, has given rise to the problem of waterlogging and salinity. Since these areas are generally unfit for most of the crops, special attention is required for exploration of the potential alternatives that ensure the food security, poverty reduction, improvement of environment and livelihood.

Growing of salt tolerant crops, trees, grasses and saltbush is the best mean of long-term salinity management. Economically unacceptable and almost impossible to reclaim soils can also be resorted for some non-conventional uses e.g. fish farming, agriculture and livestock etc.

Objectives:

i. Management of saline soils for traditional agriculture i.e. crops, trees and grasses;

ii. Management of saline soils for some non-traditional agriculture i.e. fish farming, apiculture and livestock production;

iii. Ensure livelihood and income to the farmers of salt affected areas, and

iv. Economic evaluation and potential of different alternatives for handling the salt-affected soils.

DETERMINATION OF CANAL LINING LIFE

Lining of irrigation system is very expensive, therefore, before making a huge investment on lining there must be clear idea of the benefits to be obtained. Operational water channels practically suffer heavy wear and tear caused by the adjoining settlements, plants and animals as well as wetting and drying process due to canal closure. In waterlogged areas during canal closure the high watertable exerts hydrostatic pressure on lining, which results in cracking and breakage of lining. The effective life of the lining is dependent on type of construction material, workmanship and level of O&M. The main objectives of this ongoing study are to evaluate the effective life of different types of linings comparing the hydraulic performance and seepage reduction by lined canals and to prepare recommendations for future canal lining projects.

Objectives:

i. To prepare inventory of lined canals and distributaries in Pakistan and evaluate the present condition of canal linings,

ii. To analyze the causes of deterioration of various types of lining in different operational conditions and report the problems affecting the life of lined canals in Pakistan;

iii. To study the hydraulic performance of lined canals in terms of water availability, equity conditions, silt deposition and maintenance requirements and their relationship with canal lining life;

iv. To determine the effective life of lining; and

v. To prepare recommendations for improvements in design, construction procedure and O&M for future canal lining projects.

DEVELOPMENT OF NATIONAL RESEARCH AGENDA

To prioritize the research, an effort is being made to update the national research agenda. In 1989, IWASRI developed the first 5-year National Research Agenda (NRA) on waterlogging and salinity in Pakistan for the mid-term. Local and international experts evaluated current problems on waterlogging and salinity. The NRA was adopted through consensus. It was revised in 1996 to serve as a guide for integrating the on-going research and organizing future initiatives by discrete Research Programmes that would be most responsive to research needs in the country. The agenda is now in need of updating to reflect the current strategies on waterlogging, salinity and environmental issues so that the research has to be responsive to the national development objectives.

Objective:

To update National Research Agenda on waterlogging and salinity problems, with greater emphasis on environment and social aspects and focus on long-term issues.

SUSTAINABLE RE-USE AND DISPOSAL OF DRAINAGE EFFLUENT

The problems of waterlogging, salinity/sodicity and inadequate supplies of good quality water are not only threatening the potential sustainability of agricultural production but day by day further aggravating with growing intensity. The large-scale drainage projects were executed to control the problem of waterlogging and salinity; and augment the inadequate water supplies. The effluent of most of the drainage schemes, implemented so far, is being used to supplement the irrigation water after mixing and also being disposed off into rivers/streams. It is important to reduce the drainage effluent by promoting local use after adopting the appropriate technology. There is an imperative need to study the possibilities of using brackish drainage water for crop production, reclamation of salt-affected lands, and improvisation of the abandoned lands and reduction of disposal pressure of the drainage water.

Objectives:

i. Efficient use of drainage water for growing salt tolerant crop cultivars and tree species.

Saline land

ii. Monitoring long-term effects of drainage water on soil characteristics and environment.

iii. Environmentally safe use of effluent.

iv. Access to reduction in drainage requirements through promotion of local use.

ROLE OF EFFECTIVE MICRO-ORGANISMS (EM) TECHNOLOGY IN SOIL RECLAMATION AND CROP PRODUCTION.

Salt-affected soils are generally deficient in organic matter and plant nutrients. The deficiency of these plant essentials can be overcome by adding organic matter and chemical fertilizers or by increasing the availability of nutrients through micro organisms. Although the Effective Micro-organism (EM) Technology is getting popularity among farmers, but the farmers still have some concerns about the efficacy and potential of this material over other sources. This study has been planned to evaluate the role of EM in soil reclamation, impact on release and availability of plant nutrients and better crop production.

Objectives:

1. Evaluate the efficiency of EM-material on physical and chemical properties of soil.

2. Evaluate efficiency in increasing crop production.

3. Evaluate economics of different treatments.

CHANGE IN WATERLOGGING DUE TO DROUGHT IN THE INDUS BASIN AND ITS IMPACT ON CROP YIELDS

For the last 6-7 years, i.e. from 1999 to 2005 drought conditions are being faced in Pakistan due to which water table has significantly receded in the waterlogged area because of less rainfall. Canal supplies were reduced significantly during this period, which were not sufficient for the crops requirement. The fresh groundwater SCARP tubewells have been transferred to the beneficiaries in private sector. Usable groundwater is also being pumped out by the farmers to meet with the crop water requirements in non-SCARP areas. The private sector is not only pumping usable water but marginal quality water is also being pumped for irrigation purposes, which spoil the fertile lands and also affects the crop yields. This study is being conducted with the following objectives:

Objectives:

i. To quantify the decrease in canal water supplies and increased use of marginal and low quality ground water;

ii. To check the impact of drought on waterlogging and crops yields in Indus Basin, and

iii. To disseminate the research results to the end users.

Mona Reclamation Project

RAIN WATER HARVESTING IN BARREN/SALINE AND NORMAL LANDS

Agricultural production is under stress due to shortage of water. The surface runoff is mainly generated from barren lands in the irrigated and rain fed areas. It generates quick peak flows in the drains and nullas and causes flood damages. As watertable is dropping in various canal commands, it is required to harvest the rainy water from these barren lands to recharge the aquifer and utilize it for agro-forestry and crop production.

Objectives:

i. To observe the possibility of rainwater harvesting in barren lands;

ii. To study the possible uses of rain water for soil reclamation, aquifer recharge and growing crops/trees,

iii. To study the impact of rain water harvesting on drain discharges, and

iv. To prepare recommendations for rainy water harvesting.

EVENTS OF THE YEAR

1. IWASRI Technical Committee's 21st Meeting was held on July 17, 2007 in IWASRI Committee Room, in which IWASRI, Mona and LIM Projects' Annual Work Plans for the year 2007-08 were approved.

2. IWASRI organized eleven in-house seminars from time to time during the year under report.

3. A class of 35 students of Civil Technology, Government College of Technology, Multan visited on April 16, 2008. They were briefed about IWASRI research activities.

4. IWASRI researchers participated in a number of national and international seminars and presented research papers.

5. Reports of the following research studies of national importance were published and widely circulated to various R&D institutions:

i) GIS and Image Processing for the Study "Soil Salinity Survey of Irrigated areas of the Indus Basin. Report No.275.

ii) Institutionalized Environmental Monitoring of Land and Water Conditions. Report No.277.

iii) IWASRI Annual Report 2006-07. Report No.281.

MONA RECLAMATION AND EXPERIMENTAL PROJECT

Mona Reclamation Experimental Project (MREP), WAPDA, Bhalwal is conducting applied research for the optimum management of available land and water resources, soil reclamation, brackish groundwater,

groundwater hydrological studies and dissemination of developed technologies with the objectives to increase agricultural production.

Objectives:

The following are the broad objectives of the project:

1. Development of methods to achieve effective use of water and land, reclamation of saline land and agricultural development

2. Detailed groundwater studies to determine the effect of groundwater management, water quality changes and efficient use of water supplies

3. Management of usable water supplies

4. Determining optimum cropping input-output relationship

5 Transferring knowledge to farmers and inducing as application.

The research studies are being executed under the approved PC-I. Twelve studies have already been completed. The work on the following research studies is in progress.

i. Crops yield and water use efficiency as influenced by irrigation management

ii. Impact of organic manures on crop yield and water uses efficiency

iii. Role of tillage and amendments for sustainable rice-wheat cropping system in fine textured non saline-sodic soils

iv. Performance evaluation of promising wheat and sugarcane strains under shallow watertable conditions

v. Performance evaluation of design parameters, maintenance standards and the impact of surface drainage system in Mona Project command area

vi. Evaluation and monitoring of groundwater quality and watertable flux after the transition of SCARP tubewells in Mona Project command area

vii. Dissemination of Mona's research findings and developed technologies to end-users

viii. Socio economic survey of rural communities in Mona Project area

ix. Community based approaches for rainwater harvesting

x. Impact of water management extension on crop production in a watercourse command area

xi. Water and Salt Balance in Chaj Doab

xii. Evaluation of salt tolerant crop cultivars under different salinity levels

xiii. Mitigating the effects of brackish irrigation water to control secondary salinization

A large scale research dissemination programme including seminars, farmer's days and distribution of Urdu brochures has been planned to create awareness among the farmers.

LOWER INDUS WATER MANAGEMENT AND RECLAMATION PROJECT (LIM)

LIM Project since 1980 is conducting field oriented research on modest scale to develop technologies for the optimum use of land and water resources. LIM Project carries out research activities in the Lower Indus region on the farmers' fields through its four sections i.e.Agronomy, Agricultural Economics, Soil & Water Quality and Water Management & Hydrology.

Broad objectives of LIM are given as under:

i. Management, waterlogging, salinity and soil reclamation in association with the farmers.
ii. To use saline groundwater to investigate solutions through research and demonstration related to water for soil reclamation and crop production.
iii. To determine optimum crop input-output relationship.
iv. To evaluate economic feasibility of tested technologies.
v. To develop expertise for applied research in irrigation and drainage for sustainable environment.
vi. To disseminate research findings to the end users for application.

LIM Project has published 56 research reports, 84 internal reports (including annual reports, status reports, annual research work plans, project briefs and research proposals etc.) and 20 technical papers.

The following research studies have been completed during the corresponding year.

i. Irrigation and Cultural Practices for Soils being irrigated with Marginal Quality Water
ii. Effect of farm drainage on crop production
iii. Identification of constraints for crop production: A case study
iv. Economics of Sugar Mill Waste used as Soil Reclament
v. Land, water and environment data base of Sindh
vi. Effect of high Ca/Ma Ratio Waters on Soil Conditions and Crop Production
vii. Performance evaluation of sub-surface drainage system

Work in progress on Greater Thal Canal Project

WATER DIVISIONS

WAPDA's Water Divisions are executing "Fast Track" basis projects under Vision 2025 Phase-I Programme as well as Surface Water Projects already in hand.

WATER DIVISION (CENTRAL)

GREATER THAL CANAL PROJECT

The project is a part of WAPDA's Vision 2025 Programme for Development of Water Resources. The project area lies in the eastern part of Thal Doab in Punjab Province.

Main Canal off-takes from RD 180+222 of Chashma Jhelum Link Canal. The command area falls within the boundaries of Bhakkar, Layyah, Khushab and Jhang districts.

The main objective of the project is irrigated agriculture development, self sufficiency in Agriculture, socio-economic uplift of the area and conservation of environment

The main objective of the project is irrigated agriculture development, self sufficient in agriculture, socio-economic uplift of the area and conservation of environment.

SALIENT FEATURES

Area		
● Gross Area		1.976 Million Acres
● Cultureable Command Area		1.739 Million Acres
Irrigation Water Availability (Non-Perennial Irrigation during Kharif)		
● As per Water Accord 1991		1.873 MAF
● Additional Flood Supplies		0.624 MAF
	TOTAL	**2.497 MAF**
Main Canal		
● Capacity		8,500 Cusecs
● Length		35 Km
Branch Canals		
● Capacity		3900-1200 Cusecs
● Length		344 Km
Distributaries & Minors		
● Length		1999 Km (Partially lined)
District Wise Areas to Be Irrigated		
District	**CCA (Acre)**	**Area**
Khushab	260,820	5 percent
Bhakkar	730,296	2 percent
Layyah	504,252	29 percent
Jhang	243,432	14 percent
Total	**1,738,800**	

Status of Approvals and Cost

- PC-II costing Rs. 110 million was approved by COWP on September 19,2000.
- PC-I costing Rs.30,467 million was approved by ECNEC On February 28, 2002.
- Expenditure as of June 30, 2008 – Rs.7186.107 million

Commencement

The President of Islamic Republic of Pakistan performed Ground Breaking Ceremony on August 16, 2001.

Consultants

Greater Thal Canal Consultants Joint Venture of NESPAK/NDC/ACE/BARQAAB/EGC

Completion

The first phase of the Project is to be completed by December 31, 2008, Phase-II by December 31, 2010 and Phase-III by June 30, 2013 as per PC-I schedule.

Progress

Phase-I has 90 percent been completed.

Overall progress of the project is 23 percent.

Main canal (lined) 35 km including 5 district road bridges, 4 village road bridges, 3-humps having sub surface drainage under canal lining up to RD 32 and a drainage culvert has been completed. 8 distributaries and 3 minors directly off-taking from main canal have also been completed.

Work on Mankera branch canal and system has substantially been completed. Lining of 65 km Mankera branch canal and 40 km of Kumari distributary including 83 bridges, 8 culverts, 12 fall structures, 7 bifurcator, 3 cross regulator and 8 head regulators have been completed. Tender drawings and documents for contracts under Phase-II and III have been completed by the project consultants and submitted to WAPDA during March 2006.

KACHHI CANAL PROJECT

Kachhi Canal is one of the priority projects under WAPDA's Vision 2025 Programme. The project aims to develop about 7,13,000 acres culturable command area in fertile but barren land of Kachhi Plain in Balochistan. Total command area falls in districts Dera Bugti, Naseerabad, Bolan and Jhal Magsi of Balochistan Province. Kachhi Canal is proposed to off-take from Taunsa Barrage due to constraints of gravity supplies from Guddu Barrage. Total length of main canal is 500 km, out of which head reach of 300 km is within Punjab Province while the remaining 200 km reach and total command area is within Balochistan.

For timely completion of the project, whole project has been divided into three phases and nine contracts. The survey and investigations, detailed design, preparation of tender documents, tendering process and construction activities are running as parallel simultaneous activity. The project layout plan is shown below:

SALIENT FEATURES

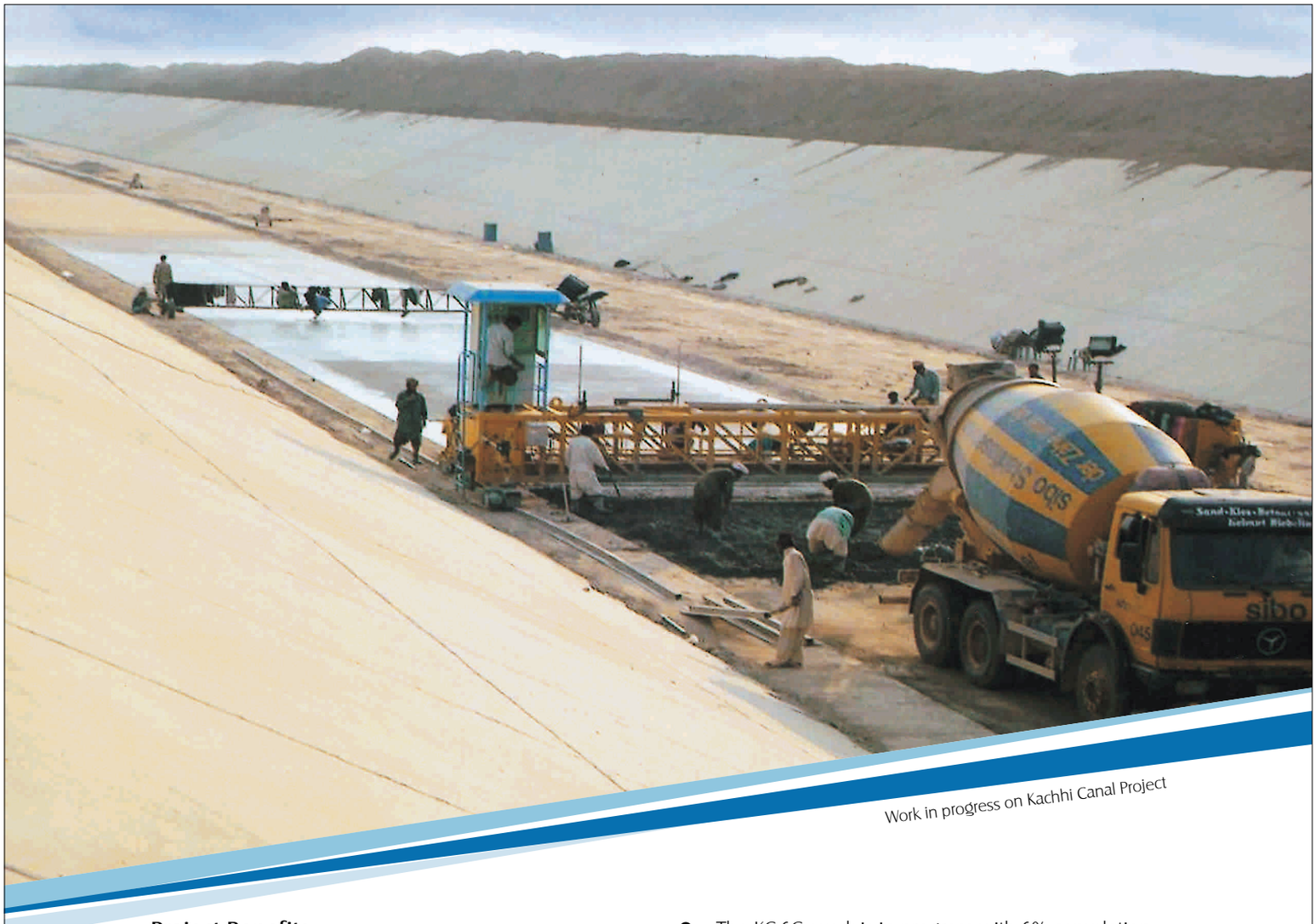
Main Canal		
-	Total length	500 Km.
-	Canal in Punjab	300 Km. (Lined)
-	Canal in Balochistan	200 Km (Unlined)
-	Peak discharge	6000 cusecs
-	Bed width (Unlined canal)	186 ft
-	Flow depth (Unlined canal)	9.5 ft
-	Top width (Unlined canal)	234 ft
-	Distribution system	1500 Km
-	Flood Carrier Channels	300 Km
-	Gross Area	1,040,000 acres
-	CCA	713,000 acres
-	Lined Canal	107 ft
-	Lined Canal	12 ft
-	Lined Canal	175 ft
Structure (Main Canal)		
-	Head regulator (at Taunsa)	1
-	Road bridges	70
-	Railway bridges	1
-	Cross drainage structures	79
-	Cross regulators	12
-	HD. Regulators (distributaries)	52
-	Water course crossings	400
-	Sui Gas Pipeline crossings	7
EIRR		**19.43%**
-	Project Funding	Government of Pakistan
-	Project Cost	Rs.31.204 billion approved by ECNEC on September 27, 2003
-	Executing Agency	WAPDA
-	Consultants	Kachhi Canal Consultants Joint Venture of NESPAK/ NDC/ACE/BARQAAB/EGC
-	Date of Commencement	04.10.2002
-	Date of Completion	31.12.2008 (Phase-I) 30.06.2009 (Phase-II) 30.06.2010 (Phase-III)
Land Acquisition		
Punjab		
·	Main canal	300 Km 12,263 Acres
Balochistan		
-	Main canal	200 Km 7,600 Acres
-	Distribution system	1500 Km 37,500 Acres

Water Availability

The Project will receive annually about 2.021 MAF water as per Water Apportionment Accord (WAA) 1991. The detail of which is as under:

- Subject to the Availability.
- IRSA approved Availability of Water on 02.09.2003.

Nature of Flows	Kharif (MAF)	RABI (MAF)	Total (MAF)
Perennial Flows	0.386	0.065	0.451
*Flood Flows	1.013	0.197	1.210
Raising of Mangla	-	0.360	0.360
	TOTAL		**2.021**



Work in progress on Kachhi Canal Project

Project Benefits

- Irrigation supplies for 713,000 acres new fertile area on RHS of Pat Feeder Canal.
- Employment opportunities
- Increase in the value of land
- Increase in exports and foreign exchange earning
- Reduction in migration from Project to Urban areas
- Increase in revenue to the Government
- Enhanced production of food grain and oilseeds
- Availability of drinking water
- Cropping intensity shall increase from existing 4% to 80%
- Agricultural benefits are estimated to be Rs.5 billion per year

Physical Progress

Contract-wise detail of physical progress is as under:

Punjab

- The KC-1 has been completed.
- The KC-2 has substantially been completed.
- The KC-3 contract tenders opened on August 22, 2007 and work is in progress with 78% completion.
- The KC-4 work is in progress with 49% completion
- The KC-5 work is in progress with 43% completion

Balochistan

- The KC-6A work is in progress with 51% completion
- The KC-6B, work is in progress with 4% completion
- The KC-6C, work is in progress with 6% completion

PHASE – II

- The KC-7, the allignment of Main Canal is 100% complete.

PHASE – III

- The KC-8, the allignment of Main Canal is 100% complete.

WATER DIVISION (SOUTH)

LOWER INDUS RIGHT BANK IRRIGATION AND DRAINAGE (STAGE-I) PROJECT

Location

The Lower Indus Right Bank Irrigation and Drainage (RBOD) Stage-I Project is located on the Right Bank of river Indus within districts of Shikarpur, Larkana and Dadu. The area is irrigated by canals off taking from right side of Sukkur and Guddu Barrage in Sindh Province.

Objectives/Benefits

The project aims at providing the much needed outfall facilities for the existing and proposed drains schemes to the Sea through RBOD-II being constructed by Army 5 corps under supervision of IPD from Sehwan to Gharo Greek. The Project will also improve the environmental conditions in Manchar and Hamal lakes which are being

Rainee Canal Project - Excavation at RD 211 + 000

deteriorated due to continuous disposal of saline drainage effluent. In addition, rehabilitation of some of the existing drainage systems in area essentially requiring timely drainage of excess water from low rice fields.

The LIRB Project Stage-I (RBOD) covers an area of 1.63 million acres under priority works, existing drainage facilities will be improved on 0.15 million acres while the remaining works cover 1.12 million acres.

The proposed works share the objectives of the agricultural sector aiming at increasing agricultural production and meeting targets of food and fiber.

The implementation of LIRB project Stage-I will result in alleviation of waterlogging and salinity problems in the project area. It will provide storm water control to reduce rice crop damage, increase the area under wheat crop and improve environmental social and economic uplift in the area and property of the population.

Scope of the Works under PC-I

The PC-I of priority works was approved in 1994 with a total investment cost of Rs.4395 million. The Project was proposed to be implemented on fast track basis with a completion period of 4 years i.e. July 1994 to June 1998. Later on completion date was extended up to June 2001 by the Ministry of Water and Power. Revised Modified PC-I costing Rs.14707.143 million with completion date up to December, 2008 has been approved by ECNEC. The priority works included in the revised PC-I are as under:-

(a) New Drainage Works

- (MNVD) RBOD Indus Link (IL-I, IL-2 and IL-3).
- Extension of RBOD (MNVD) up to Mirokhan Zero Point.
- Remodeling of MNVD

(b) Remodeling and Rehabilitation of the following existing Surface Drainage Project

- Ratodero Surface Drainage Project.
- Mirokhan Surface Drainage Project.
- Shahdad Kot Surface Drainage Project.

Latest Status

The overall progress of the RBOD-I Project till June 2008 is 75 percent. The status of the remaining works of RBOD-I Project awarded/to be awarded is briefed as under:

RBOD Indus Link

36 percent work on IL-I has been completed. The balance work shall be carried out under Contract IL-1(A). However, work s on ILs-2 and 3 are 100% complete.

Rehabilitation of Ratodero Surface Drainage Project Work on RTD-1(B) has been completed to the extent of 99 percent whereas the work on RTD- 2 & 3 is 100 percent complete.

RBOD -1 - Drain Excavation from RD 205 to RD 207

RBOD-I (MNVD) Extension to MKZP

The work was awarded on March 01, 2005 and the progress of completion work till June 2008 is 80 percent.

Remodeling of MNVD from RD 220+00 to 342+00 Cont. R-III (a/1)

The work was awarded on April 18, 2005 and the progress of completion work till June 2008 is 68 percent.

Remodeling of MNVD from RD 110+00 to 220+00 Cont. R-III (a/2)

The work was awarded on June 20, 2005 and the progress of completion work till June 2008 is 88 percent.

Remodeling of MNVD from RD 00+00 to 110+00 Cont. R-III (a/3)

The work was awarded on September 01, 2005 and the progress of completion work till June 2008 is 42.50 percent.

Widening of IL-2 & IL-3 for 3500 Cs. Contract R-1(B)

The work was awarded on December 08, 2005 and the progress of completion work till June 2008 is 65 percent.

Balance work of IL-1 including its widening Contract R-1(E)

The work was awarded on January 14, 2006 and the progress of completion work till June 2008 is 48 percent.

Rehabilitation of Miro Khan and Shahdadkot

Contract to be awarded during 2008-09.

Water Quality Monitoring Programme

Water Quality Monitoring of the drainage effluent is being carried out through Project Director, Surface Water Hydrology Lahore in consultation with consultants since 1994. Under this programme regular observations of water salinity and discharge at various key locations are being carried out to assess the impact of drainage disposal.

RIGHT BANK OUTFALL DRAINAGE PROJECT (RBOD-III) PROJECT

Project Location

Project is located on the Right Bank of River Indus. Major parts of the area lies within Districts Nasirabad and Jaffarabad of Balochistan and in District Larkana of Sindh Province.

OBJECTIVES

The main objective of the project is to provide the direly needed effluent disposal facilities for the existing and proposed drainage projects, reclaim the agricultural lands converted into the ponds of water due to lack of disposal of storm water and irrigation surplus, provide civil works and infra structure to facilitate reuse of suitable water for irrigation, improving environmental conditions and water quality in Manchar and Hamal Lakes for GCA of 287106 hectors.

Irrigation system of Mirani Dam Project

SALIENT FEATURES

1	Commencement Date	July, 2004
2	Completion Date	Original June 30,2006 Rescheduled June 30,2009
3	Gross Command Area	679000 Acres
4	Components	
	i) Hairdin Carrier Drain	Length = 44KM; Capacity = 435 cusecs
	ii) RBOD Extension from MKZP to Hairdin Pump Station	Length = 81.16KM; Capacity 785 cusecs
	iii) Construction of Irrigation Channel up to Chitti River.	Length = 15 KM Capacity 400 cusecs
	iv) Hadero Drainage Unit	Length = 126 KM; Capacity 200 cusecs
	iv) Usta Muhammad Drainage unit	Length = 113 KM; Capacity 165 cusecs
5	Project Cost	Rs. 4485.20 Million approved by ECNEC on 07 Jan 2004
6	Project Funding	Government of Pakistan
7	Executing Agency	WAPDA.
8	E.I.R.R.	12.61 percent
9	Consultants	M/s. NDC, BARQAAB and EASE Pak,
10	Expenditure up to June 30, 2008	Rs.2547.357 million (P)
11	Overall physical progress	59.50 percent
12	Overall financial progress	56.80 percent

Project Benefits

The Project will achieve the following benefits:

i. Improving environmental condition and water quality.
ii. Increasing agricultural production by way of improving cropping intensity from 113% to 125% in the project area.
iii. Increasing area under Rabi Cultivation by providing favourable timely conditions for removal of surface water.
iv. Minimizing pollution of Hamal Lake.
v. Reclamation of waterlogged areas of 6070 hectares.

Scope

The project comprises the following components:

i. Hairdin Carrier Drain Extension from Chukhi to MKZP and 6 km North of Chukhi
ii. Construction of Irrigation channel for reutilization of 400 cusecs of Balochistan effluent
iii. RBOD Extension from MKZP to Hairdin Pump Station
iv. Re-modeling of Shahdad Kot Main Drain
v Surface Drainage System of Usta Muhammad Unit.
   - Hadero Drainage Unit
   - Usta Muhammad Drainage Unit

Latest Status

The overall progress of RBOD-III Project till June 2008 is 59.50%. The status of works is as follows:

MIRANI DAM PROJECT

Mirani Dam is a part of WAPDA Vision-2025 programme, located at 40 km west of Turbat town in Mekran Division of Balochistan province.

Main Dam has been completed across river Dasht having two tributaries, Ketch river and Nihing river near Mirani village in district Ketch Turbat. It is a "Concrete faced rock fill dam" having maximum height of 127 ft, crest length of 3080 ft and reservoir capacity of 152,000 acre ft for live storage. The other components of the project comprises of a Spillway, Intake, Irrigation Conduit, Aqueduct-cum-bridge on river Dasht and a network of Irrigation Canal System which will command an area of 33,200 acres on Right and Left Banks of the Dasht river.

Description	Status up to 30-06-2008
Construction of Hairdin Carrier Drain extension from Chukhi to Miro Khan Zero Point and 6 km north of Chukhi	85 percent completed
Construction of RBOD Extension from MKZP to Hairdin Pump Station	63 percent completed
Construction of Irrigation Channel for re-utilization of 400 cusec of Balochistan Effluent from drain RD 29 km to Chitti River	59 percent completed
Construction of Hadero Drainage Unit	28 percent completed
Usta Muhammad Drainage Unit	29 percent completed
Remodelling of Shahdadkot Main Drain (RD.0+00 to RD 58+00	To be awaited

Total expenditure incurred up to June 30, 2008 is Rs.2628.806 million.

Project Benefits

On completion of the project, there will be an increased agricultural production, fisheries development, enhancement in employment opportunities, water for drinking/domestic and flood irrigation purposes. Benefit cost ratio of the Project is estimated as 12 percent.

Distribution of Canal System

Right Bank Canal

- Length of Right Bank Canal is 66268 feet
- Command area of RBC is 20800 Acres
- Capacity of Right Bank Canal is 236 Cusecs
- No. of Distributaries on RBC are four (DRI, DR2, DR3, DR4)
- No. of Minors on DR 1 are 3 and No of Water courses are 19
- No.of Minors on DR2 are 5 and No. of Water courses are 56
- No.of Minors on DR3 are 4 and No. of Water courses are 24

MIRANI DAM PROEJCT SALIENT FEATURES

Location	The Dam is located on Dasht River, about 40 km west of Turbat in Makran Division of Balochistan
Dam Type	Concrete Faced Rock Fill Dam
River	Dasht
Height	127 feet
Length at Crest	3080 feet
Spillway type	Ungated Overflow
Crest Level	244 feet
Clear water Way	600 feet
Design Capacity	205,800 Cusecs
Maximum Capacity	384,300 Cusecs
Outlet conduit dia	6 feet
Capacity	377 Cusecs
Storage	0.3 MAF
Reservoir Area	17982 Acres
Canal Capacity	377 Cusecs
Area to Benefit	33200 Acres
Cost	Rs.5811 million
Commencement Date	08.07.2002
Completion Date	30.06.2007
Contract period	5 years
Funding Agency	Government of Pakistan
Executing Agency	Pakistan Water & Power Development Authority
Type of Contract	EPC (Engineering, Procurement and construction)
Name of Contractor	M/s MDJV a joint venture DESCON leading partner
Name of Consultant	M/s NEAC a joint venture NESPAK leading partner

- No.of Minors on DR4 are 2 and No. of Water courses are 19
- Length of DR1 is 4500 feet
- Length of DR2 is 18000 feet
- Length of DR3 is 17193 feet
- Length of DR4 is 7382 feet

Left Bank Canal

- Length of Left Banak Canal is 62499 feet
- Command area of LBC is 12400 Acres
- Capacity of Left Bank Canal is 141 Cusecs
- No. of Distributaries on LBC are four (DLI, DL2, DL3, DL4)
- No. of Minors on DL1 are 5 and No of Water courses are 27
- No.of Minors on DL2 are 4 and No. of Water courses are 17
- No.of Minors on DL3 are 2 and No. of Water courses are 12
- No.of Minors on DL4 are 3 and No. of Water courses are 18
- Length of DL1 is 14984 feet
- Length of DL2 is 15728 feet
- Length of DL3 is 15714 feet
- Length of DL4 is 13871 feet

SABAKZAI DAM PROJECT

Sabakzai Dam Project is a part of WAPDA Vision 2025 Programme and being executed on fast tract basis, located at about 68 KM South-West of Zhob town and 288 KM Nortrh-East of Quetta in Balochistan.

Background

In appraisal study of Zhob River Basin in the year 1988, appraisal level study was carried out by Planning Division WAPDA wherein it was identified that site is suitable for the construction of 50 ft high storage dam. Providing a net storage of 14,500 AF equivalents to 20 cusecs of water, which will be available for irrigation. It was recommended that the project may be studied for feasibility report provided social problem of the rival tribes is resolved amicably.

Objectives/Benefits

The basic objective of the project is to store flood water, other benefits of the project are as under:-

- Irrigation supply of about 33 cusecs to over 6875 acres of land, round the year with average cropping intensity of 123 percent (present cropping intensity 20.41 percent).

- The stored water will also meet the drinking requirements of local population of over 15000 persons.

- 21.5 Km of metal laid access road up to Sabakzai.

- Extension of 11 KV transmission line up to dam site.

- Flood mitigation and reduction in annual losses to property.

- It will facilitate production of about 80 tons of fish besides boosting production of fruit, live stock and forestry.

- Development of drip and sprinkler irrigation system.
- Generation of about 250 employments annually.
- Environmental and Socio Economic uplift of the area.

Scope of Works Under PC-I

PC-1 of the project at a cost of Rs. 1010.325 million has been approved by ECNEC on September 27, 2003. The following works were included in PC-I:

i. Construction of O&M Colony and Access Road to Dam Site.

ii. Construction of Main Dam and Allied Structures.

iii. Construction of Irrigation System.

PC-I Cost

Revised PC-I of the project at a cost of Rs.1576.554 million has been approved by ECNEC.

Physical Status

The overall progress of the project till June 2008 is 98 percent. Contract wise physical status of the project is given below:-

i. Contract CZD – 01 (O&M Colony and Access Road):
Project completed on December 25, 2004.

ii. Contract CZD – 02 (Main Dam and Allied Structures):
The contract amounting to Rs. 562 million was awarded to M/s Saadullah Khan and Brothers (SKB) Quetta. Work is in progress according to Revised Work Schedule submitted by the contractor, physical progress 99.5 percent has been achieved up to June 2008.

iii. Contract CZD – 03 (Construction of Irrigation System):
The contract amounting to Rs.500 million was also awarded to M/s Saadullah Khan and Brothers (SKB) Quetta. Work is in progress according to schedule and physical progress of 95 percent has been achieved up to June 2008.

Financial Status

Financial allocation for the year under report was 200 million but the expenditure incurred to Rs.231.663 million. However, the overall expenditure up to June 2008 was Rs.1487.687 million.

Consultants

A Joint Venture of M/s NESPAK, Lahore and M/s (MWH) USA were engaged to supervise the civil works i.e. construction of Main Dam and Irrigation System.

Award of Contracts

Both the major contracts i.e. Contract SZD – 02 (Main Dam and Allied Structures) and Contract SZD – 03 (Irrigation System) were awarded to M/s SKB Quetta at a cost of Rs.562 million and 500 million respectively.

Project Officers

(i) Project Director, Sabakzai Dam Project, WAPDA, Zhob (ii) Executive Engineer, Sabakzai Dam Project, WAPDA, Zhob.

FEASIBILITY STUDIES FOR RE-DESIGN OF LBOD STAGE-I BADIN AREA DRAINAGE SYSTEM

Introduction

The prime objective of the LBOD Stage-I Project (completed in late 1990s) was the alleviation of waterlogging and salinity from an area of 1.426 million acres of Nawabshah, Sanghar and Mirpurkhas Components as well as 0.593 million acres of Badin area through implementing surface and sub-surface drainage.

During July 2003 monsoon, Badin district was hit by heavy rains of 304 mm intensity which flooded its low lying areas. The inundation of built-up infrastructure and cropped area for more than a month caused colossal damages. Scores of lives were also reported to have been lost. The local population agitated for revisiting the shortcomings of existing design of LBOD System.

The Government of Pakistan moved swiftly to address this issue and the concerned authorities were directed to prepare a proposal to eliminate woes of the low areas of Badin district. In this regard, a presentation was made to the President of Pakistan for redesign of LBOD at Governor House Karachi on 20.8.2004. The President directed that WAPDA in consultation with Government of Sindh should examine the proposal.

The basic aim of the redesign/remodeling project is to provide a permanent solution for disposal of drainage effluent into sea with a vision of accommodating future flows. A PC-II amounting to Rs.41.006 million was prepared by WAPDA in consultation with SIDA, which was approved by CDWP in its meeting held on 17.08.2006 at Islamabad.

Terms of References (TORs) for the Consultancy Agreement of the Project were framed by WAPDA in consultation with SIDA that were duly approved by the then Chief Minister of Sindh. A joint venture of NESPAK (lead firm) ACE and DMC was appointed as Consultants to carryout the feasibility studies for redesign of LBOD Stage-I, Badin Area Drainage System at a cost of Rs.29.850 million. The consultants started the feasibility studies on 5th September 2007 for completion in twelve months.

SALIENT FEATURES

Estimated Project Cost	Rs.1576.554 million
Project Start Date	01.01.2003
Project Completion Date	30.06.2008
Consultants:	National Engineering Services Pakistan (Pvt) Limited (NESPAK)
HYDROLOGY	
Total Catchment Area	699 Sq. Kms. (270 Sq. miles)
Average Annual Rainfall	344 mm (13.54 Inches)
Average Annual Flow	18.1 MCM (14700 A. Ft)
Maximum probable flood	2186m3/Sec (77207 Cusecs)
RESERVOIR	
Gross Storage	41 MCM (32700 A.Ft)
Dead Storage	22.3 MCM (18000 A. Ft)
Live Storage	18.1 MCM (14700 A. Ft)
Normal Reservoir level	1592m (SPD)
Maximum Reservoir level	1597.2m (SPD)
Dead Storage level	1587m (SPD)
DAM	
Type	Rock/Earth Fill
Maximum height	34.75m
Length at Crest	395m
Top width	10m
Crest Elevation	1599.6m
SPILLWAY	
Type	Ogee type
Crest level	1592m
Width	68.46m
Maximum design capacity	16.30m3/Sec (57562 Cusecs)
IRRIGATION SYSTEM	
Type	Gravity Lined Channels
Command Area	
- Right Bank Canal	2806 Acres (length 23 KM)
- Left Bank Canal - I	4069 Acres (length 17 KM)
- Left Bank Canal – II	
Total	6875 Acres
Present Cropping Intensity	20 percent
Average Cropping Intensity after completion of project	109 percent

Terms of Reference of Consultants

i. To examine the existing and required surface and subsurface water drainage capacity of the present system of LBOD outfall drains and its collector and new constructed drains.

ii. To examine the existing and required outfall potential of the system with respect to considering the recent development.

iii. The system needs to be enhanced in order to carry out taking saline and storm water in the event of maximum rains.

iv. Estimation for upcoming maximum saline effluent and storm water to handle under worst scenario (historical rainfall intensity/over 300 mm rainfall) and evacuation of storm water should be possible within a maximum period of five/three days.

Sabakzai Dam

v. To determine all deficiencies in the system in relation to the desired capacity of the system.

vi. The other options for disposal of the drainage effluent/surface runoff through an outfall aligned in a North-South direction may also be considered, because one reason for failure of the tidal link is its alignment in an East-West direction.

vii. Impact of Sea intrusion and suggest the appropriate structure with value, flap and automatic gates etc at suitable place and related items of work necessitated to stop further scouring/intrusion of sea water in between RD to RD (-)22 of KPOD. Also improvement of Dhand eco system.

viii. Analysis of the present lines/alignments of outfall drains and study of pre-inception of LBOD and natural drains/Dhoras and suggests the best option to carry the storm/saline effluent smoothly into sea.

ix. Analytically determine parameters for redesigning of the entire LBOD Stage-I system and maximum permissible effluent and run-off recommended to be handled by the system.

x. Analysis financial effects of various options highlighting the recommended option in relation to benefits.

xi. Re-design entire LBOD System, including outfall drains to provide for the following:

- Rainfall intensity of 75 mm with a return period of 50 years.
- Rainfall intensity of 150 mm with a return period of 50 years.
- Historical rainfall/more than 300 mm.

xii. Prepare feasibility report and the PC-I Proforma (as modified by the Planning Commission) incorporating each one of the above mentioned options for approval and implementation including drawings, designs and cost estimates.

xiii. Suggestions of stakeholders may also be considered before finalizing the study for redesign of LBOD system.

xiv. Assess the damages caused to the entire LBOD system and people of the area etc, due to alleged defective designing of LBOD System.

xv. Assess the environmental aspects of entire project and mitigation measures may also be included in study.

xvi. The study of disposal of storm water into sea through Dhoro Puran and activation of other natural drains as

Irrigation system of Sabakzai Dam Project

source of smooth transportation may also be conducted. All other Dhoras, which cross LBOD and its system, be studied for activation of the same.

Progress Achieved (Output -wise)

- Inception report submitted on October 09, 2007
- Mid term report submitted on February 11, 2008.
- Feasibility report under preparation

Hydrologic Studies

Frequent analysis of maximum 24 hour rainfall event for the period 1968-2006 was carried out using Gumbel, Log Pearson Type III and computer programme SMADA statistical methods.

Return periods of 50 and 25 years matching with 209 mm and 180 mm of rainfall respectively were studied for the design of outfall drains. The storm flows for 300 mm rainfall intensity have also been computed. The total flows for return periods of 50 and 25 years are 15,521 and 12,664 cusec respectively.

It has been agreed to by WAPDA and SIDA to redesign LBOD Stage-I for 25-year return period having a total storm flow of 12,664 cusecs.

Stakeholders Meeting

A stakeholders meeting was arranged on May 29, 2008 in Karachi where the disposal options were shared with the stakeholders and their views were recorded for incorporation in the redesigning process. The meeting was chaired by the Provincial Minister for Irrigation and Power Jam Saifullah Khan Dharejo. Secretary Irrigation and Power GOS Mr. Shuja Ahmed Junejo, Member (Water) WAPDA Syed Raghib Abbas Shah, General Manager (Projects) South WAPDA Mr. Huzoor Bux Memon, senior officers from WAPDA IPD, SIDA, consultants and stakeholders of the area also attended the meeting.

A Farmers Organization Meeting, arranged by the consultants was held on June 14, 2008 in Badin to discuss disposal options for safe drainage of Badin area. In this connection another follow up meeting with stakeholders is scheduled in August 2008 in Badin.

Alternate Storm Water Disposal Arrangements

The consultants have studied/identified various storm water disposal arrangements. They are under study for further scrutiny and refinement.

Latest Status as on June 30, 2008

The consultants have submitted a working paper which provides detailed progress of work against all sixteen TOR as per consultancy agreement.

The consultants are working on the preparation of feasibility report with due consideration to the comments of stakeholders.

RAINEE CANAL PROJECT

Rainee Canal Project is located in Sindh Province. Rainee Canal will off take from left bank of River Indus upstream of Guddu Barrage and will command an area of 412,400 acres (CCA) in aid zone along eastern fringe of Guddu Barrage command, in the districts of Ghotki, Sukkur and Khairpur. This barren land comprises flat patches with predominantly sand dunes.

Objectives

The Rainee Canal Project would be a multipurpose project and will afford benefits in the following fields.

a) Better utilization of flood water ensuring greater supply of water to Sindh.

b) Better flood mitigation and aversion of losses o property.

c) Irrigation of 412,400 acres of barren land.

d) Cropping intensity during Kharif would increase from 0% to 80% in initial five years.

e) Improved forestry and fruit production.

f) Development of cattle breeding, dairy farming.

g) Drinking water for Arid Zone.

h) Social uplift and poverty alleviation.

i) Environmental improvement due to charging of lakes.

j) Development of fish farming to the extent of 258 tons annually.

k) Development of transportation routes in project area.

l) Creation of job opportunity and alleviation of poverty.

Scope of work

The length of Main canal is 175 km with capacity of 5,155 cusecs. About 609 km of distributaries will also be constructed. All the branch distributaries will be lined. 304 major and 1318 minor structures are proposed to be constructed.

The work on the project commenced in October 2002 with ground breaking ceremony performed by the President of Pakistan. The project is scheduled to be completed by March 2009 (Phase-I).

PC-I amounting to Rs.18.862 billion was approved by ECNEC on February 18, 2004.

Physical Progress

The project executed through eleven following contracts.

i. Contract RC-1 (RD 18-38) meant for earthwork of main canal is 100 percent complete.

ii. Contract RC-2 (RD 38 to RD 127+500) meant for earthwork of main canal is 83 percent complete up to June 2008.

iii. Contract RC-3 (RD 128 to RD 181+433) meant for earthwork of main canal is 70 percent complete up to June 2008.

iv. Contract RC-4 (RD 0 to RD 18) meant for head regulator and earthwork is 62 percent complete up to June 2008.

v. Contract RC-5 (RD 18 to RD 181+433) meant for structures is 30 percent complete up to June 2008.

vi. Contract RC-6 (RD 181+433 to 276+853) meant for earthwork, concrete lining and structures is 35 percent complete up to June 2008.

vii. Contract RC-7 (RD 276+853 - 363+752) meant for earthwork, concrete lining and structures is 39 percent complete up to June 2008.

vii-A. Contract RC-7A (RD 181+433 to 363+752) meant for distribution system is 45 percent complete up to June 2008.

Design and tender documents of contracts RCs-8, 9 and 10 to be scheduled in Phase-II, starting from 2009-10.

The contracts RC-2, 3, 5 and 6 have been terminated due to default by the contractor. Fresh tenders for RC-5A (balance works of RC-2, 3 & 5) and RC-6A (balance work

SALIENT FEATURES

Main features of the project are as under:	
Canal Capacity	5155 cusecs
Command Area	412,400 acres
Canal length	175 Kms
Lined portion of canal	119 Kms
Distribution system	609 Kms
Lakes storage	415,770 Aft
Syphon	09
Canal Head Regulator (at Guddu Barrage)	01
Cross Drainage Structures	51
Railway Bridge	01
National Highway Bridge	01
Road Bridges	120
Head Regulators of Distributaries	67
Project Cost	18.862 billion
EIRR	12 %
Commencement Date	03-10-2002
Scheduled Completion Date of Phase-I	31-03-2009
Expected Completion Date of Phase-I	31-12-2009

of RC-6) have been awarded with completion date up to December, 2009.

The overall physical progress in phase-I is 55 percent.

Financial Status

PC-I to the extent of Rs.18.862 billion has been approved by ECNEC on February 18, 2004 against which an expenditure of Rs.5244.206 million has been incurred up to June, 2008.

PSDP allocation for the year 2007-08 was Rs.1675 million, against which an expenditure of Rs.1747.469 has been incurred up to June, 2008. PSDP allocation for current financial year 2008-09 is Rs.3000 million.

Financial progress of approved project is 27.5 percent.

Land Acquisition

Land acquisition process for 5186 acres has been completed. Rs.982.823 million have been provided to Government of Sindh for payment to the affectees, out of which Rs.957.520 million has been paid so far to the land owners by land acquisition officer.

WATER DIVISION (NORTH)

Under Vision 2025 Phase-I Programme of WAPDA, the following projects are being implemented on "Fast Track" basis. The status of these projects is:-

Gomal Zam Dam Project

Gomal Zam Dam is located at Khajuri Kach on Gomal River in South Waziristan Agency, which is situated west of the districts of Tank and D.I. Khan of the North West Frontier Province (NWFP). Project site is accessible from Indus Highway via D.I. Khan – Tank Road. From Tank, the dam site is about 60 km to the west and connected through a metalled road.

Background

The need for storing the flood water of Gomal River had been observed as early as 1880 at the time of first settlement of D.I. Khan by the British Administration. After independence this study continued and in 1957 a scheme known as "Gulkach Dam Project" was approved by the Government and preliminary works were undertaken by the Provincial Irrigation Department which continued up to October 1959.

On taking over the charge by WAPDA in 1959, the project was re-examined and a new proposal was prepared by changing the site to Khajuri Kach, 30 miles downstream thereby tapping the biggest tributaries Zhob River and Wana Toi. Further studies were conducted by WAPDA during the period 1960-1990 through firstly by M/s Energoproject (Yugoslavia) in 1963, then by M/s Coyne et Bellier, (France) during 1983 – 1990. PC-I prepared by WAPDA in 1993 included irrigation works and a tunnel intake in view of Stage II – Hydropower. However, by another updated feasibility study conducted within the framework of a contract signed between the Government of NWFP and M/s Coyne et Bellier for the additional studies, consultants submitted feasibility report in 1995. PC-I, prepared on the basis of this report, was approved by ECNEC on 31 August 2001.

Benefits

- **Direct and Indirect Benefits**

Benefits likely to accrue from construction of the dam at Gomal River are both tangible and intangible. Tangible benefits include increased agricultural production under perennial irrigation and hydropower generation while intangible benefits include increase in employment opportunities, increased economic activity in agriculture as well as trade & commerce, rise in income levels resulting in better standard of living etc.

- **Irrigation Benefits**

At present Rod Kohi Irrigation is being practiced in the Irrigation Command area of the Project. The Project would provide a dependable source of water for irrigation. Overall annual cropping intensity will increase from 15.8 to 86.5 percent.

- **Non-Agricultural Benefits**

Other benefits include: employment opportunities during construction and in the industry and commerce; improved standards of living; security to farmers as a result of reliable water supply both for irrigation and domestic use; balanced diet through productions of fruits, vegetables and other proteins foods; installation of agro-industries due to extension of electricity; improvement in regional environment due to increased income of people; and initiation of commercial fishing.

- **Hydropower Benefits**

Cheaper power as compared to thermal power would be provided. A hydropower station at dam site would generate 17.4 MW.

SOCIO-ENVIRONMENTAL IMPLICATIONS

- **Resettlement**

No resettlement problem is involved in reservoir area. A nominal effect to the built-up property/houses in ROW of main canal and distributaries is involved.

- **Socio-Economic Impact**

The most important effect will be saving of flood losses in form of land, houses, livestock, infrastructure, roads, communication and human lives as well.

CONTRACTS AWARDED

- WAPDA initially awarded an EPC/Turnkey Contract for the main Project works to a Joint Venture comprising M/s National Water & Hydropower Engineering Corporation

Widening of access road to Allai Khwar Hydropower Project

SALIENT FEATURES

Location of Dam	**Khajuri Kach on Gomal River**
Main Component	
Dam and Spillway	
Height	437 Feet
Length	758 Feet
Type	Roller Compacted Concrete (RCC) Gravity Dam
Reservoir	
Gross Storage	1.140 MAF
Live Storage	0.892 MAF
Irrigation System	
Length of Main Canal	60 Km
F.S. Discharge of Main Canal	848 Cusecs
Length of Distributaries	200 Km
Canal Command Area	163,100 Acres
Power House	
Installed Capacity	17.4 MW
Barrage	
Length	140 Meters (460 feet)

and Harbin Power Engineering Company (CWHEC-HPE JV) of the Peoples Republic of China in June 2002. However, due to non-resumption of the works, which they had abandoned on October 09, 2004 due to kidnapping of their Chinese Engineers by terrorists, this contract stood terminated effective April 14, 2006.

- Subsequently, in pursuance of ECC's decision taken in the Cabinet Meeting held on April 14, 2006 for award of contract to Frontier Works Organization (FWO) on EPC/Turnkey basis at negotiated rates, WAPDA awarded the contract to FWO on March 9, 2007 with M/s Sinohydro Corporation of Peoples Republic of China and M/s TEKSER of Turkey as FWO's Sub-Contractors for Dam and Hydropower Component (less transmission line) and Irrigation and Flood Protection Component respectively.

- The works are scheduled for completion within a period of 03 years and 120 days to be reckoned from June 1, 2007, the notified date of commencement. The Project is thus expected for completion on October 08, 2010.

PROJECT COST

The estimated total cost as per PC-I (2001) is Rs.12829 million with a foreign component of Rs.4964 million, which is being revised to cater for the prevailing conditions. The Project has an EIRR of 12 percent and a benefit cost ratio of 1.18:1.

PROJECT STATUS

EPC/Turnkey Contract

The previous contractor had achieved about 13.3 percent physical progress of permanent works executed at site up to October 09, 2004 the day when he stopped the work. The completed works include: design services (partly); 392m long concrete lined diversion tunnel (6.8m i/dia); Dam abutment excavation (partly); foundations of transmission line; some work on Main Canal and Distributaries.

Satpara Lake

After re-award of work, FWO started mobilization and deployment of their troops and FC troops for security purposes in the last week of May 2007 which continued during June and July 2007. The Chinese Sub-Contractor of FWO also started mobilizing his Chinese/Local personnel to Dam site in June 2007. After restoration of preparatory works, the Contractor had started execution of work at site in August 2007 which is in progress. FWO's sub-contractor for Irrigation and Flood Protection Component started mobilizing in February 2008 for establishment of camps etc. which is substantially completed. The Contractor started remedial works of the earthwork on main canal done by the previous contractor, in June 2008 which is in progress.

Overall Physical and Financial Progress ending June, 2008

Physical Progress

Progress achieved under previous Contract No.GZD-01	=	13.3%
Progress achieved under Contract No.GZD-02	=	7.4%
Overall progress ending reporting period	=	20.7%

This progress is against overall target of 34.5 percent. The shortfall is due to abnormal delay in the commencement of work on the Irrigation Component.

Financial Progress

Financial Progress achieved under previous Contract No.GZD-01 (since terminated)	=	6.8% of the Contract Price
Financial Progress achieved under Contract No.GZD-02	=	14.7% of the Contract Price

Overall Financial Progress

Allocation for the Project in the PSDP 2007-08 was Rs.1800 million. An expenditure of Rs.1105 million was incurred against actual releases of Rs.1105 million during the year 2007-08.

Total expenditure incurred on the Project since commencement up-to-date (June 2008) is about Rs.2973 million. The overall up-to-date financial progress on the Project is thus 23.17 percent of the approved PC-I cost of Rs.12829 million.

WATER (NORTHERN AREAS)

SATPARA DAM PROJECT

Satpara Dam Project is being constructed on Satpara Nullah down-stream of Satpara Lake. The main objectives of the Project are:

- Irrigated agriculture development
- Assured drinking water supply
- Hydroelectric power generation

Main dam, spillway, outlet structure, powerhouses and irrigation system are the main components of the Project. The Project will irrigate around 15,000 acres of land and will produce about 17 MW of power with power houses No. 1, 2, 3 & 4.

PC-I of the Project was approved by ECNEC on September 2, 2002 at a total cost of Rs. 2090.431 million. Satpara Dam Consultants (a consortium of six consultancy firms) have been fielded to review design / supervise the construction works in the capacity as "the Engineer". The construction work was commenced in April 2003 and first power house having total capacity of 4.86 MW was commissioned in October 2007 and inaugurated by the President of Pakistan on October 24, 2007. To date power generation from the Power House is 2.34 million kwh.

The Project construction has been planned under following contract Lots;

Lot-1A: (Civil and Hydraulic Steel Works)

The contract has been awarded to M/s DESCON Engineering Ltd and J&P Joint Venture on April 14, 2003. Progress of works is 78 percent. Powerhouse # 1 (4.86 MW) was commissioned on October 24, 2007 and Powerhouse # 2 (8.76 MW) is expected to go into operation by September 2008.

Lot-1B: (Electrical & Mechanical Works)

The contract has been awarded to M/s CMIC, China and Letter of Commencement has been issued on November 5, 2003. The design and manufacturing of equipment is completed. Progress of works is 95 percent.

Lot-2: (Irrigation System)

The contract has been awarded to M/s CCPG, China and Letter of Commencement issued on November 23, 2004. The Contractor has mobilized on site and progress of works is 56 percent. Expected to be substantially completed by mid 2009.

Lot-3: (Construction of Operator's Quarters)

Construction of Operator's quarters has been completed.

Lot-4: (Shatung Nullah Diversion)

Deferred on environmental and technical grounds.

ALLAI KHWAR HYDROPOWER PROJECT

The Project is being implemented on Allai Khwar (Allai Nullah) a Left Bank Tributary of River Indus near Besham Town in District Battgram of North West Frontier Province (NWFP). It is 265 km from Islamabad and 365 km from Peshawar on famous Silk Route called Karakuram Highway.

It will generate a maximum of 121 MW electricity by drawing 21 Cumecs discharge of water through 2366 meter long tunnel and by utilizing maximum of 697 meter head. PC-I of the Project was approved by ECNEC on September 2, 2002 with a total cost of Rs. 8577.824 million that includes Rs. 3453.540 million as foreign exchange component.

Contract for Civil and Hydraulic Steel (C&HS) works was awarded to M/s Dongfang Electric Corporation (DEC), a Chinese firm through international competitive bidding at a Contract Price of Rs. 2163.5 million. Contract for Electrical and Mechanical (E&M) works has also been awarded to M/s VA Tech an Austrian firm at a Contract Price of US$ 25.1 million.

Progress of C&HS works is 28 percent whereas the progress of E&M works is 40 percent, expected to be completed by mid 2010.

KHAN KHWAR HYDROPOWER PROJECT

The Project is being implemented on Khan Khwar (Khan Nullah) a Right Bank Tributary of River Indus near Besham Town in District Shangla of North West Frontier Province (NWFP). It is 265 km from Islamabad and 350 km from Peshawar on famous Silk Route called Karakoram Highway.

It will generate a maximum of 72 MW electricity by drawing 35 Cumecs discharge of water through 4557 meter long tunnel and by utilizing maximum of 257 meter head. PC-I of the Project was approved by ECNEC on September 2, 2002 with a total cost of Rs.5362.705 million that includes Rs.2644.098 million as foreign exchange component.

Contract for Civil and Hydraulic Steel (C&HS) works was awarded in June 2003 to M/s China National Water Resources and Hydropower Engineering Corporation (CWH-HE JV), a Chinese firm through international competitive bidding at a Contract Price of Rs.1816.3 million. Whereas the Contract for Electrical and Mechanical (E&M) works has been awarded to M/s Dongfang Electric Corporation (DEC), a Chinese firm at a Contract Price of US$ 12.2 million.

Progress of C&HS works is 49 percent. Progress of E&M works is 78 percent. The project is likely to be commissioned during 2009.

DUBER KHWAR HYDROPOWER PROJECT

The Project is being implemented on Duber Khwar (Duber Nullah) a Right Bank Tributary of River Indus near Pattan Town in District Kohistan of North West Frontier Province (NWFP). It is 300 km from Islamabad and 400 km from Peshawar on famous Silk Route called Karakuram Highway.

It will generate a maximum of 130 MW electricity by drawing 29 Cumecs discharge of water through 4873 meter long tunnel and by utilizing maximum of 540 meter head. PC-I of the Project was approved by ECNEC on

September 2, 2002 with a total cost of Rs. 9754.260 million that includes Rs. 4147.510 million as foreign exchange component.

Contract for Civil and Hydraulic Steel (C&HS) works was awarded to M/s China National Water Resources and Hydropower Engineering Corporation (CWH-HE JV), a Chinese firm through international competitive bidding at a Contract Price of Rs. 2744.5 million. Contract for Electrical and Mechanical (E&M) works has also been awarded to M/s VA Tech an Austrian firm at a Contract Price of US$ 22.9 million.

High Head Consultants (a consortium of nine consultancy firms) reviewed the design prepared by the Contractor and supervised the construction works in the capacity as "the Engineer"

Progress of C&HS works is 42 percent. Progress of E&M works is 40 percent and likely to be commissioned by mid 2010.

Supply and construction of 132 and 220 KV transmission lines for power dispersal of three high head hydropower projects i.e. Duber Khwar, Khan Khwar and Allai Khwar on River Indus under Contract No. HIC-1.

This Transmission Lines Project is planned for evacuation of power of three high head hydropower stations. The entire transmission project is being implemented in three lots as under:

Lot-1A:

132 kV Duber Khwar, Khan Khwar and Allai Khwar, D/C, Twin Bundle with Rail Conductor, Transmission Line (to be constructed at 220 kV insulation level).These transmission lines (50 km) will interconnect all the three power plants at Allai Khwar from where onward the power will be transmitted to National Grid at 220 kV voltage level.

Lot-1B:

132 kV D/C, Lynx Conductor, transmission line for in and out of existing Abbottabad – Mansehra S/C 132 kV Transmission Line at Mansehra New 220/132 kV Grid Station (about 16 km).

The contract for construction of the above transmission lines has been awarded to M/s NEIE China for Pak Rs.1008 million on March 29, 2005 with expected completion up to December 2008. Overall progress of works is 80 percent.

Lot-2:

Allai Khwar – Mansehra New, D/C, Twin Bundle with Rail Conductor, 220 kV Transmission Line (about 80 km).

The contract for construction of this line has been signed with M/s NEIE China on March 29, 2005 for Pak Rs. 1184 million. The work is under execution and is expected to be completed in December 2008. Overall progress of works is 87 percent.

Lot-3:

220 kV Mansehra New-Islamabad Peshawar Road (ISPR) Grid Station, D/C, Twin Bundle with Rail Conductor, Transmission Line (about 100 km).

The contract has been awarded to M/s ICC Lahore on March 19, 2005 for Pak Rs.1256 million. The work is under progress and expected to be completed in December 2008. Overall progress of works is 88 percent.

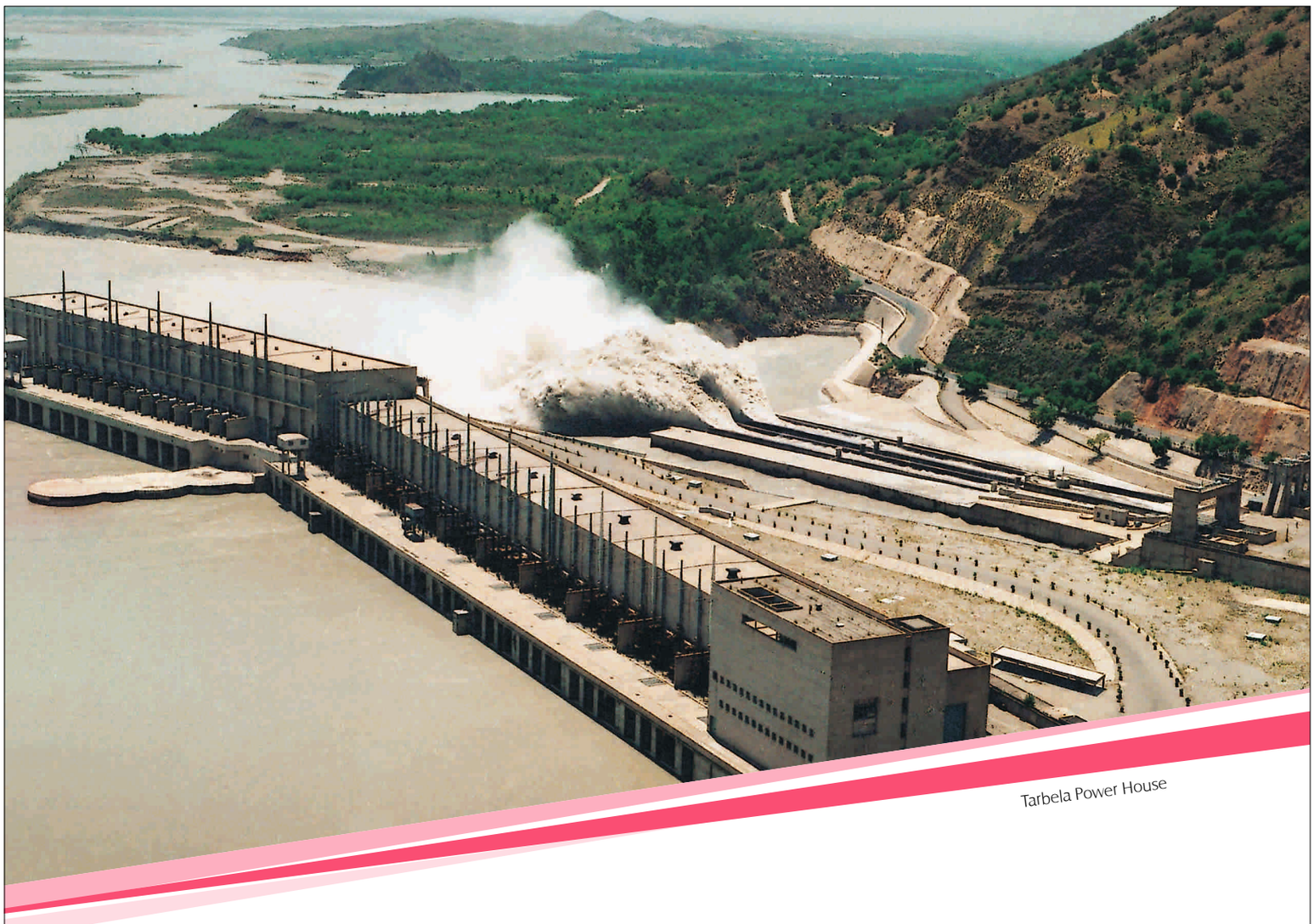
Hydro Projects under implementation

Name of Project	Capacity (MW)	Year of Commissioning
Allai Khwar HPP	121	2000-11
Khan Khwar HPP	72	2009-10
Duber Khwar HPP	130	2009-11

SCARP Tubewell

POWER WING

POWER GENERATION (HYDEL)



Tarbela Power House

POWER GENERATION

HYDEL ENERGY GENERATION

The total installed generating capacity of 13 WAPDA Hydroelectric Power Stations is 6444 MW (Table-1). These Power Stations produced 28225.177 MKWh of the net electrical energy during the year 2007-08.

The station-wise performance is given as under:

TARBELA

The annual generation parameters of the Power Station having total installed capacity of 3478 MW (10 units of 175 MW and 4 units of 432 MW each) are as follows:

Brief description of the major works carried out during the year:

a. 500 KV CIRCUIT BREAKER

500 KV Circuit Breaker No.B11Q1 (B-phase) module No.3 exploded during normal operation along with tripping of 500 kV bus bar No.1 and 500 KV Tarbela-Peshawar line. Tarbela Engineers/Technicians repaired this extensive damage without the assistance of foreign experts resulting in saving a huge amount of cash foreign exchange.

b. 500 KV TRANSFORMERS FOR UNIT NO.8

Red and yellow phase transformers (ASEA and Hitachi make) were replaced with newly procured Chinese transformers. The assembling, shifting and commissioning of the transformers were carried out by Tarbela Engineers/Technicians in the supervision of Chinese Experts. Results of all the field tests were carried out and found normal and within the safe range. All the adaptation work required was completed before energization of the transformers. The transformers were energized and kept on S.N.L. voltage for 30-minute and no abnormality was noticed. The unit was synchronized with the system on November 17, 2007 at 1244 hrs. for commercial operation and is now running successfully.

GHAZI BAROTHA

The annual generation parameters of the Power Station having total installed capacity of 1450 MW (5 units of 290 MW each) are as follows:

Net Electrical Output	14,866.634 MKWh
Maximum monthly generation during August, 2007	2,736.473 MKWh
Maximum daily generation on September 03, 2007	89.142 MKWh
Maximum load attained on August 05, 2007	3,702 MW

Brief description of major works carried out during the year 2007-08 is detailed below:

Unit # 1:

The unit was shutdown from 14.12.2007 to 10.01.2008 for annual maintenance during which period the following works were carried out:

i. Draft Tube and Spinal Casing Inspection
ii. Turbine Runner Inspection. Runner, Head Cover and Bottom Ring Clearance recording
iii. Governor Oil/Air System Maintenance
iv. Cooling Water System Maintenance
v. Generator Lower Guide Bearing, Upper Guide Bearing & Thrust Bearing Inspection/Maintenance
vi. Clearing and Hydro Static Testing of Generator Surface Air and Bearing oil Coolers
vii. Tubrine Shaft Seal Inspection, recording of its thickness and maintenance of seal assembly
viii. Turbine Guide Bearing Maintenance and recording of pads clearance and its coolers cleaning/testing
ix. Recording of Brake Pad thickness and maintenance of Brak Pad Assemblies
x. Cleaning of Generator Brake Dust Collector System
xi. Annual maintenance of Power Intake Gates including inspection, cleaning, maintenance and touch painting etc. was carried out. Besdes this one of the section of Power Intake Gate # 1 was not provided with drain hole by the manufacturer which was drill in-situ for draining of water when the gate is in left up position

Unit # 5:

After completion of Guide Vanes End Seal modification work in March 2007 by M/s Voith Hydro (the Turbines Contractor) for reducing the water leakage to bring it into the guaranteed limits; frequent breakage of shear pins occurred from time to time.

The matter was taken up with Contractor and they sent their expertise for carrying out the rectification works of shear pin breakage. The following works were carried out from 4th to 19th February 2008 under the supervision of Contractor representative:

i. Inter gate clearances of all the Guide Vanes were measured with squeeze and without squeeze. The interference/clearance between Guide Vanes and End Seals installed in head cover and bottom ring were measured for analysis purpose whether particular End Seals require grinding or upward adjustment

Net Electrical Output	6,490.154 MKWh
Maximum monthly generation during July 2007	711.296 MKWh
Maximum daily generation on October 29, 2007	25.251 MKWh
Maximum load attained on July 01, 2007	1,450 MW

ii. All the End Seals installed in the head cover (top side) were dismantled and chamfered for a radial width of about 6mm so that the Guide Vanes slide over them smoothly. The surfaces of the End Seals were grinded and polished to the required dimensions
iii. Likewise the lower End Seals in bottom ring were also chamfered for a radial width of 6 mm and their top surfaces were grinded/polished for the required dimensions
iv. All the Guide Vanes were detached by dismantling guide van levers links shear pins and their movements were checked with chain pulleys. The movements of some Guide Vanes were found jammed which were made free by inserting shims under the stoppers
v. All the dismantled parts were reassembled and the movements of Guide Vanes was checked manually from Governor and found smooth
vi. Finally after confirmation of Guide Vanes free movement, the End Seals installed in the head cover were dismantled and applied lock tight on the bolts and steel expoxy on the Allen screw of End Seals
vii. After rectification work on February 19, 2008, again nine shear pins were broken down from time to time up to May 22, 2008. The manufacturer has been approached for rectification of the problem and he has agreed to supply new end seals for replacement if these are made available before the next lean water season i.e. December 2008. However, the unit is operating satisfactorily since last two months.

Replacement of guide van bushes

After restarting the unit on February 16, 2008, excessive water leakage was observed from Guide Van bottom Stem Bush Seals. All the seals were replaced with new improved seals provided by M/s Voith Hydro and the leakage was stopped.

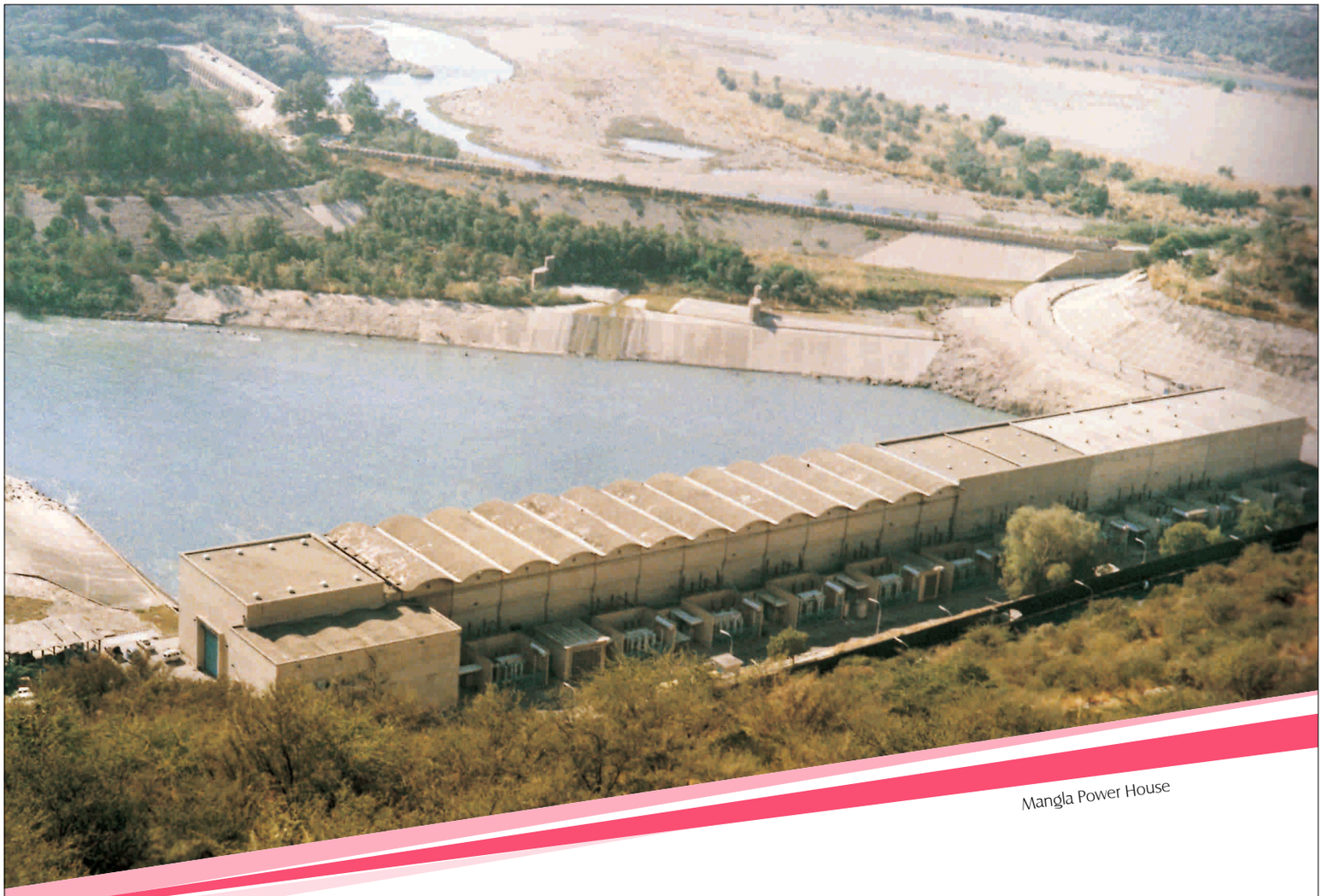
Station Service Water System Unit 1-5

Three pressure reducing valves had been installed by M/s DEC China ME-03 Contractor on the main supply line of station service water system.

At the time of commissioning, when all these valves were put into service, excessive vibration was observed in the Common header of service water system. To keep the system to be safely operated and as per Contractor instruction only one valve was put into service. Later on, the Contractor supplied three new modified pressure-reducing valves along with associated-fitting, which were replaced by WAPDA on the pipeline of service water system. These are now working satisfactorily.

Tail Regulator

Stop logs were installed on both sides of Tail Regultor Gate # 4 (i.e Power Channel and Forebay sides) subsequently dewatering of annular of space was carried out, scaffolding was erected and annual maintenance of the gate including complete painting was carried out.



Mangla Power House

MANGLA POWER STATION

With the total installed capacity of 1000 MW consisting of 10 units of 100 MW each, the Power Station has been one of the major contributors of power supply to the National Grid during the year. It has been able to give a maximum output of 1150 MW and maximum daily generation of 27.21 MKWh was recorded on different dates. The energy generation from the station was recorded as 4,687 GWh during the year 2007-08 as compared to 6,151 GWh during the last year. This shows a decrease of 1,464 GWh (23.8%) in energy generation during current year because of lower average inflows and lesser irrigation indents. Total generation since commissioning is 178.751 billion KWh up to June 30, 2008.

The annual generation parameters of the Power Station are as under:

Brief description of the major works carried out during the year:

i. Sand Blasting and painting of intake gates No.2 and 5 were carried out under Mangla Dam Raising Project Contract
ii. Seals of East side servomotors of inlet valve of Unit No.8 have been replaced
iii. Dredging in front of intake tunnels No.1 to 5 has been carried out.

Net Electrical Output	4,568.445 MKWh
Maximum monthly generation during July, 2007	562.374 MKWh
Maximum daily generation on various dates	27.21 MKWh
Maximum load attained on various dates	1,150 MW

Financial Benefits

The IRSA indented 5.57 MAF of storage releases for irrigation purposes during 2007-08 as against 4.17 MAF recorded during previous year. Resultantly Mangla Power Station generated 4,687.33 MKWh of electricity.

WARSAK

The annual generation parameters of the Power Station having total installed capacity of 242.96 MW (4 units of 40 MW and 2 units of 41.48 MW each) are as under:

Brief description of the milestones achieved during the year:

a. The 2nd highest 1,050.042 MKWh gross generation has been recorded in the financial year 2007-08 since commissioning of the Station.

Net Electrical Output during FY 2007-08	1,050.042 MKWh
Maximum monthly generation during August 2007	144.662 MKWh
Maximum daily generation on August 21, 2007	4.960 MKWh
Maximum load attained on June 09, 2008	208 MW

Chiehoki Malian Hydel Power Station

b. The 2nd highest 1,055.931 MKWh gross generation has also been recorded in the calendar year 2007-08 since commissioning of the Station.
c. Ever maximum generation of 144.662 MKWh has also been recorded during August 2007
d. Major overhaul of Unit No. 4 was carried out.
e. Annual maintenance of Units No.1, 2,5 & 6 was carried out

CHASHMA

Chashma Hydel Power Station is located on the River Indus close to right embankment of Chashma Barrage. It is low head Hydel Power Station utilizing available head of 04 meters to 13 meters. Bulb type turbines have been installed here and these are the 1st one of such type in Pakistan. It is run-of-river plant and its operation/loading is dictated by the releases downstream Chashma Reservoir being controlled by the Indus River System Authority (IRSA).

The annual parameters of the Power Station having total installed capacity of 184 MW (8 units of 23 MW each) are as follows:

The energy generation during the year 2007-08 was recorded as 987.494 MKWh which is 13.82 percent less as compared to last year's generation of 1145.800 MKWh. The energy generation is affected by the huge trash at the intake of the powerhouse. All the available trash removal equipment (TRCMs Mobile cranes, Drainage & Manorial crane) was deployed on regular basis for obtaining optimum power generation and dispose off 35811 M3 of trash.

Net Electrical Output during FY 2007-08	980.174 MKWh
Maximum monthly generation during August 2007	119.396 MKWh
Maximum daily generation on October 31, 2007	4.290 MKWh
Maximum load attained on August 25, 2007	184 MW

The major activity besides removal of trash was the rehabilitation of the powerhouse after the flooding incident occurred in January 2008. All the restoration activities were successfully carried out by the WAPDA engineers and staff.

SMALL HYDEL POWER STATIONS

Nine (09) Small Hydel Power Stations Rasul (22.0 MW), Dargai (20.0 MW), Nandipur (13.8 MW), Shadiwal (13.5 MW), Chichoki (13.2 MW), Kurram Garhi (4.0 MW), Renala (1.1 MW) and Chitral (1.0 MW) with a total installed capacity of 88.6 MW collectively generated 290.677 MKWh (Net Electrical Output) during the year 2007-08.

SPILLWAY PROJECT HPS RASUL

Since commissioning of spillway at Rasul Power Station in June 2005, a benefit of additional generation of 17.464 MKWh has been availed which also includes 1.07 MKWh energy during the year 2007-08 due to enhancement of

Old Power Station Jabban

water share as per availability made by Irrigation Department, government the Punjab for Rasul Power Channel.

REHABILITATION OF JABBAN HYDROELECTRIC POWER STATION

Jabban Hydroelectric Power Station (19.6MW) was commissioned in 1938/1952. The 70 years old Power Plant was badly damaged due to a fire incident on 12-11-2006. The extent of damaged was such that it was not possible to restore operation of the existing units. The situation necessitated to carryout Rehabilitation of Jabban on "Fast Track Basis".

WAPDA immediately started the planning for rehabilitation works of Jabban. PC-1 of the Rehabilitation Project was submitted to the Ministry of Water & Power on February 22, 2007 which was finally approved by ECNEC on September 19, 2007 with approved cost of Rs.1037.55 million including foreign exchange component of Rs.573.71 million and completion period as 36 months. Government of Pakistan is providing funds for the Project under Annual Development Programme (ADP).

M/s NESPAK were hired as Project Consultants through single source selection. First phase of the Project i.e. design, preparation of tender documents by the consultants and pre-qualification of constructors started on September 18, 2007 has been completed by the end of FY 2007-08.

Tender documents were issued to the pre-qualified Joint Ventures in July 2008 and the bidding process up to award of contract (Phase-II) is scheduled to be completed by November 2008. Construction work at site (Phase-III) is expected to start in December 2008, will take about 21 months for completion i.e. up to August 2010.

SALIENT FEATURES OF WAPDA HYDEL POWER STATIONS

STATION	WATER WAY (River/Canal)	UNITS NO.	CAPACITY OF EACH UNIT (MW)	INSTALLED CAPACITY (MW)	DATE OF COMMISSIONING
TARBELA	INDUS (Reservoir)	1~4	175	700	Jul. 1977
		5~8	175	700	Dec. 1982
		9~10	175	350	Apr. 1985
		11	432	432	Feb. 1993
		12~14	432	1296	Nov. 1992
			TOTAL	**3478**	
GHAZI BAROTHA	INDUS (D/S Tarbela)	1	290	290	Jul. 2003
		2	290	290	Aug. 2003
		3	290	290	Nov. 2003
		4	290	290	Dec. 2003
		5	290	290	May. 2004
			TOTAL	**1450**	
MANGLA	JHELUM (Reservoir)	1~4	100	400	1967/1969
		5~6	100	200	Mar. 1974
		7~8	100	200	Apr. 1981
		9~10	100	200	Feb. 1993-1994
			TOTAL	**1000**	
WARSAK	KABUL (Reservoir)	1~4	40	160	Jul. 1960
		5~6	41.48	83	Mar. 1981
			TOTAL	**243**	
CHASHMA	INDUS (Chashma Barrage)	1-6	23	138	June 2001
		7-8	23	46	Dec. 2000
			TOTAL	**184**	
RASUL (R)	UJC*	1~2	11.0	22.0	Jul. 1952
DARGAI (R)	Swat**	1~4	5.0	20.0	Dec. 1952
MALAKAND (R)	Swat**	1~3	3.2	9.6	Jul. 1938
		4~5	5.0	10.0	Oct. 1952
			TOTAL	**61.6**	
NANDIPUR ®	UCC***	1~3	4.6	13.8	Mar. 1963
SHADIWAL (R)	UJC*	1~2	6.75	13.5	Jan. 1961
CHICHOKI (R)	UCC***	1~3	4.4	13.2	Aug. 1959
Renala	LBDC****	1-5	0.22	1.1	Mar. 1925
K/GARHI (R)	KUCHKOT****	1~4	1.0	4.0	Feb. 1958
CHITRAL (R)	LUDKO	1~2	0.3	0.6	1975
		3~4	0.2	0.4	1982
			TOTAL	**46.6**	
TOTAL HYDEL INSTALLED CAPACITY				**6463.2**	

FINANCE AND ADMINISTRATION

PUBLIC SECTOR DEVELOPMENT PROGRAMME

FINANCIAL REVIEW

ADMINISTRATIVE SUPPORT

BALANCE SHEET

Warsak Reservoir and Spillway

PUBLIC SECTOR DEVELOPMENT PROGRAMME 2007-08

The final allocation of Water Sector Projects/Schemes (excluding IBPs) under execution of Wapda Water Wing against GOP financing through Public Sector Development Programme 2007-08 stands at Rs. 33682.530 million including foreign assistance of Rs. 65,000 million, as tabulated below:

Power Wing (Hydel)

The Authority / Government of Pakistan had approved an amount of Rs. 12,534.380 million including Foreign Loan of Rs. 800.00 million for the PSDP 2007 - 08 for Hydel Generation (Power Wing). Out of above allocation a sum of Rs. 350.380 million has been approved under ADP (Financing by Government of Pakistan). The utilization position of Power Wing (Wapda) during the year 2007 - 08 is given on page 101.

Description	Original Allocation 2007-08		Excesses & Short Releases 2007-08		Final Allocation 2007-08	
	Total	Foreign Assistance	Total	Foreign Assistance	Total	Foreign Assistance
Drainage Projects	2700.00	0	0	0	2700.000	0
Dams (Storages)	26507.000	1200.000	-) 6680.000	-) 1200.000	19827.000	0
Canals (Irrigation)	13739.000	65.000	-) 2995.000		10744.000	65.000
General Investigation Schemes	265.180	0	-) 9.360	0	255.820	0
Baluchistan Dams' Studies	81.710	0	+) 59.000	0	140.710	0
Environmental Works	15.000	0	0	0	15.000	0
GRAND TOTAL	**43307.890**	**1265.000**	**-) 9625.360**	**-) 1200.000**	**33682.530**	**65.000**

Expenditure & Physical Achievements During 2007 - 08

The expenditure on Water Sector Projects / Schemes has finally been booked at Rs.38466.044 million for CRBC (Additional Works), amounting to Rs.230.047 million against disbursement from Donor - ADB. The break up of expenditure and the physical achievements there against are as follows:

Description	Expenditure 2006-2007		Physical Achievements			
	Total	Foreign Assistance	Earth Works (Mcft)	Structures (Nos)		
Drainage Projects	2490.632	0	RBOD-I: 111.690 RBOD-III: 129.402	65 89		
			Description	Units	Achievement During 2007-08	
Dams:	24463.750	0	**Raising of Mangla Dam**			
			Land Acquisition	Acres	3700	
			Houses Compensation	Nos.	1700	
			a) Main Works			
			- Earthwork	Mcuyd	9.58	
			- Concrete	Mcuyd	0.1	
			b) Power House Bypass Road and Bridge Over Bong Canal			
			Concrete	Cum	400	
			c) Infrastructure Development	Acres	300	
			- Area	Nos.	10	
			- Buildings	KM	07	
			d) Access Dykes			
			Mirani Dam	Cum	244646	
			- Earthwork	Cum	1508	
			- Lining	Cum	1715	
			- Concrete/Pitching			
			Satpara Dam	Mcft	12.427	
			- Earthwork	Cft	443266	
			- Concrete Work	Ton	424.5	
			- Rebar	Ton	153.1	
			- Penstock/Steel Liner	Cft	430861	
			- Stone Masonry/Rip Rap			
			Sabakzai Dam	Acres	1903	
			Land Acquisition			
			Civil Works:	Mcft	0.216	
			- Earth & Stone Work	Cum	4998	
			- Concrete	Nos.	88	
			- Structures			
			Gomal Zam Dam	Mcum	0.454	
			Earthwork	Nos	6	
			Structures			
			Kurram Tangi Dam	Acres	163	
			Land Acquisition			

Description	Expenditure 2006-2007		Physical Achievements		
	Total	Foreign Assistance	Description	Units	Achievement During 2007-08
Canals:	11179.245	230.047	**Greater Thal Canal**		
			- Land Acquisition	Acres	4000
			- Earthwork	Mcft	492
			- Lining	Mcft	0.131
			- Stone Pitching	Mcft	1.855
			- Structures	Nos.	83
			Kachhi Canal		
			- Land Acquisition	Acres	2973
			- Earthwork	Mcft	908.499
			- Lining	Mcft	12.798
			- Structures	Nos.	46
			Rainee Canal		
			- Earthwork	Mcft	15.897
			- Lining	Mcft	0.215
			- Stone Pitching	Mcft	0.365
			- Brick Work	Mcft	0.031
			- Steel Work	M.Kg	0.537
			CRBC (Additional Works)		
			- Earthwork	Mcft	15.897
			- Lining	Mcft	0.215
			- Stone Pitching	Mcft	0.365
			- Brick Work	Mcft	0.031
			- Steel Work	M.Kg	0.537
General Investigation Schemes	193.491	0	Activities continued at IWASRI, Mona and LIM Research Organizations besides Hydrological Investigation in Nowshehra District and Land & Water Monitoring of Indus Plains by SMO. Studies for integrated development of Chitral, Swat and Kabul Rivers as well as re-design of LBOD in Badin Area were also conducted.		
Feasibility Studies of Balochistan Dams	126.834	0	Detailed Engineering Design of Naulong, Hingol Dams were continued while Feasibility Studies of Sukhleji and Winder Dams were completed.		
Environmental Works	12.092	0	Watershed Management practices in Mangla Catchment Area were carried out.		

Utilization Position of Power Wing (WAPDA) during the year 2007 - 08

Rs. in Million Excess (-) Saving (+)

SECTOR	LOCAL	FOREIGN	TOTAL
A) Generation (Hydel)			
PSDP Allocation	5784.000	800.000	6584.000
Actual Expenditure	5080.000	750.000	5830.000
Vairation	704.000	50.000	754.000
B) Neelum Jhelum Hydro Power Project	5600.000	---	5600.000
Actual Expenditure	3324.839	---	3324.839
Variation	2275.161	---	2275.161
Total (A + B)			
PSDP Allocation	**11384.000**	**800.000**	**12184.000**
Actual Expenditure	**8404.839**	**750.000**	**9154.839**
Variation	2979.161	50.000	3029.161
Percentage (%) PSDP	73.83 %	93.75 %	75.14 %
C) ADP (Financing by GOP)			
PSDP Allocation	**350.380**	**---**	**350.380**
Actual Expenditure	**433.100**	**---**	**433.100**
Variation	**(-) 82.720**	**---**	**(-) 82.720**
Grand Total (A + B + C)			
PSDP + ADP Allocation	**11734.380**	**800.000**	**12534.380**
Actual Expenditure	**8837.939**	**750.000**	**9587.939**
Variation	**2896.441**	**50.000**	**2946.441**
Percentage (%) Overall	**75.32 %**	**93.75 %**	**76.49 %**

The total percentage of utilization in PSDP is 75.14% (the percentage utilization position in local component is 73.83% and in foreign loan component is 93.75%. The overall utilization position in PSDP + ADP is 76.49%.

Control Room of Mangla Power House

FINANCIAL REVIEW

The power sector in Pakistan is now being regulated through NEPRA, after restructuring of WAPDA in line with decisions of the Government of Pakistan. NTDC/CPPA is being operated as single buyer/purchasing agency on behalf of power distributors, except KESC franchised areas. Tariff of various power service providers i.e. power generation, transmission and distribution is now being determined by NEPRA. Power sale/purchase and its price settlement is governed through Power Purchase Agreements (PPAs) and Electricity Supply Agreements (ESAs).

Power demand during last few years has increased tremendously whereas sources of power supply could not be created to cope with the rising power demand. Therefore, power sales during the year were marginally lower than those of last year. On the other hand, cost of power because of sky rocketing hike in fuel oil price, has increased manifold during the year; whereas, inadequate power tariff to consumers has been revised only once in March 2008. Because of mismatch of revenue and cost, finances remained under pressure during the year. The financial performance of CPPA in terms of power acquisition, supply and its settlement has been discussed in this report with respect to its key operational activities.

Power Balancing

Power Distribution

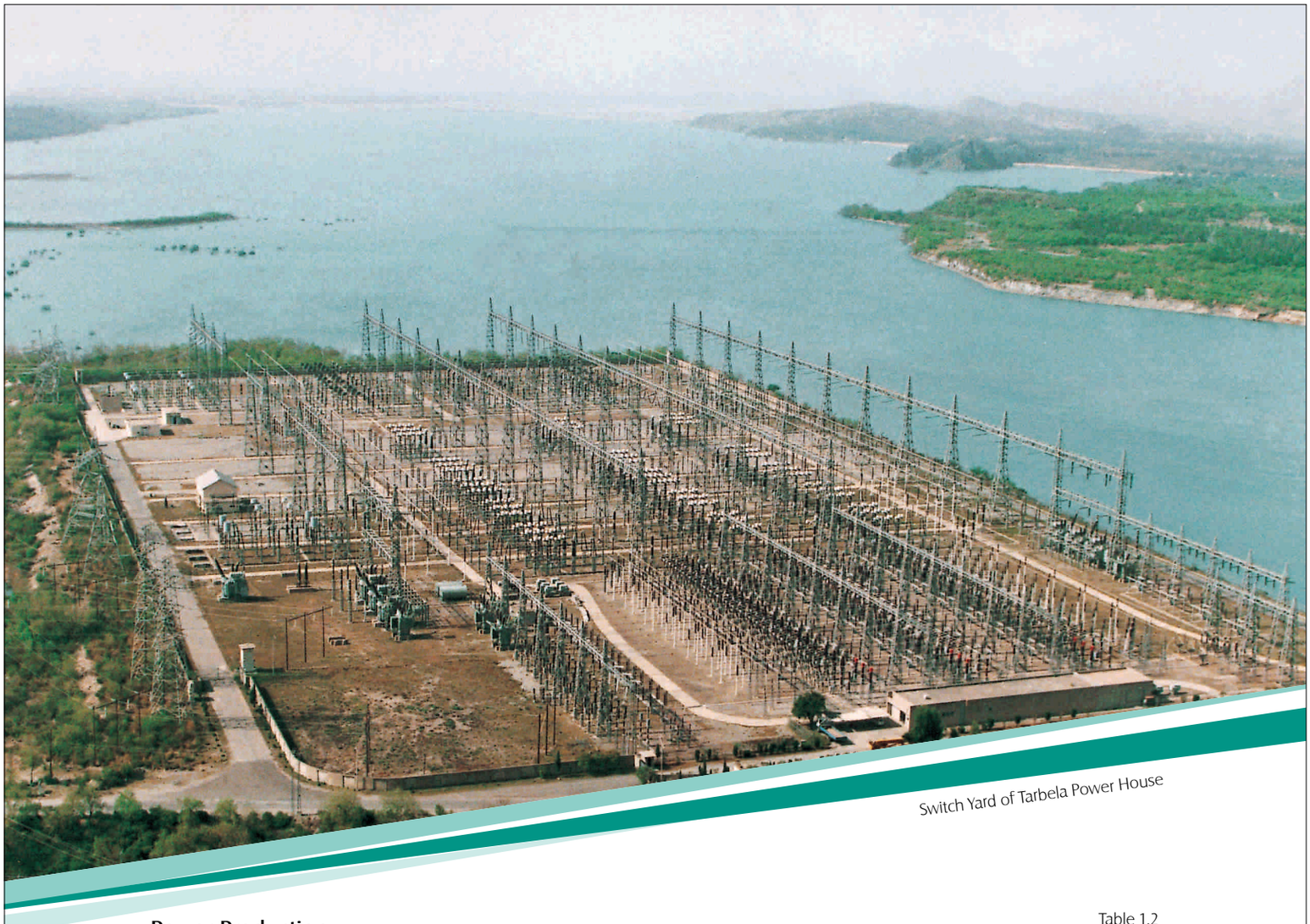
During FY 2007-08 the distribution companies have sold 62,456 million units, declined by 106 million units over FY 2006-07. The distribution losses during the period i.e. 19.5% also remained in the close vicinity of last year as set out in the table 1.1.

Power Transmission

Supply of power by NTDC, during FY 2007-08, stood at 81,633 million units, down by 1,085 million units from the previous year i.e. FY 2006-07. The transmission losses have also come down to 3.4% during the period under report from the previous year figure of 3.7%.

Table 1.1

	FY 2007-08 (MKWh)	FY 2006-07 (MKWh)
Power Purchased	77,550	77,800
DISCOs Sales	62,456	62,562
Losses	15,094	15,238
Losses (%age)	19.5%	19.6%



Switch Yard of Tarbela Power House

Power Production

The source wise power production during FY 2007-08 has been enumerated in the table 1.3.

During the year FY 2007-08, Net Electrical Output (NEO) has declined by 1,420 million units (almost by 1.7%). The generation mix based on the fuel is given in table 1.4.

Because of lesser availability of gas and water during the year, the generation mix has shifted from cheaper source to more expensive sources. The share of generation from hydel and gas sources has decreased, whereas frm RFO it has increased significantly.

Power Acquisition Cost

Despite 1.7% decrease in generation, the generation cost during FY 2007-08 has increased by 30% over the year FY 2006-07. The table 2.1 shows the source-wise generation cost.

The increase in the generation cost of Rs.85.2 billion is mainly attributable to the rising oil and gas prices, which have almost doubled during FY 2007-08. The share of hydel generation has also declined by almost 3.1% during the year under report, which has made an adverse effect on the finances of the utiliy. The cost per unit from each source at bus bar of the power station has been summarized in the table 2.2.

Table 1.2

	FY 2007-08 (MKWh)	FY 2006-07 (MKWh)
Power Procured	84,468	85,888
NTDC Supply	81,633	82,719
- DISCOs	77,550	77,800
- KESC	4,083	4,919
T&T Losses	2,835	3,169
Losses (%age)	3.4%	3.7%

Table 1.3

	FY 2007-08		FY 2006-07	
	(MKWh)	(% age)	(MKWh)	(% age)
Hydel	28,353	33.6%	31,480	36.7%
GENCOs	19,986	23.7%	20,341	23.7%
IPPs	36,129	42.7%	34,067	39.6%
Total	**84,468**	**100%**	**85,888**	**100%**

Table 1.4

	FY 2007-08		FY 2006-07	
	(MKWh)	(% age)	(MKWh)	(% age)
Hydel	28,353	33.6%	31,480	36.7%
Gas	27,800	32.9%	29,101	33.9%
RFO	24,635	29.1%	22,969	26.7%
Others	3,680	4.4%	2,338	2.66%
Total	**84,468**	**100%**	**85,888**	**100%**

Table 2.1

	FY 2007-08 (Min Rs.)	FY 2006-07 (Min Rs.)
Hydel	28,728	27,169
GENCOs	103,307	83,806
IPPs	240,876	176,739
Total	**372,911**	**287,714**

The average production unit cost increased by almost 32% from the previous year and the main contributor of this icrease is the prices of fuel oil and gas which have sky rocketed during the year.

Power Supply Cost

The energy acquired by NTDC/CPPA has been billed to the DISCOs and KESC as per the determinations of NEPRA. During FY 2007-08 an amount of Rs.391 billion was billed to DISCOs and KESC against the last year's amount of Rs.305.4 billion, showing an increase of more than 28%, for almost the same volume of power supply. Table 3.1 shows the amount billed to DISCOs and KESC.

Power Cost Settlement

Receipts from DISCOs & KESC

During the year funds amounting to Rs.277.4 billion (Rs.221.1 billion in 2007) were received as shown in the table 4.1.

DISCOs have remitted an amount of Rs.274.8 billion (net of taxes) to the central treasury/CPPA against billing of Rs.359 billion. This also includes term loans amount of Rs.36.1 billion obtained from the commercial banks by LESCO, GEPCO, FESCO and IESCO. KESC paid only Rs.2.6 billion against the billing of Rs.32 billion during the year.

The summary of revenue remitted in relation to the amount billed for supply of power during FY 2007-08 by DISCOs & KESC has been elaborated in the table 4.2.

The payments by LESCO, GEPCO and FESCO include loan amount of Rs.8 billion each whereas IESCO's payments include loan amount of Rs.12.1 billion. Except IESCO no other DISCO has paid full payment of billed amount for power supply during the year. MEPCO, PESCO, HESCO and QESCO remained very weak on the recovery front. No payment was received from TESCO against the billed amount of Rs.11.9 billion whereas payments by KESC were only 8% of the billed amount.

GOP Subsidies

GoP is not passing on the electricity consumers the burden of full tariff increase allowed by NEPRA to DISCOs. GoP has also maintained the policy to keep the electricity tariff uniform throughout the country. Resultantly, GoP is paying tariff differential subsidy to the power utilities to offset the tariff increase impact on the electricity consumers.

During FY 2007-08 GoP paid Rs.61.7 billion (41.9 in 2007) on account of subsidies as against claims of Rs.75.9 billion. Table 4.3 shows the category-wise subsidy provided by GoP.

In addition to the cash payments of Rs.61.7 billion, GoP has also adjusted Rs.52 billion for tariff differential subsidy against its debt serving liability on WAPDA/PEPCO during the year.

Table 2.2

	FY 2007-08 (Rs./kWh)	FY 2006-07 (Rs./kWh)
Hydel	1.01	0.86
GENCOs	5.17	4.12
IPPs	6.67	5.19
Average	**4.41**	**3.35**

Table 3.1

	FY 2007-08 (Min Rs.)	FY 2006-07 (Min Rs.)
DISCOs	358,985	276,026
KESC & IPPs	31,968	29,416
Total	**390,953**	**305,442**

Table 4.1

	FY 2007-08 (Min Rs.)	FY 2006-07 (Min Rs.)
DISCOs	274,757	206,275
KESC & IPPs	2,618	14,824
Total	**277,375**	**221,099**

Table 4.2

	Amount Billed (Min Rs.)	Fund Received (Min Rs.)	Payment Ratio (%age)
LESCO	72,741	78,536	108%
GEPCO	32,288	27,827	86%
FESCO	45,608	34,653	76%
IESCO	36,578	49,674	136%
MEPCO	52,081	39,299	75%
PESCO	58,616	24,706	42%
HESCO	37,342	15,050	40%
QESCO	23,730	5,012	21%
Sub. total	358,985	274,757	76.5%
KESC	31,968	2,618	8%
Total	**390,953**	**277,375**	**62%**

Table 4.3

	FY 2007-08 (Min Rs.)	FY 2006-07 (Min Rs.)
Tariff Subsidy	35,000	20,545
Agriculture Subsidy	5,351	3,455
GST Subsidy	21,307	17,935
Total	**61,658**	**41,935**

Payment for Power Generation

The amount received from power distributors and GoP subsidies have been remitted to power producers and NTDC in settlement of their monthly invoices for power acquired. IPPs payments were given the preference over the others, then dues of oil & gas suppliers were cleared and balance payments were made for the development and O&M expenses of GENCOs and WAPDA Hydel. Despite all best efforts, the stock of payables towards IPPs and Oil & Gas companies has further piled up.

The table 4.4 shows the summarized view of payments made to different sectors:

The above table shows that as against receipt of funds of Rs.339 billion (Rs.277.4 billion from DISCOs & KESC and Rs.61.6 billion as GoP subsidy), CPPA has remitted Rs.316.3 billion to power producers and NTDC. The balance payments of Rs.23 billion have been made through further borrowing by WAPDA in the shape of raising of SUKUK-II and GoP Cash Development Loans.

The payments to power producers and NTDC in comparison of their billing during the year have been shown in the table 4.5.

During the year, GST amounting to Rs.46 billion was also released to power producers, NTDC and FBR against their claims. The funds for GST payments were received from DISCOs and KESC collected through their billing to the electricity consumers.

Table 4.4

	FY 2007-08 (Min Rs.)	FY 2006-07 (Min Rs.)
Hydel	29,778	21,839
GENCOs	90,136	90,542
IPPs	189,172	153,909
NTDC	7,243	14,522
Total	**316,329**	**280,812**

Table 4.5

	Billed Amount (Min Rs.)	Payments (Min Rs.)
Hydel	28,728	29,778
GENCOs	103,307	90,136
IPPs	240,876	189,172
NTDC	18,042	7,243
Total	**390,953**	**316,329**

Consultancy Agreement Signing Ceremony for Neelum-Jhelum Hydroelectric Project

ADMINISTRATIVE SUPPORT

INTERNAL AUDIT

Internal Audit as a part of Internal Control System reviews the Financial and Operation accounts of formations of WAPDA and corporatized entities. It also reviews the consumers accounts kept at Customer Services Offices of Distribution Companies in addition to the physical verification of stock held at various Stores, checking of payments made for Consultants services engaged on development projects and special audits as per directives of the Authority.

During the year under report, consumers' accounts in all Customer Services Offices were reviewed. A sum of Rs.353.17 million has been recovered as less billing to the consumers. As a result of review of payments made to consultants and follow up of audits previously conducted a sum of Rs. 11.34 million has been recovered in addition to the foreign currency recovery of US Dollar $ 1,675 and DM 8,446.

Internal Audit Division also assists the formations in finalizing replies to the audit reports of Auditor General of Pakistan for final examination by the Public Accounts Committee. During the year 2006-07, comments of the Authority on the Audit Reports updated and submitted to the National Assembly Secretariat, Ministry of Water & Power Islamabad, Auditor General of Pakistan and Director General Audit WAPDA for discussion in the PAC/DAC meetings are given as under:

a) Audit Report 2003-2004
b) Draft Paras issued for inclusion in Audit Report 2005-2006.
c) MFDAC for the year 2001-2002.
d) The comments on Audit Report and Performance Audit/Special Study Reports included in the Audit Reports 1995-96, 1989-90, 1994-95 were prepared and presented before Public Accounts Committee meetings held on 30.10.2006, 12.01.2007 and 13.01.2007 respectively.
e) WAPDA's comments on different reports were discussed in three D.A.C. meetings held during the year under report.

Central Contracts Cell (CCC)

In order to implement projects through its own experienced Engineers with quality home office support, WAPDA decided to create a department which should provide the contractual and related services to the field formations involved in the Projects implementation. Accordingly, Central Contracts Cell (CCC) was created by the Authority in May 1974. Besides formulating guidelines

Member (Power) listening to the complaints of consumers in Chairman WAPDA's Complaint Cell

and issue instructions to streamline the contract management functions within WAPDA on behalf of the Authority, CCC is providing specialized assistance on preparation/vetting of tender documents for construction, supply and other turn key contracts, evaluation of tenders, review of contractor's claims, variation orders etc. in respect of local/international contracts financed by International Funding Agencies or through WAPDA/Pakistan's own resources. The Cell has rendered valuable services to WAPDA over a period of more than 34 years and selfless services rendered by all the staff of CCC has justified its existence.

The CCC is a Common Services department of the Authority, headed by a General Manager assisted by Chief Engineer (Power), Chief Engineer (Civil) and eight Directors drawn from Water, Power and Finance Wings, each of whom is a specialist in his field. The cell has now grown into a self-sustaining institution which is working as an independent advisory body to the Authority and its duties encompass all activities right from tender opening to implementation and ultimate completion of a project. Owing to Vision-2025 priority projects, role of CCC has attained more importance and one consultant having sufficient exposures and background in contract administration has also been inducted in CCC to handle extra work. Another important aspect dealt with by CCC is processing of cases of Registration of 'A' class contractors with WAPDA and their periodic renewals.

During FY 2007-08, the CCC evaluated 68 cases of tender evaluation, reviewed 68 tender documents, processed enlistment/renewal of 10 contractors and dealt with 10 consultancy services cases. Besides, the cell participated in 27 tender opening, processed 7 claims of EOT, TOC, VOS and rendered advice on 73 contract cases to the field formations and handled 34 miscellaneous cases.

Monitoring and Surveillance

Implementation and performance of water and power projects, lawful use of energy and attendance of public complaints is monitored by this organization which is basically a non intrusive set up reporting directly to the Authority.

Investigation

As many as 58 inquiries were conducted.

Confidential

As many as 100 inquiry committees were constituted. 80 inquiries were received and twenty inquiries are pending.

Complaints

Chairman's Complaint Cell located in WAPDA House, Lahore received 8,721 complaints, out of which 6,937 were disposed off.

TRAINING

The performance and efficiency of an organization depends on the availability of trained manpower. Due importance is being given to this element in Wapda and engineers, officers and staff are systematically trained. A number of training organizations have been established in WAPDA to meet present and future managerial and technical needs of officers and staff. At present following institutions are functioning at various places:

- Wapda Staff College, Islamabad
- Wapda Engineering Academy, Faisalabad
- Regional Training Centres (RTCs); one each in Distribution Companies (Total 8)
- Training Centres at Tarbela, Gatti (Faisalabad) and Kot Lakhpat Lahore under Technical Services Groupt (NTDC).
- Hydel Training Centre Mangla
- Thermal Training Centre Guddu

During the year 2007-08, the existing training centres imparted training to large group i.e. 23,025 WAPDA personnel of which 911 were officers between Grade 17 to 20 and the rest comprised staff of different grades.

Wapda Staff College Islamabad

WAPDA Staff College Islamabad is imparting training to the managers belonging to levels of the organization to improve their managerial skills, groom their personalities as managers, broaden their knowledge base and perception. Besides the mandatory management courses i.e. the (i) Junior Management Course (ii) Middle Management Course and (iii) Senior Management Course, various other management related courses are conducted to enable the managers of the Authority to control the complex situational factors they are facing while performing their duties in different fields and to acquaint them with the ever-changing economic, operational and technological scenario/needs. Besides the management and management related trainings, this college has provided a platform to the officers of the organization to gather all the constituents of the Department share their views and experience for the betterment of the organization.

The college has hosted various seminars and symposia on changed management and introducing the corporate culture. On various occasions, Chairman WAPDA, Members of the Authority and other high-ranking officers of the Authority as well as of Government attended these functions in inaugural and concluding sessions.

In FY 2007-08, WAPDA Staff College has conducted 17 courses where 262 officers and 113 supervisory staff have been provided training.

Wapda Engineering Academy Faisalabad

WAPDA Engineering Academy, Faisalabad is imparting technical training to electrical, mechanical, civil, electronics and computer engineers, technicians, supervisors, sub station operators, foremen etc of WAPDA, Govt/Semi Government agencies, industries and private sector. Presently 81 technical courses of different durations are being conducted. The salient disciplines are generation, transmission, distribution which encompass grid system operation, instrumentation and control, programmable logic controllers (PLC), mechanical instrumentation, cable jointing, advance fitting practices, electronic control circuitry, industrial electrical skills, information technology, internet and construction of dams, barrages, irrigation channels, vertical drainage systems/tubewells, open drainage, miscellaneous civil structures and their maintenance. The academy being unique of its kind in the country is playing vital role in boosting up the technical know-how of engineers, supervisory staff and technicians in WAPDA, as well as in private sector.

During he year under report 1,031 personnel of different cadres were trained in this academy and they are rendering outstanding services to their parent departments which renewed vigor and confidence based on professional competence achieved through training at this academy.

The training is being imparted through the usage of the highly sophisticated equipment installed in mechanical, electrical and pressure gauge workshops, electrical circuit and electrical instrument laboratory, cable jointing and testing laboratory, high voltage laboratory, electrical machine laboratory, transformer laboratory, switch gear laboratory, meter testing laboratory, instrumentation and control (I&C) laboratory, computer laboratory, welding shop, analogue simulator, steam power plant simulator, gas turbine simulator and grid network simulator.The water wing training through soil mechanical laboratory and concrete laboratory.

During the period under report WAPDA Engineering Academy, Faisalabad has trained 966 WAPDA employees, which includes 394 officers (BPS 17, 20) and 572 staff (BPS 5-16). In addition to this, the academy has also trained 04 university students and 61 persons of Government/Semi Government/Private/Public sector. Thus total became as 1,031.

Regional Training Centres (RTCs)

Eight regional training centres (RTCs) i.e one each in distribution companies are functioning where following courses are conducted for the employees of respective DISCO:

LS Technical (T-500), LM (T-300), ALM (T-100), ALM Special (S-200), ALM (S-100), LS Commercial (C-500), General Clerks (C-300), Meter Readers (C-200), Bill Distributors (C-100), Commercial Clerk (C-370), LS Management (M-300), Tariff Training, Senior Clerks Training Course, One Window Operation Training and Special Safety Course.

165 officers and 20,764 officials were trained during the year 2007-08 in all RTCs.

Training Centres Under TSG

- Training imparted to 23 officers and 452 officials in the fields of Protection and Instrumentation, Transmission Line and Grid Stations.
- Training imparted to 452 officials (Operation staff as well as Maintenance Staff) of DISCOs and NTDC for promotion purposes.

Hydel Training Centre Mangla

To meet the training requirements of employees of hydel organization, only one training centre at Mangla is functioning at present where three junior engineers and 97 officials have been imparted training during the year under report. In addition to above, this centre has also trained eighteen students of Engineering University.

Thermal Training Centre Guddu

Thermal Training Centre Guddu imparts training to the staff of steam power stations as well as on chemical treatment of water in the thermal power stations.

During the period under report, 13 courses were conducted and 111 persons were trained. Audio/visual training is also- imparted to the trainee through Video Cassettes pertaining to Boiler, Turbine and generator operation/maintenance as a regular feature.

ADMN DIVISION

During the year 2007-08, the Directorates working under GM (A) maintained sustained improvement of their performance as organizational mission. Brief achievements of ADMN Division are as under:-

MEDICAL SERVICES

WAPDA Hospitals / Dispensaries

WAPDA Medical Services is providing health care facilities to its employees through 11 regional groups bifurcated into 11 hospitals, 7 fortified dispensaries and 17 basic dispensaries spread all over the country. These units are functioning under the technical/financial control of Director General Medical Services for achieving the assigned mission of affording essential and effective medical care to WAPDA/PEPCO employees, their dependents and widows.

Establishment of 50-Bedded Hospitals

Prsently hospitals at Guddu, Gujranwala, Peshawar and Tarbela are functional as 50 bedded. Furthermore, hospitals at Faisalabad and Multan are completed and ready for inauguration while those at Hydrerabad, Rawalpindi and Quetta are under progress.

Establishment of Fortified Dispensaries

Apart from five fortified dispensaries having facilities of OPD, X-Ray, E.C.G., Pathological Lab: and Independent Emergency Cover are being established at Dadu, Gujrat, Jhang, Kasur and R.Y. Khan.

Name of Hospital	Status
WAPDA Hospital, Tarbela	Functional as 50 bedded
WAPDA Hospital, Guddu	-do-
WAPDA Hospital, Peshawar	-do-
WAPDA Hospital, Gujranwala	-do-
WAPDA Hospital, Multan	Completed
WAPDA Hospital, Faisalabad	-do-
WAPDA Hospital, Rawalpindi	Design finalized, consultants hired
WAPDA Hospital, Hyderabad	Under construction
WAPDA Hospital, Quetta	-do-

Appointment/Posting of Psychiatrist

Besides the existing specialities i.e. Medicine, Surgery, Eye, Dermatology, Pediatrics, Gynaecology, Radiology, Pathology and Oncology, two new specialities e.g. Psychiatry and Urology have been established for providing better health facilities.

Regional Grouping of Health Units

The Authority has approved the Regional Groups System for better management of Medical Services, Division affairs and introduced eleven Regional Groups of various WAPDA Hospitals/Dispensaries. In the new scenario M.S. of each hospital has become the Regional Head of the respective hospital with allied dispensaries for all administrative/establishment purposes.

Human Resources

WAPDA Medical Services has always emphasized to engage professionally sound and skilled human resources for the efficient and smooth functioning of the Medical units. Sufficient doctors are always required to deal with the patients spreading all over the country for providing comprehensive medical cover.

During the year under report, five specialists, 22 GDMOs and 88 Paramedical Staff have been appointed in WAPDA Medical Services.

Promotion of Specialists/Doctors

In recognititon of their valuable services for the department, nine doctors from different cadres have been promoted to next grade during the corresponding period. One BPS-19 specialist promoted to BPS-20 whereas the other was promoted from BPS-18 to BPS-19. Moreover, one GDMO was promoted from BPS-19 to BPS-20 and five BPS-17 were promoted to BPS-18. One dental surgeon promoted from BPS-17 to BPS-18.

Regularization of Contract Service

WAPDA has a policy to bring the service of contract employee (BPS-17 and above) on regular cadre after

Chairman WAPDA's visiting WAPDA Hospital Complex, Lahore

completing one year's satisfactory service. During 2007-08, 14 specialists, 22 GDMOs, two Dental Surgeon and one Nursing Superintendent working on contract basis have been brought on regular cadre as per the recommendations of Regularization Board.

Management Courses

Management courses have been specifically designed to acquaint the participants with advance knowledge and skill in the field of management. Such courses would enable the participants to implement the acquired skill in a professional and organizational manner for the purpose of better departmental services. During the year under report, fourteen doctors have completed Middle Management Course at WAPDA Staff College, Islamabad.

Senior Lady Medical Officer along with paramedical staff attended training course at Punjab Population Welfare Department, RHA Centre, General Hospital, Lahore.

Postgraduate Training/Creation of Leave Reserve Posts

WAPDA Authority has always stressed upon the significance of higher qualification/post graduation and encouraged employees to improve qualification at their own expenses/resources. Such investment of the organization is aimed at utilizing the services of trained employees towards improvement of the department. As far as medical services are concerned, two percent of the total sanctioned posts of doctors are selected for postgraduation training. In this regard two doctors have been selected for postgraduate qualification in FCPS (Paeds) and Ms (ENT) respectively at WAPDA expenses in the interest of WAPDA patients.

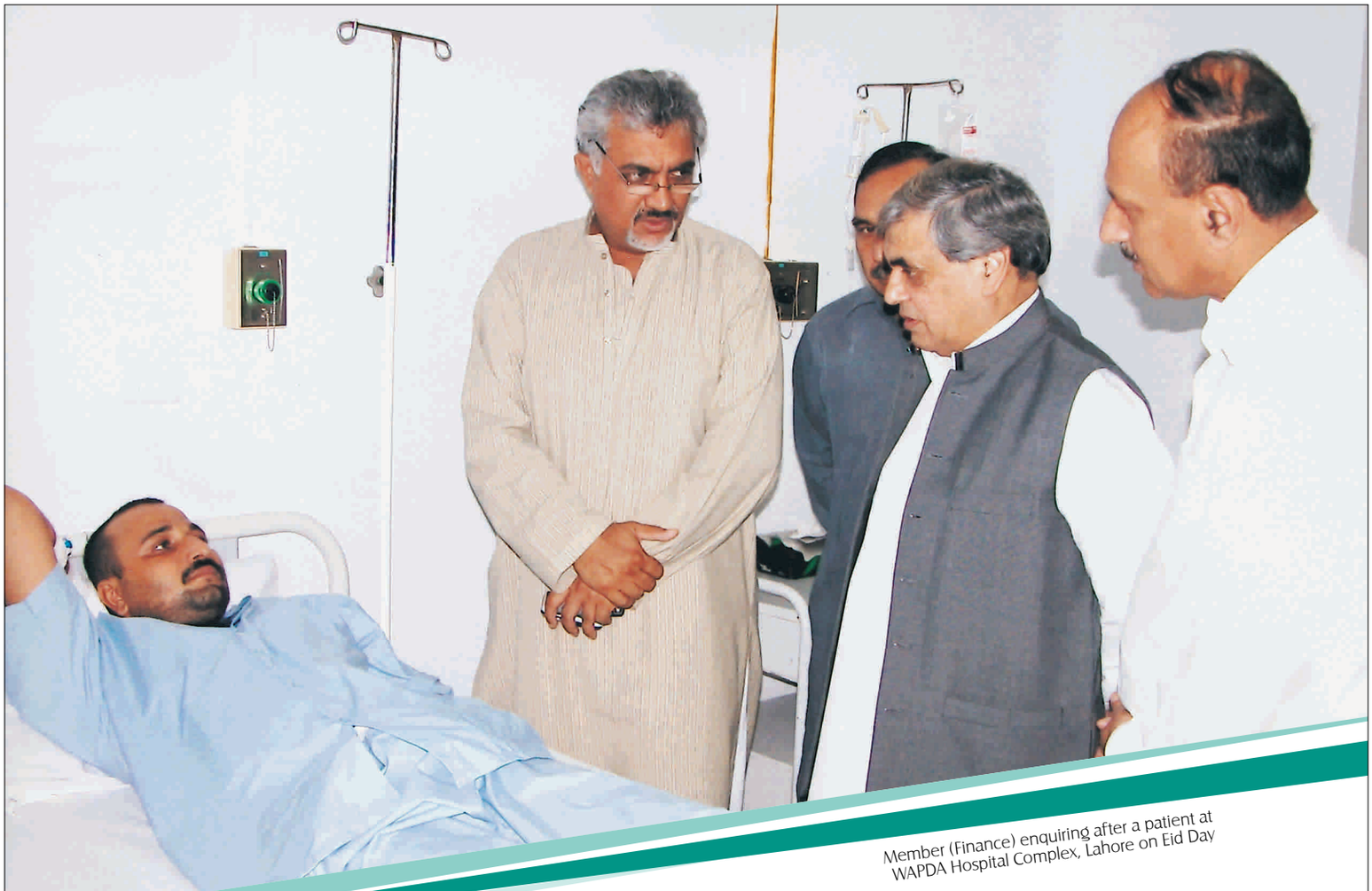
The Authority has created two leave reserve posts of doctors to proceed with the doctors' proceedings at WAPDA expenses on postgraduate training.

Continued Medical Educational Programme

The field of medicine has witnessed rapid technological advancement in the recent past. Therefore to update the knowledge of WAPDA doctors and keep them abreast with the latest skills and techniques, clinical sessions are being arranged at WAPDA Hospital Complex, Lahore on weekly basis in which specialist doctors are delivering lectures on various medical subjects.

Incentive for Hard Areas to Doctors

Guddu and Tarbela have been categorized as hard areas station due to peculiar working condition as doctors are not available from the open market willing to serve there freely. Realizing this fact, Authority has graciously allowed an incentive of one scale higher w.e.f. February 5, 2007 to encourage doctors to serve at hard areas of Guddu and Tarbela Power Stations. In this regard, two doctors have been given the incentive of higher grades at Tarbela.



Member (Finance) enquiring after a patient at WAPDA Hospital Complex, Lahore on Eid Day

Full Medical Facility to Widow

Authority has allowed full medical facility to the widows and the entitled dependent children along with reimbursement facility w.e.f. March 27, 2008.

Change of option from Cash Medical Allowance to Medical Faciliy

One hundred and nine books of cash medical allowance were converted into free medical facility w.e.f. February 11 to May 25, 2008.

Establishment of Burn Unit

A state of the art, most modern 6-Bedded Burn Unit is under construction at WAPDA Hospital Complex, Lahore. It will comprise the following services:

- Emergency
- Operation Theatre
- Intensive Care Unit
- Diagnostic Units
- Shower Room
- Sterilization Room
- Rescure Unit
- Dialysis Unit

Keeping in view the requirement of Burn Unit at WAPDA Hospital Complex, civil work has been started to complete this very important project, within the limited time frame. It will benefit employees who suffer from serious and life threatening burn injuries.

Establishment of Family Planning Centres

Population Welfare Centres have been established at major hospitals and dispensaries i.e. Hyderabad, Peshawar, Multan, Quetta, Rawalpindi and WAPDA Fortified Dispensaries at Sahiwal and Muzaffargarh. The center established at WAPDA Hospital Complex, Lahore is working as RHS-B and the cases of established centers are also under process for their upgradation as RHS-B. Those centers, which are presently in phase of establishment at 50-bedded hospitals will also get the status of RHS-B center in near future.

Employees Medical Benevolent Fund

Employees Medical Benevolent Fund constituted to benefit the patients requiring such highly costly treatment as liver and Bone marrow Transport etc.which were previously refused by the department. Five WAPDA employees have now been benefited.

Training of WAPDA Doctors and Paramedical Staff

Senior Lady Medical Officer along with paramedical staff attended training course at Punjab Population Welfare Department, RHA Centre, General Hospital, Lahore.

WAPDA Hospital Complex, Lahore.

- WAPDA Hospital Complex, Lahore is the largest Health Care Unit of WAPDA, which strives to improve the Health Status of the WAPDA employees and their families through provision of state of the art, extensive and comprehensive medical facilities.

- This hospital has a daily OPD attendance of more than 1600 patients. Specialized cover is available in most of the clinical disciplines through a specialist OPD floor, which has all the hospitality facilities required for convenience and satisfaction of the patients.

- WAPDA Hospital Complex is functioning with 250-Beds. The officer ward consists of 24 well-furnished rooms.

- Computerized Reception in Wapda Hospital Complex Lahore is functioning. In Computer Reception daily attendance of the staff is being carried out. Laboratory Test Reports are also provided to the patients through Reception.

- Hospital boasts of Hi-Tech diagnostic and therapeutic components including Echocardiogram, Exercise Tolerance Test, Cryoscopy (Skin treatment), G.I. Endoscopy, Laproscopic Surgery and Lithotryptic therapeutic components including Echocardiogram, Exercise Tolerance Test, Cryoscopy (Skin Treatment), G.I. Endoscopy, Laproscopic Surgery and Lithotryptic theatre. Two new operation theatres are being added at 2nd Floor in addition to the existing at 3rd Floor and will be equipped this year.

  The following departments are functioning in the hospital:-

  - **Pathological Laboratory.** Pathological laboratory is functioning round the clock. For quality assurance WAPDA Hospital Laboratory is being monitored by RIQAS England. The quality of our testing accuracy is more than 90%. The RIQAS has given a certificate to this effect as well.

    Dimension RXL, automatic chemistry analyzer has been installed in the laboratory which functions on complete automation to the extent that the reaction, couvettes are generated for every sample in the machine. This exclude the analytical error supposed to occur due to faulty couvettes used in other machines.

  - **Eye Department.** Two new Machines Argon Laser and YAG Laser have started functioning for providing Opthalmological care to the patients. A new Eye OPD has been established with modern equipments and facilities for patients.

  - **X-Ray Department.** New Automatic Film Processor X-Ray Machine in X-Ray department is functioning. Three Radiologists including a Female Radiologist have been posted to facilitate patient for quick X-Rays and Doppler Study.

  - **Physiotherapy Department.** Physiotherapy Department is also providing better result with new facilities like Machine Shoulder Wheel.

  - **Family Planning Department.** Family Planning Department is functioning since 19.5.2005 under Population Welfare Department, Punjab Govt. of Pakistan. The Centre has been declared as category RHSB by the Government.

  - **New Dental Department.** After remodeling of Dental Department, the patients are availing safe and quality dental care facilities. Two new Dental Chairs have been provided replacing the old one.

  - **New Gynae. OPD.** A new remodeled Gynae. OPD has been established to provide general care to Gynae Patients.

  - **One Doctor per Floor.** One doctor per floor in evening and night shifts each has been deputed to look after the admitted patients.

  - **Library.** Library has been established in the hospital which is also a pre-requisite for its recognition by PMDC. Adequate books regarding all specialities and various other important topics are available. 180 books have been added during 2007-08.

  - **Blood Bank.** Blood bank in WAPDA Hospital Complex, Lahore is functioning round the clock to provide safe and clean blood to the needy patients. The screening include Hepatitis B, C & Aids etc.

  - **Ambulances.** Four Ambulances are functioning.

  - **Automatic Telephone Exchange.** Automatic telephone exchange in WAPDA Hospital Complex, Lahore has been installed and is in functioning condition.

  - **ICU Department.** ICU Department has been providing fine facilities to the critical patients care.

- **Automation of WAPDA Hospital Complex, Lahore Phase-I.** Automation of Hospital is now being undertaken at fast pace and Phase-I of the project has been implemented. The Networking of computers of WAPDA Hospital Complex, Lahore has been undertaken by Director (MIS). The requisite hardware equipment has been procured. In-house software development for all the modules of Phase-I by MIS Section has been completed and is in operative. The departments and the Sections which have been made operational along with brief nature of job are as below.

- **Out Door Reception.** A new reception hall has been constructed and is now operational. In this hall the patients' visiting OPD will be registered by the computers. The computers are providing printing prescription slips to facilitate outdoor patients. Counters for Officers, Employees and their families have been provided. Senior Citizens have also been facilitated with the provision of special counter. In addition to this Specialist Appointment's and Refer-out/in counters have also started.

- **In Door Reception.** Indoor Admission and Discharge is also being computerized in near future where all new admissions and discharges will be done through computers installed at main reception. By linking with main computer it will provide immediate and reliable information on indoor status to senior management

- **Pathology Lab Reception.** A new computerized reception counter linked with main computer to replace the manual counter to facilitate Patients and Management in near future has been introduced.

- **Radiology Lab Reception.** A new computerized reception counter linked with main computer to replace the manual counter to facilitate Patients and Management in near future has been introduced.

- **Central Drug Store.** Real time computerized Drug Store System has replaced the manual maintenance of record with the installation of computers in the main drug store. Computers have been provided to DSO and ADSO for better management of main drug store and pharmacy outlets. All the computers are linked with main server.

- **Out Door Pharmacy.** All the Outdoor Pharmacy outlets (Five in numbers) are now computerized where the disbursement of medicines is being made through computers in real time environment.

- **In Door Pharmacy.** Indoor Pharmacy in addition to providing medicines to Wards, is also disbursing medicines to senior officers and their families through the use of computer in real time environment.

- **Performance of Family Welfare Centre at WHC, Lahore for 2007-08**
  - Condoms (Units) = 9120
  - Oral Pills (Cycle) = 524
  - Exluton (Cycle) = 14
  - Postonor – 2 = 34
  - Copper - Ts (Units) = 136
  - Multi Load (Units) = 32
  - Inj. Norogest = 95
  - Inj. Megestron = 17
  - Munolap = 136
  - Vasectomy = 13
  - **Total = 10,121**

- **Recognition of WAPDA Hospital Complex for House Job**

Case is under process to get WAPDA Hospital Complex, Lahore recognized by Pakisan Medical and Dental Council, for Medicine, Surgery and Eye Department.

- **Over-All Performance of WAPDA Hospitals / Dispensaries.**

Over-all performance of WAPDA Hospitals / Dispensaries at different stations for the period July, 2007 to June, 2008 has been shown as under:-

- Patient attended in outdoor patients department = 19,39,494
- Emergency/Casualty Attendance = 1,67,964
- No. of tests investigated in WAPDA Hospitals / Dispensaries = 27,08,231
  - i) X-Ray = 72,541
  - ii) E.C.G. = 20,512
  - iii) Laboratory Tests = 25,88,845
  - iv) Ultra Sounds = 25,501

- No. of cases referred to outside institutes for investigation = 24,600
  - i) PIC = 711
  - ii) AFIC = 117
  - iii) NICVD = 92

- No. of cases referred to outside Non WAPDA Hospitals and Specialists = 58,892

- No. of patients admitted in WAPDA Hospital Complex, Lahore = 31,636
  - i) Surgical = 1,497
  - ii) Medical = 2,205
  - iii) Gynaecology = 280
  - iv) Children = 438
  - v) ENT = 166
  - vi) Eye = 441
  - vii) Cardiology = 1,352
  - viii) Oncology = 1,153
  - ix) ICU Ward = 1,271
  - x) Officer Ward = 986

- No. of Operations (Minor/Major) performed = 8,029
  - i) Surgical = 1,227
  - ii) Gynaecology = 373
  - iii) ENT = 202

iv) Eye = 515
v) Skin = 193
vi) Orthopaedic = 802

- Cardiac cases referred for Interntional treatment = 920

- Antiviral treatment provided for Hepatitis B&C = 683

- Cases referred for Renal Transplantation = 05

ESTABLISHMENT

- Establishment Directorate is an integral part of the offices of the Authority functioning under GM (Admn) and Hub of Human Resources activities. This Directorate is mainly responsible in dealing with all Establishment matters of BPS-20 and above officers and BPS-1 to 19 controlled by S&GA. Besides handling of deputation of all Army Personnel to WAPDA, advice to the Authority on various issues, imparting clarifications on the matters (other than service rules) are the added responsibilities. This Directorate is also playing a pivotal role in coordinating between WAPDA and Ministry and off and on passe on requisite information to the Ministry.
- The Human Resource activities handled by this Directorate during the year 2007-08 includes induction of 17 personnel in various grades and their orientation, mandatory training of 34 officers/staff besides alleviated 14 employees and adjustment of 16 surplus employees. Number of welfare cases, pension/reward cases etc have also been processed by the Directorate.

O&M DIRECTORATE

O&M Directorate, WAPDA is mainly responsible for conducting O&M studies of Projects and other formations of Water Wing, Hydel Generations and Residual WAPDA. It is often assigned additional support of advisory exercises associated with expertise as per need of Admn Division to facilitate maximal / optimal achievements by the Division. Progress for financial year 2007-08 was as under:-

- **Manpower Statistics** Manpower Statistics Ready Reckoner bearing information up to June 30, 2007 and December 31, 2007 have since been published by Manpower Statistics Cell (O&M). Moreover, all formations of WAPDA have been asked to provide manpower data for the preparation/updation of the coming issue of the Ready Reckoner bearing information as on June 30, 2008, which will be compiled and issued shortly.
- **O&M Studies** The following studies were carried out and completed by the Scrutiny Committee of O&M Directorate during the corresponding period:
  - O&M study report on WAPDA Sports Board/WAPDA Sports Complex, Lahore.
  - Restructuring of WAPDA and Transition of Manpower and other resources to PEPCO
  - Review of Resident Representative, Karachi (RRK) office
  - Restructuring of Public Relations Directorate

EDUCATION DIRECTORATE

With a view to create professionals like doctors, engineers, administrators, teachers and scientists, WAPDA is running 38 educational institutions comprising one degree college, one inter-college and 36 schools at various WAPDA projects throughout the country. These institutions are managed by 700 qualified teachers. More than 18000 students are receiving education in these schools and colleges. An amount of Rs.182 million was spent on education during the year under report.

- **Facilitations during the year**
  - 06 Lecturers (BPS-17) promoted as Assistant Professors
  - 09 lecturers (BPS-17) appointed on contract basis
  - 07 Senior Trained Graduate Teachers promoted as Headmasters/mistress
  - Government High School Mangla taken over from District Government Jhelum on June 20, 2008
  - Services of 15 contract/daily wages teachers regularized
  - Regional Groups of Educational Institutions (RGEIs) abolishesd on March 8, 2008. Administrative powers to appoint teaching staff given to CEOs/GMs of corporate entities
  - Mechanism for proper monitoring of schools/colleges devised and issued on May 26, 2008 to heads of institutions/local administrative heads/appointing authorities i.e. CEOs/GMs for information and implementation
  - SOP for Education Directorate including schedule for inspection of schools prepared and circulated on June 24, 2008 to all concerned formations for information

SECURITY

Security Directorate remains responsible for the security arrangements. Taking cognizance of the prevalent law and /order situation, the following measures have been taken to improve upon this aspect:-

LABOUR AND WELFARE

Labour & Welfare Directorate is mainly responsible to assist the Authority for preservation of industrial peace in WAPDA. To achieve these objectives, this Directorate plans, coordinates, evaluates labour management relations through amicable settlement, human relations and motivation to the workers.

Labour & Welfare Directorate further maintains liaison between Authority, its officers/employees Collective Bargaining Agent as well as other agencies operating in WAPDA to resolve labour conflicts.

This Directorate has been able to control the labour situation effectively throughout Pakistan. Hence, Labour Management Relations in WAPDA remained cordial and noticeable progress was achieved towards promoting sense of security and belongingness amongst WAPDA employees.

A resume of major activities of this directorate during the period under report is appended below:-

- Two notifications for application of Pakistan Essential Services (Maintenance) Act, 1952 for all cases of employment in Tarbela Dam Project and other Small Hydel Power Stations were got issued from the Ministry of Interior, Government of Pakistan
- 13 complaints received from Provincial/Federal Governments were sorted out and suitable actions taken under intimation to the concerned Governments.
- 385 complaints/representations regarding individual grievances received from WAPDA employees were processed, genuine grievances got redressed and decisions intimated to all concerned
- A large number of employees' outstanding cases were decided in 09 meetings of Joint Works Council held in different formations and their decisions were implemented by the concerned quarters.
- 301 nominees of CBA were notified by this Directorate to perform duties of Shop Stewards in various offices
- 13 Safety Seminars were held at various places with the coordination of this Directorate.
- 8,074 cases of retired/deceased employees and widows of deceased employees were processed and settled as detailed below:-

    - WAPDA employees pension cases = 3947
    - Grant out of W.W.Fund = 225
    - Marriage Grant = 453
    - Educational Scholarship = 2868
    - Grants to handicapped children of WAPDA employees = 23
    - GLI- = 558

Legal advice was imparted after thorough examination on numerous cases of labour laws received from subordinate formations. Besides, important cases of WAPDA employees instituted under labour laws were briefed to WAPDA Counsel and monitored successfully in NIRC.

TRANSPORT

Transport Directorate WAPDA is operating and maintaining 226 vehicles with a staff of 250. Salient contributions of this Directorate are as under:-

- Community Service is provided daily to 2,995 WAPDA employees through 44 large vehicles (buses/coasters/vans) on various routes in and around Lahore.
- Transport facility is provided daily to 835 School/college going children of WAPDA employees through 19 large vehicles (buses/coasters/vans).
- 77 old / unserviceable vehicles of different WAPDA formations were inspected and recommended for auction.
- 18 old / unserviceable vehicles of Transport Directorate were auctioned for Rs. 3.7 Million.
- 11 new vehicles were purchased to improve existing Transport.
- On July 23, 2007, Transport Directorate started fortnightly training programme for drivers/conductors to educate them on traffic rules and regulations. Curriculum also included Islamic education to improve their conduct. Training has been imparted to 114 drivers/conductors during the year under report.
- To enhance the driving skills of drivers, Transport Directorate arranged lecture/presentation through audio/video means on traffic rules and regulations, delivered by a team sent by Senior Superintendent of Police, Traffic Police, Lahore on August 18, 2007. Similarly another lecture/presentation was arranged by Chief Traffic Police Officer Lahore on June 17, 2008 at Transport Directorate, Sunny View Complex, Lahore. Both the presentations were very educative and informative. The presentations were attended by officers and more than 200 drivers of the Directorate.
- As an economy measure, Transport Directorate started re-fixation of MPG of small vehicles and management of community service routes w.e.f. June 2007. As a result of this exercise, till June 2008, an economical saving of 1267 liters diesel and 1008 liters petrol per month has been achieved.
- Efforts were made to boost up the repair, maintenance/working efficiency of Unit Repair Organization of Transport Directorate, which resulted into a saving of approximate Rs.425,000/- per annum.
- In order to make better outlook of the busses of Transport Directorate plying on different routes of Lahore, complete denting and painting of five busses was carried out during 2007-08.
- For the sake of economy, busses performing school/college duty in Summer Camp were replaced with small vehicles.
- In order to increase the interaction, coordination and cooperation amongst drivers, bus conductors and WAPDA employees, a Hafta-e-Khush Ikhlaqi was celebrated by Transport Directorate.

PROPERTY MANAGEMENT CELL

This Cell was established by the Authority during March, 2002 for expediting transfer of ownership rights of the assets to WAPDA and its corporatized entities. Since its inception, a total number of 1239 assets have

Activities	Installations/Formations
Inspection regarding fire fighting arrangements	13 Nos.
Training of employees executed at Federal Civil Defence and Fire Fighting Institutes, through allocations to various field units of WAPDA	158 Nos.
Fire Fighting Practices at WAPDA House, Lahore	36 Nos.
Employees trained in Fire Fighting at WAPDA House	104 Nos.
Training of Security Staff executed at WAPDA House Lahore for checking procedure of ID card, visitors, handling of visitors, handling of wireless set & voice procedure, use of metal detector, identification of walk through gate, search/checking of vehicles, terminology of Natural Disaster Management, Handling the situation if bomb is found, causes of fire, type of fire, extinguishers, fire fighting drill, handling of procession, in/oput procedure for vehicles/gate pass and handling of weapons	236 Nos.
Training of security staff executed at WAPDA House Lahore regarding action in case of explosion. Entry procedure of Union Leaders, activities of Union during working hours, entry procedure of visitors/retired WAPDA employees at WAPDA House, handling of weapons/safety of weapons and procedure to be adopted for issue/deposit of weapons/Ammunition and duties of Security Staff on out break of fire.	48 Nos.

been identified out of which 840 numbers have been got tile transferred in favour of WAPDA/its corporatized entities. Achievements of this Cell can be truly classified as outstanding, keeping in view the fact that in many cases, prolonged delays in transfer/mutation had resulted in dislocating/disappearance of record/payment proof.

PRINTING PRESS

WAPDA Printing Press is rendering its services to all formations of Residual WAPDA/PEPCO in respect of printing tasks.

After modernization, Management of WAPDA Printing Press gradually improved their skill to deliver quality printing well in time. As far as the printing charges of WAPDA Printing Press are concerned, the cheaper rates are ensured after comparison with the charges of any A class printing press in the private sector.

To facilitate our precious clients in near future, WAPDA Printing Press will develop/launch its web page. By doing so, indentors would be able to okay proofs on net and could also get status of their printing task even at the eleventh hour to pass on any instructions.

By introducing such services, the indentors will be able to save their physical involvements and would get their printing tasks well in time.

COMPUTER ADMN DIRECTORATE

This directorate is an integral part of the offices functioning under GM (Admn) and is the hub of automation activities. This directorate is mainly responsible for:-

a. Gradual automation of the admin branch
b .Provide the technical guidance to GM (Admn) and the directorates working under him in the following ways:
   i) for procurement of computer accessories and software
   ii) for accessing training requirement
   iii) for accessing software and hardware requirements
c. To manage networking of GM (Admn) branch and Authority offices.

Computer Admn directorate has developed state of the art software for WAPDA Central Stationery Store and Printing Press apart from computerization of CM cells and establishment directorate. Recently efforts are being made to automize more facilitated and user friendly human resources management system.

CAREER MANAGEMENT CELLS

Career Management Cells deal with career- planning, development, management of officers of WAPDA and its Satellite Entities to the defined limits. Transfers, Promotions, Up-gradation, Deputations, Training within and outside country, assisting in acquisition of higher qualifications within criteria, formulation of career planning related policies on assignment, etc of officers from BPS-18 to BPS-20, are also processed in these cells.

During the year under report, Career Management Cell (S&C) processed promotion cases of 64 officers and regularization of 21 officers. The Cell arranged locally and abroad the training/inspection visits of 42 officers, 02 deputation cases and 16 court cases were pursued. Annual Confidential Reports of 608 Grade-18, 19 and 20 officers were completed. In addition, various studies were conducted including SOP of Promotion Boards.

CAREER MANAGEMENT (POWER (H) & FINANCE

Career Management (P (H) & F) Cell deals with Career Planning development and management of Grade 17, 18

& 19 Hydel Generation Officers and BPS-18 & 19 Finance Wing Officers of WAPDA. Besides maintenance of Service record/ACRs of the Hydel and Finance Wing Officers, it deals with transfers/postings as per criteria of "right man for right job".

Moreover upgradation to higher scale, trainings, inspection of material abroad and deputation (Local as well as Aborad) of Hydel & Finance Wing Officers are also taken care by Career Management (P (H) & F).

The salient achievements of Career Management (P (H) & F) during the year 2007-08 are as follows:

- Two Promotion Boards for Hydel Generation (Power Wing) officers for promoton from BPS-18 to 19 were conducted.13 officers were approved for promotion.
- One Upgradation Board for Hydel Generation (Power Wing) officers was conducted. Six officers were approved for time scale upgradation to BPS-19.
- Seven Hydel Generation officers of BPS-18 were sent to attend Refresher Course.
- Eight Hydel officers of BPS-18 were sent to Middle Management Course.
- Two Hydel officers of BPS-18 were sent to deputation abroad.
- One Hydel Generation officer of BPS-18 was sent to Germany for Pre-shipment Inspection/Testing of Circuit Breakers.
- Five Hydel officers of BPS-17 were sent to Sector Specific (Pre-promotion) Course.
- Two Promotion Boards for Finance Wing officers for promotion from BPS-17 to BPS-18 and BPS-18 to BPS-19 were conducted. Nine officers were approved for promotion.
- Two Finance Wing officers of BPS-19 were sent to attend Senior Management Course.
- Six Finance Wing officers of BPS-18 were sent to attend Middle Management Course.
- Two Finance Wing officers of BPS-18 were sent to local deputation and one Finance officer of BPS-19 was sent to deputation abroad.
- 256 ACRs of Grade 18 & 19 officers were got cleared during 2007-08.

SERVICES & ESTATES

The Services & Estates Directorate is responsible to provide services to the Authority's offices and various other offices working under GM (Admn) and S&GA Division. It looks after the affairs of Official / Residential Accommodation, Rest Houses and Single Officers Hostel at Lahore. It also assists Authority in formulation of accommodation/telephone policiy and ensures its implementation. The salient contribution of this Directorate is as under:-

- The Services & Estates Directorate has generated an annual income of approximately Rs.40 million from commercial tenants and Rest house charges.
- The post bifurcation space issues with PEPCO were resolved amicably. PEPCO has been allotted ample space as per requirement. For the purpose, occupation plan of WAPDA House and Sunny View was reviewed/reassessesd and the adjustments/shifting were made to ensure proper utilization of available space in the best interest of Authority.
- Boarding & lodging facilities were provided to the officers (BPS-17 to 20) at Single Officers Hostels in a befitting manner.
- The touring officers were provided boarding and lodging facilities at WAPDA Rest House Shadman.
- The Services & Estates Directorate ensured provision of quality food at subsidized rates to WAPDA/PEPCO employees at WAPDA House/Sunny View Employees Canteen.
- The House acquisition rates were enhanced (10% increase) as per approval of Authority in the interest of employees.
- 221 x Rent Assessment Reports of houses to be acquired for WAPDA employees were processed/finalized during the year under report.
- 1440 x house acquisition cases/renewals were processed/finalized during the report year.

CENTRAL STATIONERY STORE

This directorate was established for procurement of statinery/paper items on competitive rates for their further supply to different WAPDA formations all over the country by adding very nominal store handling charges.

Since its inception, all WAPDA formations are getting statinery items/standardized printed items on very competitive rates.

To improve the working of the directorate, role of computers was introduced in 2006. Later on, one-window operation was introduced which has considerably improved the performance of the directorate.

In the near future, the directorate of Central Stationery Store will launch its Web page to; save the time and provide information to all residual WAPDA/PEPCO office. By doing so, physical involvement of indentors will be reduced and order receipt/dispatch will be done by using Web page services.

WAPDA SPORTS

WAPDA is one of the largest organizations creating and developing remarkable sporting atmosphere within its units all over the country. It has made worthwhile contribution towards promotion of almost all disciplines of sports at the national and international level. Salient features of performance of WAPDA Sports Board, during the year under report are the following:-

Chairman WAPDA giving away WAPDA Inter Unit Championship Trophy to LESCO Chief Executive

- **National Standing of WAPDA Teams.**
  - Maintenance of 36 Men-Teams, 18 Women Teams.
  - The Current National Standing of WAPDA Teams:-
    - Champions 27
    - Runners-up 11
    - Third Positions 04

- **Performance at International Level.** It is the honour for WAPDA that its players are showing outstanding performance as representatives of Pakistan in international competitions and won 10 gold, 10 silver and 19 bronze medals.

- **Sports Activities:** Annual Inter Unit competitions of Badminton, Baseball, Cricket, Cycling, Football, Kabaddi (Circle) and Table Tennis, have been organized up to June 30, 2008. Besides arranging Annual Inter Unit Sports Competitions in various cities, WAPDA Sports Board also organized the following National Championships at WAPDA Sports Complex, Lahore:
  - National Karate (Men and Women) Karate Championship 2007
  - 43rd National Gymnastics Championship 2007
  - 43rd National Sr. Men's Volleyball Championship 2008.
  - WAPDA Sports Board also organized 2nd Pakistan Master Table Tennis Tournament 2008 (International).
  - WAPDA Annual Inter Unit Prize Distribution Ceremony was organized on June 05, 2008.

- **Sports Infrastructure.** WAPDA Sports Board is maintaining sports infrastructure for training and competition purpose, which includes athletic track, football/ cricket grounds with flood lights arrangements, International standard swimming pool, gymnasium, hostel, fitness centre and sports library.

- **Future Plans.**
  - Endowment Fund for WAPDA/National Sports.
  - Horticultural improvements of WAPDA Sports Complex.
  - Preparations / participation in all National Champions scheduled in 2008-09.
  - Preparations / participation in all National Games 2009, Peshawar.
  - Participation in National Training Camps and National Champions as per selection/plan of Pakistan Sports Board and National Sports Federations.

WAPDA Employees Co-operative Housing Society

- **Residential Status**.
  - The construction activities in Phase-I of WECHS are in full swing. Presently, 4,305 members are residing in the town while 587 houses are under construction. Total membership is 8283.

Member (Water) presenting Umra Package to the winner of WAPDA employees' Annual Naat Competiton

- The construction activities in Phase-II have been started where 33 houses are under construction.
- The construction activities in Ph-I (Ext) have also started and 8 houses are under construction.
- The allotment of shops of J-2, K-1 and G-5 blocks to members and left over plots to WAPDA Employees and widows of employees have been done through balloting, 4 No. shops in D-3 Block adjoining D-3 Mosque have been completed and rented out.

- **Roads.** The roads network in Phase-1/Ph-I (Extn) is 100% complete whereas in Phase-II 85% physical achievement has been made. Repair of one million sq. ft. worn out roads for Phase-I has been taken up in different phases.
- **Water Supply**. Water supply network is 100% complete in Phase-I and Phase-I (Extension) whereas 95% achievement has been made in Phase-II. Construction of broken mainhole and outfall structure has been carried out.
- **Sewerage System.** Sewerage system is 100% complete in Phase-I & Phase-II.Laying of independent sewerage system for Khamba village in Phase-II has also been carried out.
- **Sui Gas.** The provision of gas is 100% complete in Ph-I and 90% complete in Ph-II. Necessary correspondence for Ph-I (Ext) for issuance of job number is under process whereas demand notice has been deposited.
- **Electrification**. Electrification work is 95% complete in Phase-I, 50% in Phase-II and 75% in Phase-I Extension (A-1 & A-2 Block).
- **Horticulture.** 2400 trees in 2007-08 were planted in the present monsoon, 400 plants were planted on Main Boulevard WAPDA Town. Jogging tracks were constructed in Parks of Block D-3, B-4, E-1, Sports Club, E-I, F-2, G-4, G-5 & J-I, development of lawn in Block G-2 & E-I sports club.
- **Education.** Construction of Govt. Girls Degree College in D-2 Block is 100% complete where classes have started during September 2008. WAPDA's Public Girls High School in J-I Block has shown 100% result in 10 TH class (Lahore Board) examination and all the students' very high marks. WAPDA's Public Girls High School is accommodating 600 students.

  Lahore Grammar School Wapda Town is also accommodating 175 WAPDA and 1655 non-WAPDA students.

- **Mosques.** Construction of D-2 Mosque is under progress whereas construction for further extension of Mosque in J-2 block is under process. Construction of Main Jamia Mosque (F-2 Block) is going to start in near future. Construction of B-4 Mosque is underway.

- **Boundary Wall.** Construction of boundary wall around G-5, H-4 & A-5 Blocks and Phase-II has been completed.

- **Development Projects / Activities.**
  a. Construction of Marriage Halls in G-1 Block is under progress.
  b. Construction of Chowkidar Room J-I School.
  c. Construction of Independent sewerage system for khamba village Phase-II.
  d. Construction of boundary wall around graveyard Phase-II.
  e. Construction of sector shops H-4 Block underway.
  f. Construction of corner shop F-2 Block Jaffarabad underway.
  g. Construction of temporary accommodation for security guards Phase-II is underway.
  h. Pre-mix carpeting of worn out roads Phase-I.
  i. Widening of Main Boulevard is likely to start in the near future.
  j. Boundary wall in Phase-II around Khamba village completed.

- **Security.** Security measures have been improved through effective patrolling and good communication by induction of new mobile vans, motorcycles, mobile phones.

RULES DIRECTORATE

This Directorate is responsible for imparting necessary advice to the Authority on various issues during the Authority meetings, carrying out amendments and issuance of clarifications of Service/General Rules on receipt of reference from various WAPDA Formations. The Directorate made correspondence with Ministry of Water and power regarding clarification of rules from Federal government during the year 2007-08.

During the Financial Year 2007-08, Rules Directorate also held many sessions with PEPCO to help them formulating Power Wing Companies' various rules.

During the Financial Year 2007-08 Rules Directorate has updated, re-hashed and published by incorporating scattered and separately issued rules / instructions in the following books:-

a. WAPDA Medical Rules
b. WAPDA Transport Rules.

During the year under report, the progress of Rules Directorate is as under:

a.	Clarification of Rules	130
b.	Amendment of rules	17
c.	Comments / opinions given	230
d.	Disputed date of Birth Rules	20
e.	Studies of different rules	04

Scanning of old record of Rules of this Directorate was also carried out.

Public Relations Division

This division effectively continued to project WAPDA's achievements and activities through print and electronic media to enhance the organization's image. In addition, efforts were made to educate the public on the achievements and its role in nation building activities through publication of articles in newspapers as well as stories and executives participation in electronic media programme.

During the year, this division issued 392 press releases and clarifications to project WAPDA's activities and to alleviate misgivings created in public mind by certain news items published in the national and regional press. Projection through documentaries and talks on TV and Radio were organized. With a view to imparting information about WAPDA, press conferences of chairman were arranged.

The division arranged publication of as many as 1083 tenders, pre-qualification and other notices for various WAPDA formations in the national and regional newspapers of Pakistan during the year. Protocol was provided to a number of delegates from inland and abroad who visited WAPDA's completed and ongoing projects and WAPDA headquarters.

Publication of WAPDA Khabarnama, WAPDA Annual Report and Telephone Directory continued. Circulation of these publications was ensured inland and abroad to the interested readers.

BALANCE SHEETS

CONSOLIDATED BALANCE SHEET (Power, Water and Co-ordination Wings) as at June 30, 2008

Rs. in Millions

	Consoidated Amounts 30-06-2008
Fixed Assets	**128,256.317**
Operating fixed assets	
Capital Works	
In progress	167,940.724
Completed Works	79,473.028
Total Capital Works	247,413.752
Long Term Investments	187,009.778
Notes Receivables	19,435.353
Total Fixed Assets	**582,115.200**
Current Assets	
Stock & Stores	1,415.065
Work in progress	18.925
Sundry Debtors	273.390
Advances	2,869.147
Other Receivables	255,438.949
Short term investments	5,806.000
Cash and Bank balances	7,850.742
Total Current Assets	273,672.217
Total Assets	**855,787.417**
Capital / Contributions & Surplus	
Share Capital	9,522.000
Revaluation Surplus	14,847.487
Investment by Govt. of Pakistan	316,383.647
Contributions / Grants	8,808.512
Surplus up-to previous year	174,374.553
Surplus (Deficit) for the year	18,222.529
	192,597.082
Total Capital / Contributions & Surplus	**542,158.729**
Non-Current Liabilities	
Long Term Loans and Bonds	102,528.041
Liability under Ijara Financing	16,000.000
Deferred Credits of GST	210.927
Total Non-Current Liabilities	**118,738.968**
Current Liabilities	
Deposits	52.610
Creditors	80,015.107
Accounts Payables	1,038.644
Current Maturity of Loans & Bonds	4,818.713
Short Term Liabilities	70,124.724
Accruals and other Liabilities	38,839.922
Total Current Liabilities	**194,889.721**
Total Capital & Liabilities	**855,787.417**
Current Ratio	1.40
Debt Equity Ratio	0.22

CONSOLIDATED BALANCE SHEET (Power, Water and Co-ordination Wings) as at June 30, 2008

	Co-ordination Wing	Water Wing	Power Wing (Hydro Electric)	Consolidated Amounts
	30-06-2008 Rs.	30-06-2008 Rs.	30-06-2008 Rs.	30-06-2008 Rs.in Millions
Fixed Assets				
Operating fixed assets	605,520,045	8,398,000	127,642,399,000	128,256.317
Capital Works				
In progress				
Completed Works	—	147,002,007,000	20,938,717,000	167,940.724
Total Capital Works	—	79,473,028,000	—	79,473.028
Long Term Investments	—	226,475,035,000	20,938,717,000	247,413.752
Notes Receivables	—	—	187,009,778,000	187,009.778
	—	—	19,435,353,000	19,435.353
Total Fixed Assets	**605,520,045**	**226,483,433,000**	**355,026,247,000**	**582,115.200**
Current Assets				
Stock & Stores	66,463,416	—	1,348,602,000	1,415.065
Work in progress	5,355,633	—	13,569,000	18.925
Sundry Debtors	202,727,084	55,345,000	15,318,000	273.390
Advances	179,343,926	242,302,000	2,447,501,000	2,869.147
Other Receivables	2,109,022,690	110,686,000	253,219,240,000	255,438.949
Short term investments	2,606,000,000	3,200,000,000	—	5,806.000
Cash and Bank balances	325,085,552	1,734,426,000	5,791,230,000	7,850.742
Total Current Assets	5,493,998,301	5,342,759,000	262,835,460,000	273,672.217
Total Assets	**6,099,518,346**	**231,826,192,000**	**617,861,707,000**	**855,787.417**
Capital / Contributions & Surplus				
Share Capital	—	—	9,522,000,000	9,522.000
Revaluation Surplus	—	—	14,847,487,000	14,847.487
Investment by Govt. of Pakistan	—	176,606,317,000	139,777,330,000	316,383.647
Contributions / Grants	39,068,294	—	8,769,444,000	8,808.512
Surplus up-to previous year	5,342,122,960	2,244,265,000	166,788,165,000	174,374.553
Surplus (Deficit) for the year	338,707,364	1,096,613,000	16,787,209,000	18,222.529
	5,680,830,324	3,340,878,000	183,575,374,000	192,597.082
Total Capital / Contributions & Surplus	**5,719,898,618**	**179,947,195,000**	**356,491,635,000**	**542,158.729**
Non-Current Liabilities				
Long Term Loans and Bonds	—	51,111,637,000	51,416,404,000	102,528.041
Liability under Ijara Financing	—	—	16,000,000,000	16,000.000
Deferred Credits of GST	—	—	210,927,000	210.927
Total Non-Current Liabilities	**—**	**51,111,637,000**	**67,627,331,000**	**118,738.968**
Current Liabilities				
Deposits	20,528,100	32,082,000	—	52.610
Creditors	39,283,012	15,375,000	79,960,449,000	80,015.107
Accounts Payables	318,741,121	719,903,000	—	1,038.644
Current Maturity of Loans & Bonds	—	—	4,818,713,000	4,818.713
Short Term Liabilities	—	—	70,124,724,000	70,124.724
Accruals and other Liabilities	1,067,495	—	38,838,855,000	38,839.922
Total Current Liabilities	**379,619,728**	**767,360,000**	**193,742,741,000**	**194,889.721**
Total Capital & Liabilities	**6,099,518,346**	**231,826,192,000**	**617,861,707,000**	**855,787.417**
Current Ratio				1.40
Debt Equity Ratio				0.22

INDUS BASIN PROJECTS BALANCE SHEET as on June 30, 2008

Rs. in Million

ASSETS	as at 30-06-2008	as at 30-06-2007
FIXED ASSETS		
Project Cost	**19,620.056**	**19,715.623**
CURRENT ASSETS	**471.413**	**384.522**
Cash, Bank & Imprest Balances	3.023	7.680
Sundry Debtors	5.719	36.179
Inter Wing Accounts (Dr. Balances)	462.671	340.663
TOTAL ASSETS	**20,091.469**	**20,100.145**
CAPITAL & LIABILITIES		
LOANS & GRANTS	**20,080.395**	**20,080.395**
Local	3,855.418	3,855.418
Foreign	16,224.977	16,224.977
CURRENT LIABILITIES	**11.074**	**19.750**
Sundry Creditor	2.743	2.911
Inter Wing Accounts (Cr. Balances)	8.331	16.839
TOTAL CAPITAL & LIABILITIES	**20,091,469**	**20,100.145**

WATER WING BALANCE SHEET as on June 30, 2008

Rs. in Million

ASSETS	as at 30-06-2008	as at 30-06-2007
CAPITAL WORKS	**226,475.035**	**187,519.711**
On-going Projects	147,002.007	108,298.480
Completed Projects	79,473.028	79,221.231
OTHER ASSSETS	**8.398**	**6.352**
CURRENT ASSETS	**5,342.759**	**7,074.092**
Cash, Bank & Imprest Balances	1,734.426	2,334.360
Investment	3,200.000	4,400.000
Deposit & Advances	242.302	193.855
Sundry Debtors	55.345	51.197
Clearing Account	110.686	94.680
TOTAL ASSETS	**231,826.192**	**194,600.155**
CAPITAL & LIABILITIES		
CAPITAL EMPLOYED	**227,717.954**	**191,899.086**
On-going Projects	145,852.632	110,175.725
Completed Projects	81,865.322	81,723.361
CURRENT LIABILITIES	**767.360**	**456.804**
Sundry Creditor	15.375	0.982
Account Payable	1.248	0.185
Deposit Accounts	32.082	28.405
Clearing Account	60.313	70.395
Inter Wing Account	248.250	16.173
IBP Account	410.092	340.664
OTHER RECEIPTS	**3,340.878**	**2,244.265**
TOTAL CAPITAL & LIABILITIES	**231,826.192**	**194,600.155**

RESIDUAL POWER WING BALANCE SHEET as on June 30, 2008

Rs. in "000"

ASSETS	as at 30-06-2008	as at 30-06-2007
NON-CURRENT ASSETS		
Fixed assets in operation	127,642,399	116,971,755
Capital work in progress	20,952,286	17,014,021
	148,594,685	**133,985,776**
LONG TERM INVESTMENTS	187,009,778	181,395,222
NOTES RECEIVEABLES	19,435,353	59,880,588
	355,039,816	**375,261,586**
CURRENT ASSETS		
Stores and spares	1,348,602	1,256,427
Trade receivable from NTDC	229,761,720	151,540,280
Advances, deposits and other receivables	25,920,339	31,134,082
Cash and bank balances	5,791,230	11,563,667
	262,821,891	195,494,456
TOTAL ASSETS	**617,861,707**	**570,756,042**
EQUITY AND LIABILITIES		
Share Capital	9,522,000	9,522,000
Revaluation Surplus	14,847,487	6,859,699
Investment by Government of Pakistan	139,777,330	140,280,841
Accumulated Profit	183,575,374	166,788,165
	347,722,191	**323,450,705**
GRANTS	**8,769,444**	**8,880,011**
NON - CURRENT LIABILITIES		
Long term loans & Bonds	51,416,404	103,052,207
Liability under Ijara Financing	16,000,000	8,000,000
Deferred Credits of GST	210,927	2,284,519
	67,627,331	**113,336,726**
CURRENT LIABILITIES		
Current maturity of loans & bonds	4,818,713	9,845,367
Short term liabilities	70,124,724	77,629,214
Creditors, accrued and other liabilities	118,799,304	37,614,019
	193,742,741	125,088,600
TOTAL EQUITY AND LIABILITIES	**617,861,707**	**570,756,042**

RESIDUAL POWER WING INCOME STATEMENT
FOR THE PERIOD ENDED 30-06-2008

Rs. in "000"

ASSETS	2008	2007
Electricity Sales	263,692,383	203,702,870
Cost of Electricity	236,994,448	178,994,445
Gross Profit	**26,697,935**	**24,708,425**
Operating Cost	11,129,324	13,521,849
Operating Profit	15,568,611	11,186,576
Other Income	4,540,733	5,869,776
	20,109,344	**17,056,352**
Financial Charges	7,494,149	7,750,369
Profit / (Loss) for the Year	12,615,195	9,305,983
Prior Years Adjustments	4,172,014	(46,243)
Profit / (Loss) for the year after adjustments	**16,787,209**	**9,259,740**
Unappropriated Profit Brought Forward	166,788,165	157,528,425
Unappropriated Profit Carried Forward	183,575,374	166,788,165

RESIDUAL POWER WING CASH FLOW STATEMENT
FOR THE YEAR ENDED 30-06-2008

Rs. in "000"

DESCRIPTION	2008	2007
CASH FLOW FROM OPERATING ACTIVITIES		
Profit for the year	**16,787,209**	9,259,740
Adjustment for:		
Depreciation	**3,452,717**	5,289,223
Financial charges	**7,494,149**	7,750,369
Interest Income	**(1,218,654)**	(1,619,557)
Dividend Income	**(2,575,357)**	(2,873,227)
Cash flows before working capital charges	**23,940,064**	17,806,548
(Increase)/Decrease in current assets:		
Stores & spares	**(92,175)**	(32,609)
Trade Receivable from NTDC	**(78,221,440)**	—
Advances, deposits and other receivables	**5,213,743**	(70,020,279)
(Increase)/(Decrease in current liabilities:		
Current maturity of loans and Bonds	**(5,026,654)**	(247,217)
Short term liabilities	**(7,504,490)**	46,335,891
Creditors, accrued and other liabilities	**81,185,285**	26,885,037
	(4,445,731)	2,920,823
Cash generated from operations	**19,494,333**	20,727,371
Financial charges paid	**(7,494,149)**	(7,750,369)
A). Net cash flow from operating activities	**12,000,184**	12,977,002
CASH FLOW FROM INVESTING ACTIVITIES		
Addition & Disposal of fixed assets	**(14,123,361)**	(1,602,990)
Capital work in progress	**(3,938,265)**	(4,895,988)
Long term Investment	**(5,614,556)**	(4,844,712)
Notes receivables	**40,445,235**	(6,715,204)
Interest received	**1,218,654**	1,619,557
Dividend received	**2,575,357**	2,873,227
B). Net cash flow from investing activities	**20,563,064**	(13,566,110)
CASH FLOW FROM FINANCING ACTIVITIES		
Investment by Government of Pakistan	**(503,511)**	—
Revaluation Surplus	**7,987,788**	—
Long term Loans and Bonds	**(51,635,803)**	4,287,948
Liability under Ijara Financing	**8,000,000**	—
Deferred credits of GST	**(2,073,592)**	959,053
Grants	**(110,567)**	—
C). Net cash flow from financing activities	**(38,335,685)**	3,328,895
Net Increase/(Decrease) in cash equivalents (A, B & C)	**(5,772,437)**	2,739,787
Cash & Cash Equivalents at the beginning of the year	**11,563,667**	8,823,880
Cash & Cash Equivalents at the end of the year	**5,791,230**	11,563,667

CO-ORDINATION WING BALANCE SHEET as on 30-06-2007

DESCRIPTION	30-06-2008	30-06-2007
	RS.	RS.
TANGIBLE FIXED ASSETS		
Operating fixed assets	605,520,045	553,884,853
Capital work in progress	—	—
	605,520,045	**553,884,853**
CURRENT ASSETS		
Stock & stores	66,463,416	80,212,826
Work-in-progress	5,355,633	3,754,503
Debtors, advances & other receivables	2,491,093,700	3,443,560,280
Short term investments	2,606,000,000	1,251,000,000
Cash and bank balances	325,085,552	685,408,658
	5,493,998,301	5,463,936,267
TOTAL ASSETS	**6,099,518,346**	**6,017,821,120**
EQUITY/CONTRIBUTION & SURPLUS		
Equity/Contribution	39,068,294	39,068,294
Surplus up-to previous year	5,342,122,960	4,899,943,325
Surplus (Deficit) for the year	338,707,364	442,179,635
	5,680,830,324	**5,342,122,960**
CURRENT LIABILITIES		
Deposits	20,528,100	270,492,579
Creditors and accounts payable	358,024,133	355,813,561
Accruals and other liabilities	1,067,495	10,323,726
	379,619,728	**636,629,866**
TOTAL EQUITY AND LIABILITIES	**6,009,518,346**	**6,017,821,120**

Ministry of Water & Power, Govt. of Pakistan, Islamabad As on June 30, 2008	Minister for Water and Power Seretary	Raja Pervaiz Ashraf Muhammad Ismail Qureshi

Senior WAPDA Managers
As on June 30, 2008

Authority
Chairman
Shakil Durrani

Member (Power)
Fazal Ahmad Khan

GM (Hydel)
Azhar Masood Panni

GM (Finance) Power
Anwar-ul-Haq

GM (Training)
Brig. (Retd) Muhammad Iqbal

CE/Principal
Engg: Academy Faisalabad
M. Munir Sultan

Member (Finance)
Ch. Abdul Qadeer

Secretary WAPDA
Muhammad Imtiaz Tajwar

GM (Admn)
Brig. (R) Muhammad Najam-us-Saqib

GM (CCC)
Muhammad Azhar Iqbal

Chief Auditor
Ghulam Mustafa

DG (S&GA)
Pervaiz Ahmad

DG (Finance) B&C
Najeeb Tariq

Director (PR)
Raza-ul-Haq Siddiqui

Director (Vigilence)
Col. (R) Sayed Ali

Member (Water)
Syed Raghib Abbas Shah

GM (P&D)
Dr. Muhammad Siddique

GM/PD Tarbela/GBHP
Maqsood Shafiq Qureshi

GM (Central) Water
Muhammad Ali Shah

GM (Technical Services)
Dr. Izhar-ul-Haq

GM (Projects) North
Brig. (R) Mushtaq Ahmad

GM (Projects) South
Hazoor Bux Memon

GM (Finance) Water
Iftikhar Rafique

GM (C&M) Water
Manzoor Ahmad Gabole

GM (Projects) NA
Brig. (R) Muhammad Zareen

GM (Hydro Planning)
Zia-ul-Hassan

GM (Neelum Jhelum)
Husnain Afzal

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