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9. ABSTRACT

A fairly brief history of the Indus River Basin, with special emphasis on the history of the Tarbela Dam. The report begins with a quick description of the Indus River Basin and then discusses the independence of India and the creation of Pakistan. With partition came conflict over the river and in particular, over the various river projects. The author examines the political history of Pakistan and India during this turbulent period (1950-1960) up to the Indus Basin Agreement at the end of this period. Then the creation of the West Pakistan Water and Power Development Authority (WAPDA) is detailed and debated quite thoroughly. Other development agencies and commissions are studied, as well as U.S.-Pakistan relations during this time. Finally, the impact of the Tarbela Dam on domestic politics and economic development is discussed. The author brings us up to date in his conclusion by indicating that controversy continued to plague the dam project, the lowest bid from a pre-qualified bidder was not accepted, but that eventually the contract went to a consortium of firms led by an Italian company. Tarbela Dam was scheduled for completion in 1975.

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THE INDUS RIVERS AND TARBELA DAM

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THE INDUS RIVERS AND TARBELA DAM

1. History of the Indus River Basin

The Indus River Basin is composed of six major rivers which originate in Kashmir and eventually unite in the Indus River which flows into the Arabian Sea just to the east of Karachi. From east to west the rivers are: Sutlej, Beas, Ravi, Chenab, Jhelum and the Indus. The Indus River plays a central role in the history of the Indian sub-continent. The Indus Valley civilizations, remains of which have been found at Mohenjo-daro and Harappa, are among the earliest known centers of organized human life. In the second century B.C., the early Aryan invaders of Asia encountered the mightiest river they had ever seen and referred to it as the "Indus", or river and therefore named the unknown land they were encountering India or the land of the river. One thousand years later, Alexander the Great halted his invasion of Asia at the banks of the Indus, and he and his army navigated down it to the sea on the first stage of their return journey to Greece.

Although many of the early Indian kingdoms were located in the Indus River Basin area, there were no attempts to utilize the waters of the Indus and its tributaries until the 16th century. At the time of the Mogul emperors, initial attempts were made to divert water for agriculture. Extensive development of irrigation in the Indus Basin came only in the 19th century under British rule when irrigation canals and water distribution systems made Punjab State the richest agricultural area of India, and began to provide water to Sind State, further downstream on the Indus, to develop its agriculture. Even before independence, the fact that the Indus could not provide all the water needed for maximum development of agriculture in the Punjab and the Sind became clear, and competition between the two States for water became a reality.

Nevertheless, the Punjab prospered as the Government formed "canal colonies" and settled small farmers on irrigated land. The British tended to concentrate their resources for development of agriculture in the Punjab and as a result the region prospered. However, as independence approached and the Muslim League's demand for an independent Muslim State of Pakistan became more effective, tension in the Punjab rose because of the mixture of inhabitants of Muslim, Hindu and Sikh faiths.

2. Independence and Partition

In 1947, Britain granted independence to India, and simultaneously created the new State of Pakistan out of the Muslim majority areas of British India. Independence and partition were a time of bitterness and communal conflict. States such as the Punjab were divided, the eastern portion becoming part of India and the western portion part of Pakistan. As refugees fled to their chosen countries, riots and communal conflict ensued killing thousands, primarily in the Punjab.

The new nation of Pakistan was born in chaos and poverty, and with the strong opposition of many Indians. Few expected it to survive. In the wake of

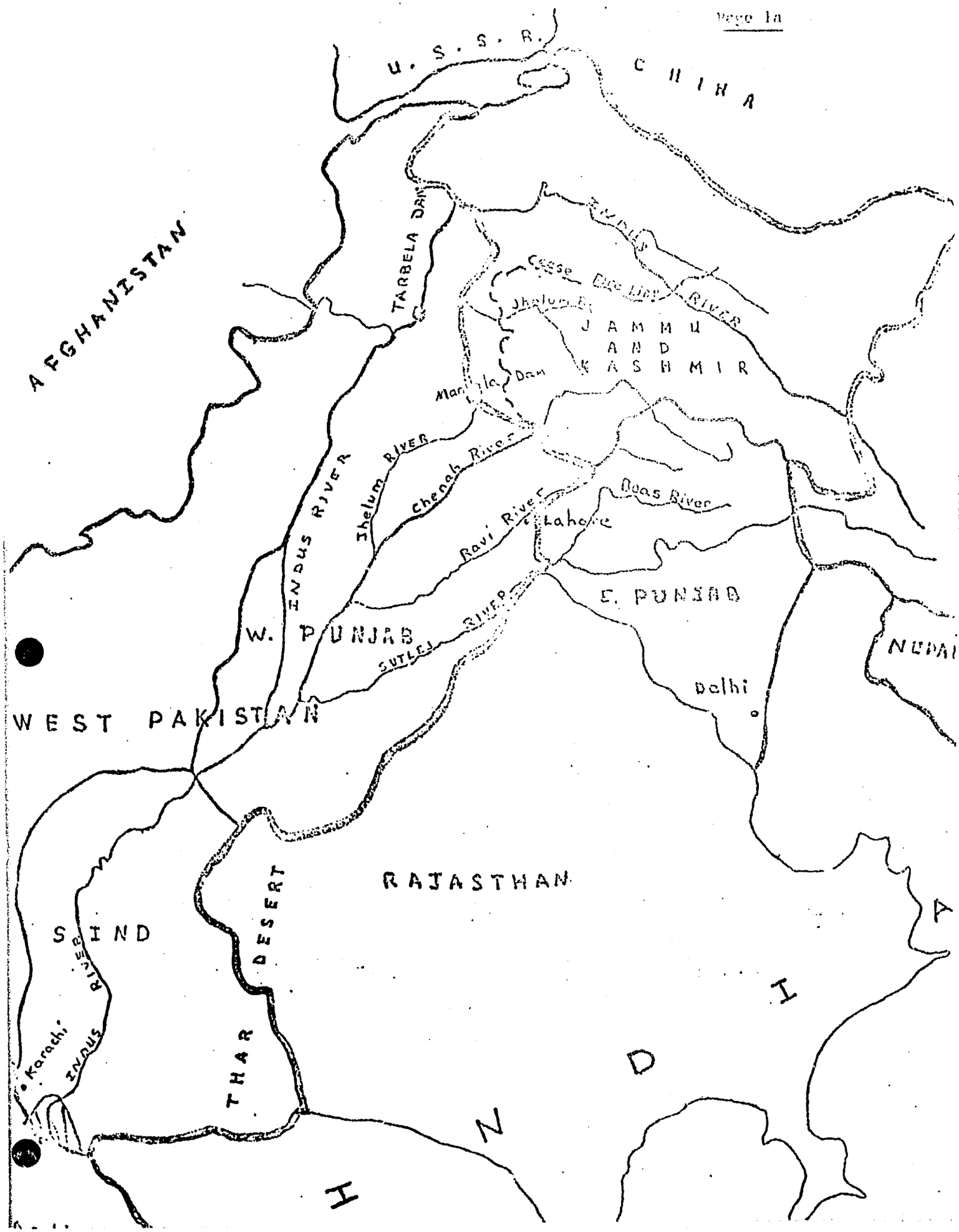
partition, the issue of who should control the State of Kashmir became a major source of conflict between India and Pakistan. Although Kashmir had a predominantly Muslim population, its ruler was Hindu and he opted for India at the time of partition. India immediately sent troops to reinforce the decision, while Pakistan sent armed tribesmen from the Northwest Frontier areas into northern Kashmir to assert Pakistan's claim. Finally, a cease-fire supervised by a UN armistice team was declared. Pakistan assumed control of the northern areas of the territory and India controlled the prosperous southern portion. The cease-fire line still divides Kashmir and the fate of the territory has been the focus of bitter conflict (including a war in 1965) between the two nations.

3. The Indus Rivers Conflict

The conflict over Kashmir is central to the development of the Indus Basin. All six rivers have their origins in the Indian controlled sections of Kashmir, leaving India in an overwhelmingly powerful position in any conflict over the use of the rivers. In addition, partition drew a hostile boundary across the Punjab that had no relation to the irrigation system that interlaced the former united Punjab. As a result, partition contained an implicit conflict over the use of the Indus River waters.

On April 1, 1948, nine months after partition, and the day after the expiration of the partition council and arbitral tribunal which had been established to settle conflicts over partition, India cut off the flow of waters in the three eastern rivers of the Indus Basin. These however were the ones that had received the most intensive development for irrigation purposes. The loss of water to Pakistan caused an immediate 8% reduction in total crop acreage, and the loss of water for the Lahore municipal water supply. The prospect of India's diverting the waters of the Indus Basin for her own use alarmed and infuriated Pakistan, and if allowed to go unchallenged would eventually lead to the total loss of Indus waters and the destruction of agriculture in Pakistan Punjab and the Sind. It was clear that India could eventually utilize all the waters of the Indus River and its tributaries to irrigate in the East Punjab and Rajasthan. India's motivations in acting at this time are not entirely clear. While she intended to develop irrigation in the east Punjab and Rajasthan, she could not use all the water herself in 1948. It also appears, at least in retrospect, that her ambitious plans to develop the Indus waters for agriculture in the East Punjab and Rajasthan were not the most efficient allocation of resources available for investment in irrigation. While maximum development of agriculture in the Punjab was clearly a high priority, the attempts to reclaim portions of the Rajastan desert by irrigation have been quite unsatisfactory. Investment in irrigation in the rivers flowing eastward through Uttar Pradesh, Bihar and Bengal, with approximately 90 million cultivable acres and a population of over 80 million might have been a better proposition in economic terms.

In April 1948, India began the Bhakra Nangal project which was completed six years later, and announced that this was the first in a series of works to continue until 1988. These works were to divert all the Indus waters to India where they would irrigate an additional 15 million acres of crop land through the Punjab and Rajasthan. Pakistan did not invest in replacement works because they feared such action might be interpreted as acceptance of India's claims to the three eastern rivers. Pakistan was also afraid that development of the three western Indus rivers might be sabotaged by a later diversion of these rivers by India. In the conflict, Pakistan's only recourse was to threaten war and destruction of civil


U.S.S.R.
CHINA
AFGHANISTAN
TARBELA DAM
INDUS RIVER
Jhelum River
Chenab River
Ravi River
Beas River
Sutlej River
JAMMU AND KASHMIR
Mangla Dam
Lahore
W. PUNJAB
E. PUNJAB
WEST PAKISTAN
Delhi
RAJASTHAN
SIND
THAR DESERT
Karachi
INDUS RIVER
INDIA

works in India, and this she did with vigor, spurred on by the frustration of her own helpless situation.

In 1951, the Government of India invited David Lilienthal, known worldwide for his role in TVA, to advise them on the development of the Indus waters. Lilienthal also visited Pakistan and returned pursuaded that war between the two nations was a distinct possibility. In an article published in Collier magazine on August 4, 1951 entitled "Another Korea in the Making", he warned of the seriousness of this situation, and proposed that through a technical solution to maximize the use of the Indus waters, a political accomodation between India and Pakistan might be found.

David Lilienthal, a good friend of Eugene Black, President of the International Bank for Reconstruction and Development, (the World Bank), pursuaded Black that the Bank was the proper international intermediary to undertake such a task. With the concurrence of the Governments of India and Pakistan, the Bank undertook this task. In May 1952, the first meeting took place in Washington with delegations from India and Pakistan each presenting their claim. It is important to note that the negotiations always centered on the Indus Rivers. Despite the fact that domestic and foreign resources available to India might have been better used in developing waters flowing from the Himalayas further to the east, and the Ganges Basin, this possibility was never proposed by any party to the negotiation. This began eight years of negotiations which culminated in the Indus Waters Treaty in 1960. In 1952 however, the positions seemed irreconcilable and the final outcome highly improbable.

4. The Politics and Administration of Pakistan and India - 1950-1960

The politics of the two countries in this period that are relevant to the Indus settlement and the decision to build Tarbela Dam can be summarized fairly briefly. The Indian political scene during the entire 50's was dominated by Prime Minister Nehru and his Congress Party. Two themes tended to dominate India's foreign relations in this period. First was a concern with and opposition to Pakistan which suspected, with partial justification, that many leaders of India which was five times her size and population, desired the elimination of Pakistan and its reincorporation into India. Second, was India's international position of neutralism in the era of the cold war. In the 1950's India's espousal of Socialism assured strained relationships with the United States. Prime Minister Nehru played an important role in organizing the Bandung conference of neutral nations in 1955. His Foreign Minister Krishna Menon was a caustic critic of the United States in the U.N. and in other international forums. It was also a period of cordial relations with China. When Chou En Lai visited India the crowds' chant of Hindi Chini Bhai Bhai (Indians, Chinese are brothers) became symbolic of the feelings between the two nations. Although the U.S. provided economic aid to India, in substantial quantities, there was no military aid and relations between the two countries were distant and frequently antagonistic.

For Pakistan the situation was very different. Md Ali Jinnah, the leader of the Pakistan movement and the first governor-general of the new nation, died within a year after independence, and his deputy Liaquat Ali Khan, who succeeded him as Head of State, was assassinated a year after Jinnah's death. The result was a partial vacuum in the political leadership in the new nation. Between

1950 and 1958 seven men served as Prime Minister of Pakistan.

In foreign affairs, Pakistan's policy can be understood primarily as a response to India, its larger neighbor which it was convinced was determined to bring about Pakistan's collapse. In the early 1950's when Pakistan was struggling to establish itself as a nation and was undergoing considerable political instability, the American policy of seeking anti-communist alliances offered Pakistan the opportunity to align itself with the United States, United Kingdom and the European nations, and to obtain substantial quantities of military aid under the SEATO and CENTO treaties. Through the 1950's Pakistan received many millions of dollars worth of U.S. military supplies. In return Pakistan provided the U.S. with a base in Peshawar, which became famous in 1960 as the place from which the ill fated U-2, shot down over Russia, had departed. Although deeply resented by India, western military aid and alliances, to a considerable degree, assured Pakistan of a military parity with India and removed the threat of Indian military conquest.

In 1958 when political instability had led to a serious economic crisis, General Md Ayub Khan, Chief of Staff of the Pakistan army, took over the Government of Pakistan in what he called the revolution of 1958. Ayub Khan's regime was dedicated to restoring stability, removing those problems which had interferred with economic and political progress, establishing a working constitutional system of government, and undertaking a concerted program of economic development.

The Ayub Government banned many former politicians from offices and initially appointed many military men to high office, but they were phased out fairly soon and the Government came to rely on the elitist Civil Service of Pakistan (CSP) to fill the top jobs in Government. The CSP non-political and highly capable Government officers quickly became the most powerful group in the country. Although ministers were later appointed to top Government posts, the CSP remained the real wielders of power.

5. The Indus Basin Agreement

The ascent of General Ayub Khan to power had a clear bearing on the resolution of the Indus waters dispute. President Ayub saw his role as eliminating those conflicts and impediments which blocked Pakistan's development, and the cut-off of the Indus waters as well as the larger hostilities toward India were clearly such an obstacle. (See Appendix A for President Ayub's own statement of his role. Note particularly his conflict with Pakistani technicians) President Ayub, with a strong mandate to govern in the late 1960's, could bear the political cost of a compromise settlement with India.

The benefits to Pakistan of the Indus Treaty however were considered by many to outweigh the costs. India had already cut off the waters of the three eastern rivers, and controlled the source of the three western. Pakistan was in a weak bargaining position. By permanently revoking claim to the eastern rivers, which was only recognition of the existing facts, she was guaranteed rights by treaty to the waters of the western rivers, plus promised $632 million in additional aid to finance replacement and development works in these rivers. (see attached Table1)

For the Bank, the signing of the Indus Basin Treaty was a major diplomatic and international triumph, particularly for its President Eugene Black and Vice President William Iliff (who was knighted for his role by the British Government). The editorials and articles from the New York Times in Appendix B give some flavor of the international response to the Treaty. Eugene Black in his book, The Diplomacy of Economic Development provides some insight into his response to the Treaty and the precedent which it set as well as a brief description of the negotiations. He writes:

> In contrast, if economic aid is accorded a separate and distinct status in national policy, development diplomacy can help conventional diplomacy.
>
> The World Bank and the other development agencies of the United Nations already have had some experience to bear out this point. Two cases attracting considerable publicity are the negotiations with the United Arab Republic regarding the claims and counterclaims which followed after the Suez crisis, and the continuing negotiations between India and Pakistan over the division of the waters of the Indus Basin. In both of these cases conventional diplomacy failed; in the one case a war was fought and in the other there has been an ever-present threat of war.
>
> The Indus negotiations are still in progress, but I have hope that they, too, will result in agreement. If Pakistan and India can escape their predicament in this crucial matter of dividing the waters in the largest irrigation system in the world by turning their joint efforts to the development of that system, then the whole world will benefit.

(pps 48-9)

> The Bank's international character, its reputation for objectivity and its expertness in finance led it logically but unexpectedly into the field of international mediation.
>
> Looming over all these matters were the efforts of the Bank's management to resolve a dispute directly affecting the livelihood of 40 million people on the Indian subcontinent. Late in 1951, the Bank proffered its good offices to help the Governments of India and Pakistan to evolve a plan for sharing and developing the waters of the Indus River system. The Bank's offer was accepted in March 1952, and work looking toward agreement on a comprehensive scheme was begun that summer. After it became apparent that the respective plans of the two governments could not be reconciled, the Bank put forward a plan of its own in February 1954. Negotiations were subsequently carried on in Karachi, New Delhi, and London, as well as Washington, and appeared to be entering a final stage in the summer of 1960. In the meantime the Bank had announced agreement in principle on a scheme whereby once India and Pakistan had reached a settlement on sharing the waters of the Indus River system, the Bank would cooperate with six "friendly governments" to finance a ten-year, $1 billion program for the development of this system.

(pps 70-1)

As Black indicates, the Indus negotiations had many phases. They were spread out over a period of eight years, and involved forming a consortium of "friendly governments", plus a contribution of $174 million from India to finance the replacement works in Pakistan.

Despite the fact that much effort went into the Agreement, some of the most serious conflicts for the Bank lay ahead. After 1960, the international dispute was settled. The "friendly governments", motivated by a desire to avoid international conflict, had achieved their goals. India had received international legal sanction for what it wanted but major differences between Pakistan and the Bank over the cost and specification of the replacement works lay ahead.

6. The Creation of the West Pakistan Water and Power Development Authority

In the early stages of the Indus Basin negotiations, the technical agency operating as Pakistan's agent was the Irrigation Department. Primarily as a result of the Indus Basin negotiations, Pakistan became aware of the technical inadequacies of this agency for dealing with the problems of water development in West Pakistan. In response to this need, an international commission was sponsored by the United Nations to recommend means through which Pakistan's organizational capabilities could be strengthened. In 1958, the West Pakistan Water and Power Development Authority was established as a semi-autonomous corporation with comprehensive responsibility in the water and power area. The new agency quickly became probably the most powerful agency in West Pakistan. There were a variety of reasons for this.

1. Leadership - The first two chairmen of WAPDA were Ghulam Faruque (1958-1962) and Ghulam Ishaq (1962-1967). Both were among the most powerful members of the elite Civil Service of Pakistan, and both were highly trusted by the military leadership. Faruque was chosen to be the first head of WAPDA because of his great success in heading the Pakistan Industrial Development Corporation. In that job he won a reputation for being about the most effective administrator of economic development in Pakista-n. Analysts of Pakistan development describe his work and style in the following manner:

> Ghulam Faruque was a strong-willed, powerful individual who made rapid decisions, saw them carried out and worried about government rules, procedures or approvals only afterwards, if at all. He was prepared to take substantial risks, smothered opposition by a combination of ability and ruthlessness.

(Papanek, Dr. Gustav. Pakistan's Development, Harvard, 1967, p. 95)

> Ability and strength of personality such as Faruque possessed led him to thrust aside the querulous doubts of academically-minded civil servants or ride roughshod over Finance Ministry rituals ...

(Feldman, Herbert. From Crisis to Crisis Pakistan 1962-1969, Oxford U. Press, London, 1972 p.172

Needless to say, with these qualities WAPDA was quickly established as a powerful and effective agency. After leaving WAPDA in mid 1962, Ghulam Faruque went on to become Minister of Commerce and Industry, a position from which he could and did legitimately assist the two development agencies he previously headed, the Pakistan Industrial Development Corporation and WAPDA.

Faruque was succeeded by Ghulam Ishaq, a man less publicized but, if anything, more effective than Ghulam Faruque. One active foreign participant in the Indus Basin development, when asked about his role commented "he was just smarter and better prepared than anyone else he dealt with, which includes everyone the Bank sent out to negotiate with him". Ishaq's reputation in Pakistan was equally impressive. Always tough, to the point, and in total command of information and data, there were few who would challenge him in his requests, demands or even on his views. In his period as head of WAPDA, Ishaq fully believed that his agency was the one which could use funds most effectively, and in that belief sought to expand his role in the development program. At the end of 1966, he became Secretary of Finance, a position from which he wielded even more power, and from which he began for the first time to really scrutinize and challenge the budget and authority of WAPDA. Personally, Ghulam Ishaq was something like the prototypical diplomat or man of affairs in the Rolex watch ads; elegant, aloof, slim, greying, exuding an aura of authority while those around him scurried to carry out his will.

2. Financial Resources - WAPDA quickly became the best financed agency in the country. In the decade of the 1960's, WAPDA administered 41% of the total West Pakistan development budget, excluding expenditures on the Indus Basin! If Indus Basin expenditures, which almost equal development expenditures are included, WAPDA's budget was equal to an average of 70% of West Pakistan development budget.

Similarly, the bulk of foreign aid funds were administered by WAPDA. In the 60's, approximately 46% of total foreign aid (again excluding Indus Basin Funds) was administered by WAPDA, while the remainder was divided over all the other sectors. If Indus Basin is included, WAPDA was administering about 75% of the aid available to West Pakistan and roughly 50 to 55% of the total aid to Pakistan.

Such figures indicate that although there may have been shortages of funds in Pakistan's overall development effort, WAPDA programs were adequately financed. The close links that the agency forged with aid donors and the power that WAPDA wielded in the process of allocating Pakistan's resources assured it that the agency was rarely short of funds for its programs

3. Technical and Human Resources - Not surprisingly, WAPDA, which was outside the restriction of the regular Government on pay and other facilities it could offer its employees, employed much of the best technical talent available in Pakistan. While difficult to quantify, it is clear that Pakistani engineers consider working for WAPDA to be very prestigious, and the agency was able to attract many Pakistani engineers who had left the country back to serve in its numerous programs.

The importance of WAPDA was also reflected in the size of its staff. In the mid 1960's, WAPDA was the second largest employer in Pakistan (Pakistan West Railways being the largest), with almost 100,000 employees. (see Table 2 for details)

Similarly, WAPDA made extensive use of foreign consultants. Although they were criticized periodically for this, it did assure them of first class technical work. Appendix C lists the foreign consultants working for WAPDA in a typical year.

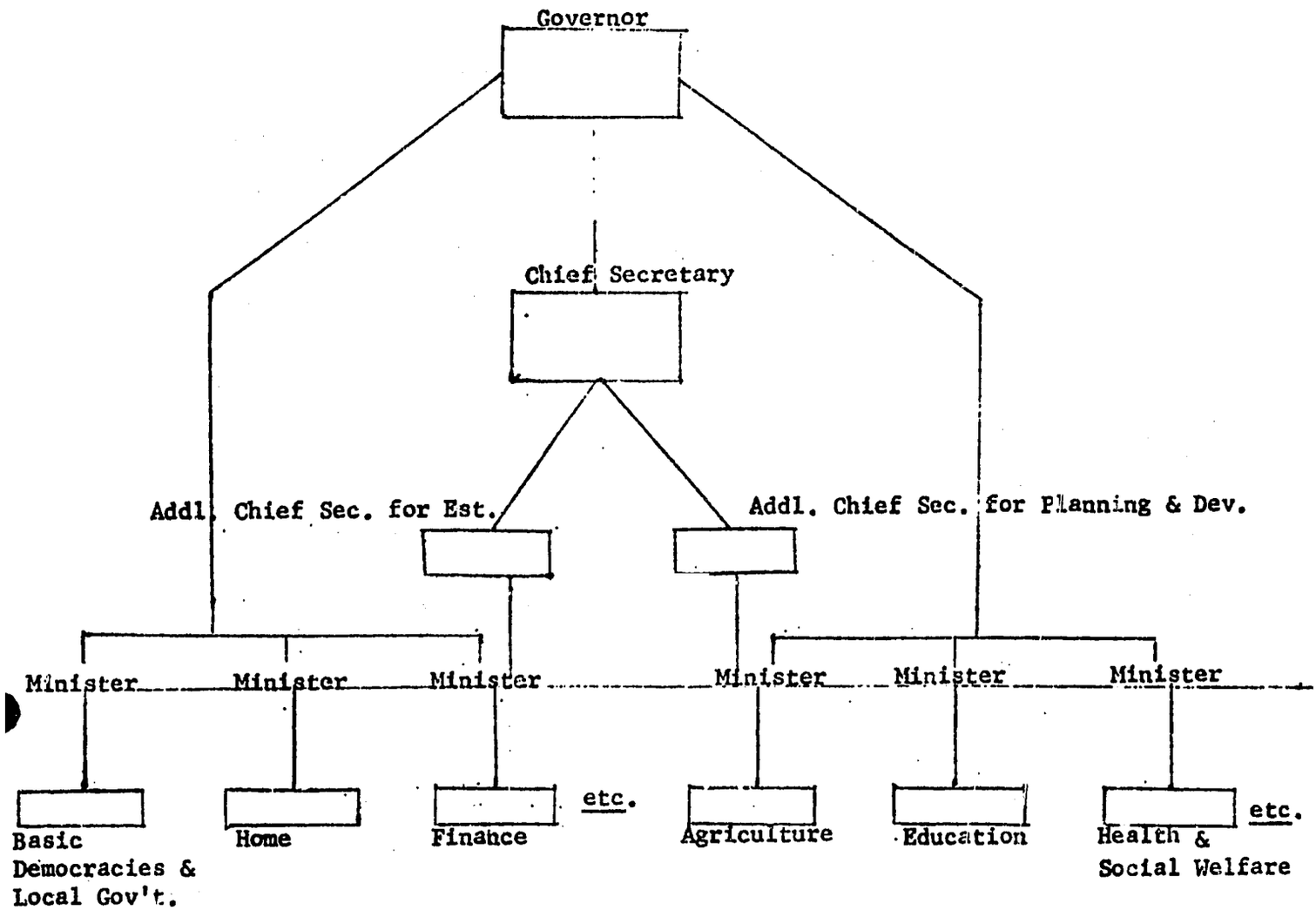
The effect of this technical capacity and depth was that WAPDA was always capable of presenting high quality technical analysis to document its positions and support its programs. Its human resources (and its esprit de corps) were always greater than that of other agencies. It is worth noting also that WAPDA was an engineering agency in the technical professional sense. Its standards were those of technical engineers and it tended continually to advocate advanced technology and capital intensive solutions to problems it faced.

7. Other Development Agencies and the West Pakistan Bureaucracy

Although WAPDA was clearly the most powerful agency in West Pakistan, it was not the only one. In 1960, when high priority was being attached to agricultural development, the Agricultural Development Corporation (ADC) was established on the model of WAPDA. While its directors were never quite as powerful as the chairman of WAPDA, and it was never quite so abundantly financed, it was an agency of considerable influence and bureaucratic clout. This was reinforced by the Minister of Agriculture, Malik Kuda Baksh, a prominent politician in Ayub Khan's Muslim League, and a wealthy large land owner in the Punjab, who chose ADC as one of his favored instruments to push agricultural development. The Department of Agriculture, while less influential than ADC, was one of the stronger agencies, and together formed a strong bureaucratic team in support of agriculture.

The Government of West Pakistan also had a Planning Department (in addition to the central Planning Commission). This was presided over by the Additional Chief Secretary for Planning and Development, the second ranking civil servant in the Provincial bureaucracy and always a member of the Civil Service of Pakistan. (It is interesting to note that Ghulam Ishaq's successor at WAPDA was A. K. N. Kazi, the previous Additional Chief Secretary for Planning and Development.) Much importance was attached to planning and the Planning Department had to approve all new development projects, and was responsible for preparing the development budget.

The head of the bureaucracy was the Chief Secretary, the most powerful civil servant in the Province. Over him was the politically appointed Governor. Through the 1960's, this position was held by Md. Amir Khan of Kalabagh, a powerful traditional landlord of the Frontier Province. (Kalabagh was the primary alternative site for Tarbela Dam) The structure of the West Pakistan Government was as follows:



The semi-autonomous corporations (WAPDA, ADC) were outside this structure.

7a. The Role of the Central Planning Commission

Although the Provincial Planning and Development Departments had to pass on all projects to be implemented in their province, and prepared the Provincial Development Budget, the central Planning Commission and the National Economic Council (made up of the President, members of the central government cabinet, including the head of the Planning Commission, the Chief Secretaries of each province and the Governor of the State Bank) had to pass on all large projects. This meant that they had to approve all the Indus Basin projects. The Planning Commission as the staff arm to the National Economic Council, and the agency charged with establishing the overall size of provincial development budgets and preparing national development plans, had a major role to play in decisions such as Tarbela.

President Ayub Khan, who was officially Chairman of the Planning Commission, placed the Commission in the President's Secretariat to raise it above other Departments. It was headed by a Deputy Chairman who was of cabinet rank and

a Secretary who was equal to other Departmental Secretaries. Both were normally senior civil servants. In the period 1961-1965 the Deputy Chairman was Said Hassan, who was not terribly powerful in his own right, but parlayed the very strong interest of the President in economic development and his support for planning into very considerable influence. Much the same could be said for the Secretaries of the period.

Beneath the civil service leadership was a professional staff headed by a Chief Economist and a group of professional economists under him with special interests in the whole range of economic issues. It was a staff of economists, with a few younger civil servants mixed in who were regularly being trained abroad and were constantly developing competence in their fields. In this work they were supported by a small group (5 to 7) of advisers provided by Harvard University. The Pakistan Planning Commission, both because of its professional competence and the importance attached to it by political leaders was generally considered one of the best agencies of its type in the developing world in the mid 1960's, and had great influence over the nation's development program.

Because of its role, the Planning Commission did most of the staff work for the agencies that made the crucial economic decisions and had access to top decision makers if it wanted to bring economic issues to their attention. It was an agency which certainly had its say on the Indus Basin Works, and had a responsibility to bring the economic implications of such a project to the attention of the decision makers but probably had less influence on Tarbela and the Indus Basin Works than on most other projects and policies which were less politicized.

8. Conflict over Tarbela

The Indus Basin Agreement provided for six categories of works and dams on the:

1. Jhelum River
2. The Indus River
3. New link canals
4. Barrages (gated diversion structures across rivers - part of headworks for distribution canals)
5. Improving existing link canals
6. Tubewells and drainage

(see Table1) The entire package comprised the world's largest and most complex irrigation system. . The barrages and link canals were relatively uncontroversial, and represented a substantial portion of the work. Tables 3a and 3b provide details of this work. (Note the bonus provisions for early completion of work and their impact in Phase I.)

Initial work on Mangla Dam was begun in 1959, and the mandate for this dam which represented the heart of the replacement works was clear. It was built to the approximate specifications in the Indus Agreement and completed in 1968, the largest earth filled dam in the world.

Tarbela Dam however, was a far more controversial proposition, and here the conflict was between Pakistan and the World Bank as the head of the consortium of friendly nations financing the Indus Basin works. (The specifications of the major dams on the Indus Rivers are given in Table 4). The problem centered around the rapidly increasing cost estimates for Tarbela Dam. These estimates are summarized in the attached estimates (Table 5b). Initially, the Bank took the position that the Indus Agreement provided only a sum of money for replacement works, while Pakistan argued that they had been promised a set of physical facilities, irregardless of the cost. Aloys Michel describes the conflict over Tarbela well in his book, The Indus Rivers. That description is attached here. (It should be read however with attention to the underlying forces which affected the decision that Michel tends to minimize.)

Note on U.S. Relations with Pakistan and India 1961 - 1968

The assumption of the Presidency of the United States by John F. Kennedy in 1961 signaled a shift in U.S. relationships with India and Pakistan. Kennedy's policy was for more cordial relations with India and a more neutral position in Pakistan-India disputes. One sign of this was the appointment of John Kenneth Galbraith, a trusted adviser to Kennedy, as ambassador to India. In Pakistan the U.S. ambassador remained a career civil service officer without the same links to the White House. In this and other not highly visable ways the balance began to swing from the U.S. and Pakistan being open allies to a situation in which the U.S. had good relations with both India and Pakistan, but was not an ally of either. This had several effects on relationships between the three nations. Proposals for aid to Pakistan, particularly military aid, were scrutinized more closely and level of military aid declined. Pakistan began to publicly criticize the U.S. in steadily more strident terms, and began to move toward what was to become its alliance with China. The subtle but important shift had a bearing on positions taken by each nation in the discussions on projects and aid of the 1960's, and affected attitudes and responses to the unanticipated events that took place on the Indian sub-continent in the 1960's.

9. Impact on Domestic Politics and Economic Development

President Ayub Khan's commitment to Tarbela Dam was clear. He wanted the Indus settlement, he wanted to obtain maximum amounts of aid for Pakistan, and he needed symbols of the bargain he had gotten for Pakistan in the Indus settlement. He correctly foresaw that the Indus Agreement would become a major issue in the 1964 Presidential elections, and that he would be attacked for having given too much to India. To counteract this he needed Tarbela. (President Ayub's commitment to Tarbela was also believed by some to have been deepened by the fact that he grew up, and was a large land holder in the Hazara District just south and east of Tarbela and the Indus, and areas where cultivation without irrigation was marginal but which would benefit enormously from Tarbela Dam. Clearly this was not the major factor in Ayub's support but may have strengthened his commitment.)

The most important impact of the Indus Basin works and Tarbela Dam, particularly in its final form where it absorbed large portions of Pakistan's domestic and foreign exchange resources, was in the allocation of resources internally. It was realized from the beginning by all concerned that the Indus project would substantially diminish resources available for development. In part to counter this, the entire cost of the Indus Basin and Tarbela were put outside the development budget and the Plan, with the arguement that this cost represented replacement of resources lost rather than development. This however, did not alter the fact that the Indus works were all in West Pakistan, which received the benefit of the expenditure and the completed works, and greatly reduced development resources which could be divided between East and West Pakistan, or that the Indus works established the largest single claim in Pakistan's own foreign exchange, most of which was earned by East Pakistan exports.

During the 1960's while per capita income in West Pakistan was rising from approximately $65 to $100, East Pakistan's economy was stagnating and per capita incomes remained about $63 throughout the period. While much was said about dividing Third Plan resources 52% - 48% in favor of East Pakistan, the Indus Basin Works clearly illustrated that most expenditures were in West Pakistan. However, East Pakistan seemed unable to mount sufficient political and economic force to offset the Indus Basin, despite the fact that the 1962 Constitution had included a provision that disparity between East and West must be eliminated by 1985.

After the Indus Works became a reality, East Pakistan leaders recognized that the Works assured an unequal distribution of resources, and began to look in rather jaundiced fashion on other programs for East Pakistan. The reaction of a professor of economics at Dacca University who legitimately saw Pakistan's other development programs through lenses tinted by the Indus Basin Works is typical:

> The Rural Works Programme thus had its genesis in the negotiations over the Public Law 480 programme in August 1961 between the Government of Pakistan and the Government of the United States.

> The original objective behind the programme was to inject surplus commodities into West Pakistan to mop up the purchasing power generated by the rupee component of the Indus Replacement Works, thereby reducing the inevitable increase in inflationary pressure generated by the project. There had, however, been considerable criticism of the programme in East Pakistan because it had seriously distorted the balance of resources between West and East Pakistan. This had already been felt to be inequitable within the main body of the Second Five Year Plan. The inclusion of another Rs. 600 crores for the Indus programme, outside the plan, was felt to aggravate the already very serious economic imbalance which existed between East and West Pakistan and which had been perpetuated by the Second Plan.
>
> In response to this clamour and out of sensitivity to the political consequences of a further injection of aid under the PL-480 programme into West Pakistan, the Harvard Advisory Group attached to the Pakistan Planning Commission, came up with the idea of a Rural Public Works Programme for East Pakistan, to be financed outside the Plan. In this respect it was clearly meant as a sop, however inadequate, to East Pakistan, to match the Indus Works.

(Sobhan, Rehman. Basic Democracies Works Programme and Rural Development in East Pakistan Bureau of Economic Research, University of Dacca 1968 pp. 105-106.)

Other programs were not the equivalent to the Indus Works, but East Pakistan was unable to make either its case or the consequences of its case being ignored sufficiently clear to change the course of events.

Eventually East Pakistan's response came to be their own version of the Indus Works; comprehensive flood control. Having been ineffective in combatting the Indus Works (primarily the expanded and twice as costly Tarbela Dam) they decided in the late 1960's (too late to be very effective) to demand a program of comprehensive flood control. The problem of recurring floods in the area was well known , and with growing politization of East Pakistan the demand for comprehensive flood control was increasingly articulated.

Technically the problem was almost insolvable in an area like East Pakistan as long as no work could be done up stream in Indian territory. However this fact did little to reduce the demand nor did it seem to affect the response. The more volubly the demand was made, the more political momentum it gathered. One indicator of the effectiveness of the demand was the arrival of a variety of international consulting firms and World Bank Missions to appraise the situation. While the technical problem of flood control remained almost insuperable, the demand gained increasing support and had civil war not transformed Pakistan something would have had to be done to meet the demand.

10. Private Tubewells in West Pakistan

The 1960's was the decade of agricultural development in West Pakistan. From 1950 to 1960 production of major crops grew at 2.3% per

year but in the 1960's the rate jumped to 5.4%, a remarkable jump given that agriculture contributes over 50% of the GNP. The rise in production resulted primarily from the introduction in the early 1960's of an entire new technological package of agricultural production in the wheat and rice producing areas of West Pakistan. With the provision of new high yielding seed varieties and greatly increased supplies of fertilizer and pesticide the payoff to agricultural production grew enormously. Water was the one additional import needed to expand areas of production and increase yields in existing areas. With Tarbela 10 years away farmers began looking for other means of obtaining water, and small low-cost tubewells provided the most economic answer.

In 1956, the Agricultural Engineering Department of the West Pakistan Department of Agriculture designed a simple, low-cost tubewell that cost between Rs. 7,000 and 9,000. The result was a well which could be built, installed and serviced locally, which made engineers skeptical but was to prove highly popular among farmers.

The Department of Agricultural Engineering, which initiated the low-cost tubewell program, only installed about 750 of the low-cost wells. After that public funds were no longer available for this type of well development and the program was dropped. However, the popularity of low-cost tubewells installed by farmers with their own funds grew rapidly in the late 1950's and early 1960's although there was little knowledge of this phenomenon. Public investment in wells also grew during the period. However, most public wells were of a large capacity, constructed to specifications that made them very expensive and were concentrated in the large salinity control and reclamation projects.

By 1965 West Pakistan began to witness spectacular growth in agricultural production. Initially, it was assumed that this was derived from efforts to improve the technology of agriculture with fertilizer, new seed varieties and pesticides. However, analysts of West Pakistan's agricultural success concluded that "water is the key input in the (Indus) basin region, which produces about 80 percent of the total provincial (agricultural) output". (W.P. Falcon and C.H. Gotsch, "Lessons in Agricultural Development -- Pakistan", in Gustav F. Papanek, ed., Development Policy: Theory and Practice, Cambridge, 1968, p. 273.) Much of this water was produced by low-cost, private tubewells. These increased from about 7,000 in 1960 to 55,760 in 1969 (Projected 1970 figures from U.S. A.I.D., Division of Economic Analysis, Statistical Fact Book, (Rawalpindi, 1968), while over the same period public tubewells increased from an unknown number in 1960, to 10,353 in 1970 (ibid.) at a cost of approximately Rs. 72,000 per 2-cusec well.

Of irrigation tubewells operating in West Pakistan at the end of the 1960's, 93 percent were private and provided 79 percent of the total well irrigation water. This large impetus to West Pakistan's development from private investment in tubewells of the magnitude of Rs. 502 million during the 1960's was an important if unanticipated stimulus to development.

The private tubewell phenomenon went almost unnoticed until the mid 1960's because it was in the private sector and because it was not drawing heavily on imported goods. When people did become aware of what

was happening there were two reactions. One was pleasure at the increases in agricultural production, and the other was concern because although the low-cost wells were highly efficient from the perspective of the individual farmers, they were not as efficient in a technical sense as larger, higher cost wells. An additional effect was that private tubewells were irrigating approximately 6 million acres and irrigation of much of this land had been calculated as one of the benefits of Tarbela Dam which was already under construction by that time.

11. Conclusion

By 1967 the World Bank team studying the water and power resources of West Pakistan submitted its ten volume report, the consortium of Gibb, Hunting and ILACO submitted their 23 volume report, and the final agreement to proceed with Tarbela was made a reality by asking for bids.

Controversy continued to plague the project however, as the Bank and Pakistan decided not to accept the lowest bid from a pre-qualified bidder, a West German consortium of firms. The contract finally went to a consortium of firms led by a new Italian firm created for the purpose of undertaking the project. Tarbela is now under construction and scheduled for completion in 1975.

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Table 5a

COST ESTIMATES FOR THE INDUS BASIN PROJECT

(In Millions)

	Total Cost US$	For. Ex. (aid) US$	For. Ex. (Pak.) US$	Rupees US$
IBP Agreement 1960	893.3	632.		261.3
WAPDA 1960 Consultants Estimates	1,297.3		745.4	551.9
	(including land acquisition, import duties, sales & income taxes)			
WAPDA 1962 Consultants Estimates	1,795.		960.	835.
Bank/WAPDA 1962 Agreement	1,745.	938.	108.	699.
WAPDA 1963 Proposal	1,802.6	938.	175.6	689.*

*(Third Five Year Plan estimates PL 480 rupee receipts at Rs 3.2 billion of which Rs 2.2 billion was to be allocated to Tarbela)

Table 5b

COST ESTIMATES FOR TARBELA DAM

(In Millions)

	Total Cost US$	Foreign Exchange Component US$	Rupees US$
IBP Agreement 1960	194.0	-	
WAPDA 1960 Consultants Estimates	374.8	239.6	135.2
Decision to increase size from 4.2 maf live storage to 9.3 maf			
WAPDA 1962 Consultant Estimates	702.8	420.	372.8
Bank/WAPDA 1962 Agreement	552.4	300.	252.4
Bank's Final Estimate 1967	896.8	553.9	342.9

Such was the position maintained by WAPDA as agent of the Government of Pakistan one year after the Treaty was signed. But the position of the Bank, as Administrator of the Development Fund Agreement, was quite different. Confronted with the cumulative changes in the barrages and link canals and in the design of Mangla Dam, the Bank was beginning to suspect that WAPDA was proceeding with the IBP as though its consultants' estimates of June 1960 (formally submitted to the Bank only on September 2, 1960; see Chapter 6) had been accepted rather than rejected by the Bank and the "friendly Governments." It will be recalled that these consultants' estimates put the cost of the IBP at $1,297.3 million, of which $745.4 million was in foreign exchange. (The estimated cost of the Tarbela Dam had been given as $374.3 million, of which $239.6 million constituted foreign exchange.) Although Pakistan had to back down from this position and to accept a figure of $893.5 million for the Development Fund, of which total foreign exchange in grants

15. The foregoing discussion of dam sites on the Indus is based on a report written by A. Rashid Kazi when he was Chief Engineer, West Pakistan WAPDA and entitled *Factors Affecting the Selection of a Dam Site--Selection of the First Storage Dam on the Indus* (Lahore, WAPDA, September 1961, mimeographed). More recent estimates of Tarbela's life would give the initial dam about forty-five years and raised Tarbela about sixty. But the last million acre feet or so of storage could be maintained almost indefinitely and used to feed the off-channel storages which are now estimated at 30 m.a.f. of live capacity.

and loans amounted to $632 million, she could of course increase the amount of her own expenditure on the IBP over and above the Fund figure.

But Pakistan, and WAPDA as her agent, still had to submit *all* plans, specifications, estimates, and schedules for the IBP to the Bank as Administrator, and the Bank had the power to refuse to make disbursements—or to delay them—if it did not approve of the manner in which Pakistan was executing the IBP (see Chapter 6). In other words, Pakistan's first duty (under the Treaty to India and under the Fund Agreement to the Bank and the "friendly Governments") was to complete with "due diligence and efficiency and in conformity with sound engineering and financial practices . . . that part of the Project whose purpose is replacement"[16] (see also Chapter 6, page 258). After the replacement portion of the works (to the limited extent that it could be separated out) had been completed, Pakistan could go ahead with the rest of the "Project Description" and could add to the IBP anything she could pay for. But if the elaboration of projects and the escalation of costs became so great in the initial stages as to threaten the eventual completion of even the replacement portion, then the Bank felt a duty with respect to the "friendly Governments" to intervene in Pakistan's management of the IBP. Even aside from the specific provisions of the Fund Agreement regarding the Administrator's role, the Bank itself was lending Pakistan $80 million and had an obligation to all of its members to see that the project as originally described was completed at a cost that would not imperil Pakistan's ability to repay the loan portions of the Fund (including the $70 million loan from the U.S.A., though that could be repaid in rupees whereas the Bank loan could not) and to meet her other international obligations.

It is also relevant to point out that four of the six "friendly Governments" contributing to the Development Fund were also members of the "Aid to Pakistan Consortium" organized by the World Bank to supply financial assistance to Pakistan's Second Five Year Plan (1960–65). As of January 1962 the participants in the Consortium were the World Bank, the United States, the United Kingdom, Canada, West Germany, France, and Japan. Before Pakistan had signed the Indus Waters Treaty and the Development Fund Agreement, she

16. IBRD, *Indus Basin Development Fund Agreement*, p. 11.

had elicited assurances from the "friendly Governments" and the Bank that their contributions to the Fund would not be written off against their contributions to her general development under the Plans but would be considered as additions to such aid. Thus, any elaborations of the IBP, even if included under the Five Year Plans, affect the "friendly Governments," the other members of the "Aid to Pakistan Consortium," and Pakistan's general economic health, especially if they contribute to the inflationary spiral. The "friendly Governments" had legitimate reason to be concerned about the escalation in the IBP estimates.

The basic difficulty between the Bank and WAPDA lay in the fact that even though about 40 per cent of the difference between the WAPDA consultants' estimates of June 1960 and those of the Bank's consultants submitted in February 1960 lay in such items as land acquisition costs, import duties, and sales and income taxes—items which the Bank insisted should not be charged to the Fund—the elaboration of the IBP components and the escalation of costs had reached a point where the absolute amount of the WAPDA consultants' estimates, irrespective of how they were derived or presented, came quite by coincidence to seem more "realistic" than the Bank's own estimates or the amount of $893.5 million agreed upon in the Development Fund Agreement. Even in presenting the June 1960 estimates, WAPDA and its consultants had warned that *they* were still preliminary and subject to revision. And revision of course means revision upward, especially when a project is spread over ten or fifteen years and represents such a sizable impact upon an economy that it is bound to produce inflation.

At any rate, there is no evidence that WAPDA ever abandoned its consultants' cost estimates of June 1960.[17] From *its* point of view, *downward* revisions would have been both professionally dishonest and unpatriotic. Instead, as planning, investigation, design, the letting of tenders and receipt of bids, and domestic and world inflation proceeded, the estimated costs of the IBP steadily mounted. By March 1962 they had reached $1,795 million, of which $960 million represented foreign exchange. Although the almost exact doubling of the original Development Fund amount is only a coincidence, the

17. WAPDA, *Indus Basin Settlement Plan, Construction and Expenditure Schedules* (Lahore, WAPDA, October 1960). Note month.

increase was of such proportions as to alarm the Bank. For Pakistan could not hope to provide the extra funds herself without wrecking her economic development in other sectors. Yet for the Bank to recommend to its directors and to the "friendly Governments" additional loans or contributions on the order of $330 million for the completion of the IBP was, in the light of the Bank's earlier estimates and statements, awkward to say the least.

The alternative was to restrict the scope of the works, if necessary by eliminating certain components. And since the Tarbela Dam, which had now displaced Mangla as the single most costly component (estimated in March 1962 at $552.4 million), and since its estimated foreign exchange cost was nearly $300 million, the Bank suggested that it be deleted from the IBP. In Tarbela's place, the Bank suggested that the Mangla Dam be built to its ultimate height of 420 feet to provide a total of 7.75 m.a.f. rather than the 4.75 m.a.f. of live storage indicated in the Development Fund Agreement's "Project Description." Although "Raised Mangla" would fall short by 1.20 m.a.f. of the 8.95 m.a.f. of live storage visualized in the "Project Description," it could be completed by 1970 with no change in design and with little loss at Tarbela, where only preliminary investigations and designs had been carried out (about $11 million had been spent on Tarbela by mid-1962). The role to be played by the Indus Zone would have to be redesigned, as would the operation of the entire IBP, but the Bank and the "friendly Governments" would be much more willing to make a reasonable contribution toward an IBP shorn of Tarbela than toward one costing twice the Development Fund Agreement figure.

Pakistan's reaction to the Bank's proposal might have been anticipated, since her basic position had not changed since the summer of 1960. Pakistan felt that she was selling three rivers to India in exchange for a system of works. This system of works had to replace the irrigation uses from the Eastern Rivers, including the loss of *sailab* uses and the lowering of adjacent water tables beyond the reach of wells (both of which would necessitate new canal or distributary construction). It had to provide excess water supplies for reclamation purposes, and it had to have an element of development in it to compensate for the losses to waterlogging and salinity and the growth of population since 1947.

Furthermore, Pakistan maintained, the IBP as described in the

Development Fund Agreement did not satisfy her legitimate claims but merely provided the foundation from which she herself could satisfy them at a later date. The "Project Description," with its total of 8.95 m.a.f. of live storage, would fall short by some 5 to 7 m.a.f. of the uses embodied in the IBAB Plan, which themselves were *lower* than the pre-Partition sanctioned allocations (see above, page 271). To bring Pakistan back to the relative position she had enjoyed in 1947 would require not only the building of Raised Mangla, but the building and raising of Tarbela too. By 1974, when all of this could be completed, only the IBAB uses would be met, and Pakistan would have "lost" some twenty-six years of development. After 1974, the development of off-channel storages would have to be undertaken to make up for the loss of storage capacity due to silting in Mangla and Tarbela reservoirs, to bring the old irrigation projects up to pre-Partition sanctioned allocations, and to permit intensification of irrigation in accordance with modern American (Blaney-Criddle) standards rather than the traditional British practice of spreading the water thin (see Chapter 3).[18]

The "Project Description" called for a dam on the Indus. Investigations had shown that the Tarbela site at Bara was best suited, although new estimates of siltation rates indicated that the initial dam there would have to have a live storage capacity of 6.6 m.a.f. rather than the 4.2 originally specified "in order to achieve storage benefits commensurate with those contemplated in the Treaty."[19] The cost was immaterial. Pakistan had warned, on the eve of signing the Treaty, that her consultants' estimates were substantially higher than either the IBAB estimates or those of the Bank's consultants. She had signed the Treaty and the Development Fund Agreement only in the belief that she was getting a *system of works*, not just a fixed sum of money, and that system included "a dam on the Indus."

> The danger of rising costs was there and recognized long before the Treaty and the Fund Agreement were signed but Pakistan was assured that what was sacrosanct from the point

18. IBP Publication No. 49, *Settlement Plan without Tarbela, An Appraisal* (Lahore, WAPDA, July 1962), pp. 3–4. This publication was subsequently revised and reissued as IBP Publication No. 53 but bearing the same date (July 1962). The reference should be to the Development Fund Agreement rather than to the Treaty.

19. Ibid., footnote to p. 5.

> of view of Bank and friendly countries was the system of works and not the price tag on it. It was in view of these assurances that Pakistan gave up many of its legitimate financial claims and accepting the Bank as the Administrator of the Fund, embarked, despite the inadequate phraseology of the Fund Agreement, on the implementation of the Treaty Works. Any attempt on the part of the Bank or the friendly countries to treat the price tag on the works and not the works themselves as sacrosanct . . . after Pakistan signed away its rights on the three rivers to India, can be rightly construed at least as a breach of faith if not a breach of a treaty in the legal sense.
>
> The Bank had a critical role to play in Water Dispute. It was the chief architect of the Settlement Plan and also the party primarily responsible for making Pakistan agree on the basis of it to part with its resource heritage. The so called solution now offered by the Bank alters, as the foregoing analysis indicates, the very basis of the Plan. Apart from negation of a pledged word and solemn assurances it takes away from the Plan all those elements in consideration of which Pakistan signed the Treaty. This is a solution with which Pakistan cannot just afford to live and must be rejected.[20]

Whether or not Pakistan would actually have denounced the Treaty if Tarbela had been excluded from the IBP, there had developed between her and the Bank by the summer of 1962 a situation not unlike the one that existed between Egypt and the World Bank (plus the U.S. and U.K.) in the summer of 1956 over the Aswan Dam. Perhaps bearing that precedent in mind, Sir William Iliff, Vice President of the Bank (he had been knighted after the signing of the Treaty), flew to Pakistan in July 1962 for discussions with President Ayub, other members of the Government of Pakistan, and WAPDA representatives at Murree.[21] Iliff still urged eliminating Tarbela and raising the height of Mangla, but WAPDA had come up with an alternative suggestion. Although the position with respect to the dam

20. Ibid., p. 12.

21. The hill station that serves Rawalpindi as Simla serves Delhi. Rawalpindi had been designated the interim capital of Pakistan in 1959, pending the completion of the new city of Islamabad at the foot of the Siwaliks between Rawalpindi and Murree.

on the Indus had not changed since the summer of 1960, a new development had created some room for maneuver on another component of the "Project Description"—the $50 million set aside for tubewells and drainages.

In April 1961 Dr. Abdus Salam, a distinguished Pakistani physicist and science adviser to President Ayub, had visited the United States in connection with the Centennial of the Massachusetts Institute of Technology. Speaking at the convocation, he mentioned his distress that the tools of modern science had not yet been brought to bear on the problems of waterlogging and salinity illustrated in the Indus Basin. In the audience was Dr. Jerome B. Wiesner, Special Assistant for Science and Technology to President John F. Kennedy. Weisner spoke to Dr. Salam and informally offered the services of his office in solving the problem, indicating that the initiative ought to come from Pakistan. On his return home, Dr. Salam mentioned the proposal to President Ayub, who responded most favorably.[22] When Ayub visited Washington, in July 1961, he raised the matter with Kennedy, who had been briefed by Wiesner. Thus arose the White House–Interior Panel on Waterlogging and Salinity in West Pakistan, headed by Dr. Roger Revelle, then science adviser to the U. S. Secretary of the Interior. The panel, whose work will be discussed at length in Chapter 9, included earth scientists and economists from Harvard, M.I.T., the universities of California and Chicago, the U.S.G.S., the U. S. Department of Agriculture, other government agencies, and several private firms. It was what the Pakistanis call a "high-powered panel." In September and October 1961, the panel paid its first visit to Pakistan, where the records and services of

22. Interview with Dr. Abdus Salam, Professor of Theoretical Physics, Imperial College of Science and Technology, London, July 31, 1963. It should be mentioned that the United States had furnished, under its technical assistance program, a team of hydrologists from the U. S. Geological Survey to Pakistan as early as 1954. These experts worked with the Ground Water Development Organization of the Punjab Irrigation Department in assaying the groundwater resources and in laying the foundation for the first Salinity Control and Reclamation Project (SCARP I in the Rechna Doab) which was undertaken by WAPDA in 1960 with assistance from the U.S. International Cooperation Administration. In 1960, the Ground Water Development Organization was transferred to WAPDA, where it became WASID (Water and Soils Investigation Division), and shortly thereafter WAPDA established its Groundwater and Reclamation Division (see Chapter 8) to plan and execute additional SCARPs.

WAPDA's Water and Soils Investigation Division (WASID) were immediately placed at its disposal. Thus, by early 1962, WAPDA had a pretty clear indication that the Americans were going to do something about the waterlogging problem in the entire Pakistan portion of the Indus Basin. So, when the World Bank reacted to the March 1962 estimates by suggesting that Tarbela be eliminated, WAPDA responded by proposing that the $50 million set aside for the Tubewells and Drainage Works component of the IBP be transferred instead to the cost of the Tarbela Dam.

Both alternatives were discussed at the Murree meetings in July 1962, but as the above quotation indicates, Iliff found the Pakistanis firmly opposed to the deletion of Tarbela. They would transfer the $50 million from the Tubewells and Drainages component, and would also assume the entire rupees cost, equivalent to $807 million, of the IBP. But they insisted that the Bank and the "friendly Governments" were morally bound to provide the additional foreign exchange needed to complete the "scheme of works" specified in the "Project Description." Finally, Iliff said that he was willing to recommend to the Bank and the "friendly Governments" that they make an additional contribution of $310 million in foreign exchange to the Fund. But this contribution was to be the last, and Pakistan was to agree that it represented the discharge of all obligations, explicit or implied, regarding the financing of the IBP.

This was a reasonable proposal inasmuch as, by eliminating the $50 million Tubewells and Drainages component, the March 1962 estimates could be reduced to $1,745 million and the foreign exchange portion from $960 million to $938 million. Pakistan would receive a total of $942 million ($632 million in grants and loans under the original Development Fund Agreement, plus $310 million under a supplementary agreement). Of course, Pakistan would have had to contribute $108 million in foreign exchange to the Fund to offset the $80-million worth of rupees originally scheduled to be bought with foreign exchange plus the $28 million which had gone into the Special Reserve out of India's contribution in pounds sterling. (Pakistan, it will be remembered, would have these Special Reserve funds turned over to her in the event that she did not extend the Transition Period.) Thus Pakistan would have incurred a net obligation of $101 million in foreign exchange, to be met out of her Five Year Plan al-

locations. But the Murree proposal also envisaged that Pakistan would devote to the IBP (with the approval of the governments concerned) all the rupee counterpart funds arising from sales of United States agricultural products under the "Food for Peace" program (less amounts reserved for U.S. uses in Pakistan) or from sales of commodities supplied by other countries (notably West Germany) under similar programs. This meant that the net burden on Pakistan was limited to $101 million in foreign exchange plus any amounts in rupees not covered by counterpart funds (impossible to estimate accurately).

On the whole, it seemed to be another good bargain for Pakistan, and Iliff believed that his proposal had been accepted.[23] But no agreement was signed, inasmuch as Iliff was in no position to sign one until he had consulted with the directors of the Bank and with the "friendly Governments." This took some time and met with some reluctance. Meanwhile, two new factors, one basic and one seemingly extraneous, were injected into the situation. The basic factor was the submission, in November 1962, of the design studies and new estimates for the Tarbela Dam by the New York firm of Tippetts-Abbett-McCarthy-Stratton (TAMS), now serving as WAPDA's consultants for the project. Including a $20-million contingency allowance suggested by WAPDA's general consultants, Harza Engineering Company International of Chicago (see Chapter 8 for the roles played by the various consultants), these raised the cost of Tarbela to $702.8 million, or $150.4 million above the March 1962 estimate.

The seemingly extraneous factor was injected in October 1962 when Chinese forces attacked Indian outposts in eastern Kashmir (Ladakh) and in the North East Frontier Agency (N. E. F. A.). The Indian Army withdrew and was in full retreat when the Chinese halted and pulled back. Whether the Chinese withdrawal was due to the prompt supply of American and British weapons and military advisers to India or, as many Indians seem to believe, to action by the Soviet Union in cutting off petroleum shipments to China, or whether the Chinese themselves decided that they had secured their immediate objectives, Indian foreign policy and Pakistan-Western

23. The reader may note certain analogies between the Iliff Mission and the Cabinet Mission which left the subcontinent just sixteen years previously after hill-station conferences and in the belief that its plan had been accepted.

relations had undergone an unprecedented shift. Pakistan had stood aside, contemplating with a certain satisfaction the humiliation of her proud neighbor. Whether or not the United States and United Kingdom asked their SEATO/CENTO ally Pakistan to come to India's aid is not known. What is known is that Pakistan continued to make any rapprochement with India contingent upon a Kashmir settlement (discussions were resumed, at U.S.-U.K. urging, in the spring of 1963 but came to naught) and also continued negotiating a border treaty, cultural exchange, and air transit agreement with China. Although Pakistan's position is perfectly understandable from her premises (including the conviction that India had been unjustly occupying Jammu-Kashmir for fifteen years and the fact that India's Defence Minister, V. K. Krishna Menon, had been calling Pakistan "India's Number One Enemy" for most of this time), her attitude toward the Chinese-Indian fighting and her denunciation of "massive Western arms assistance to India" were not appreciated by the State Department or Foreign Office.

Returning from these political heights to the more practical level of the IBP, it is hardly necessary to point out that the U.S. and the U.K. are the main contributors to the Fund as well as the mainstays of the World Bank. Thus, Pakistan's bargaining position with respect to "massive Western financial assistance for the IBP" (if one may adapt a phrase) was somewhat impaired by her foreign policy in late 1962 and early 1963. Furthermore, on purely technical grounds, WAPDA's willingness to exclude the Tubewells and Drainages component from the IBP, and the activities of the Revelle Mission on which this concession was apparently based, had opened up an entirely new approach to replacement and development of water supplies in the Indus Basin. For now the "groundwater advocates" in and out of Pakistan came to the fore to challenge the need for Tarbela and the Indus Zone works in the "surface water" IBP scheme. They spoke in terms of a groundwater reservoir of at least two *billion* acre feet (14 times the average annual runoff of the Western Rivers and almost 50 times the maximum storage capacity at Tarbela *including* off-channel storages) underlying the "Northern Zone" of the Indus Plains ("Northern Zone" being defined as the area above the Gudu Barrage; see page 41 and Map 6) in West Pakistan. With such a reservoir of generally low-salinity groundwater underlying

the very works of the IBP and developable at reasonable cost through tubewells, which would also serve to lower the water table and thus to reclaim land, why put $703 million or more into a dam with an expected life of less than fifty years?

The interchangeability of surface water and groundwater in meeting the irrigation needs of the Indus Plains is an extremely complex problem, which we shall discuss in detail in Chapters 9 and 10. It is possible that, as far as the Northern Zone is concerned, and in terms of water actually reaching the crops after allowances for all losses, groundwater may come to play a role as great as that of surface water today. But meanwhile the role of surface water, even in the Northern Zone, will have to be practically doubled. In the Southern Zone, i.e. Sind and Khairpur, the groundwater reservoir appears to be substantially smaller and, with certain localized exceptions, much higher in salt content. Thus, as far as Sind is concerned—and this point can hardly be overemphasized—ground water is *not* an alternative to surface water even in the early stages of development. Ultimately, West Pakistan will have to develop both surface water and groundwater resources to their respective points of diminishing return in relation to each other and to other agricultural inputs. Furthermore, tubewells and processing industries require cheap electric power, and until Pakistan's network of thermal power plants (based increasingly on the natural gas at Sui, northwest of Gudu, and other fields) are much further developed, hydroelectricity from Tarbela will be cheaper. Finally, in many areas even in the Northern Zone, groundwater is too high in salt content to be applied to crops without dilution with surface water, and that means reservoir storage.

So although it is true that if one could somehow have suspended the entire IBP operation in the summer of 1963, while the groundwater investigations were continued, one *might* have concluded, after several years, that Pakistan would be better advised to use the remainder of the Development Fund for a groundwater program with incidental modifications to the surface water system, human affairs are not, and probably cannot be, conducted in such a scientific fashion. By the summer of 1963, Tarbela had become (like Aswan in 1956) a burning public issue in Pakistan. It was grouped with Kashmir, Gurdaspur, other issues along the Indian border, refugee grievances and claims, new reports of persecutions of Muslims in

West Bengal, and fear over Western (and Soviet) arms aid to India as another example of injustice to Pakistan. Pakistan had signed away her birthright rivers to the "enemy." Was she now to be denied her mess of pottage by a combination of former colonialists and neo-imperialists represented by the "friendly Governments" and the World Bank?

This may be putting matters too harshly, but they certainly were seen in this light by many literate Pakistanis.[24] Tarbela had become a symbol, an idée fixe in the public mind. And the odd thing about it was that even those Pakistani engineers and planners, and their conscientious and loyal foreign consultants, who honestly believed that the groundwater program provided the fundamental, long-range answer, had to conceal their enthusiasm and word their reports cau-

24. Pakistan, which has received over $3 billion in Western economic and military assistance, has proved to be increasingly sensitive on this matter in recent years as she has tried to reorient her foreign policy toward the non-aligned position of most Afro-Asian states. She has been vociferous both in demanding "aid without strings" and in asserting her determination to reduce her dependence upon foreign aid for development. When in the summer of 1965 the meeting of the "Aid to Pakistan Consortium," which was to discuss underwriting of her Third Five Year Plan, was postponed at U.S. instigation, Pakistan's Foreign Minister, Zulfikar Ali Bhutto, "declared that Pakistan values its independence more than economic development and emphasised that she is opposed to all forms of colonialism, domination and dictation no matter from which quarter they came. . . . Mr. Bhutto said that Pakistan was an aggrieved country. It was betrayed, he said, before it came into existence and then again after its independence. India was made stronger at Pakistan's expense and all the Muslim majority areas were not given to Pakistan and they had to meet one challenge after another." (Government of Pakistan, Ministry of Information and Broadcasting, Press Information Department, *Pakistan News Digest* [Karachi, The Times Press], July 15, 1965, pp. 1, 9.) The September War brought further curtailments of U.S. and U.K. assistance to both Pakistan and India, and by early November the Ministry of Planning in Karachi announced that development expenditures in the Third Five Year Plan would have to be reduced both because of restricted foreign assistance and because of increased defense allocations. In December 1965 President Ayub visited Washington for discussions with President Johnson, and in January 1966 at Tashkent Ayub and Prime Minister Shastri of India agreed to restore the status quo ante in Kashmir and along the Indo-Pakistan border. When U.S. Vice President Humphrey visited New Delhi and Karachi in February 1966 he announced a limited resumption of American aid to each country. On June 15, 1966, the United States announced simultaneous full-scale resumption of aid to India and Pakistan. Coincidentally, President Ayub relieved Foreign Minister Bhutto of his duties and assumed them himself. (In July Pirzada Sharifuddin was appointed Foreign Minister.)

tiously lest they seem to imply that something was wrong with Tarbela. The "groundwater" and "surface water" schools of thought cut across departmental and ministerial lines. WAPDA, the Irrigation and Power Department with its Irrigation Research Institute, the provincial Department of Agriculture, the central Ministry of Agriculture, the provincial Soils Reclamation Board, and the central Planning Commission all had their advocates of each approach, and of both in varying combinations.

Nor could one even assume that an "old-timer," an engineer who had spent most of his life in the Irrigation Department and subsequently, perhaps, had been transferred to WAPDA, was necessarily a "surface water man" while a "newcomer," an engineer fresh out of the university or recently returned from graduate work abroad and assigned to WAPDA, was necessarily a "groundwater man." For there had been groundwater advocates in the Irrigation Department as early as the 1920s and there were young men in WAPDA who saw more problems than potential in it. Even S. S. Kirmani, Chief Engineer of the IBP and Tarbela's staunchest advocate, saw a necessary and increasing role for groundwater (18 m.a.f. in the Northern Zone; see above, page 272), though he stressed the need for Tarbela as an immediate measure, as a source of supplementary fresh surface water for diluting saline groundwater, and as a source of cheap hydroelectricity to operate the tubewells. And nobody, not even the staunchest groundwater advocate and Tarbela opponent, had figured out what to do with the effluent of massive groundwater irrigation in the Northern Zone except to send it down the Indus to further poison Sind's fields or perhaps to transport it at exorbitant cost to a point where it can be dumped directly into the sea or into the desert along the Indian border.

Nevertheless, by early 1963 the Bank's engineers and economists appeared to be sufficiently impressed with the possibilities of groundwater development as an alternative to Tarbela that they were more reluctant than ever to proceed with the dam, especially on the basis of the November 1962 estimates. The "friendly Governments," on both political and technical grounds, were ill-disposed toward putting any more money into completing the surface water system of the IBP. Rather, like India in the spring of 1959, they were now mainly interested in putting a ceiling on their own contributions. From the

standpoint of *Realpolitik* they no longer saw either the need or the likelihood of purchasing Pakistan's goodwill. On the one hand, they did not appreciate Pakistan's attitude in the Sino-Indian conflict. On the other, they saw a chance (perhaps ephemeral) to replace her with a much stronger "ally" in South Asia. So why pay for Tarbela? At the behest of the "friendly Governments" the Bank again suggested that WAPDA eliminate Tarbela, substitute Raised Mangla, and finish the job as close to the original cost estimates as possible.

Faced with this combination of political, financial, and technical objections to Tarbela, and realizing that Pakistan's bargaining position had deteriorated since the Murree meetings, WAPDA began to give way in a somewhat oblique fashion. In May 1963 it published new estimates for the IBP, revised to reflect the November 1962 Tarbela figures and all other changes occurring since March 1962. The new total cost of the IBP including Tarbela but excluding the $50 million for tubewells and drainages came to $1,900.5 million, or $1,802.6 million after excluding the customs duties and sales taxes on materials procured for the project which Pakistan had been required to refund to the Development Fund. If Tarbela were excluded, and Raised Mangla substituted (the Bank's plan), then Pakistan would insist on keeping the $50 million component for tubewells and drainages. The total cost would then amount to $1,373.5 million, or $1,299.1 million after reimbursement of customs and taxes. Thus, the net cost of keeping Tarbela in the project was "only" $503.5 million.

But the real point in WAPDA's May 1963 submission was that Pakistan would pay a larger portion of the foreign exchange costs of Tarbela. She would make foreign exchange contributions of $160.2 million via her Five Year Plans, plus another $15.4 million through the Development Fund, for a total of $175.6 million as compared with the $104 million in the Murree proposals. According to WAPDA's new estimates, these contributions would amount to *more* than the added cost *in foreign exchange* ($143.7 million) of keeping Tarbela in the project, while eliminating Tubewells and Drainages, as compared to completing the original "Project Description." The additional cost of Tarbela in rupees would be $359.8 million, but here too Pakistan would make concessions. She would assume all but $80 million of the $154.6 million originally set aside in the Fund for

rupee purchases, and would increase her own rupee contributions to the Fund by $14.3 million. If the United States would allow her to devote all of the accumulated and prospective Public Law 480 and Food for Peace counterpart rupees (excluding amounts reserved for United States uses) to the IBP, Pakistan would promise to make up any shortfall, though it hoped there would be none.

What all this meant was that Pakistan was asking the United States for an additional $154.3 million in counterpart rupees over and above the $231.8 million included in the original Fund Agreement. Coupled with the original U.S. dollar contributions in grants and loans, the WAPDA proposal would have raised the total U.S. share in the Fund to about $1,105 million. Even granting that Food for Peace is a "giveaway" program, inasmuch as the United States can never begin to use the counterpart funds generated by its commodity shipments but instead devotes them to projects suggested by the recipient nation, total *dollar grants* to Pakistan would come to about $298 million and total *dollar loans* to $121 million under this plan (and World Bank loans to almost $140 million). So despite Pakistan's willingness to make foreign exchange allocations from her Five Year Plans (which are also supported by the "friendly Governments" contributing to the Indus Basin Development Fund), she was still asking for considerable assistance from the United States, the other "friendly Governments," and the Bank at a time when there was little disposition to accede to her requests.

Indeed, for some strange reason, WAPDA's May 1963 submission entitled *Financing the Indus Project on the Basis of Sir William Iliff's Financial Plan of July, 1962*,[25] which states that it "does not present a proposal but only indicates the requirements of funds from the various Contributing Governments and the Bank under the two alternatives," consistently employs figures based on an assumption that the *entire* additional foreign exchange costs of the IBP, including Tarbela, would be divided among the "friendly Governments" in the proportions used in the original Development Fund. This is true despite the fact that the report notes that Iliff's proposal limited their additional contribution to $310 million, points out that Pakistan will have to assume the added foreign exchange burden of $160.2

25. IBP Publication No. 87 (Lahore, WAPDA, May 1963).

million by allocations from her Five Year Plans, and mentions as an additional "concession" by Pakistan her "limiting the maximum liability of the contributors to the Fund specified in the Agreement" if Tarbela is included. Perhaps the reason for this rather oblique approach lies in this statement:

> If, however, Tarbela is excluded from the Plan and Raised Mangla substituted instead, as now suggested by the Contributing Governments and the World Bank, the concessions given by the Pakistan Government would not apply and the financing of a Plan excluding Tarbela and substituting [raised] Mangla instead would have to be strictly in accordance with the principles laid down in the Fund Agreement.[26]

At any rate, WAPDA's use of figures that the Murree proposals had rendered purely hypothetical seems to contradict WAPDA's effort to demonstrate how much the contributing governments would "save" by adopting its suggestion rather than that of the Bank. There was no real possibility, by the summer of 1963, that the "friendly Governments" would increase their contributions over the amount suggested at Murree. There was even a very real question whether they would be willing to do as much, considering the events of the intervening year. WAPDA's May 1963 submission assumes that they would, and suggests that they might do more, but there were anxious hours in Lahore and Rawalpindi that summer and fall. Indeed, it was not until the end of the year that Pakistan could relax in the assurance that the $310 million would be forthcoming.

In November 1963 Bank President George D. Woods, who had succeeded Eugene Black in January 1963, met with President Ayub and agreed to recommend the supplementary contribution to the "friendly Governments" provided that Pakistan would allow the Bank to conduct a fundamental study of water and power resources of the Indus Basin, including both the surface water and groundwater aspects. The two presidents agreed in principle, and the following month a WAPDA team visited Washington where details of the accord were worked out. The Bank and "friendly Governments" would make the contribution of $310 million foreseen at Murree, plus an allocation of $5 million for the Indus Resources Study. The "tech-

26. Ibid., p. 6.

nical feasibility" and "economic viability" of a dam on the Indus were to form the first portion of the study, which was to be completed within a year, and the entire study was to be available in 1966.

To formalize these arrangements, a Supplemental Agreement to the Indus Basin Development Fund Agreement was signed at Washington on March 31, 1961, by representatives of the Bank and the U.S.A., and one week later by the representatives of the other "friendly Governments" and Pakistan. Its salient features are as follows:

1. All parties accept the Supplemental Agreement as "a full and complete discharge of all obligations, whether legal or moral, expressed or implied" under the 1960 Agreement.
2. The parties will make the following supplemental contributions to the Development Fund:

		Grants	*Loans*
Australia	£A	4,669,643	
Canada	Can.	$ 16,810,794	
West Germany	DM	80,400,000	
New Zealand	£NZ	503,434	
United Kingdom	£	13,978,571	
United States	U.S.	$118,590,000	U.S. $ 51,220,000
World Bank International Development Association			U.S. $ 58,540,000 (in various currencies)

3. No further rupee purchases shall be made from the Fund.
4. Pakistan shall pay all additional rupee costs of the project, using for this purpose either U.S. counterpart rupees (by agreement with the U.S.A.) or her own rupee resources.
5. Priority of disbursements from the Fund shall be accorded to:
   a. Materials costs of Mangla Dam and related works
   b. Materials costs of the "Links Canals, Barrages and Other Works" set forth in the "Project Description" appended to the 1960 Agreement, as already modified by agreement between Pakistan and the Administrator with the approval of the "friendly Governments," but excluding the Tubewells and Drainage Works Component

c. Overhead and engineering costs related to (a) and (b)
d. Expenses incurred by the Administrator for his services
e. The costs of the Study described in (7) below

6. After all of the above expenses have been met, any non-rupee assets remaining in the Fund will be disbursed to meet the non-rupee costs of the Tarbela project *if Pakistan and the Bank agree that Tarbela is justified on the basis of the Study* described in (7) below; if they do not so agree, then these funds will be allocated *to some other development project* or projects *in the water and power sector* in West Pakistan as agreed between Pakistan and the Bank.
7. The Administrator shall organize and administer a study of the water and power resources of West Pakistan which would provide the Government of Pakistan with a basis for development planning under the Five Year Plans; the study will be completed within two years of its commencement; and the first objective of the Study will be a report on the technical feasibility, construction cost, and economic return of a dam on the Indus at Tarbela, this portion to be completed if possibly by the end of 1964.
8. There is no commitment by the parties to participate in any project arising out of the Study except as provided in (6) above.[27]

With this Supplemental Agreement, the Bank and the "friendly Governments" had achieved a number of objectives. Their total liability toward the IBP had been fixed. Their contributions would be used to complete the project as originally described and subsequently modified, but *not* including Tarbela unless the Bank and Pakistan agreed that it was justified, and then *only* if any foreign exchange remained in the Fund (a highly unlikely contingency). And if, by some chance, some foreign exchange did remain in the fund, it could be used for any water or power development project in West Pakistan acceptable to both the Bank and WAPDA, such as groundwater development. Of course, even if the Bank study ruled out Tarbela, Pakistan theoretically remained free to finance it out of her own

27. IBRD, *The Indus Basin Development Fund (Supplemental) Agreement, 1964*, and IBRD Press Release No. 64/10, "Indus Supplemental Agreement" (Washington, D.C., April 8, 1964). This summary is a paraphrase; italics are the author's.

resources, but the Supplemental Agreement required her first to meet any foreign exchange requirements of the project minus Tarbela, plus all of its remaining rupee requirements to the extent that they were not met by U.S. or other counterpart rupees. The Bank had also secured two more of its aims, though not quite in the order it wanted to achieve them. Tarbela would be subjected to a technical and economic reappraisal, and a fundamental investigation of all water (including groundwater) and power resources of the Pakistan portion of the Indus Basin would be carried out under the Bank's direction.

From an ideal point of view there was one flaw in the Supplemental Agreement arrangements. The Tarbela investigation was to be completed a year ahead of the general study. Thus feasibility and viability of Tarbela would have to be decided in the absence of full data on the groundwater alternative, if any existed. In the view of an impartial observer, this would seem to be putting the cart before the horse.

In the event, the Tarbela study largely revisited old ground which had been covered since 1952 by the Irrigation Department's Dams Investigation Circle, by the consulting firms of Tipton and Hill and TAMS, and by WAPDA itself. The section of the World Bank team concerned with the Tarbela report was divided into three groups to investigate each of the following aspects:

A. Dam sites and side valley storage sites, rates of silting and costs including those of building a dam further up the Indus to prolong Tarbela's life
B. Power aspects
C. Economic aspects

Group A investigated eight possible sites on the Indus, eliminated all but Kalabagh and Tarbela, and finally came up with an opinion not much different from that expressed by WAPDA's Chief Engineer (A. R. Kazi) in 1961, i.e. that Tarbela was not attractive, but less unattractive than Kalabagh (see above, page 295).

The Tarbela section of the report would have been ready by November 1964, but was delayed at WAPDA's own request to allow the submission of new benefit analyses. It was finally presented to the Bank in February 1965, and by the Bank to Pakistan in March. On March 18, 1965, the Ministry of Finance announced:

> The report finds the construction of a dam on the Indus at Tarbela technically feasible and economically justifiable.
>
> In view of the size of the Tarbela project and the magnitude of its cost in terms of both foreign exchange and domestic expenditure, the financial implications require further discussions by the Government of Pakistan with others, amongst them the World Bank as Administrator of the Indus Basin Development Fund and as the leading international agency in economic development financing.
>
> It is likely that the discussions will take some time.[28]

One reason why the discussions would "take some time" apparently lay in the need to coordinate the funding of Tarbela with other development expenditures included in Pakistan's Third Five Year Plan, due to begin on July 1, 1965. Excessive spending on capital works that do not increase the production of consumable goods until many years have passed is, of course, a frequent and serious contributor to inflation in developing nations. Although, as we have seen, Pakistan proposed to finance most of the domestic costs of Tarbela out of counterpart funds generated by the U. S. Food for Peace and similar programs, such a procedure might well give pause to an economist. For these "accumulated" rupees exist only as accounting balances. The only way Pakistan can use them is to print them and issue them in exchange for domestic goods and services—a sure path to self-defeating inflation. Thus, for all practical purposes, the only counterpart funds Pakistan could devote to the Tarbela project would be those accruing *in the future* from the sale of American (and other) surplus commodities. But in the spring of 1965, the U.S.A. was starting to reappraise not only its Food for Peace program but its entire foreign aid operation in both economic and political terms. In June, the United States Government refused to renew the annual Food for Peace agreements with India, announcing that it would continue such shipments only on a month-by-month basis pending a thorough review of India's programs for agricultural development. (The Food for Peace agreement with Pakistan did not expire until December.) In September, after the outbreak of the Kashmir War, the U.S.A.

28. Embassy of Pakistan, Washington, D.C., *Pakistan Affairs*, April 16, 1965, p. 5.

suspended all aid to both countries except what was "in the pipeline," and it was not until early 1966 that aid, on a limited scale, was resumed. We shall discuss the implications of the events of 1965 for the IBP in more detail in Chapter 10.

Meanwhile, late in 1964, WAPDA had requested its Tarbela consultants (TAMS) to prepare final designs for a raised dam with 9.3 m.a.f. of live storage. Early in 1965, WAPDA announced its intention, if the Bank approved, to invite tenders for the dam in June 1965, to award the contract in March 1966, and to complete the dam by March 1973.[29] WAPDA also announced plans to proceed with raising Mangla by 40 feet, completing it by June 30, 1970, the end of the Third Five Year Plan. Although the outline of the Third Five Year Plan does not specifically include allocations for Mangla, Tarbela, or any of the IBP works, it estimates that IBP requirements would absorb 2.2 billion rupees ($463 million) of the expected Food for Peace counterpart funds accruing over fiscal 1965–70.[30] Making allowances for United States uses and contingencies, this would leave about one billion rupees for items specifically included in the Plan. And it was indicated that Tarbela would be specifically included in the Fourth Plan.

June 1965 passed without any invitations of tenders for Tarbela, and it soon became apparent that the dam's status was again in jeopardy as a result of the uncertainty over future Food for Peace shipments and because of the U.S.-initiated postponement of "Aid to Pakistan Consortium" discussions on the whole Third Plan. But in the spring of 1966, after the Ayub-Shastri meeting at Tashkent and the withdrawal of Indian and Pakistani forces to the positions occupied in August 1965, the World Bank began to release payments from the Development Fund to cover the cost of the railway spur and power line which WAPDA was building to the Tarbela site. This would seem to be a firm indication that the Bank was prepared to proceed with Tarbela as long as there was no new deterioration in the political situation. At the beginning of June 1966, S. S. Kirmani, Chief Engineer, IBP, said he expected that the Consortium meeting scheduled for July would give final approval to the dam, and that

29. *WAPDA Weekly*, January 29, 1965 and February 19, 1965.

30. Government of Pakistan, Planning Commission, *Outline of the Third Five-Year Plan (1965–70)* (Karachi, August 1964), p. 62.

the Bank had already released Rs 120 million ($25.4 million) for the preliminary works.[31] But since actual construction of the dam cannot begin until a bridge has been placed across the Indus at the site, it does not seem possible to begin work before early 1968 or to finish Tarbela before late 1974 or early 1975, about two years after the end of the Transition Period outlined in the Treaty.

Also in 1965, WAPDA's regional consultants for the Lower Indus Basin or "Southern Zone," Hunting Technical Services, Ltd., and Sir M. MacDonald and Partners, both of London, had completed a 56-volume, 28,000-page investigation report as a basis for planning. But as of mid 1966 this report has not been released. Meanwhile, the regional consultants for the "Northern Zone," Tipton and Kalmbach of Denver (the successor firm to Tipton and Hill), were continuing their work not only on a project-by-project basis but on a regional plan for the Zone, due for completion, though probably not for release, in September 1966.

As for the World Bank's comprehensive study of water and power resources in West Pakistan, its completion was delayed from the end of 1965 to May 1966 and then to early in 1967. The second portion of the Harza Appraisal Report, which is to carry the report released in March 1964 up to 1985 or 1990, was postponed from the end of 1965 to mid 1967 in order to allow the general consultants to incorporate the results of the Hunting-MacDonald, Tipton and Kalmbach, and World Bank studies. Thus WAPDA's Master Plan for Water and Power Development in West Pakistan can hardly be completed much before 1969 or even 1970.

The Bhakra-Beas-Rajasthan Project (India)

If India's position in the Indus Basin was good in 1947, it was even better in 1960. On the one hand, the Indus Waters Treaty had conferred upon her, in exchange for the sum of $174 million (offset by loans totaling $56 million from the United States and the World Bank), undisputed ownership of the three Eastern Rivers. On the

31. *WAPDA Weekly*, June 8, 1966, p. 3. Added in proof: The World Bank finally authorized WAPDA to issue Tarbela tender invitations in March 1967, with tenders due in September 1967. Hopefully, this marks the end of the Tarbela crisis.

Appendix A

Friends Not Masters A Political Autobiography
By Mohammad Ayub Khan

VI

The Indus Basin waters dispute between Pakistan and India has a long and chequered history. While Kashmir is basically a political problem, the canal waters was a technical and economic issue which turned into a bitter feud because of India's intransigence. A major contributory factor was the policy of weakness and vacillation followed by successive governments in Pakistan.

Soon after the promulgation of Martial Law, I told a news conference in Karachi that if the Kashmir and canal water disputes were settled peacefully the new régime should be able to work out some mode of coexistence with India. I decided to deal with both the problems in a pragmatic spirit.

The Indus, with its five main tributaries, is one of the great river-systems of the world. Its annual flow is twice that of the Nile and three times that of the Tigris and Euphrates combined, amounting to almost 170 million acre-feet, or enough water to submerge to a depth of one foot the whole area of France or the State of Texas in the United States. The rivers, together with the system of irrigation developed over the past hundred years, support a population of about 40 million in Pakistan

one note of dissent the recommendations were supported by all members of the Commission. The previous government avoided the responsibility of implementing the report through their fear of the *ulema*. I had the report examined by distinguished jurists including Justice Mohammad Ibrahim of East Pakistan and Mr. Manzur Qadir, ex-Chief Justice of the High Court of West Pakistan. The recommendations of the Commission did not interfere in any way with any Islamic injunction on the subject; they only provided a procedure for the proper and judicious implementation of the Islamic principles relating to marriage. I decided to implement the procedure recommended by the Commission because I considered it my duty as a Muslim and as Head of the State to do what was necessary to eliminate a grave social malpractice which was affecting the lives of the people. Accordingly, the Muslim Family Laws Ordinance was promulgated in 1961. A section of the *ulema* immediately accused me of interfering with Islam. Some went to the extent of suggesting that I had rewritten certain sections of the Qur'an. Fortunately the social benefits of the new law made an immediate impact on family life: people in general, and the womenfolk in particular, supported the reform and the obscurantists found themselves isolated. I have mentioned this to underline the difficulty of adapting laws to suit contemporary conditions.

VI

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and 10 million in India, or almost one-tenth of the combined populati... of the two countries. The Indus Basin irrigation system is the larg... in the world, irrigating about 30 million acres, or a larger area tha... that irrigated in Egypt and the Sudan by the Nile.

The partition of the sub-continent in 1947 left the headworks of some of our major irrigation systems in Indian territory. All the canals of what are known as the Central Bari Doab and the Sutlej Valley projects depended for their supplies on headworks and rivers under Indian control. The rivers Sutlej, Beas, and Ravi, whose waters flowed into these canals, originated and ran for long distances in Indian territory before they entered Pakistan.

Soon after Partition, India chose to take the drastic action of withholding water supplies to our canals and created a grave crisis for us. Water was released only under certain conditions to which we had no option but to agree, for the alternative was the physical devastation of vast fertile areas. The problem was made more complex because, until then, the Indus Basin irrigation system had been developed entirely from river flow and without reservoir storage. Water supplies were governed not only by seasonal variations, but also by the yearly variations in the flow of the rivers depending on rainfall in the upper reaches of the Himalayas.

India was trying to appropriate for her own use all the waters of the Sutlej, the Beas, and the Ravi; and, perhaps, some waters of the Chenab. As an upper-riparian, she was in a position to deprive us of all this water which flowed through her territory. Tempted by the prospect of quick economic development by utilizing easily available water, India started on huge engineering works which could only result in the complete desolation of vast areas of land in Pakistan.

The sharing of the waters of the Indus system had been a matter of dispute for many years. Before Partition, there were water claims continuously in dispute between the Sind and Punjab provinces of undivided India. Partition drew the border between India and Pakistan right across the Indus system. Pakistan became the downstream riparian, and the headworks of two of the main irrigation canals in Pakistan were left on the Indian side of the border. The sharing of the use of the waters then became an international issue. Somewhere about 1955 or 1956, when I was Commander-in-Chief, there was a great deal of talk in the Press about the Indus Basin dispute. The Indians seemed determined to cut off water supplies to our canals. If that had happened, the country might well have found itself involved in an armed conflict with India. I knew very little about the problem, so I asked for elucidation. The West Pakistan government sent two engineers who

explained the case in great detail to me. My main worry was the vulnerability of Pakistan. The sources of the rivers were in India along with the headworks. India had made arrangements to divert the waters and the Indian Army was three times the size of our army. I felt that if negotiations with India broke down, and the Indians did decide to divert the waters, we should be facing a situation of war. Every factor was against us. The only sensible thing to do was to try and get a settlement even though it might be the second-best, because if we did not, we stood to lose everything.

In October 1958, very soon after the Revolution, I undertook a closer study of the facts of the case and acquainted myself with the issues involved. I came to certain definite and firm conclusions. By May 1959 the main issues had crystallized and the World Bank had reached the stage when they could make us a definite offer. Agreement was reached on the general principles on which a water treaty should be based. The World Bank conceded our demand for the construction of a system of replacement works. This was to be a part of the settlement arrangements, with India making a financial contribution. The World Bank team, headed by its President, Eugene Black, offered us the Mangla Dam plus certain headworks and the diversionary and link canals. They also offered a dam at Rohtas near Jhelum. The resources for these gigantic works were in the main to be provided by the friendly countries, especially the United States; some by India and some by Pakistan.

But before I write of the negotiations with Eugene Black, I should like to describe the confrontation I had with our own technical experts and administrators. I sensed that they did not fully realize the gravity of the situation and were asking for the moon when we were in a position of weakness all along the line. They were also trying to dictate policy and were taking up extreme positions. Some thirty or forty of them were assembled in Government House, Lahore, where I addressed them. I said: 'Gentlemen, this problem is of far-reaching consequences to us. Let me tell you that every factor is against Pakistan. I am not saying that we should surrender our rights but, at the same time, I will say this: that if we can get a solution which we can live with, we shall be very foolish not to accept it. Now when I say that, I am in fact saying it to myself because I shall have to take the responsibility for the solution.

'The responsibility does not lie on any one of you, so let me tell you very plainly that the policy is going to be mine. I shall consult you whenever I am in doubt regarding technical details, but if any one of you interferes with the policy, I shall deal with him myself. This prob-

lem, if not tackled properly, may well mean the end of the country. I mean every word of it. So, don't let any one make any mistake about it.' I think they understood my meaning.

Eugene Black's offer came to about two million dollars in terms of money. I then consulted my technical advisers, who were firmly of the view that in addition to a dam on the river Jhelum at Mangla, we should need a dam at Tarbela to store the surplus flow of the Indus River. This would not only cater for replacement requirements but also provide some water for development, especially to feed the canals in Sind. So a dam at Rohtas was no answer. The difference in cost was of the order of about 200 million dollars. This was a staggering figure, and I knew that when Eugene heard it he would hit the roof. And so he did. But I told him, and I quote the words as I recall using them: 'I have been around these areas which are going to be affected by the withdrawal of waters by India. People have told me very plainly that if they have to die through thirst and hunger they would prefer to die in battle and they expected me to give them that chance. Our *jawans* and the rest of the people feel the same way. So this country is on the point of blowing up if you don't lend a helping hand. This is a human problem of a grave nature and cannot be blinked away.

'What we are being called upon to do is to barter away naturally-flowing waters into our canals, for storage water, and the history of storage is that it begins to silt the moment it is completed. Besides, we are going to be put back by about ten years or so by building these storages and link-canals. All this effort could have been put to more constructive effort. So, we are making great sacrifices.

'I know certain countries have been very kind in offering us assistance, but unless we get our additional needs of water, apart from replacements, there is going to be chaos in this country. So a dam at Tarbela is a must.'

Eugene Black thought I had made his task very difficult. He did not know how he was going to persuade the donor governments to provide another 200 million dollars. He wanted to have some time to think over the matter. I urged him, 'Must you have time to think over an obvious thing like this?' We went over it again and again. Finally, he agreed to support our demand and said that he would ask the donor countries for the additional sum—the difference between Rohtas and Tarbela. In the end we got a promise of over 740 million dollars. I understand that, earlier, Chaudhri Mohammad Ali was prepared to settle for 100 to 150 million dollars, and that in the form of loans.

We should be grateful to the friendly countries and to Eugene Black for what they have done for us. Later they promised to give an additional

350 million dollars for Tarbela or its equivalent, because costs had gone up. For the latter sum all credit is due to George Woods who succeeded Eugene Black as new head of the World Bank.

The Indus Waters Treaty was based on the division of the rivers, according to which, after a transitional period of ten years, extendable at Pakistan's request up to thirteen years, the three eastern rivers—Ravi, Beas, and Sutlej—will be allocated exclusively to India, while the waters of the three western rivers—Indus, Jhelum, and Chenab—will be available exclusively for Pakistan, except for limited uses by India in upstream areas in Indian-occupied Kashmir, eastern Punjab, and Himachal Pradesh. During the transitional period, Pakistan will undertake to construct a system of works, part of which would replace, from the western rivers, such irrigation uses in Pakistan as had hitherto been met from the eastern rivers.

The Indus works programme will be the largest of its kind to be undertaken anywhere in the world and will cost about 1,070 million dollars, of which about 870 million dollars will be spent on the works in Pakistan. These works will include two large storage dams, one on the Jhelum river (with a reservoir capacity of 4·75 million acre-feet) and the other on the upper Indus (with a capacity of 4·2 million acre-feet), five barrages and eight link canals nearly 400 miles in total length, transferring waters from the western rivers to areas formerly irrigated by the eastern rivers; that is, to replace the supplies for areas served by the Central Bari Doab and Sutlej Valley canals. Power stations will be installed at the Jhelum dam with a capacity of more than 800,000 kw. Tube-wells will be installed and drainage undertaken to overcome waterlogging and salinity in irrigated areas totalling 2,500,000 acres. While this system of works is being built, India will continue deliveries from the eastern rivers according to an agreed programme, which will take into account some development needs of Pakistan as well.

During the course of the protracted negotiations, it had become apparent that the cost of financing the system of work in Pakistan and India, to which the two governments had agreed as one of the features of an acceptable settlement, was far beyond the capacity of these two countries. The World Bank, therefore, set up an Indus Basin Development Fund to finance the whole programme. India undertook to contribute to the Fund about 174 million dollars, and the cost of the works in Pakistan will be financed out of the Indus Basin Development Fund.

Details of the agreement show that the division of the total waters of the Indus system under the Treaty would be in the proportion of 80 per cent for Pakistan and 20 per cent for India. The Treaty was

signed in Karachi on 19 September 1960 by me, Mr. Nehru, and the World Bank Vice-President, Mr. Iliff.

As I explained to my people at the time of signing the Treaty, the solution that we had finally arrived at was not the ideal one but it was the best we could get under the circumstances. It should be realized that it was the immediate danger to the peace of this sub-continent posed by the dispute that had impelled the World Bank to step in as mediator in 1951. We had no alternative but to make a genuine and determined effort to assist the Bank to find an engineering solution to this grave problem which constituted a threat to peace between the two countries—a solution that we could live with and that would provide financial and technical resources to enable us to construct works which would divert the waters of the western rivers to the canals taking off from the eastern rivers. After years of negotiations of the utmost complexity, heart-breaking delays and frequent stalemates, we had, I felt, been able to obtain a solution which was adequate. So, whereas there was no cause for rejoicing at the signing of the Treaty, there was certainly cause for satisfaction that a possibly very ugly situation had been averted.

When one is dealing with a sensitive problem of this nature, one has to be realistic and judge the situation dispassionately in order to formulate a rational approach. Very often the best is the enemy of the good. We abandoned the chase of the ideal and accepted what was good after a careful and realistic appreciation of the overall situation. Had we not done that, we might have drifted into a conflict at a time when many factors were against us. The basis of this agreement, therefore, as far as we were concerned, was realism and pragmatism. Emotions had no place in it, nor could they be allowed to have any place where the future and safety of millions of people depended on a solution. I have nothing but admiration for President Black and Vice-President Iliff and for the Bank's technical team headed by General Wheeler, who made this dispute an issue of technical skill and human needs and lifted it from the plain of political controversy.

We are also grateful to friendly powers whose contributions to the Indus Basin Development Fund were a vital factor in making the terms of settlement acceptable to us. The cost of the works was far beyond our capacity. That these friendly countries, including the U.S.A., the U.K., Australia, New Zealand, Canada, and West Germany, have so readily come forward with offers of financial assistance, is not only a tribute to their sympathetic understanding of the issue, but also a proof of their interest in the stability and well-being of this sensitive part of the world. The World Bank, by its initiative, offered a dis-

tracted world an example of how problems could be solved by generosity and goodwill. I must also say that in the final stages of negotiations Mr. Nehru's personal intervention helped to remove certain differences which had arisen over arrangements during the transitional period.

The experience of the spirit that prevailed during the closing stages of the Treaty negotiations gave me hope that the problem of Kashmir might also get resolved in an amicable and just manner. The very fact that Pakistan had to be content with the waters of three western rivers underlined the importance for us of having physical control over the upper reaches of these rivers to secure their maximum utilization for the growing needs of West Pakistan. In my mind, therefore, the solution of the Kashmir issue acquired a new sense of urgency on the conclusion of this Treaty.

With the signing of the Treaty, a chapter of long and uneasy negotiations and suspense in our national affairs came to an end. We entered a period of sustained hard work to provide the huge storages and immensely long link-canals for alternative sources of water. By 1970 we hope to have completed these works, and when that is done we shall be independent of India in the matter of water supply.

Appendix B

NEW YORK TIMES EDITORIAL
March 20, 1960

A billion-dollar enterprise that would improve the lot of 50,000,000 people and help India and Pakistan to fortify their growing sense of common destiny in the face of the Communist menace has come a long step nearer realization with the announcement by the World Bank that six nations stand ready to join in financing the Indus River project. This project, developed by the World Bank, calls for equitable sharing of the waters of the Indus River system between the two nations for both irrigation and hydro-electric power for the economic development of one of the greatest river basins in the world.

The nations prepared to participate in this enterprise, which in size and in the number of people affected exceeds the Soviet-financed Aswan Dam for the Nile basin, are the United States, Britain, Canada, Australia, New Zealand and West Germany. Together with the World Bank they would provide more than half of the funds needed, partly in grants, partly in loans, with the United States contributing by far the largest share.

The actual start of the project now depends on a final water-sharing agreement between India and Pakistan. But since accord has already been reached in principle and on many of the details involved, the final agreement that has been six years in the making is now expected during the next two months. India and Pakistan have already settled most of the border and financial disputes that arose between them from the partition of the Indian sub-continent, and agreement on the Indus River would cap a progressive rapprochement that should also facilitate solution of the last remaining conflict over Kashmir, where much of the Indus River system originates.

One must assume that growing realization of a common interest in the project provides the real basis for the agreement - a basis that is necessary if the project is to flourish in the future. But there is no doubt that Chinese Communist pressure on both countries contributed to it, with the result that Communist China appears to be playing the same role in uniting India and Pakistan that Soviet Russia played in uniting the West.

NEW YORK TIMES EDITORIAL
September 13, 1960

The peoples of India and Pakistan may be thought of as taking a long step toward a constructive reconciliation of their interests in the Indus River agreement. Little maps and big maps show the headwaters of the Indus, some of them coming out of Kashmir draining southwestward toward the Arabian Sea. These waters have never been fully utilized. Now, in spite of the boundaries that they cross, they will be increasingly put to work.

Ever since the partition of the Indian peninsula a decade ago, the Indus waters have been roiled with bitter feeling between Pakistan and India. Thousands of years ago in the very dawn of history the six rivers to the northeast were being partially used for irrigation and for transport. The British added modern engineering works. Now it is proposed, with loans from six nations, including the United States, to double or triple the irrigated area and to bring the means for a better life to perhaps 50

million people. The World Bank, under the direction of its President, Eugene R. Black, has fathered and encouraged the project.

There will still be sources of disagreement between India and Pakistan when, as is expected, Prime Minister Nehru and President Mohammad Ayub Khan sit down to put their signatures on the final agreement that may lead to the spending of a billion productive dollars. But progress will be made. This will be a good day to remembe in spite of all the bad days that so often get into the news.

Appendix C

PARTIAL LIST OF WAPDA FOREIGN CONSULTANTS 1966-1967

Tipton & Kalmbach
Sir Alexander Gibb & Partners
A.E.C. Ltd.
Hunting Technical Services, Ltd.
Sir M. MacDonald & Partners
Advisory Group of Consultants
Canadian Hoosier Engineering Co. Ltd.
Commonwealth Associates Inc.
Harza Engineering
Jackson

Appendix D

PARTIAL LIST OF WAPDA FOREIGN CONTRACTORS - 1966-1967

A. Mangla Dam
- Guy F. Atkinson
- Harza Engineering

B. Tarbela Dam
- Guy F. Atkinson
- Morrison-Knudsen Int'l Co. (USA)
- Hochtiel (W.Germany)
- Impresilo (Italy
- Sir Alex. Gibb & Partners
- Harza
- Mustaqim Khan
- Hitachi Zosen (Japan)
- Fairbanks Morse

C. Other Projects
- Ed Zublin A.G. (W. Germany)
- Dumez-Borie (consortium of French firms)
- Canal Constructor's Corp (USA)
- Compagnie-Francaise d'Enterprise
- Hitachi Ship Bldg. & Engineering Co. Ltd.
- Geoistrazivanja & Energoinvest (Yugoslavia)
- H.T.Smith, Inc. (USA)
- Malik Brothers, Ltd
- AEG consortium (Stienmuller, Brown Boveri, Hochtief)
- Imperial Electric Co.
- Westinghouse
- AEG Export (W. Germany)
- CEM France
- FAIT/GIE (Italy)
- Skoda (Czechoslovakia

Appendix E

PARTICIPANTS IN TARBELA DAM DECISION

President Ayub Khan	Blunt, straightforward, Sandhurst trained general, pragmatic, paternal, ultimately illustrated Lord Acton's aphorism - "power corrupts. . . "
Dr. Abdus Salam	Science Adviser to Pres. Ayub A physicist and professor at Imperial College of Science and Technology - London
Ghulam Faruque	Civil Service of Pakistan First Chairman of Pakistan Industrial Development Corp. Chairman of WAPDA 1958 - 1962 Governor of East Pakistan Minister of Commerce
Ghulam Ishaq	Civil Service of Pakistan Chairman of WAPDA, 1962-1967 Minister of Finance 1967-1969 *
M. A. Hamid	Engineer Chief Engineering Adviser to Gov't. of Pakistan Pakistan's first Indus Water Commissioner
S. S. Kirmani	Director of Design, Punjab Irrigation Dept. 1951 Chief Engineer of Indus Basin Project (Tarbela's strongest advocate) Deputy Director - Special Projects Division of IBRD- 1970 Pakistan Commission to Indus Commission
Md. Shoaib	Minister of Finance later, Vice President of IBRD
Z. A. Bhutto	Present President of Pakistan Minister of Power and Irrigation (early 1960's) (later Foreign Minister) Large landholder in the Sind
East Pakistan Interests	The Awami League, East Pakistan WAPDA, Urban elite, East Pakistan Planning Department

* One foreign expert who was in many of the negotiations says of Ghulam Ishaq, "he was better prepared and smarter than anyone the Bank ever sent into the negotiations".

PARTICIPANTS - cont.

International Bank for Reconstruction and Development

Eugene Black	President IBRD from inception through 1962
George Woods	President IBRD successor to Black previously an investment banker (nominated by Eisenhower)
Sir Wm. A.B. Iliff	Vice President IBRD - British citizen Knighted in 1960 for role in Indus Basin Agreement (Bank's signator of fund agreement)
Gen. Raymond Wheeler	Former head of U.S. Army Corps of Engineers and technical adviser to the Bank
Robert Sadove Peter Lieftinck Thomas Creyke	The technicians from the Bank's staff who headed the Bank's Study Group in the Indus Basin.

U.S. Ambassadors

Wm. Rountree	1959 - 1962 A proper, typical career Foreign Service Officer
Walter McConnaghy	1962 - 1965 A Career Foreign Service Officer with characteristics similar to his predecessor.
Benjamin Oehlert	1967 - 1969 Vice President of Coca Cola

Directors of U.S. AID Mission in Pakistan

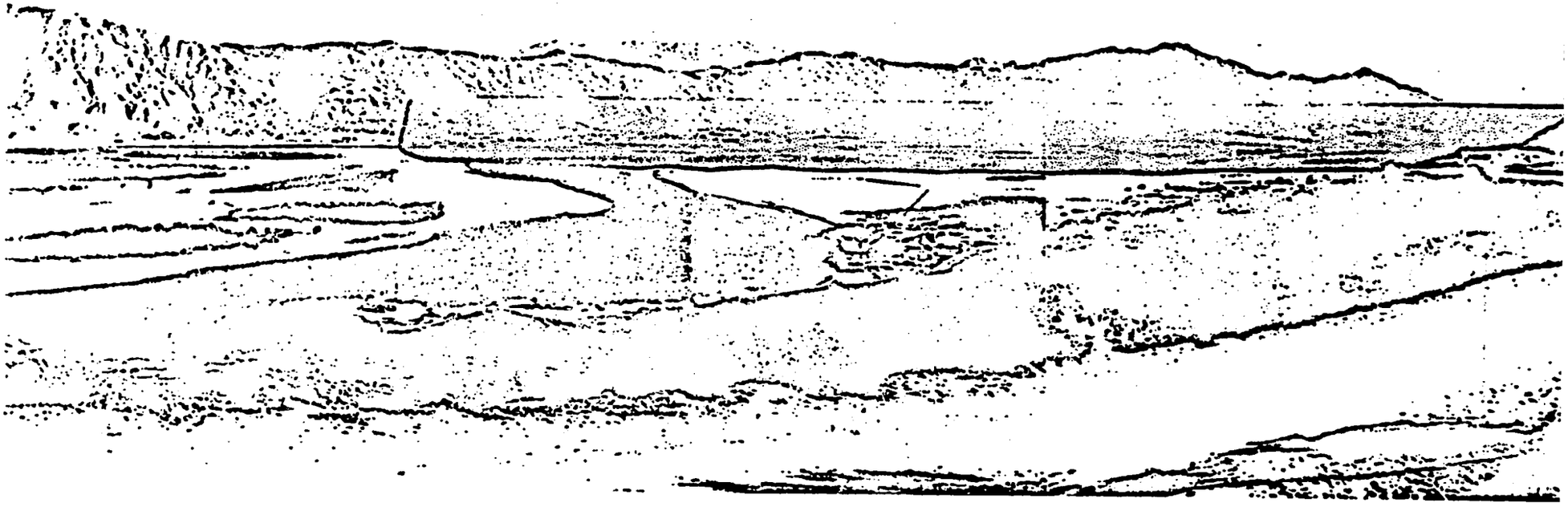
James Killen	1960 - 1962 Hard nosed, forceful, capable, controversial, businessman. Advocate of private sector programs.
John Hertman	1962 - 1963 Tough, tended to throw around weight he didn't have. Considered by most the least capable of a group of unusually able mission directors. Now in AID Washington in some moderately high position.
Donald McDonald	1963 - 1965 Hertman's deputy, smooth diplomatic, bright young man in the AID agency, subsequently Mission Director in Nigeria and Vietnam. Now Assistant Administrator for AID in Near East and South Asia Bureau
Maurice Williams	1965 - 1968 McDonald's deputy. Bright, tough, experienced, now Deputy Administrator of U.S. AID.

PARTICIPANTS - cont.

Consultants

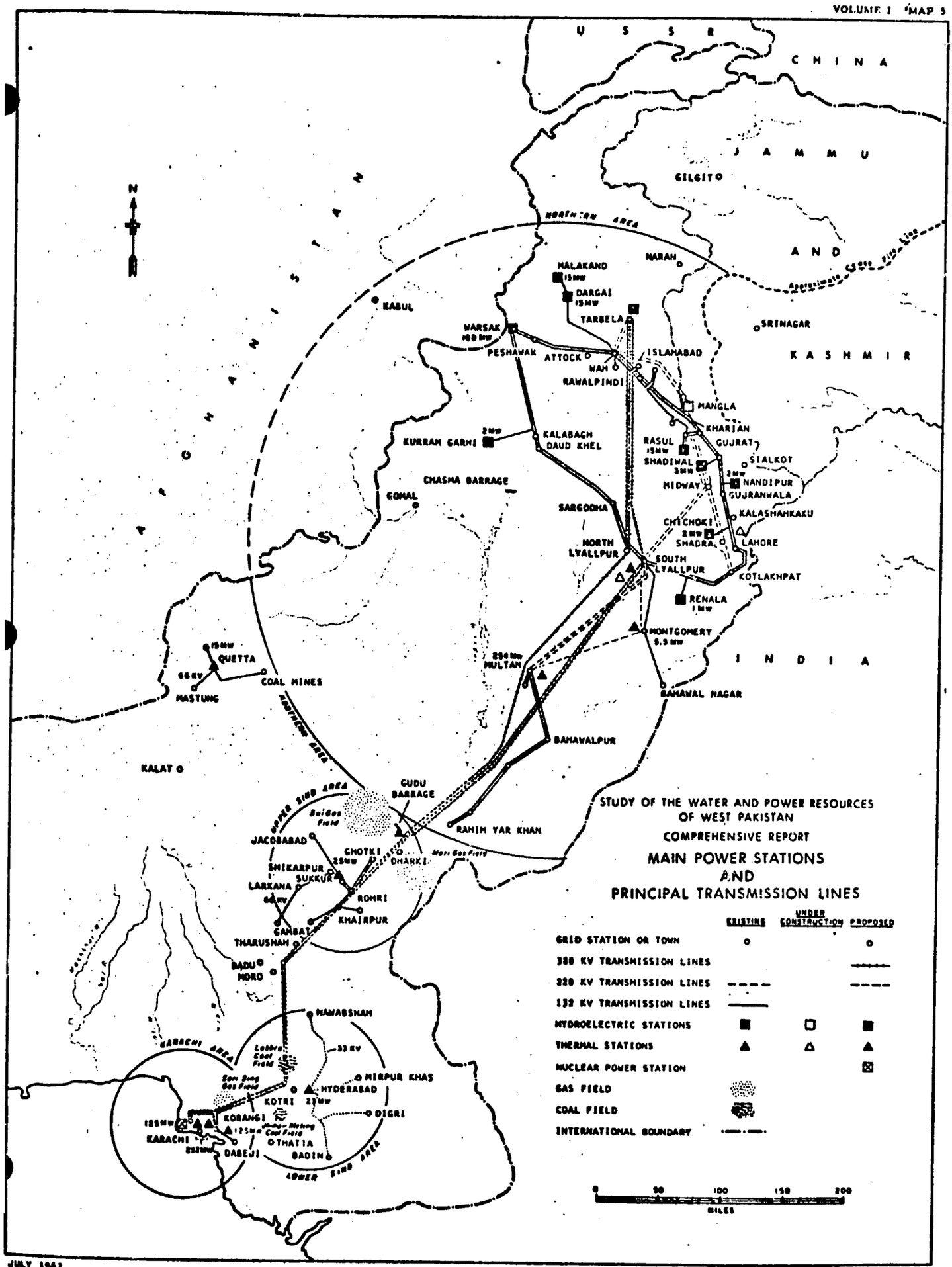
Harza Engineering	Chicago based firm, general consultants to West Pakistan WAPDA.
General Clark	Head of Harza team. Formerly with U.S. Army Corps of Engineers. Adroit technical politician, engineer, highly influential in Pakistan
Roger Revelle	Oceanographer - Eminent scientist from Scripps Institute of Oceanography. Science Adviser to Secretary of Interior Udall. Appointed by Kennedy to head mission of top U.S. scientists to Pakistan to work on waterlogging and salinity problems in the Indus Basin.
Jerome Weisner	JFK's Science Adviser Current President of MIT

Appendix F



TARBELA DAM PROJECT

Source: Tippetts - Abbett - McCarthy - Stratton International Co., Consulting Engineers for WPWAPDA



STUDY OF THE WATER AND POWER RESOURCES OF WEST PAKISTAN

COMPREHENSIVE REPORT

MAIN POWER STATIONS AND PRINCIPAL TRANSMISSION LINES

	EXISTING	UNDER CONSTRUCTION	PROPOSED
GRID STATION OR TOWN	○		○
388 KV TRANSMISSION LINES			———
220 KV TRANSMISSION LINES	- - - -		- - - -
132 KV TRANSMISSION LINES	———		
HYDROELECTRIC STATIONS	■	□	■
THERMAL STATIONS	▲	△	▲
NUCLEAR POWER STATION			⊠
GAS FIELD			
COAL FIELD			
INTERNATIONAL BOUNDARY	——·——		

1880-1928R1

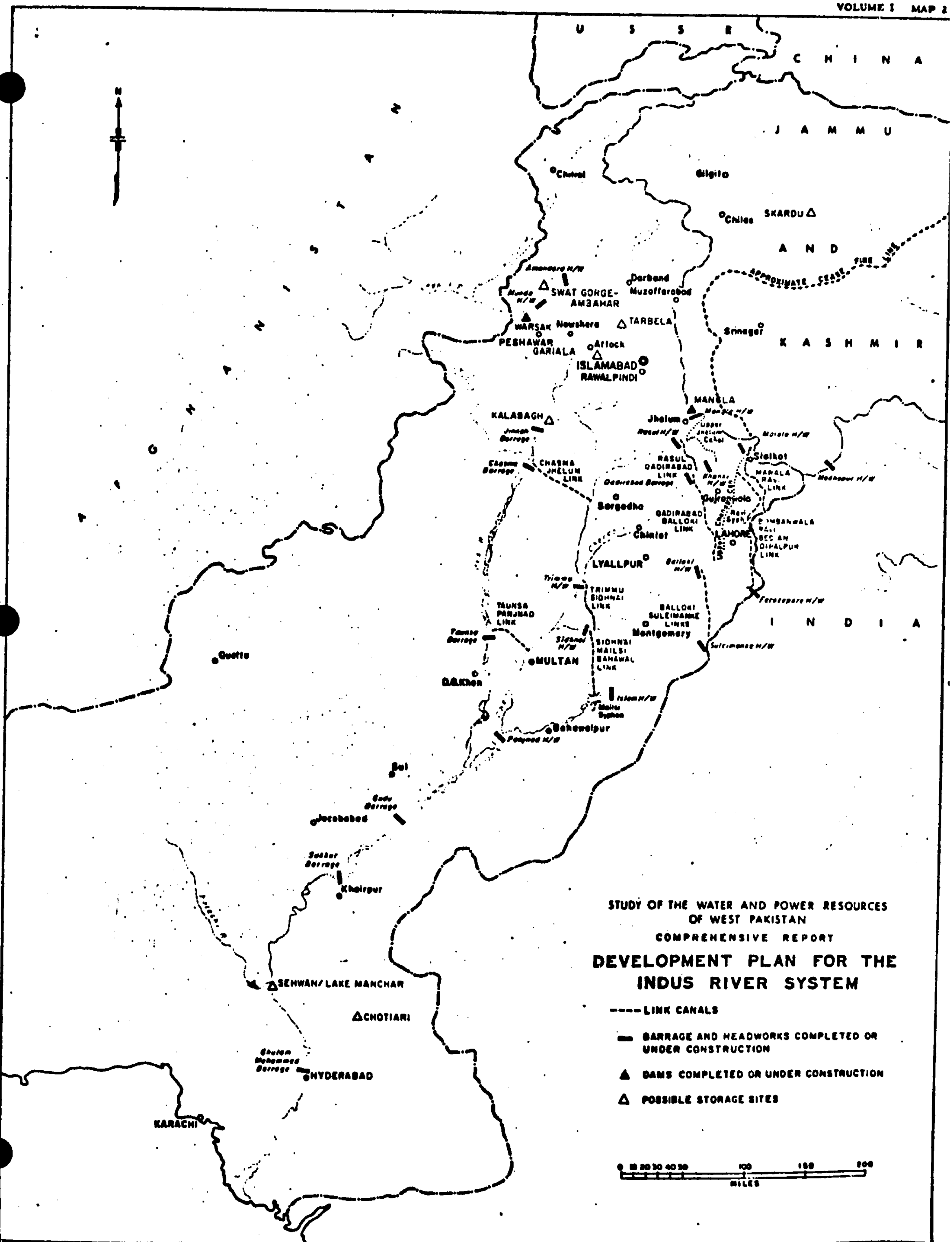

U S S R
C H I N A
J A M M U
A N D
K A S H M I R
I N D I A
APPROXIMATE CEASE FIRE LINE
N
Chitral
Gilgit
Chilas
SKARDU
Darband
Muzafferabad
SWAT GORGE-
AMBAHAR
WARSAK
Nowshera
TARBELA
PESHAWAR
GARIALA
Attock
ISLAMABAD
RAWALPINDI
Srinagar
MANGLA
Jhelum
KALABAGH
Jinnah Barrage
Chasma Barrage
CHASMA JHELUM LINK
RASUL QADIRABAD LINK
Sialkot
Gujranwala
Sargodha
QADIRABAD BALLOKI LINK
Chiniot
LAHORE
LYALLPUR
TRIMMU SIDHNAI LINK
TAUNSA PANJNAD LINK
BALLOKI SULEIMANKE LINK
Montgomery
Taunsa Barrage
SIDHNAI MAILSI BAHAWAL LINK
MULTAN
D.G.Khan
Islam H/W
Bahawalpur
Panjnad H/W
Ferozepore H/W
Sulaimanke H/W
Madhopur H/W
Quetta
Sui
Guddu Barrage
Jacobabad
Sukkur Barrage
Khairpur
SEHWAN/LAKE MANCHAR
CHOTIARI
Ghulam Mohammed Barrage
HYDERABAD
KARACHI
STUDY OF THE WATER AND POWER RESOURCES
OF WEST PAKISTAN
COMPREHENSIVE REPORT
DEVELOPMENT PLAN FOR THE
INDUS RIVER SYSTEM
LINK CANALS
BARRAGE AND HEADWORKS COMPLETED OR UNDER CONSTRUCTION
DAMS COMPLETED OR UNDER CONSTRUCTION
POSSIBLE STORAGE SITES
0 10 20 30 40 50 100 150 200
MILES

Table 11 Comparison of Estimates by Indus Basin Advisory Board, World Bank Consultants, and WAPDA Consultants for the Indus Basin Project, West Pakistan, by Components, in Millions of Dollars[a]

Component	*IBAB (Sept. 1959)*	*Bank Consultants (Feb. 1960)*	*WAPDA Consultants (June 1960)*
Jhelum Dam	326.0	277.0	492.8
Indus Dam	210.0	194.0	374.8
New Links	235.1	202.5	255.2
Barrages	86.9	86.9	96.5
Existing Links	28.0	28.0	28.0
Tubewells and Drainages	50.00	50.0	50.0
Totals	936.0	838.0	1,297.3

a. Source: West Pakistan WAPDA, *Indus Basin Settlement Plan, Report on the Consultants' Cost Estimates*, Part I, Summary (July, 1960), Annexures A, B, C. The report uses "Mangla Dam" instead of "Jhelum Dam" and "Tarbela Dam" instead of "Indus Dam." But although preliminary work at Mangla was begun in the summer of 1959, the site of the Indus Dam was still under discussion. For reasons explained later in the text, the Indus Basin Development Fund Agreement refers only to "Jhelum" and "Indus" dams, and it seems more appropriate to substitute these designations here.

At this, the Bank was upset, feeling that Pakistan was upping the ante at the last moment in the hope of getting the Bank and the "friendly Governments" to go along with it rather than lose the prospect of a treaty. The Bank was particularly incensed at the timing of the consultants' estimates, which were not formally transmitted to it until September 2, 1960! To which WAPDA and the Pakistan delegation replied that even these estimates were still preliminary, and that not enough detailed investigations had yet been carried out on the projects to allow firm determinations of costs. Actually, the consultants' estimates were the first to be based essentially upon local investigations and determinations of costs in Pakistan rather than upon interpolations and assumptions made in London or Washington. They were also the first estimates prepared on the Pakistan side by agents who were more or less immune from the traditional departmental attitude (not unknown in the U.S.A. or U.K.) that once "Government" was committed to a project it would have to follow through, no matter how the cost escalated.

Furthermore, WAPDA and its consultants had now taken the

Table 2

WEST PAKISTAN WAPDA EMPLOYMENT TOTALS
JUNE 30, 1964

	Administration & Coordination Wing	Power Wing	Water Wing Minus IBP	Indus Basin Project Division	Total	Contractors	Expatriates with Consultants	Grand Totals
Engineers	—	615	466	458	1,539	468	250	2,257
Officers (excluding engineers)	91	95	318	160	664	168	82	914
Establishment (office workers)	488	7,444	5,219	2,660	15,811	3,571	2	19,384
Laborers (skilled, unskilled, general utility)	341	24,938	18,337	4,530	48,146	27,220	—	75,366
Grand Totals	920	33,092	24,340	7,808	66,160	31,427	334	97,921

SOURCE: West Pakistan WAPDA, "West Pakistan WAPDA Manpower Employment Statistics as on 30-6-64." P. and I. Publication No. 36, Lahore, December, 1964. Table 1.1.

From C. Birkhead Administrative Problems in Pakistan, Syracuse, 1966

Table 39

Phase I of the Indus Basin Project: Trimmu-Sidhnai-Mailsi-Bahawal Links and Barrages[a]

Project	*Length, Capacity, and Lining (Links Only)*	*Contractor (Nationality)*	*Date Contract Signed*	*Completion Dates*		*Cost (million rupees)*	*Bonus Provision (rupees)*
				Contract Target	*Actual*		
Trimmu-Sidhnai Link	44 miles 11,000 cusecs (unlined)	Kaiser Engineers, Inc. (U.S.A.)	2/13/62	4/14/65	1/15/65	120	10,000/day for up to 180 days
Sidhnai Barrage	710 feet 167,000 cusecs	Société Dumez (France)	3/24/62	3/31/65	1/28/65	119	12,000/day for up to 100 days
Sidhnai-Mailsi Link	62 miles 10,100 cusecs (last 47 miles lined)	Cogefar-Astaldi (Italy)	4/20/62	4/30/65	2/65	200	10,000/day for up to 180 days
Mailsi Siphon-Barrage	1,600 feet 429,000 cusecs	Mailsiphon (Denmark, France, Pakistan)	5/18/62	3/31/65	8/64	108	12,000/day for up to 100 days
Mailsi-Bahawal Link	13 miles 4,000 cusecs (lined)	Mir Aslam Khan Hastam Khan & Sons (Pakistan)	8/30/62	3/31/65	2/65	30	

a. Sources: IBP Publications Nos. 98–101; *WAPDA Miscellany, 1964;* and various issues of *WAPDA Weekly* gazette (all Lahore, WAPDA).

Note: Part of the remodeling of Trimmu headworks (the new link intake) was included in the T-S Link contract, as was realignment of the last 6 miles of the Haveli Canal. Other portions of the Trimmu remodeling were later awarded to two Pakistani contractors at a total cost of 1.17 million rupees. Since it was impracticable to exclude or carry through all the silt in the T-S Link, it was designed with a settling basin just below the intake. Two hydraulic dredges, one for this basin and another for the Qadirabad-Balloki Link (to be used meanwhile in clearing some of the 252 million cubic feet accumulated in the M-R Link) were purchased from the Australian firm of G. H. & J. A. Watson, Ltd., for a total cost of 5.6 million rupees (*WAPDA Weekly*, March 6, 1964).

The tender for the Sidhnai-Mailsi-Bahawal Link was divided into two contracts in order to allow Pakistani firms to bid on the smaller portion south of the Sutlej. The successful bidder, Mir A. Khan H. Khan & Sons, found himself at a disadvantage vis-à-vis foreign firms in that he had to apply for foreign exchange allocations from the State Bank of Pakistan for purchasing materials and equipment and had considerable difficulty in getting them. But, using donkeys, baskets, and a great deal of hand labor, he also managed to complete his portion ahead of time.

Table 4

Comparison of the Major Dams in the Indus Basin (West Pakistan and India)[a]

	Mangla	*Raised Mangla*	*Pong*	*Tabela*	*Bhakra*
Location:	Jhelum River		Beas River	Indus River	Sutlej River
Type:	Rolled earth fill		Rolled earth fill	Earth and rock fill	Concrete, gravity
Height					
above river bed:	380 feet	420 feet	330 feet		620 feet
above foundation:			380 feet	485 feet	740 feet
Length:	11,000 feet	11,000 feet	5,750 feet	9,000 feet	250 feet at base to 1,700 feet at top
Volume:	75 million cubic yards		35 million cubic yards	159 million cubic yards	5.4 million cubic yards
Length of Reservoir:	40 miles		23 miles	50 miles	55 miles
Area of Reservoir:	100 square miles			92 square miles	64 square miles
Volume of Reservoir:	5.75 million acre feet	8.75 million acre feet	6.55 million acre feet	11.1 million acre feet	8 million acre feet
Volume of Live Storage:	4.75 million acre feet	7.75 million acre feet	5.50 million acre feet	9.3 million acre feet	6.3 million acre feet
Hydroelectric Potential:	1 million kw	1 million kw	.36 million kw	2.1 million kw	1.05 million kw
Estimated Cost:	Rs. 2,500 million ($540 million)		Rs. 1,108 million ($243 million)	?	Rs. 824 million ($173 million)

a. Sources: IBP Publication No. 97, *Mangla Dam Project*; various issues of *WAPDA Weekly*; Bureau of Reclamation, United States Department of the Interior, *Beas and Rajasthan Projects*; Public Relations Officer, Bhakra-Nangal Project, *Facts and Figures, Bhakra-Nangal* and *Bhakra-Nangal Project* (Nangal, Punjab, March 1957 and July 1961 respectively).

long and 234 feet high and required 23 million cubic yards of fill. The Jari Dam construction was almost as complicated as that of the main dam since it, too, involved excavation down to bedrock, cementing of weak zones in this rock, inclusion of a rolled clay core to prevent seepage, and provision for raising when the main dam is raised. The Jari Dam even has its own discharge facility to provide water for irrigation along the Jari Nala. The Kakra Dam, 750 feet long and 125 feet high, is merely an eastward extension of the Jari Dam and posed no special problems.

The submergence of 65,100 acres by the Mangla reservoir has displaced over 80,000 persons in Pakistan and Azad Kashmir, including some 9,000 inhabitants of the old town of Mirpur, which will lie under 80 feet of water. Most of these "Mangla affected persons" have been resettled, on fairly generous terms, in the Lyallpur, Sargodha, and Multan districts where they are learning the irrigation agriculture that submergence of their homes is to enhance. On the hills overlooking the reservoir from the south, a New Mirpur town has been built with provision for an eventual population of some 30,000. The total cost of resettlement and the building of New Mirpur is about RS 180 million, or 7 per cent of the total cost of the Mangla project.

In operation, at least until it is raised, the normal maximum level of the Mangla reservoir will be 1,202 feet above sea level or 32 feet below the initial crest of the dam. This 32 feet of "freeboard," combined with the 900,000-cusec capacity of the main spillway and the 212,000-cusec capacity of the emergency spillway (elevation 1,206), are considered sufficient to store or pass a flood of 2.6 million cusecs. (The historic flood of record at Mangla occurred in 1929, the year of the Islam disaster on the Sutlej, and amounted to 1.1 million cusecs.)

The main and emergency spillways are located on the right or western flank of the main dam. The emergency spillway, which will discharge back into the Jhelum via the Bara Kas Nala, is merely a concrete-lined, unregulated open cut in the hills. But the main spillway is a remarkable piece of engineering. Because it must pass up to 900,000 cusecs of flow down a drop of over 500 feet, the energy created by this falling water at maximum discharge will amount to some 40 million horsepower. Most of this must be dissipated before

Project	Capacity, and Lining (Links Only)	Stage of Design, Contracting or Construction	or Lowest Bidder (if bids opened)	Completion Target Date	Cost (million rupees)
New Rasul Barrage	3,209 feet 850,000 cusecs	Contract awarded 1/12/65; under construction	Cogefar-Astaldi (Italy)	3/31/68	140
Rasul-Qadirabad Link	30 miles 19,000 cusecs (unlined)	Contract awarded 12/15/64; under construction	Cogefar-Astaldi (Italy)	3/31/68	118
Qadirabad Barrage	3,510 feet 912,000 cusecs	Contract awarded 11/6/64; under construction	Mailsiphon (Denmark, France, Pakistan)	3/31/68	181
Qadirabad-Balloki Link[b]	83 miles 18,600 cusecs (unlined)	Contract awarded 3/10/64; under construction	Canal Constructors Corporation (Pakistan, U.S.A.)	1967	240
Remodeling Balloki Barrage[c]	(raising the crest and other changes)	Contract awarded 9/16/64; works completed	M. A. Rashid Said Alam Khan (Pakistan) and Remodelling Org. (I.D.-WAPDA)		15.5
Remodeling Balloki-Suleimanke Link I[c]	15 miles 18,500 cusecs (unlined)	Contract awarded 2/1/65; under construction	Machinery Pool Organization (WAPDA)		12.0
Balloki-Suleimanke Link II[c]	39 miles 6,500 cusecs (unlined)	Contract awarded 7/22/65; under construction	M. A. Rashid Said Alam (Pakistan)	3/31/68	67.3
New Marala Barrage[d]		Contract awarded 1/30/65; under construction	Zublin GMBH (West Germany)	12/31/68	183
Remodeling Marala-Ravi Link	63 miles 22,000 cusecs (unlined)	Completed	Remodelling Organization (I.D.-WAPDA)		
Remodeling BRBD Link[e]	102 miles 5,000 cusecs (miles 52 to 75 lined)	Completed	Remodelling Organization (I.D.-WAPDA)		

GROUP B: Projects designed to transfer Indus waters to the lower Jhelum and Chenab

Project	Length, Capacity, and Lining (Links Only)	Stage of Design, Contracting, or Construction	Contractor or Lowest Bidder (if bids opened)	Completion Target Date	Cost (million rupees)
Chasma Barrage[f]	4,200 feet 1 million cusecs	Contract to be awarded in 8/66; work to begin in 10/66		1970	
Chasma-Jhelum Link	63 miles 21,700 cusecs (unlined)	Tenders to be issued in 7/66; contract to be awarded in 11/66		1970	
Taunsa-Panjnad Link	38 miles 12,000 cusecs (unlined)	Contract for excavation awarded 5/30/66; under construction	Messrs. T. P. Link Task Force (Pakistan)	3/31/70	75.4 (for excavation work only)

a. Source: Various issues of *WAPDA Weekly*.

b. The contract includes construction of the LCC Feeder, offtaking the Q-B Link after 18 miles, with a capacity of 4,100 cusecs to permit higher intensities and to provide additional water for reclamation purposes in the LCC command (central Rechna Doab).

c. In 1961, the Remodelling Organization of the Irrigation Department was temporarily transferred ("seconded") to WAPDA for various tasks in the IBP. Before the Remodelling Organization was returned to the I.D. in July of 1965, it had completed remodelling of the Marala-Ravi (M-R) and Bambanwala-Ravi-Dipalpur-Bedian (BRBD) links. The Remodelling Organization had begun work on the Balloki Barrage when, in September 1964, this project was taken over by WAPDA's Links Construction Directorate, which proceeded to contract some of it to M. A. Rashid Said Alam, the same firm that was awarded the contract for the new B-S II Link in July 1965. B-S I is being remodeled by WAPDA'S Machinery Pool Organization to accommodate 18,500 cusecs for the first 15 miles. At this point, B-S II begins and will carry 6,500 cusecs to Suleimanke, while B-S I continues to carry the remaining 12,000 cusecs to the same point.

d. By agreement with the Administrator, WAPDA left the decision as to whether to remodel the existing Marala Barrage or to construct a new one to be decided by the bids. When these were received, it was found that a new barrage could be constructed 1,000 feet downstream more cheaply than the old one could be remodeled. (The same situation prevailed at Rasul. Both the old Marala and Rasul barrages will be demolished.) There is no change in capacity of the M-R Link, which will be tied into the new Marala Barrage.

e. The BRBD Link will continue to function as before, offtaking the UCC below the new Marala headworks. Some remodeling below the Ravi siphon will enable it to deliver 2,700 cusecs to the CBDC and 2,000 cusecs to the Dipalpur Canal, which has also