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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

150p.

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Bilateral Assistance Subcommittee

INDIA - GUJARAT MEDIUM IRRIGATION

AID/EAS-003

UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID/BAS-003

June 12, 1978

MEMORANDUM FOR THE BILATERAL ASSISTANCE SUBCOMMITTEE

SUBJECT: India - Gujarat Medium Irrigation

Attached for your review are recommendations for authorization of a loan to the Government of India (the "Cooperating Country") in an amount not to exceed Thirty Million United States Dollars (\$30,000,000) to help in financing certain foreign exchange and local currency costs of goods and services required for the project.

This loan is scheduled for consideration by the Working Group on Bilateral Assistance on Tuesday, June 20, 1978, at 2:30 p.m., Room 5951 New State.

Working Group on Bilateral Assistance
Office of Policy Development and Program
Review

Attachments:

Summary and Recommendations
Project Analyses
Annexes A - P

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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT IDENTIFICATION DOCUMENT FACESHEET <i>To Be Completed By Originating Office</i>	1. TRANSACTION CODE <input type="checkbox"/> A = Add... <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	PID <hr/> 2. DOCUMENT CODE 1
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3. COUNTRY/ENTITY INDIA	4. DOCUMENT REVISION NUMBER <input type="checkbox"/>
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5. PROJECT NUMBER (7 digits) 386-	6. BUREAU/OFFICE A. Symbol ASIA B. Code 04	7. PROJECT TITLE (maximum 40 characters) GUJARAT MEDIUM IRRIGATION
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8. PROPOSED NEXT DOCUMENT A. <input checked="" type="checkbox"/> 2 = PRP <input type="checkbox"/> 3 = PP B. DATE 03/7/8	10. ESTIMATED COSTS \$5000 or equivalent, \$1 = 8.5 rupees FUNDING SOURCE a. AID Appropriated 30,000
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9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION 3. INITIAL FY 78 5. FINAL FY 78	b. OTHER U.S. 1. _____ 2. _____ c. Host Country 81,000 d. Other Donor(s) 85,000 TOTAL 196,000
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11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$5000)							
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY 78		LIFE OF PROJECT	
		C. Grant	D. Loan	F. Grant	G. Loan	H. Grant	I. Loan
(1) FN	3213		064		30,000		30,000
(2)							
(3)							
(4)							
		TOTAL					

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)

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13. SPECIAL CONCERNS CODES (maximum six codes of four positions each)	14. SECONDARY PURPOSE CODE

15. PROJECT GOAL (maximum 240 characters)

Increase domestic food production; augment small farmer income; expand rural employment opportunities.

16. PROJECT PURPOSE (maximum 480 characters)

Increase irrigated agriculture in the State of Gujarat.

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

Economist and rural sociologist for 1 to 2 months each; possible team to perform an environmental assessment

18. ORIGINATING OFFICE CLEARANCE	19. Date Document Received in AID/W, or for AID/W Documents. Date of Distribution
Signature A.R. Love	Date Signed MM DD YY 11 07 77
Title Director, Office of Project Development	

CURRENCY EQUIVALENTS

US\$1.00 = Rupees (Rs) 8.60 1/

WEIGHTS AND MEASURES (METRIC SYSTEM)

1 meter (m)	=	3.28 feet (ft)
1 kilometer (km)	=	0.62 miles (mi)
1 hectare (ha)	=	2.47 acres (ac)
1 million cubic meters (Mm ³)	=	810 acre-feet (ac-ft)
1 thousand million cubic feet (TMC)	=	28.32 Mm ³
1 cubic foot per second (cusec)	=	0.028 m ³ /s
1 ton	=	1,000 kilograms (kg) 2,205 pounds

1/ Until September 24, 1975, the Rupee was officially valued at a fixed Pound Sterling rate. Since then it has been fixed against a "basket" of currencies. As these currencies are floating, the US Dollar/Rupee exchange rate is subject to change. Conversions in this report have been made at US\$1.00 to Rs 8.60, which represents the projected exchange rate over the disbursement period.

ACRONYMS

AC	-	Appraisal Committee
CDO	-	Central Design Organization
CE	-	Chief Engineer
CWC	-	Central Water Commission
DA	-	Department of Agriculture
EE	-	Executive Engineer
ERI	-	Engineering Research Institute
GAU	-	Gujarat Agricultural University
GOC	-	Government of Gujarat
GOI	-	Government of India
GSFC	-	Gujarat State Fertilizer Corporation
ICB	-	International Competitive Bidding
IIM	-	Indian Institute of Management
IP	-	Irrigation Project
LBC	-	Left Bank Canal
MIP	-	Medium Irrigation Project
PPM	-	Project Preparation and Monitoring Cell
PWD	-	Public Works Department
RBC	-	Right Bank Canal
SE	-	Superintending Engineer
VLW	-	Village Level Worker
WRI	-	Water Resources Investigation Circle
PRC	-	Project Preparation Committee

FISCAL YEAR

Government of Gujarat and Agencies	- April 1 - March 31
ARDC, Cooperatives	- July 1 - June 30
Commercial Banks	- January 1 - December 31

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GUJERAT MEDIUM IRRIGATION PROJECT LOAN

Part I. Project Summary and Recommendations

A. Recommendations

A loan is requested to finance the local costs of the Gujarat Medium Irrigation Project as described below.

1. Borrower: The Government of India (GOI).
2. Implementing Agency: The Irrigation Wing of the State of Gujarat's Public Works Department (PWD).
3. Financing:

a. AID Contribution: Loan \$30 million.

Terms: Repayment of principal and payment of interest within 40 years, including a 10-year grace period of repayment of principal, with interest at two percent (2%) per annum during the grace period and three percent (3%) thereafter.

b. Other Donor Contribution:

World Bank (IDA): \$85 million.

c. Borrower's Contribution: Rupees 860 million or \$100 million equivalent @ Rs. 8.6 = \$1.00.

d. Total Cost: Fx \$115 million; LC \$100 million equivalent. Total = \$215 million.

B. Summary Description

1. Project Duration & Rationale.

The Gujarat Medium Irrigation Project (MIP) is a [five year] (FY78-FY83) irrigation sector support project that will attempt to remove a prime constraint to increased food production in Gujarat--the availability

of a reliable source of water supply. The Gujarat climate is characterized by low and uncertain rainfall which combined with limited irrigation facilities, makes this State extremely susceptible to drought and famines. The last drought years were in 1972/1973 and 1974/1975 when food production fell 50% below normal levels. By increasing the number of irrigated acres through the construction and modernization of surface irrigation sub-projects, the project will also attempt to alleviate the risk of drought and reduce the incidence of famine.

The Government of Gujarat (GOG) official statistics show that only 15% of cultivated land in Gujarat is irrigated. Groundwater resources have been developed to almost 70% potential, higher than any other Indian State. However, groundwater development alone cannot meet food production needs estimated to be at 5.5 million tons a year. Production in a normal year is estimated at 4.5 million tons. To make up for this short-fall, the GOG has planned a long-term surface irrigation program to develop the potential of available water resources.

2. Project Strategy.

The pace of surface water development for all of India remained relatively constant during the last decade or about .5 million hectares a year.^{1/} Indian states

1/ 1 hectare approximately equals 2.5 acres.

under great pressure to start a large number of projects were faced with limited financial resources to carry out an effective irrigation program with the result that there were long construction periods and concomitant delays in benefits. However, in recent years, budgetary allocations have grown rapidly, and Indian states have increased their efforts to complete on-going projects. AID and the World Bank (IDA) have proposed loan financing in support of Gujarat's long-term irrigation program. As such, AID's and IDA's contributions will be in essence buying a five-year time slice of the GOG's over-all program in attempts to accelerate the pace of irrigation development during the next five years.

One of the main features of the project is the delivery of a reliable water supply to or near farm gates by the construction of lined canals to 8 hectare blocks. This feature represents a substantial improvement over the traditional practice of supplying water in 40 hectare blocks to public outlets.

3. Project Components.

The project consists of (a) the construction of new and the execution of on-going MIPs; (b) the modernization or rehabilitation of existing MIPs to bring these to standards established for new MIPs; (c) the establishment of a network of automatic discharging measuring stations (for river gauging)

and, (d) monitoring and evaluation studies.

For this project's purposes, medium irrigation sub-projects are defined as encompassing an area of 2,000 to 30,000 hectares. Major projects are defined as encompassing areas larger than 30,000 hectares. Minor irrigation refers primarily to tube wells and pump sets.

Construction of new MIPs will bring an estimated 80,000 hectares under irrigation during the project period while modernization will improve existing irrigation systems covering 69,000 hectares.

Individual MIPs will encompass cultivatable command areas of 2,000 to 30,000 hectares. In equivalent terms, approximately 13 new MIPs will be constructed, and 20 MIPs will be modernized during the project period. MIPs will be located throughout Gujarat with the greatest concentration being in east Gujarat where rainfall is the highest and surface water development opportunities are the greatest. Approximately one-fourth of the projects will be located in Saurashtra, western Gujarat, where rainfall is the lowest and irrigation development potential is not as great.^{1/}

^{1/} These are approximations, since sub-project sites are not fixed in advance. Individual sub-projects will be put forward by the GOG and will be approved by the Appraisal Committee of the GOI's Central Water Commission over the course of the 5-year program.

The network of river flow measuring stations will be established state-wide and will improve the hydrological data base for planning future medium irrigation projects. This will be partially financed by IDA.

The monitoring and evaluation studies will track project performance and study present on-farm water management practices and their improvement.

Base-line agro-economic surveys will also be conducted for each MIP to provide a rational basis for project planning as well as feedback on project progress.

An important feature of this project is the agreed-upon technical and economic criteria that each proposed MIP must meet prior to approval. The major thrust of the criteria is to provide a more rigorous basis for, and comprehensive approach to MIP design and construction than has been the case till now, with the main objective of maximizing water potential in a technically and economically feasible manner for delivery to farmers on an equitable and sustained basis.

Project Financing.

Total project cost is estimated at US 215 million of which AID will contribute \$30 million (14% of total project costs), IDA \$85 million (40%), and the GOI \$100 million (46%). Both AID and IDA will reimburse the GOI, in amounts proportional to their respective contributions, for the local cost for construction. IDA

will finance the Fx costs of some of the river gauging equipment to be imported. It is anticipated that AID will finance, with the GOI/GOG, a part of the studies dealing with on-farm water management. Funds for this purpose have not been allocated, as details for study design have yet to be worked out with the GOG. The GOI's contribution of \$100 million will finance a portion of construction costs, salaries, river gauging equipment and various project-related studies. Its contribution more than satisfies FAA section 110(a) requirements.

5. Project Purposes.

(1) To increase food production in Gujarat and, (2) to reduce the impact of droughts. Accomplishment of these purposes will contribute to the goals of (1) an increased level and security of small farmer income, (2) expansion of rural employment opportunities, and (3) increased availability of food to the rural and urban poor.

6. End of Project Status.

At the end of five years, the following conditions should have been achieved, indicating that the project purposes have been accomplished:

a. Food Production Increased. In a normal year, food production in Gujarat averages 4.5 million tons compared to estimated requirements of 5.5 million tons. Food

production in areas impacted during the five-year project period is expected to increase state-wide production by about 4%. Expressed in tonnage, a total of approximately 175,000 tons of increased food grain and oil seed (groundnut) will have been realized at the end of five years. Production levels will increase substantially over the long run once the GOG irrigation program is completed.

b. Reduced Variability of Production. Crop production for most of Gujarat is heavily dependent on the annual monsoon rains which are unpredictable in most years. Annual food production thus varies with each year's rainfall. Under these conditions, farmers tend to be risk averters utilizing traditional agricultural practices. However, under irrigated conditions, farmers will take economic risks and will use improved agricultural methods. With the provision of a dependable water supply which also provides a hedge against a late monsoon, production can be both stabilized as well as increased.

7. Project Beneficiaries.

Irrigation sub-projects will benefit small, medium and moderately large farmers in proportion to the size of their holdings. MIPs will benefit a larger portion of small farmers in east or mainland Gujarat (where most of the population is concentrated, space is at a

premium and holdings more fragmented) than in the western or Saurashtra region where historically low rainfall patterns have prevented the support of larger populations. Intensified crop production will increase the demand for rural laborers and also increase their incomes. Dam and irrigation works construction will generate labor demands thus expanding opportunities for off-farm employment throughout the project life and into the future.

8. Project Organization and Implementation.

The direct responsibility for planning, implementation, operation, and maintenance rests with the Irrigation Wing of the GOG's Department of Public Works (PWD). It will prepare for each sub-project a proposal which will include (1) designs of dams and canals; (2) cost estimates; (3) an agricultural plan incorporating agro-economic survey data, and (4) a tentative implementation plan for each sub-project. Each proposal, after GOG clearance, will be submitted to the GOI's Central Water Commission (CWC) for final approval. The CWC is India's highest technical authority for water resources development and has a capable staff of 1,000 engineers. Under a similar project in Orissa (also financed by IDA), the CWC has established an Appraisal Committee (AC) which is staffed with competent agriculturalists, economists, and engineers for its appraisal and monitoring functions

of irrigation projects. For proposed MIPs costing less than \$8 million or encompassing an area less than 12,000 hectares, the AC will have full responsibility for appraisal and monitoring. For projects exceeding these limits, IDA will at least initially retain review/appraisal authority. To date, the AC's performance has been very satisfactory.

C. Project Development & Summary Findings.

The project draws substantially on the World Bank feasibility studies and analyses begun in Summer, 1977. After a resumption of U.S. aid to India, discussions were held with appropriate GOI officials to determine a focus of AID involvement. A similar project for Rajasthan was proposed for U.S. financing. However, since time constraints precluded adequate project development for FY 78 funding, the GOG/GOI recommended AID involvement in Gujarat. Accordingly a PID was prepared and reviewed in November 1977. Subsequent to the review, Messrs. T. Dobbs and D. Peterson of AID/W conducted further studies in January/February 1978 on feasibility issues (discussed below) arising out of the PID review. (see Annex A for the PID cable to USAID/Delhi).

As a whole, the World Bank and the Dobbs/Peterson report indicate that the project is technically, socially, and economically sound. The CWC's Appraisal Committee has gained valuable experience with other such projects and has the technical and managerial ability for carrying

out its appraisal functions. The GOG's own irrigation services have acquired adequate experience for undertaking the number of projects envisioned. The criteria established for proposed MIPs will further improve performance. Local contractor capability is also satisfactory and will be able to meet design specifications and standards.

The project satisfies all statutory criteria. The Mission has endorsed the proposed loan and has certified (Annex B) that the host country is capable of maintaining and effectively using the project.

D. Project Issues:

1. Will Individual projects be self-sustaining?

Discussion: Irrigation projects in Gujarat, not unlike those in the U.S., have been characterized by a low rate of financial return. Gross revenues from water charges have not been sufficient to cover project working expenses over time. "Betterment levies" have been established for lands affected by irrigation projects in Gujarat in attempts to recoup part of projects' capital costs. However, the levies have seldom been collected from farmers. These problems have been further compounded by the application of a uniform water rate (based upon crop season) which only crudely approximates volumes of water used. Depending on location, farmers at the head reaches of the localized water supply (water courses)

have access to greater and more reliable amounts than those at the tail-end. This differential effect is in part related to excessive water losses along canal courses as a result of poorly, farmer-constructed water courses. Under this project, lined canals will be brought to a 8 hectare public outlet as opposed to the traditional 40 hectare policy. This approach will substantially reduce water losses and ensure a more reliable water supply to farmers. The resultant income gains to be made from increased irrigation production and corresponding increases of land values will justify higher water charges. Increased production from MIPs will also provide increased revenues to the public treasury through the agricultural sales tax. In this regard, the GOG's efforts have been good with revenues increasing at about 10% per year.

2. Will the project benefit small farmers both in terms of absolute numbers and in terms of relative impact on social and economic status vis-a-vis larger farmers?

Discussion: This issue to some extent has been discussed under the "Beneficiary" section on page 7.

In terms of absolute numbers of small farmers to be benefitted, it is not possible to say exactly how many will benefit, in light of the procedures established for project

selection. As also discussed earlier, Gujarat's MIPs will generally benefit a larger proportion of small farmers in the east compared to small farmers in the west or Saurashtra. Holdings in the east average 2 to 3 hectares (5-8 acres) in size in contrast to the western average of 6-8 hectares (15-20 acres). Approximately three-fourths of the MIPs will be constructed in the east, thus a greater proportion of small farmers there will benefit. However, if land ceilings on existing as well as newly irrigated lands are enforced relatively large land holders in the west will be prevented from capturing a majority of the benefits.

On the whole, Gujarat's MIPs will not increase the concentration of holdings. Irrigation will make small farms more viable and thus avoid the type of mortgaged indebtedness which can lead to loss of lands by small holders to large farmer-cum-moneylenders.

E. AID'S INVOLVEMENT

The project was originally conceived for a total cost of \$170 million, an amount shared equally by the GOI and IDA. As a result of AID's contribution (\$30 million) in collaboration with IDA, the GOI has increased its original contribution by \$15 million. This additional \$45 million has made possible a larger overall project impact (by approximately 26%) than was originally envisioned. Pursuant to the Development Coordinating Committee's decision on December 21, 1977 (see Annex M), AID's contribution, like much of IDA's, will finance the local costs incurred under the project.

PART II. DETAILED PROJECT DESCRIPTION

A. Overview of Gujarat

Gujarat State covers an area of about 19.6 million hectares and has a population of 30.7 million (1977) that is increasing at the rate of 2.6% per year, one of the highest in India. About a third of the total population live in towns and cities and next to Maharashtra and Tamil Nadu, Gujarat is the third most urbanized state.

Approximately 25% of the population belong to Gujarat's traditionally disadvantaged groups: tribes (18%) and castes (7%). In income terms, the rural areas of Gujarat are characterized by a relatively equal distribution of income, though there are regional variations. Some 40% of the rural population have incomes below the poverty line of U.S. \$70 as defined by India. The eastern and southern parts of the State have about two-thirds of the population below this level, while the proportion in the western areas are about a third. Since the more arid, lower rainfall western parts have historically been unable to support larger populations, land holdings in these areas tend to be higher than the State average.

The average farm size in Gujarat is 4.1 hectares or 10 acres, but vary from district to district (See Annex C) with distribution largely determined by agro-climatic conditions. Mainland or east Gujarat has an average farm size of 3.1 hectares compared to 6.8 hectares in the Saurashtra on western region. Tenancy legislation has been strictly enforced in Gujarat, and according to the 1970 Agricultural Census, 97% of all holdings were fully owned. With regard to existing irrigated lands, and lands to come under irrigation, land ceilings are in force and are applied according to soil type and reliability of irrigation water; ceilings range from 4.1 hectares to 10.9 hectares for irrigated lands and 8.1 hectares to 21.9 hectares per family for lands unirrigated.

Agriculture has a dominant influence on the State's economy contributing about 40% of State income and employing about 65% of the labor force. The labor force is made up of 31% of the population or about 9.5 million people. Agricultural conditions and cropping patterns vary widely among Gujarat's three main geographic regions: mainland Gujarat, the Saurashtra peninsula and Kutch (see Map annex D). Generally, the more fertile soils are found within the Gujarat mainland characterized by deep black soils and some sandy loam. In the western and coastal areas, soils are less fertile. Most of the rainfall occurs in the June-September monsoon period, is uncertain, and varies in amounts and intensity from region to region. Most of the rains fall in mainland or east Gujarat (80") and considerably less in the west (12"). Because of the low, and also uncertain rainfall, cropping intensity is one of the lowest in India (107%). There are three cropping seasons: Kharif (June-October); Rabi (November-February); and hot weather (March-May). Most of the cropping is done during the monsoon-fed kharif season. The main crops are pearl millet (the most important foodgrain); sorghum (for fodder use); wheat; irrigated paddy; maize and groundnuts.

Agricultural Extension is the responsibility of the Department of Agriculture. However, the Village Level Worker (VLW), the prime contact with farmers is employed by the Department of Community Development and has more than just agricultural duties. Because of this dual command structure and the lack of an agricultural focus on the part of the VLW, the extension service has largely been rendered ineffective. The GOG is aware of these shortcomings and will attempt to remedy them through structural reorganization and the training and visitation approach to extension. The GOG proposes to make these changes through the assistance of the World Bank which is financing similar projects in other Indian States. For such assistance, a covenant will be included in the loan agreement.

B. Project Rationale

Approximately 15% of Gujarat's cultivable lands are irrigated, less than two-thirds of the national average. However, much of the ground-water resources (70% of potential) have been developed, and further development is limited in scope. For these reasons, the GOG has placed a high priority on surface irrigation development. Greater emphasis over the next five years will be given to medium-scale rather than major projects mainly because surface water resources limit the numbers of major projects. Only two (Narmada and Tapi) of Gujarat's rivers provide year-round flow. About 90% of the total flow for all other rivers, occur during the monsoon when the need for irrigation is the lowest. Moreover, the topography (especially in Saurashtra and Kutch) is not conducive to large dams, and large damsites are costly to construct.

Technical analyses show that the development of irrigation schemes have a direct impact on increased production which in turn can lead to higher income levels. With the introduction of irrigation, farmers will take the economic risks inherent in production increasing agricultural technologies rather than continuing traditional cultivation practices. Intensive cultivation made possible by irrigation will increase the demands for agricultural labor and for longer periods of time thereby providing higher incomes and sustained employment. For non-farm employment, expanded opportunities will be generated from the construction of dams and canals.

Together with the emphasis on medium projects will be vigorous attempts to maximize the impact of MIPs. Projects constructed in the past in Gujarat have not had a satisfactory record. Their economic returns generally have been lower than the Indian average and are attributable to the following shortcomings: (1) insufficient hydrological data base which has led to either over-design or under-design of dams for actual water available; (2) low estimates of water losses in the canal system resulting in less-than-planned-for irrigated areas; (3) water conveyance systems built to a limit of large 40 hectare public outlets conducive to excessive

water losses and inefficiencies. (Farmers lacking the technical expertise to construct their own canals (to a 4.1 hectare average farm) have built their own systems that promote rather than reduce water losses); and (4) farmers poorly trained in irrigated crop management leading to wasteful water use.

An essential feature of the proposed project's design will be to correct past deficiencies by applying strict criteria to project development and approval. These criteria (discussed in the Technical Section Part III) have been agreed to by the GOG and is included as a covenant under this loan. The criteria are intended to assure that each new MIP has a dam capacity correlated to actual water flows and canals that are lined to the 8 hectare level.

C. The Logical Framework (for Logframe Matrix, See Annex G)

1. Program or Sector Goal

The goals of the proposed loan are to: (1) increase the level and security of small farmer income; (2) expand rural employment opportunities; and (3) increase the availability of food to the rural and urban poor. This project aims to contribute to goal attainment by focusing on increased food production through the expansion of irrigated agriculture. This will also provide a measure of relief against the risks of drought, primarily because of the enhanced ability to provide more food.

Indicators of goal achievement are demonstrated increases in incomes of about five to six times over current levels; increased farm and non-farm employment opportunities (estimated at 13,000 and 15,000 jobs respectively); and increased foodgrains and oil seed use in Gujarat and other Indian States. Farm and rural area baseline and follow-on surveys done as part of the evaluation plan will verify goal achievement. Baseline or agro-economic surveys for each MIP will serve as reference points for measuring progress towards goals. Government statistics (indirect measures) for food consumption and prices and for employment will also be available.

a. Assumptions Governing Goal Attainment:

(i) The GOG/GOI continue to maintain agricultural price policies that are favorable to small farmers. There is support for this assumption in that the host government has on the whole promulgated policies that are favorable to input/output price relationships. A notable exception was in 1975/1976 when fertilizer prices were raised substantially. Prices since then have remained at stable levels.

(ii) Changed production practices are labor demanding rather than labor displacing. In the short run, intensified crop production made possible by MIPs will increase incomes. For example, unirrigated cotton requires only about 40 person days of labor per acre in contrast to 140 days of labor per irrigated acre. However, in the long run, labor gains may be partially mitigated by some farmer investments in mechanized agriculture to avoid labor management problems or by shifts to fruit crops which demand relatively less labor.

(iii) Construction activities of MIPs do not shift significantly to capital intensive methods. In India construction activities traditionally have been high demanders of labor that is available in abundant supply. Damsites and canal construction for a majority of the projects will continue to utilize labor intensive inputs. However, a possible consequence of an accelerated program over the next five years will be some contractor shift to capital intensive methods in order to complete MIPs on schedule. Major shifts are not expected since labor costs relative to capital are still very favorable.

(iv) Present land ceilings are maintained. There is support for this assumption in that the GOG has legislated limits of land ownership per family. As mentioned earlier, ceilings range from 4.1 to 10.9 hectares for irrigated lands depending on soil conditions and also family size. There is no indication that these ceilings will be lifted causing in the process a squeezing out of small holders through land speculation. Present ownership patterns have largely been stabilized through 30 years of land reform in Gujarat and this project is not likely to affect significantly these patterns.

(v) New processing facilities to handle increased production are located in rural areas. There is support for this assumption as evidenced by strong GOG efforts to locate agro-industries (sugar cane processing as a prime example) in predominantly rural areas.

(VI) Market and storage network remains adequate for increased production. Gujarat's marketing and storage network is well developed with markets serving areas within a 6 mile radius. Over time, the marketing and storage services have responded quickly to increased output of both food grains and cash crops.

2. Project Purposes: (1) To increase food production in Gujarat and (2) decrease the risk of drought. Largely due to favorable weather, agricultural production in Gujarat peaked in 1970/1971 and has not

been equalled since. Poor rainfall was a major contributing factor to a decline in production. The introduction of irrigation alone will not only measurably increase agricultural production but will also carry some irrigation water over for pre-planting

irrigation in the kharif season. Yearly reservoir supply will still depend on rain fall.

a. End of Project Status (EOPs). At the end of the five year period. it is expected that food and oil seed production in areas impacted by the project will increase by about 175,000 tons or roughly 400 percent over current levels of production. Gujarat crop statistics and farm surveys done as a part of the evaluation process will be used to verify EOPs.

b. Linkage of Purpose to Goals. The linkage between purpose achievement and goal attainment are dependent on several assumptions discussed below:

(i) Credit available at reasonable rates. Most institutional credit is available to all farmers at varying interest rates ranging from 11% to 13%.

(ii) Technological inputs remain accessible and at reasonable rates. Gujarat has a well developed system for distribution and sales of seeds, fertilizers, and pesticides. Generally, inputs are easily available and at reasonable prices.

(iii) Agricultural extension system strengthened through a separate World Bank loan. The World Bank completed its final appraisal of this loan in March 1978 and expects GOG agreement to be concluded shortly after the signing of the Gujarat MIP loan. Through proposed organizational changes in the extension service, and better training for village level workers (VLWs), the present performance of the extension service should significantly improve.

(iv) Agriculture and Irrigation Departments coordinate activities well. Extension personnel with

specialized training are located at district and sub-district levels and will be available to supplement and support the activities of the VLWs.

(v) Reservoir releases managed to minimize the kharif planting risks. Under the project, controls will be applied to limit water use during the pre-kharif hot season. In addition, the World Bank is developing a computerized technique for water scheduling. This will minimize the delays between farmer application for water and its actual release during the planting season.

(vi) Government food price and storage policies cause increased production to reduce drought related famine risks. There is support for this assumption, as most of Gujarat's markets are regulated under the control of marketing committees. Licensed traders operating within these markets pay the same farm-gate prices of the regulated market. Prices are favorable to farmers.

(vii) Price relationships encourage farmers to plant additional acreage for food production. With the provision of irrigation combined with the use of high yielding varieties of food grains (pearl millet and wheat), farmers will be induced to plant additional acreage for food production. Fertilizer prices have stabilized since 1975/1976 and remain favorable for farmer use. Cotton, grown state-wide as an irrigated and rainfed crop in favorable soil conditions, accounts for about one-sixth of the cropped area. Though there will be some project impact on increased production, the price of cotton relative to food grains will not cause major shifts away from food production.

3. Outputs:

(1) Increased acreage under irrigation in the State of Gujarat. The irrigation program for MIPs consists of the construction of new MIPs and the modernization or rehabilitation of existing MIPs. New MIPs will be composed of (i) an earthfill storage dam with a gated spillway; (ii) a fully lined canal network which would deliver water through outlets serving 8 hectare blocks; and (iii) a drainage network connected to major natural drains. The cost per hectare is estimated at Rs. 15,000 or \$1,740.^{1/} Modernization of MIPs would be composed of (i) canal extension

^{1/} US\$1=Rs. 8.60 representing the projected exchange rate over the disbursement period. Estimated per unit cost under new construction strategy in Gujarat regardless of source or timing of funding.

to outlets serving 8 hectare blocks; (ii) lining of the entire canal system; (iii) additional control structures to enable a better regulation of water delivery; and (iv) local drainage works. The cost for the improvements is estimated at Rs. 4,000 per hectare or \$465.

During the five year period, it is estimated that approximately 13 new MIPs covering 80,000 hectares (200,000 acres) will be constructed, and 20 MIPs will be modernized, covering approximately 69,000 hectares (173,000 acres).

- (2) Network of Automatic discharging measuring stations. Establishment of this network will improve the hydrological data base for planning future medium irrigation projects. GOI and World Bank financed stream gauging and river flow equipment will be procured for this purpose. Additionally, World Bank financed short-term outside consultant service will assist the GOG irrigation technicians.
- (3) Intermediate Outputs. An integral component of MIP planning and development will be development of an Agricultural Plan along with each proposal for new and modernized MIPs. The Plans will consist primarily of baseline, agro-economic studies which will assist in sub-project planning and collectively will provide reference points for monitoring and evaluating overall project progress. Surveys will be conducted by the Sardar Patel University in Gujarat and will include data on such factors as: (i) employment (farm and non-farm) and income; (ii) land use, ownership, and farm size distribution (iii) existing cropping patterns under rainfed and irrigated conditions; (iv) demographic and social characteristics; (v) agricultural production and marketable surplus; (vi) marketing channels and prices; (vii) use of agricultural inputs and (viii) agricultural supporting services (extension, research, storage facilities, etc.).

The PWD's (Irrigation Wing) records, reviews of baseline agro-economic surveys and agricultural plans for each MIP, and statistics for irrigated acreage by district will be available for verifying achievement of outputs.

a. Linkage of Outputs to Purpose:

Assumptions governing output achievement are:

- (i) GOG engineering and contract management capability adequate. Adequate capability developed on previous irrigation sub-projects exists and will be enhanced on future projects.
- (ii) Adequate numbers of feasible projects can be identified. World Bank discussions with GOG officials reflect that a sufficient number of feasible projects can be identified for development.
- (iii) Private contracting capability is adequate. Private contracting capability exists in Gujarat.

4. Inputs:

(See also Financial Analysis, Part III C). The joint GOI/GOG, World Bank and A.I.D. contributions will on a proportional basis finance the local costs of construction; equipment, vehicles and short-term consultant services for establishing the river gauging network (excluding A.I.D.); and the monitoring and evaluation studies. On a proportional basis of contributions to total project costs - GOI/GOG (46%), World Bank/IDA (40%), and A.I.D. (14%) - a summary breakdown of allocation is:

	(\$000)			
	<u>AID</u>	<u>GOI/GOG</u>	<u>IDA</u>	<u>TOTAL</u>
1. Construction of new MIPs	24,000	81,000	67,000	172,000
2. Modernization of MIPs	6,000	18,000	16,000	40,000
3. River Gauging Network	-	500	500	1,000
4. Monitoring and Evaluation Studies		500	-	500
5. Unallocated			<u>1,500</u>	<u>1,500</u>
Total	30,000	100,000	85,000	215,000

The above figures include contingency and inflation estimated at 25%.

Flexibility between line items will be allowed including the allocation of funds for monitoring and evaluation, if necessary.

Linkage of Inputs to Outputs. Funds provided by this joint effort should be sufficient to achieve the stated outputs.

PART III. PROJECT ANALYSES

A. TECHNICAL ANALYSIS

1. AGRICULTURAL SECTOR

Due to Gujarat's low rainfall and limited irrigation facilities, crop yields are relatively low but as a result of improved farming practices, they have increased faster in Gujarat than in most other parts of India.

The potential for further increases in agricultural production is limited by a number of factors discussed below:

- Climate;
- Topography and soils;
- Present land use and the possibility of expanding the cropping area; and
- Agricultural supporting services.

a. Climate

Gujarat has a tropical monsoon climate with temperatures that are suitable for year-round cropping. Daily minimum and maximum temperatures range from 55° F - 80° F in January to 80° F - 106° F in May. Annual rainfall ranges from less than 12" in the Northwest to over 80" in a small area in the Southeast, with most parts of the State receiving 20-32" (Map Annex D).

The low and uncertain rainfall, combined with limited irrigation facilities and potential makes Gujarat extremely susceptible to droughts and famines. The latest drought years were in 1972/73 and 1974/75 when foodgrain production fell 50% below its normal level. Especially hard hit were rice and groundnut growers who, on the average, lost two-thirds and three-quarters of their crop, respectively. In large parts of the State, there was complete crop

failure which led to widespread starvation in spite of sizeable famine relief expenditures (about US \$100 M following each of the two droughts). Although these droughts were more severe than any others during the last two decades, famine in Gujarat is the rule rather than the exception: since 1900 the State has experienced famine not less than 25 times.

b. Topography and Soils

The State divides naturally into three geographical units: the Gujarat mainland, the Saurashtra peninsula, and Kutch. Mainland Gujarat comprises extensive alluvial plains flanked by hilly terrain in the east. The mainland is traversed by the State's four major rivers (Tapi, Narmada, Mahi and Sabarmah) and numerous small streams. Due to the low gradient, natural drainage is inadequate causing water-logging and salinity. Deep black soils are found in the southern and central parts of the mainland. Soils of the northern mainland range from sandy alluvium in the hilly areas along the Rajasthan border to sandy loam at lower elevations.

The central part of the Saurashtra peninsula is elevated, and the land slopes very gently towards the coast and the plains of the Gujarat mainland. Most of the rivers originate in this central table land and run radially into the sea. The central portion of the peninsula is characterized by low hills of coarse and shallow residual soils, underlain by porous disintegrated rock, alternatively with deeper clay loam or clay alluvial basins. Along the Gulf of Cambay and the Arabian Sea, coastal alluvium predominates while the soils along the Gulf of Kutch are sandy alluvium. In the coastal areas, the water table is shallow and some localized areas of salinity and high boron content occur. In recent years, over exploitation of groundwater along the coast has resulted in an increasing problem of salt water intrusion in this area.

The Kutch land mass is crescent shaped, sloping towards the Great Rann (desert) in the north and the Little Rann and the Bay of Kutch to the south. The soils are generally derived from sandstones and limestones and are coarse in texture with satisfactory internal drainage. Large areas are affected by salinity and Great and the

Little Rann of Kutch are, without reclamation, unsuitable for agricultural production.

c. Land Use

About 9.8 M ha (52% of the reporting area 1/ in the State) is under cultivation. The forest area is only 1.6 M ha (8%) and cannot be reduced further without disturbing the ecological balance. About 3.8 M ha (20%) are either barren, uncultivable or put to non-agricultural uses. Officially, cultivable waste land accounts for 2.2 M ha (12%), but most of this land is located in Kutch and has—without irrigation—extremely low production potential. 2/ The remaining 1.4 M ha (8%) are either fallow or used as permanent pastures and grazing land. Thus, in practice, there is little scope for increasing the net cultivated area except through reclamation of desert, saline and ravine areas.

The cropping intensity (107%) is one of the lowest in India; however, this figure gives a somewhat misleading picture of the intensity of land use, since almost one fifth of the area is cultivated with two seasonal or perennial crops. Given the low rainfall, the intensity of cultivation cannot be significantly increased without irrigation. Further increases in agricultural income are primarily dependent on continued yield increases in rainfed areas, expansion of irrigation, and shifts in the cropping pattern to higher value crops.

d. Crops and Cropping Patterns

There are three cropping seasons in Gujarat: kharif (June - October), rabi (November - February), and hot weather (March - May). Most of the cropping is done

1/ Land use is reported for an area of 18.8 M ha while the official estimate of the State's area is 19.6 M ha. Water bodies account for a part of the difference between the two estimates, but the difference is mainly due to incomplete coverage of the land use surveys.

2/ Before 1970, about 1.4 M ha of cultivable waste land in Kutch was classified as uncultivable.

during kharif utilizing the monsoon rainfall. In rabi, crops are grown on residual soil moisture or with irrigation. Except in limited areas with perennial irrigation no cultivation is done during the hot weather season.

Cereals--primarily pearl millet (1.7 M ha), sorghum (1.1 M ha), wheat (0.7 M ha), (0.5 M ha) and maize (0.3 M ha) --and pulses (0.4 M ha) account for less than half the cropped area. As a result, Gujarat is seriously deficient in foodgrains; in a normal year production is about 4.5 M tons compared to estimated requirements 1/ of 5.5 tons.

Pearl Millet is the most important foodgrain, accounting for 30-35% of total production. It is grown as a rainfed kharif crop throughout the State, even though it is of lesser importance in the southern part. Since Independence, yields have increased at an annual rate of 5.4% as a result of successful research. Hybrid varieties were introduced in the mid-1960s and, at present, two-thirds of the area is covered by these varieties. However, since only 9% of the crop is irrigated, the average yield remains relatively low (0.8 tons/ha).

Sorghum is grown as a food and fodder crop throughout the State. The kharif crop is, almost without exception, rainfed and the rabi crop is mostly grown on residual soil moisture. Short season hybrid varieties are available, but because of their relatively poor fodder value, they are rarely used. Grain yields are extremely poor (0.4 tons ha).

Wheat is the most popular rabi crop. High yielding varieties were introduced in 1967 and production has increased rapidly (8% p.a.). About two thirds of this increase was due to improved yields and one-third due to expansion of the wheat area.

Irrigated wheat, which is grown throughout the State, yields about 2.2 tons/ha compared to 0.7 tons/ha for the unirrigated crop.

1/ Assuming: (i) a per capita requirement of 16 oz. (0.454 kg) per day; and (ii) seed requirements and storage and transport losses amounting to 10% of production.

Irrigated paddy (accounting for one-third of the area) is usually transplanted and gives an average yield of about 2.0 tons/ha. The rainfed paddy, with a yield of about 1.2 tons/ha, is usually drilled. High yielding varieties are primarily grown under irrigation. Wheat and coarse grains are the staple food of the Gujarates. Since paddy requires much more water than upland crops, paddy cultivation is concentrated in the southern part of the State, where soils and climate are favorable.

Maize is grown in the eastern hill areas where it forms an important component of the tribal diet. Like other kharif foodgrains, it is rarely irrigated. However, hybrid varieties are gaining popularity and now account for one-fifth of the area. The average rainfed yield (1.1 tons/ha) is higher for maize than for any other foodgrains in the State.

Groundnuts are primarily grown in Saurashtra under rainfed conditions. The yield is highly influenced by the rainfall; in the drought year of 1972/73, the average yield was only 0.20 tons/ha while it reached 1.24 tons/ha three years later. The crop is also affected by a number of diseases. This makes groundnuts an extremely risky crop, and it has slowly lost ground since the early 1960s.

e. Agricultural Supporting Services

Agricultural Research. Since 1973, Gujarat Agricultural University (GAU) has been responsible for agricultural research. Its four campuses--Anand, Dabtiwasa, Junagdh and Navsari-- are located in different agro-climate zones. The University has seven main research stations, specializing in different crops and about 50 regional stations. In general, Gujarat's plant breeding programs have been highly successful. In particular, the research station at Jamnagar has achieved impressive results in the development of hybrid pearl millet. Largely due to this research, the all-India yields of pearl millet have increased faster than those of any other kharif crop. Significant contributions have also been made in the development of long staple hybrid cotton. Research on dry land farming technology and water management has not achieved the same level of success as the plant breeding programs.

Research on irrigated agriculture is carried out on 15 trial-cum-demonstration farms. The main focus of this research has been to determine water requirements in

relation to soil types, climate and critical stages of crop growth. So far, relatively little attention has been given to irrigation practices and land development for irrigation. Results are mixed, as farmers do not readily accept demonstrations under such controlled conditions which they regard as not adaptable to their own farm. At the same time, many of these farms do not have adequate staff and equipment to properly fulfill their research function.

Agricultural Extension Services. Technically, agricultural extension is the responsibility of the Department of Agriculture (DA); however, the primary contact with the farmers--the multipurpose Village Level Worker (VLW)--belongs to the Department of Community Development. He works under the administrative control of the Taluka Development Officer and under the general guidance of the Taluka Panchayat (an elected body). On technical matters, there is a direct line of communication over the Agricultural Extension Officer (at Taluka Level) and the District Agricultural Officer to DA. This dual line of command, in combination with the VLW's multi-faceted tasks and low mobility, has rendered the general extension system relatively ineffective. To overcome these problems, DA has also organized a number of special schemes for various crops.

In recent years, the awareness of the disadvantages of the present set-up has increased and GOG now plans to reorganize the extension service in accordance with the "training and visit" system that has been successfully implemented in other states under a number of IDA financed projects. A proposal for such a reorganization has recently been submitted to IDA and the scheme is scheduled for final appraisal in March 1978, as part of a multi-state project. The basic elements of the proposal are to:

- (i) Transfer the VLWs to DA;
- (ii) Strengthen applied agricultural research and establish a better link between research and extension; and
- (iii) Increase staff mobility at all levels.

Under the scheme, the VLW would work only on extension, covering 500 to 800 families, through a system of visiting groups of 80-100 farmers on a regular basis every two weeks.

Agricultural Inputs. There is a well developed system for distribution and sale of seeds, fertilizers and pesticides throughout the State. Certified seeds are produced both by the District Panchayats, under the guidance of the DA, and by the State Cooperative Marketing Federation. They are distributed primarily through the cooperative marketing societies. Gujarat is more than self-sufficient in the production of nitrogenous and phosphatic fertilizers.

GSFC*, a joint venture between the GOG and the private sector is India's second largest manufacturer. Fertilizers and pesticides are distributed through both cooperative marketing societies and approved private retailers. There are about 6,000 distributors, of which 5,000 are cooperatives, and inputs are usually available within easy reach of the farmers.

Farm Mechanization. There are now an estimated 12,000 tractors in Gujarat or 1.2 tractors per 1,000 ha, which is below the national average. Most of the tractors are owned by individual farmers but group ownership is not uncommon. The Agro-Industries Corporation has recently established a net-work of "Agro-Service Centers" which provide repair facilities for tractors and implements and customs hiring services (at a rate of Rs 30 per hour for a 50 hp tractor). They also provide training facilities for mechanics and drivers. The private sector, however, handles most of the sales and repairs of tractors and implements.

Marketing and Processing.

Gujarat has a well developed system for agricultural marketing and processing. Most of the trade is through regulated markets that serve a specified area, usually within a 10 km (6 mile) radius. The 280 regulated markets are under the control of Agricultural Produce Marketing Committees. Some 30 markets have not yet been regulated, mainly due to the resistance from vested interests. Licensed traders are allowed to operate inside the service areas of the regulated markets. Normally, these traders pay the same price--at farm gate--as the farmers would get at the regulated market. About three-quarters of the storage and processing facilities are owned by the private

*Gujarat State Fertilizer Corporation.

sector with the remainder provided by the public and cooperative sectors. In general, the present system for marketing and processing, which is highly competitive, has responded quickly to increased output of both foodgrains and cash crops.

Agricultural Credit. The organization for institutional credit to farmers follows the normal pattern in India. The cooperative banks, which provide short (up to one year) and medium-term (one to five years) credit at an interest rate of about 13% are organized on a three tier basis with the Gujarat State Cooperative Bank at the State level, 18 central cooperative banks at the district level and 8,700 primary cooperative credit societies at the village level. The cooperative movement has always been strong in Gujarat, about 80% of the farmers are members. The State Cooperative Land Development Banks (SLDB) with about one million members, has 182 branches. It provides long-term (up to 15 years) loans at an interest rate of about 11%. Commercial Banks, which provide all three types of credit, have, since 1969, rapidly expanded their lending for agricultural purposes, and they now account for about 15% of all loans to farmers. Private money lenders play only a limited role.

f. Agricultural Production Trends

The early years after independence were characterized by a rapid acreage expansion; between 1950/51, the cropped area increased from 8.5 M ha to 9.5 M ha. In the period up to the mid-1960s, the cropped area expanded much more slowly (by 0.6 M ha). However, there were significant changes in the cropping pattern. The groundnut area more than doubled to somewhat over 2.0 M ha. This expansion took place largely at the expense of the area under foodgrains (especially millets). Combined with the expansion of the cultivated area and the shift towards high value cash crops was a general yield increase. As a result, between 1952/53 and 1964/65, agricultural production grew faster in Gujarat than in any other State.

Two factors changed the agricultural scene in the mid-1960s: (i) the potential for an expansion of the net cultivated area had largely been exhausted; and (ii) high yielding varieties for a number of foodgrains were introduced on a large scale. Due to the competition

between groundnuts and kharif foodgrains, the increased yield potential of especially pearl millet meant that the area under this crop expanded, largely at the expense of groundnuts. However, most spectacular was the doubling of wheat production between 1965/66 and 1975/76. About two-thirds of this increase was due to yield increases and one-third due to expansion of the area under wheat. However, much of the transformation that was associated with the "green revolution" took place between 1965/66 and 1970/71.

Largely because of favorable weather, agriculture reached a peak in 1970/71 and this level has not been achieved since. In recent years, many of the "progress indicators" have been disturbing: fertilizer consumption has remained relatively unchanged; the use of hybrid varieties of several crops has declined or remained constant, and the area irrigated from groundwater has grown very slowly compared to the rapid expansion in the 1970s. There are a number of explanations for this mixed performance: (i) the weather--1972/73 and 1974/75 were extreme drought years and 1973/74 had less than normal rainfall; (ii) increased costs of fuel affected the profitability of well irrigation; (iii) fertilizer prices were drastically raised in 1975/76; and (iv) rapid changes in output prices -- foodgrain prices boomed during 1973 and 1974 and fell during 1975 and 1976 while groundnut prices also declined in 1975 but increased rapidly in 1976. The combination of changing absolute prices and changing relative prices made crop planning extremely difficult for the farmers. The perceived risks of droughts and falling prices reduced the incentive for private farm investments as well as for use of fertilizers and high yielding varieties.

Even though the stagnation of recent years largely can be explained by a combination of unfavorable exogenous factors, there are reasons to assume that the easy benefits of the "green revolution" have already been reaped. To regain the momentum, GOG's present plans give emphasis to:

- (i) Strengthening the agricultural supporting services;
- (ii) Expansion of the canal irrigated area and improvements to existing projects;

- (iii) Scientific assessment of the groundwater resources and enforcement of legislation of optimum use of the groundwater potential;
- (iv) Strengthening of agricultural research with special focus on drought and pest resistant high yielding varieties;
- (v) Shifts in the cropping pattern to higher value crops, for example, replacing groundnuts with soybeans and hybrid castor; and
- (vi) Development of improved dry farming techniques, with special emphasis given to methods for soil moisture retention, and expansion of the soil conservation program.

Given the past success of agricultural research in the State and the well educated and progressive farmers, the prospects for a sustained high growth rate of agricultural production are favorable.

2. ENGINEERING AND WATER SUPPLY

Gujarat is located in the fringe of the southwest monsoon. Rain occurs annually during June to September. There is practically no precipitation during the remainder of the year. During the monsoon period the rainfall is very sporadic, and is often extremely intense.

Irrigation provides water to (1) insure against short-term droughts during the monsoon (kharif) season, (2) provide water for crops during the winter dry season (rabi), (3) provide water for carrying perennial crops (sugarcane) during the hot season (March-May) and (4) store water for wetting the soil for tillage and planting prior to the monsoon.

a. Hydrology and River Gauging Network

The State has a reasonably good network of rainfall stations with records often extending back many years, but stations for measuring run-off are few and have been operated sporadically. Under the project's terms, Gujarat will establish a stream gauging network. Velocity and flow cross-sectional area must be measured at run-off stations. Velocity can be estimated by timing a float,

but this is not very accurate. Current meters, which directly measure the velocity, are better. India produces good current meters, but they are not satisfactory for the high velocities encountered in Gujarat. \$300,000 has been set aside by the World Bank to provide for imported equipment for stream gauging. Under the Bank agreement, at least one year of stream gauging records should be available and projects submitted for the second and third years should have 2 and 3 year gauging records, respectively. Stream gauging is not a new technology for Indian hydrologists and hydraulic engineers, but it is difficult and fairly expensive especially during monsoon conditions.

Hydrological procedures were reviewed by AID's PP team in considerable detail for two projects, Machhundri in Gujarat and Sunei in Orissa, and were discussed from time to time with counterparts and in particular, with senior professionals in the Gujarat Central Design Office. While runoff data are scarce, procedures utilizing rainfall information and rainfall runoff correlations adequately meet professional standards.

By appropriate weighting methods, rainfall data from nearby existing stations are used to synthesize a rainfall record at the dam site. From this, total runoff predictions are made for each year. These may be made using runoff coefficients and checked using any available correlations between measured runoff and rainfall. In the case of the Machhundri project, runoff has been measured since 1960 at Heran Dam in an adjacent watershed. This provided corroborative information regarding rainfall and runoff relationships. Under the project, stream flows should be reconstituted for at least twenty years.

Prediction of maximum peak flows which must be handled by spillways to prevent overtopping of dams by flood may be even less certain; procedures used are sound, but based on very limited data. As an example, the maximum flood at Machhundri was estimated at 93,000 cusecs from

a watershed of 84 square miles. Such large floods require unusually large expensive spillways.

Sediment transported into the reservoir is calculated using estimates of sediment load. Examination of the Machhundri design documents refer to measurements of silt in the watershed discharge taken between 1972-1975.

These were translated into a coefficient expressing silt "yield" per square mile of watershed area. This is a typical procedure in the designs inspected. Extra reservoir space (silt pocket) is provided for storing 105 years accumulation of sediment. Some oral discussions of the PP team with counterparts indicated that silt depositions may be estimated too low, but the PP team did not see definitive data. World Bank guidelines provide for strengthening the sediment measurement program including making measurements at each dam site and/or making silt deposition measurements in nearby existing reservoirs.

b. Past Performance of Major and Medium Irrigation Projects

Since Independence, the average cost for major and medium irrigation projects in Gujarat has been about Rs 10,500 per ha "irrigation potential created", which is about 50% higher than the national average. The higher cost can, to a large extent, be explained by a relative lack of good dam sites. However, the actual utilization of the irrigation potential is significantly lower in Gujarat resulting in a cost of about Rs 15,000 per irrigated ha, or almost twice the national average. Given the present level of irrigated yields, direct economic returns from past irrigation investments in Gujarat likely have been both lower than the "national average" and lower than the opportunity cost of capital. On the other hand, the unquantifiable economic and social benefits of irrigation in this drought prone state are considerable.

Outstanding among the reasons for underutilization of existing major and medium projects are:

- (1) The hydrological data base is typically poor which results in over-or-under-design of the dam and the irrigation network in relation to the water de facto available.

- (2) Many of the projects are run-of-the-river schemes supplied from a diversion weir. Large variations of the river flows make the water supply unreliable and usually the potential for rabi irrigation is limited.
- (3) Water losses in the conveyance system and on fields are grossly underestimated at the design stage resulting in the area actually irrigated being considerably smaller than the area commanded by the distribution system.
- (4) The water conveyance systems, especially in medium projects, are incomplete at the farm level. Water is presently supplied through outlets serving 40 ha blocks, and the farmers are expected to construct watercourses and field channels within the blocks and to level and prepare their fields for irrigation. However, with few exceptions, there are no effective organizations to help the farmers with the design, implementation and financing of these works. Consequently, the few channels that exist have been poorly constructed resulting in both excessive water losses and unreliable supply to the individual farms.
- (5) The Command Area Development (CAD) approach based on providing water in 40 ha outlets has had mixed success, as it has been difficult for diverse farmer groups to organize themselves to build their own canals to the farm level.
- (6) Inadequate water allocation procedures. For the highest yields, the farmers should plant most irrigated kharif crops in June, but the approval of their water applications comes only after the reservoir has started to fill up in mid-July. This usually results in too late a planting date, especially if the application is rejected and the crop has to be grown under rainfed conditions. Being "risk minimizers", the farmers plant with the first monsoon rains in the latter part of June and go for a "low technology package" under the assumption that they might not get any irrigation water. Only in the case of drought during the

later stages of the crop will they apply for water. Thus, in normal years, the potential for kharif irrigation remains largely unutilized.

- (7) The farmers are poorly trained in irrigated crop management which along with inadequate land development and preparation, leads to a wasteful use of water on the field.

c. Technical Criteria for Medium Irrigation Projects:

Basic data requirements, specific criteria for planning, design and construction, and a minimum level of economic viability have been established for MIPs eligible under the project. An assurance would be obtained from GOI and GOG that MIPs financed under the project would be designed, constructed and completed in accordance with these requirements and criteria which are detailed in the Implementation Report (Annex E) and summarized below:

- Basic Data Requirements: (i) a land classification map based on a soil survey; (ii) an agro-economic survey to provide a basis for future agricultural, social and economic development planning; (iii) rainfall records in or near the project area for a minimum of 20 years; (iv) a 20 year estimate of monthly runoff based, to the extent possible, on streamflow measurements with current meters correlated with observed rainfall data; and (v) sediment samples at or near each dam site for determination of expected sediment levels in the reservoir.

- Design Criteria: (i) the canal system would be fully lined; (ii) regulated outlets with a capacity of about 1 cusecs would serve irrigable areas no larger than 8 ha on the average; (iii) canals would be designed for rotational (warabundi) irrigation; (iv) the whole canal system would be designed with the necessary structures to permit full irrigation deliveries to all commanded areas when flows are less than 50% of capacity; (v) structures for measurement of water flows would be provided from the head of the main canal down to and including each minor; and (vi) an emergency spillway for the reservoir would be provided wherever favorable topographical and geological conditions permit.

d. Other Engineering Considerations

There is no question about capability to design and construct physical structures, dams and canal systems based on hydrological information. Inspection of design reports and interviews with senior officials of the Design Section for Gujarat's Irrigation Department, along with India's century-old educational program in civil and hydraulic engineering confirm this. Techniques used in engineering analysis and design are up to date and based on adequate testing of materials: earth, concrete, steel, etc. The State's Engineering Research Institute at Vadadora is well equipped with modern testing apparatus. It provides engineering performance data for all kinds of engineering materials: stone, concrete, earth, steel, etc, and does research to improve manufactured products, to find better materials, and to devise methods for more efficient use of naturally-occurring materials. Investigation and testing of foundation and fill materials for earth dams are carried out satisfactorily. The Institute has access to up to date international literature and makes contributions to it. The Institute has a program of continued improvement of engineering materials and refinements of analysis and design.

Under the project, (i) canal embankments and the invert, when the invert is in fill, will be mechanically compacted; (ii) earthfill around structures will be compacted; (iii) minors and sub-minors will be thoroughly saturated before lining; (iv) construction of each project would be completed within five years; and (v) construction of water courses and field channels and land shaping would be begun before the release of water.

A State government program under the Agriculture Department's Soil Conservation Service handles land leveling of farmers' fields and construction of field channels below the government outlet. On new projects channels to the farm fields will be constructed by contractors under Soil Conservation Service supervision. Farmers must repay the costs incurred at prevailing interest rates but are given seven years to do so. Payments are actually to the State Land Development Bank which manages the credit for these on-farm activities.

Based on the above analyses, the project is considered to be technically sound and meets the requirements of the FAA 611(a) and (b).

3. ON-FARM WATER MANAGEMENT

Supplying and managing irrigation water, in addition to providing adequate dams and canals, requires well-designed, constructed and maintained ditches (watercourses) to convey water from the service canals to the farmer's fields, proper field channels and land preparation. As a rule, delivery channels to fields either do not exist or are poorly designed and maintained; fields are inadequately prepared for applying irrigation water efficiently. Responsibility for dams and canals on the one hand, and for watercourses and field management for irrigation on the other sharply divides at the turnout from the public canal. Down to that point the responsibility is the Irrigation Departments'. Beyond that, it is the farmers'. Agricultural departments have the responsibility to provide technical support to the farmer. Dams and canals are furnished virtually free, but the farmer must pay full costs for watercourse construction and capital investment in land preparation.

Keeping watercourses and farm ditches maintained, clean, of uniform cross section, and without leaks, is an important part of efficient irrigation practice. Watermasters have the authority to require farmers to maintain watercourses and repair leaky ditches; and can withhold water deliveries if this is not done. While watercourse repair and cleaning are done routinely, most water courses are not very well maintained. The importance of this task usually is not realized either by the farmers or the watermaster.

Investigative programs which would actually measure losses from watercourses and attempt to learn how best to design and maintain watercourse and field channels could highlight this problem and help irrigation and agricultural officials decide how to solve it.

Delivery schedules are directly important to good farm water management. Often these are not congruent with farm water needs. In MIPs, the ability of canal systems to respond has inherent limitations stemming from uncertain rainfall and inflexibility of the physical system. Flexibility can be improved by canal lining, by use of holding ponds and by better scheduling. Tradition and administrative convenience are also major factors in present irrigation system management. The World Bank is developing a computerized approach to scheduling. This has some promise for allocating limited water resources more efficiently and for encouraging changes from tradition.

B. ECONOMIC ANALYSIS - SUMMARY

The proposed project will assist in expanding the area under irrigation and increase the productivity of existing irrigation projects. Through these means, it would increase the production of foodgrains, oilseeds and long staple cotton and provide additional year-round employment opportunities to landless laborers and small farmers.

The overall impact of AID and IDA supported works can be summarized as follows:

	<u>Construction of MIPs</u>	<u>Modernization of MIPs</u>	<u>Total</u>
Increase foodgrain production (tons)	102,000	40,000	142,000
Increased oilseed production (tons)	23,000	9,000	32,000
Increased cotton production (tons)	24,000	10,000	34,000

a. Income Benefits

At present, some 70% of Gujarat's farmers have no access to irrigation. Another 25% of the farmers have, on the average, one-quarter of their land irrigated, usually from privately owned wells. The lack of irrigation facilities is the major constraint facing these farmers. Once this constraint is removed, net farm incomes increase five or six-fold. The estimated income effects of the MIP component are:

Farm Size	<u>Mainland Gujarat</u>			<u>Saurashtra</u>		
	Present	Future without Project	Future with Project	Present	Future without Project	Future with Project
	(In Dollars)					
1 ha.	119	145	658	-	-	-
2 ha. ^{1/}	222	274	1,277	217	255	1,314
5 ha. ^{2/}	519	648	3,142	525	617	3,252
10 ha.	-	-	-	970	1,148	6,299

See the following farm budgets for 2.0 and 5.0 hectare farm.

^{1/} Approximately equal to the median farm size (1.9 ha.) for mainland Gujarat.

^{2/} Approximately equal to median farm size (5.3 ha.) for Saurashtra.

INDIA

Farm Budget for 2.0 ha Farm
(Mainland Gujarat)

	<u>P</u>	<u>FWO</u>	<u>FW</u>
<u>Cropped Area (ha)</u>			
<u>Kharif</u>			
Pearl Millet	0.2	0.2	0.1
Sorghum	0.1	0.1	0.3
Groundnuts	0.1	0.1	0.2
Pulses	0.2	0.2	0.2
Maize	0.1	0.1	0.2
Paddy	0.3	0.3	0.3
Tobacco	0.1	0.1	0.1
<u>Rabi</u>			
Wheat	0.2	0.2	-
Safflower	0.2	0.2	0.4
<u>Bi-seasonal</u>			
Cotton	0.5	0.5	0.6
Total Cropped Area (ha)	2.0	2.0	2.4
Net Cultivated Area (ha)	2.0	2.0	2.0
Cropping Intensity (%)	100.0	100.0	120.0
<u>Gross Production Value (Rs)</u>	3,106.0	3,859.0	14,151.0
<u>Farm Production Costs (Rs)</u>			
Hired Labor	124.0	142.0	327.0
Animal	385.0	392.0	523.0
Other Inputs	687.0	970.0	2,316.0
Total	1,196.0	1,504.0	3,166.0
<u>Net Farm Income (Rs)</u>	1,910.0	2,355.0	10,985.0
	(\$222)	(\$274)	(\$1,277)

NOTE:

P = Present
FWO = Future Without Project
FW = Future With Project

INDIA

Farm Budget for 5.0 ha Farm

	<u>P</u>	<u>FWO</u>	<u>FW</u>
<u>Cropped Area (ha)</u>			
<u>Kharif</u>			
Pearl Millet	1.0	1.0	0.9
Sorghum	0.7	0.7	0.6
Groundnuts	2.0	2.0	2.1
Pulses	0.3	0.3	0.3
<u>Rabi</u>			
Wheat	-	-	1.0
Safflower	0.2	0.2	0.6
<u>Bi-seasonal</u>			
Cotton	0.8	0.8	1.0
Total Cropped Area (ha)	5.0	5.0	6.5
Net Cultivated Area (ha)	5.0	5.0	5.0
Cropping Intensity (%)	100.0	100.0	130.0
<u>Gross Production Value (Rs)</u>	7,302.0	8,705.0	35,526.0
<u>Farm Production Costs (Rs)</u>			
Hired Labor	360.0	412.0	985.0
Animal	1,039.0	1,048.0	1,575.0
Other Inputs	<u>1,387.0</u>	<u>1,939.0</u>	<u>4,996.0</u>
Total	2,786.0	3,399.0	7,556.0
<u>Net Farm Income (Rs)</u>	4,516.0 \$(525)	5,307.0 (617)	27,970.0 (3,252)

<u>Net Per Capita Income Below</u>	<u>Percentage of Farm Households*</u>		
	<u>Present</u>	<u>Future without Project</u>	<u>Future with Project</u>
Poverty Line (U.S. \$70)	69%	65%	13%
Average Per Capita Income for India (U.S. \$150)	94%	93%	35%
Twice the Average Per Capita Income for India (U.S. \$300)	99%	99%	66%

Most of the benefits of the modernization of MIPs would go to farmers in the tail-end of existing systems. At present, these farmers rarely receive any water and their incomes would basically follow the same pattern as the incomes of farmers benefitting from the construction of new MIPs. Farmers in the head-reaches would benefit from reduced water logging and a more reliable water supply. Their income gains would be relatively modest.

b. Economic Criteria: (i) individual MIPs would have a benefit-cost ratio exceeding 1.0 based on annual net benefits and investment costs discounted at a 12% interest rate; (ii) the benefit-cost ratio would be established by using techniques set out in the "form for establishing the economic viability of medium irrigation projects" (Annex F); (iii) cost of land acquisition would be excluded; and (iv) cost of land clearing and shaping on presently uncultivated land would be included.

c. Cost Estimates: (i) cost estimates would be based on bid prices prevailing in the project area at the time of appraisal; (ii) cost estimates would include: a physical contingency factor of not less than 20% for feasibility grade estimates and costs for administration, design and supervision (normally about 15% of construction cost), land acquisition, and resettlement of families displaced by the project. Inflation at an annual rate of about 5% would also be factored in.

d. Economic Rates of Return (ERR)

According to the economic criteria established for new MIPs, CWC would be authorized to approve projects with an ERR exceeding 12%.** Based on an average investment cost of Rs. 15,000 (\$1,740) per ha. and on typical cropping patterns for Saurashtra and mainland Gujarat, it is estimated that the average ERR of

*In areas impacted by project.
**CWC acting through the Appraisal Committee (AC)

MIPs would be around 19%. Based on an estimated investment cost of Rs. 4,000 (\$465) per ha. for modernization component is estimated at 28%. The existing MIPs would be modernized to the standards that have been adopted for new MIPs. Consequently, the benefits per ha. of cultivable command area for the modernization works also measure the benefits accruing from the higher design standards introduced for new MIPs. (See Annex J for a proposed MIP).

e. Project Risks

The risk associated with the construction of new MIPs components would stem from: (i) the use of standardized yield and input projections for the economic evaluation of all sub-projects; and (ii) the procedures for approval and progress review of sub-projects. The agro-economic conditions in all sub-project areas would be reflected primarily in the cropping patterns. The irrigated yields in different parts of the State are broadly similar and the estimated ERR is not sensitive to the prevailing differences in rainfed yields. Consequently, the error introduced by the use of standardized projections in the evaluation of an individual sub-project would be limited. Furthermore, the overestimation of actual benefits for one MIP would be compensated for by the underestimation of benefits for another. Thus, the risk of the MIPs taken as a group is minimal. Arrangements for approval of the sub-projects and the reporting requirements that would permit AID and IDA to identify problems early and to intervene directly, if necessary, are designed to minimize the risk associated with the proposed appraisal and progress review procedures. Furthermore, the project would also include a monitoring and evaluation component. In view of the benefits from institution building, the risk is acceptable, and the risk associated with the modernization works is small.

C. FINANCIAL ANALYSIS

1. COST RECOVERY

a. Water and Water Related Charges

The Irrigation Act 1/ provides for collection of a betterment levy from farmers benefiting from irrigation works. According to the Act, the betterment levy should be set at half the increase in land value due to an individual project (defined on a before-and-after basis). The repayment period and the interest to be charged on the outstanding amount are set through an executive order, published in the Official Gazette. However, as in most other States, the betterment levy is, at present, not collected in Gujarat.

1/ The Bombay Irrigation Act of 1897, as subsequently modified.

At present, the prime vehicle for recovery of capital and O&M costs for irrigation works is the water charge. The GOG has a policy of reviewing and revising the water charge every two or three years. Charge rate schedules are subject to legislative approval. Over the last decade, the rates have increased about 2% annually in real terms, reflecting the increased agricultural productivity. The next review is scheduled for June 1978. The present rates, together with the rates in Maharashtra, are the highest in the country. For the projected cropping pattern of the MIPs, the water rate would average about Rs. 104 (\$12) per ha. of cultivable command area. A 20% local cess is levied on the water rate, which would bring the total assessment to about Rs. 125 (\$14) per ha.

There are large variations in the benefits accruing from different projects and also among different farmers in the same project. In view of the difficulties of assessing the benefits to each individual farmer, the general policy in India is to charge a uniform water rate. In the older projects, water supply to most tail-end farmers is highly unreliable and their benefits from "irrigation" are fairly low. Consequently, water rates have to be set at a low level in order to give the tail-end farmers sufficient incentive to use irrigation water even though the "average" farmer would be able to pay substantially higher charges. Until it is technically and administratively possible to implement volumetric water charges that better reflect the benefits that accrue to each farmer, the water charges will generally remain at an inherently low level.

The technical standards introduced under the credit are specifically designed to ensure that all farmers in the command area benefit from substantially increased water supply which is more reliable than before. Thus, there would be a clear justification for collecting higher charges from farmers benefiting from the construction of new MIPs and from the modernization of existing MIPs. An assurance would be obtained from GOG that: (i) it would assess and collect a betterment levy in MIPs constructed or modernized under the project; (ii) repayment periods and interest rates would be established after a review of the farmers' ability to pay, and (iii) the proposed methodology for such a project by project review and general guidelines for establishment of repayment periods and interest rates would be submitted to IDA and AID by December 31, 1982.

b. Agricultural Taxes.

Excise duties on increased agricultural produce will provide returns to the public sector from MIPs. In recent years, GOG's tax revenues have increased about 10% per year in real terms, and is presently about Rs. 130 per capita or roughly 50% above the national average. Since incomes in the agricultural sector are much lower than in the manufacturing and service sectors, the rate of agricultural taxation is relatively modest. The land revenue and associated cesses amount to about Rs. 15-20 per ha. More important from a revenue point of view is the agricultural sales tax which is levied -- at a rate of 4% -- on cotton and oilseeds. It is estimated that GOG's revenues from the agricultural sales tax would increase by Rs. 120 (\$14) per ha. brought under irrigation from an MIP.

2. SUMMARY COST ESTIMATE AND FINANCIAL PLAN
(U.S. \$000)

Source	AID	GOI	IDA		TOTAL
	LC	LC (equiv)	LC	FX	
1. New MIPs	19,000	64,000	54,000		137,000
2. Modernized MIPs	5,000	15,200	12,100		32,300
3. River Gauging	-	400		400	800
4. Monitoring/Eval. Studies	-	400	-		400
5. Unallocated	-		1,500		1,500
6. Inflation Contingency @25%	6,000	20,000	17,000		43,000
Total	30,000	100,000	84,600	400	215,000

3. DISBURSEMENT SCHEDULE (\$000)

	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>	<u>FY 84</u>	<u>TOTAL</u>
AID	6,000	6,000	7,000	7,000	4,000	0	30,000
IDA	3,000	13,000	17,000	19,500	20,000	12,500	85,000
GOI*	4,000	15,000	20,000	23,000	24,000	14,000	100,000
Total	13,000	34,000	44,000	49,500	48,000	26,500	215,000

4. Disbursement Procedures

AID's contribution (\$30 million), as much of IDA's in this co-financing effort, will be used to reimburse the GOI for the local costs of MIP construction. A small portion (\$500,000) of IDA's contribution will finance the foreign exchange costs of some river gauging equipment and short-term consultant services needed for establishing the river gauging network.

In keeping with a unified administration of disbursements, IDA (through its New Delhi office) has agreed to serve as a conduit for disbursement requests and will provide to USAID/Delhi copies of all documentation submitted by the GOG through the GOI. IDA would make a determination that the back-up documentation is in order and so inform AID. In proportion to AID's contribution to the project, USAID/Delhi would then directly reimburse the GOI for expenditures incurred. To this end, the India Mission will be provided a Direct Reimbursement Authority (DRA). This procedure is also consistent with the procedures to be followed by IDA.

Specifically with regard to payments for civil works (construction) contracts in excess of \$5,800, both IDA and AID will make disbursements against full, supporting documentation e.g. invoices, vouchers, certificates of expenditures, etc. For force account work (principally non-contractual dam compaction to be undertaken by the GOG's Irrigation Wing) and for payments of less than \$5,800 equivalent under civil works contracts, disbursements will be made against certificates of expenditures provided by the GOG on an itemized sub-project basis. Certificates for force account work

*Anticipated

(not to exceed 10% of total project cost) will be submitted to IDA which will make copies available to AID. For these works undertaken on a piece-work basis, full documentation would be too numerous to permit easy processing. However, such documents would be retained by the GOI for semi-annual audit by the GOI's Accountant General and for inspection by joint donor review Missions.

Technical verification of MIP progress will be undertaken for the most part by the Appraisal Committee (AC) of the CWC. The AC during project implementation will visit each MIP site under construction and review relevant records, plans, specifications, procurement schedules and contract documents in order to ensure that each MIP is constructed in accordance with the established technical criteria and sound engineering practices. IDA's own New Delhi-based irrigation engineers (two and possibly a third) will supplement the efforts of the AC.

D. ENVIRONMENTAL ANALYSIS

AID's participation relative to IDA in this project makes it a "minor donor" within the intent of Regulation 16 as in effect during project design; such definition technically exempts it from consideration for an Environmental Assessment. In addition, IDA has found no problem with the project under its environmental standards.

However, because of the significant absolute size of the project, and because the Agency realizes a potential utility in larger terms as a result of environmental attention to Gujarat (since it will be a forerunner of other irrigation projects), we are proposing the equivalent of an Environmental Assessment. The GOI has not objected to AID's proposed covenant, i.e., "The borrower understands that AID will finance an environmental assessment of the project during project implementation. The borrower covenants to consider guidelines and recommendations identified by this environmental assessment."

Therefore, it is our intent to develop a programmatic Environmental Assessment, which the GOI would consider for appropriate application in project implementation; such an assessment would also have benefits for future irrigation projects which may be undertaken by AID.

E. SOCIAL ANALYSIS

1. SOCIO-ECONOMIC CONDITIONS

a. Population

Gujarat has one of the highest birth rates in India and its 30.7 million population is increasing by about 2.6% per year. With about 29% of its population living in towns and cities, it is, next to Maharashtra and Tamil Nadu, the third most urbanized of the States.

About one-quarter of the population belong to traditionally disadvantaged groups: tribes (18%) and castes (7%). The tribal population is heavily concentrated in the rural areas of the eastern hill region while the population belonging to castes is widely dispersed throughout the State (Annex I).

The labor force constitutes 31% of the total population. Its participation rate among the tribal population is significantly higher (over 40%) than for the population at large. Cultivators and agricultural laborers account for 43% and 22% of the labor force, respectively.

b. Rural Incomes and Wealth

In a normal year, about 40% of the rural population have incomes below the poverty line (U.S. \$70). However, there are large regional variations in the incidence of poverty. In the eastern and southern parts of the State about two-thirds of the population live below the poverty line, while the proportion in Suarashtra is about one-third.

These income differences can be explained largely by ecological factors and the historic evolution of agriculture in the State. The southern and central parts of the mainland, with high rainfall and relatively fertile soils are densely populated with small farms and a large portion

of landless households. Kutch and Saurashtra, with low and unreliable rainfall and less fertile soils, have traditionally not been able to support a large population, which is clearly reflected in the farm size distribution for the State (Annex C). With the advent of irrigation and modern farming practices, some of the low rainfall areas natural disadvantages have been removed and the average rural household in Saurashtra is now twice as wealthy as in other parts of the State.

2. FARM SIZE AND LAND TENURE

The average farm size in Gujarat is 4.1 ha., but there are large variations from one district to another (Annex C). The present farm size distribution is largely determined by local agro-climatic conditions, and farms in the low rainfall areas are larger than in high rainfall areas:

Farm Size ha.	Gujarat		Mainland Gujarat		Saurashtra and Kutch	
	% of farms	% of area	% of farms	% of area	% of farms	% of farms
below 1	23.8	3.0	30.6	5.0	5.6	0.5
1 - 2	19.1	6.8	22.0	10.4	11.3	2.5
2 - 5	30.1	23.9	29.5	30.5	31.5	15.9
5 - 10	17.4	29.9	12.7	28.2	30.0	31.9
Above 10	9.6	36.4	5.2	25.9	21.6	49.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Avg. Farm Size	4.1 ha		3.1 ha		6.8 ha	

Tenancy legislation, giving the tenants ownership rights to the land they rented, has been strictly enforced in Gujarat. Depending on the type of tenancy, the land has been transferred to the tenants either with or without payment to the former owners. The tenants either pay for the land in installments or take loans from GOG or land development banks. According to the 1970 Agricultural Census, 97% of all holdings were fully owned; 2% were partly owned and partly rented, and 1% wholly rented.

The land ceiling in Gujarat for areas irrigated from a Government source is 4.1 ha. to 10.9 ha., depending on soil type and reliability of irrigation water. In rain-fed areas, the ceiling ranges from 8.1 ha. to 21.9 ha., per family. For each member in excess of five, the ceiling is increased by 20% up to a maximum of 100% when there are ten or more members.

3. THE LANDLESS

Some 33% of Gujarat's rural workers are landless. The landless will remain in a dependent status and continue to face great uncertainties until off-farm employment opportunities are expanded manifold.

Intensified crop production made possible by Gujarat MIPs will increase the demand for rural laborers and hence increase their real incomes. As an example, unirrigated cotton requires only about 40 man days of labor per acre. Cotton grown with irrigation and intensive use of other inputs requires about 140 days of labor per acre. Sugar cane requires approximately 180 days of labor per acre annually, probably at least twice whatever rainfed cereal and pulse crop it replaces in a 12-month period. Thus, an approximate doubling of annual agricultural labor demands can be expected in some medium irrigation command areas. In addition, off-farm opportunities will be generated in related agricultural processing industries (e.g., sugar cane factories).

Over the longer term, this increased labor demand is likely to be dampened slightly. Some larger farmers will invest increased agricultural incomes in tractors, to reduce labor bottlenecks in certain seasons and to reduce problems associated with managing agricultural labor. Also, some farmers who can afford to wait a few years for returns to materialize will invest in fruit crops. Some of these fruit crops, such as mangoes, are both lucrative and low demanders of labor.

Dam and irrigation works construction also generate labor demands for a 3-5 year period on each project. The Machundri Dam, observed under construction, is using about 1,200 laborers over a 2-1/2 year period. Laborers -- both men and women -- on this project receive \$1.00/day (equivalent) plus on-site housing. However, the contractor noted that this is only about one-half the labor he has used on projects of similar scale in the past. With a rapidly expanding number of dam construction projects in Gujarat and contractor attempts to complete projects quickly, this and other contractors are investing in more heavy equipment. Thus, one price of this rapid construction pace planned in Gujarat is use of somewhat more capital intensive construction techniques.

Minimum wages of Rs. 5.50/day (\$0.69) have been legally established in Gujarat. However, actual wages are still below that in some areas during slack seasons. On the other hand, wages go up to around Rs. 10/day in irrigated areas during peak labor demand periods.

Construction laborers generally move in camps from project to project, usually with families in tow. A good deal of the agricultural labor also now moves from District to District, with laborers frequently coming from rainfed Districts where labor is greatly in excess. Thus, though landless laborers already residing in a newly irrigated area experience increased demands for their labor, they face competition from these migrant groups. The breakdown of traditional caste relationships in the villages is such that the local laborers, like the migrants, now work on a daily wage basis and are not guaranteed employment from one season to the next. The landless therefore continue to experience considerable uncertainty.

4. BENEFIT DISTRIBUTION

Gujarat MIPs will benefit a larger proportion of small farmers in the eastern than in the western region. A larger percentage of both holdings and farm area are in small to medium size units in east Gujarat than in Saurashtra.

Although average holdings in Saurashtra are two to three times the size of those in east Gujarat, Saurashtra incomes are unlikely to be of the same multiple. The lower rainfall of Saurashtra has historically prevented it from supporting as many persons per acres as east Gujarat. Even if it is assumed that 1972-73 per capita incomes in Saurashtra were twice those of the sample households in Panchmahals, a typical east Gujarat district, that would still only put incomes there at about \$110/year. What these landholding and income data portray is a picture of considerable poverty in east Gujarat and somewhat better off but nevertheless poor households in Saurashtra.

Gujarat's surface irrigation projects should benefit small, medium, and moderately large farmers in proportion to the size of their holdings. This will be the approximate case in practice. However, land ceilings, if strictly enforced, will prevent extremely large holders in Saurashtra from capturing the majority of project benefits. Generally, irrigation will make small farms economically viable thus avoiding the possibility of mortgage indebtedness of small farmers to large land owners.

5. PARTICIPATION OF THE TARGET GROUPS IN PLANNING, IMPLEMENTATION, AND EVALUATION OF MIPs

Medium irrigation as handled in India is a generally top-down development program. Farmers themselves are involved in only limited ways in the planning, implementation, or evaluation of Gujarat's MIPs. Local water panchayats or boards do provide advice to the Irrigation Department on water allocations, and farmers have had something to say about whether or not land consolidation and land leveling activities take place in their command areas. These and other forms of participation in surface irrigation have been largely in the form of reactions or responses to actions proposed from above, rather than active, initiating types of participation.

Local participation in public works in Gujarat takes place within a fairly restricted realm. The Panchayat Raj system of local government -- flowing from village to district levels -- is involved some in public works construction in Gujarat. The Panchayats are responsible in some cases for village road projects, for example. However, the limited fiscal authority and responsibility of the Panchayats appear to restrict the areas in which they can be effective. As presently structured, it is hard to envision how they could effectively play more than an advisory role in medium irrigation, and the special water panchayats already do that to some extent.

The most likely form of effective local participation would be through water user cooperatives or associations with clearly defined fiscal authority and maintenance responsibilities. Plans are underway for pilot schemes along these lines. If those schemes prove successful, the prospects for bottom-up participation in Gujarat's irrigation development will certainly be enhanced. Such pilot schemes have been undertaken with some success in nearby Maharashtra State. Based on limited results there, the GOG is initiating pilot cooperatives for Kadana, a major project area. These cooperatives will be structured around 40 hectare blocks serving approximately 200 farmers and will be managed and administered by a professional staff. The GOG is hopeful that their pilot

efforts will be successful and is formulating plans to encompass medium irrigation project areas. Until the results of present pilot efforts are conclusive, the GOG will in the interim seek to strengthen the role of existing Canal Advisory Committees in the overall planning and implementation of MIPs. The Committees, made up of staff from the PWD and the Department of Agriculture, do represent farmer groups though to a lesser extent than is envisioned under a cooperative system.

6. EFFECTS OF MEDIUM IRRIGATION PROJECTS ON WOMEN

The most immediate and obvious effect of medium irrigation projects on women expresses itself in the increased demand for agricultural labor. Women are heavily involved in many of Gujarat's agricultural labor operations, and particularly in the weeding and harvesting operations. In fact, Gujarat officials estimated that 50 - 60% of the agricultural labor used in producing rice, cotton, wheat, and bajra is provided by females.

However, the increased demand for labor will have a differential effect among households of small and medium to large land holders. Females (both adults and children) of the landless and small farmer households will find greater local agricultural employment opportunities. They will thus tend to work more days per year in the fields. Some of the very poor will substitute the performance of agricultural work locally for work away from the village, such as on road construction. For the female members of these landless and small farmer households, the increased demand for labor induced by irrigation therefore means (1) additional days of wage employment each year, (2) labor closer to the home village, and (3) in some cases, labor that is less demanding than alternatives available (e.g., construction work).

Part IV. IMPLEMENTATION ARRANGEMENTS

A. GOI MANAGERIAL/ADMINISTRATIVE ARRANGEMENTS

1. THE IRRIGATION WING OF GUJARAT PUBLIC WORKS DEPARTMENT (PWD)

The direct responsibility for planning, implementing, operation, and maintenance of the MIPs would rest with the Irrigation Wing of PWD. 1/ The Irrigation Wing is organized into four branches, each headed by a Chief Engineer who works under the guidance of the Secretary, PWD:

(a) the Irrigation Projects (IP) Branch is responsible for the planning, design and construction of all major and medium projects in the State with the exception of Kadana and Narmada projects.

(b) the Kadana Branch was set up for the design and construction of the IDA financed Kadana Irrigation Project (Credit No. 176-IN) and for the Panam Project.

(c) The Narmada Branch is responsible for the planning and construction of the Narmada Project.

(d) the Irrigation (I) Branch operates all major and medium irrigation projects. It also assists the district Panchayats in the design and construction of minor irrigation projects.

The IP Branch is organized along both functional and geographical lines. The Water Resources Investigation Circle (WRI), headed by a Superintending Engineer (SE), is responsible for the hydrological, geological and soil surveys and the preliminary design of all major and medium projects. In order to provide basic data for irrigation planning purposes, it maintains a network of rainfall and river discharge gauging stations and carries out indepth studies of selected river basins in the State. The Central Designs Organization (CDO) with three SEs, prepares detailed designs of earth and masonry dams and major canal structures. It prepares design standards and provides typical designs for minor canals and

1/ The PWD has two other wings; one for the construction and maintenance of Government buildings and major roads and one for electrical installations in buildings.

canal structures to the construction circles. The CDO has a special unit that also assists the construction circles in computerized PERT planning for all projects. Model studies for the design of irrigation projects are carried out by GOG's Engineering Research Institute (ERI) in Baroda and by GOI's Central Water and Power Research Station in Poona, Maharashtra. In 1977, a Project Preparation and Monitoring Cell (PPM), with a multidisciplinary staff was established in order to better integrate agricultural development aspects in the planning of irrigation projects.

The Irrigation Wing's construction organization is flexible and adjusted to the implementation program. With the exception of Narmada, Kadana and Panam, the responsibility for construction of medium and major projects rests with the four Irrigation Project Circles that report to the Chief Engineer (IP). Each circle is headed by a SE and handles a work program of U.S. \$5-10 M annually. All designs of canals and minor canal structures for the circle consists of 4-6 divisions, headed by Executive Engineers (EEs), and about 25 sub-divisions. For a typical 10,000 ha. project, three sub-divisions are created; one for dam construction, one for construction of the canal and drainage networks and one for planning and quality control. Testing of construction materials is carried out by ERI. The sub-divisions are headed by Deputy Engineers.

The I-Branch of PWD has four irrigation circles that are responsible for the O&M of irrigation projects within specific geographical areas. As in the case of the IP circles, the irrigation circles are headed by a SE and consist of 4-6 divisions and about 25 sub-divisions. The I-Branch also has one circle for the construction of field channels, one circle for assistance to the district panchayats in design and construction of minor irrigation projects.

2. PROJECT DEVELOPMENT AND APPRAISAL

The Central Water Commission (CWC) of GOI is the highest technical authority for water resources development in India. The Commission consists of a Chairman and four members. It has a staff of more than 1,000 engineers. A large part of the staff is on rotation from the States.

The CWC prepares guidelines for the design and construction of irrigation projects and is responsible for technical review of all major and medium projects before they are submitted for approval by the Planning Commission of GOI. In the case of medium irrigation projects, the review is only proforma while major irrigation projects are analyzed in detail. The CWC usually is actively involved in the planning of large projects of high national importance. Recently, CWC established a Central Monitoring Directorate, which continuously follows the implementation of selected major projects. The CWC is also sometimes directly responsible for the planning and implementation of federally sponsored schemes.

The CWC would be responsible for appraising and reviewing the progress of MIPs financed from the loan. In connection with the Orissa Irrigation Project, CWC established an Appraisal Committee (AC) for this purpose.

The committee's staff presently consists of a director, four engineers, two agriculturalists and one economist. The AC has completed appraisal of three MIPs in Orissa and has recently submitted the Project Summaries to IDA for approval. 1/ The progress of CWC's appraisal and review work has been satisfactory.

3. PROCEDURES FOR MEDIUM IRRIGATION PROJECTS

There would be a continuous interaction between AC and GOG during the implementation of MIPs. The main activities in the "project cycle" would follow procedures described below.

a. Project Identification

Potential MIPs are identified in the prospective Plan of Gujarat 1974-1984. The initial investigations are carried out by WRI which prepares a Preliminary Investi-

1/ Under the Orissa Irrigation Project, CWC is authorized to approve MIPs costing less than Rs. 70 M (the same "free limit" would also apply to the proposed credit). However, in order to establish quality standards for CWC's appraisal work, the first three sub-projects were submitted to IDA for approval.

gation report. This purely engineering report, which gives an indication of the technical feasibility of the project and outlines the requirements for detailed investigations, provides the basis for a decision about a full scale investigation program. The investigation and preparation priorities of MIPs are established by the CE (IP) after consultation with concerned GOG Departments.

b. Project Preparation

Detailed hydrological, geological and soil investigations are carried out by WRI and contour survey by the Survey of India at the request of GOG. The WRI prepares a Project Report which includes preliminary designs, cost estimates and a tentative implementation plan. An assurance would be obtained from GOG that a Project Preparation Committee would be established for each MIP to be financed under the credit. This Committee would be headed by the District Panchayat President and have the District Development Officer as convener and the EE responsible for project preparation, the Agronomist -- Irrigated Agriculture and district level officers from the Agriculture, Cooperative, Revenue and Forestry Departments as members.

Subsequent to clearance by GOG technical and administrative departments, the Project Report is approved by CE (IP). Designs for earth and masonry dams and major canal structures are prepared by CDO. Designs for canals and minor structures are prepared by the designs office under the SE responsible for implementation of the project. The progress of project preparation work would be reviewed every six months by the AC to ensure the implementation of established criteria for planning and preparation.

c. Submission of Project to CWC

After approval by CE (IP), the MIPs would be included in GOG's annual development plan to be reviewed by the Planning Commission of GOI. Subsequent to GOI approval of the plan, the selected MIPs would be submitted for CWC for appraisal.

d. Project Appraisal

The AC would visit the sub-project area to review the proposed sub-project in detail and ascertain that the proposed MIP meets the criteria agreed with IDA. The AC would also ensure that: the designs are technically sound, with special emphasis given to the safety of the dam; and that the proposed cropping pattern is suitable for the command area; agricultural supporting services are adequate; and the implementation schedule is realistic. The AC would confirm and adjust the cost estimates as necessary and prepare a Project Summary, which would be submitted to IDA, ^{1/}. Field appraisal for projects with a command area larger than 12,000 ha. would be carried out with full participation of IDA, but responsibility for preparation of Project Summaries would remain with AC.

e. Project Approval

The AC would be authorized to approve sub-projects that meet the technical criteria and cost less than Rs. 70 M (U.S. \$8.1 M) excluding price contingencies if the benefit/cost ratio is higher than 1.0. In all other cases, sub-projects would be reviewed by IDA which would base its decision on an analysis of Project Reports and Summaries supplemented by field visits, if necessary.

4. PROJECT IMPLEMENTATION

The IP-Branch of PWD would be responsible for the implementation of all irrigation works. Each MIP would be implemented by two or three sub-divisions that would be technically and administratively controlled by the divisional EE. Assurance would be obtained from GOG that: (i) simultaneously with the construction or modernization of an MIP, GOG would strengthen, if necessary, the credit, input supply and marketing facilities in the area to meet the need of irrigated farming; (ii) staffing of agricultural extension services in each MIP area would conform with state-wide standards set under the forthcoming statewide agricultural extension project; (iii) the DA would establish irrigated demonstration plots in each MIP area and (iv) the DA would prepare a layout for each 8 ha. block served by an irrigation outlet, showing the design of water courses;

^{1/} Information copies of these summaries would be made available to AID.

field channels and land shaping, and it would assist the farmers in implementing these works. The PPM would continuously monitor the progress of project implementation to ensure that all necessary actions are taken by concerned departments. Progress of project implementation would be reviewed by AC three times during each construction season.

a. Operation and Maintenance

As at present, responsibility for day-to-day operation of each project would rest with the sub-divisional Deputy Engineer. Under him, three to five Section Officers would each be responsible for a section of the canal system. (commanding about 5,000 ha.) down to the farm turnouts. Within this area, about four Canal Inspectors would assess the water delivery requirements and each would supervise two gate keepers, who would operate sluices and outlets and do routine maintenance within a command area of about 500 ha. each. Water would be delivered, on a rotational basis, through outlets serving about 8 ha. Before the beginning of each irrigation season, the farmers would submit applications for irrigation water through the Canal Inspector for the divisional EE. Water allocation would subsequently be determined by the Canal Advisory Committee, which includes staff from PWD and Department of Agriculture and farmers' representatives. An assurance would be obtained from GOG that this committee would be strengthened so that it would coordinate all other activities pertaining to irrigated agriculture such as cropping patterns, input distribution and credit facilities.

Most system maintenance would take place during the non-irrigation season (March to May) with the use of temporarily hired labor or small unit price contractors. The gate keepers are responsible for routine maintenance during the irrigation season. Since the present investigation and design practices for storage and diversion dams are consistent with IDA standards, no criteria has been specified for these structures. An assurance would be obtained from GOG that biennial safety inspections would be undertaken for all dams and timely repairs would be made as needed.

5. PROGRESS REVIEW AND REPORTING

Progress review and reporting requirements, which have been agreed with CWC, are designed to: (i) ensure that the projects are designed, appraised and implemented in accordance with the agreed criteria; (ii) ensure that work for which disbursements are requested actually has been carried out; (iii) provide information ("feedback") to allow better project preparation and appraisal in the future (iv) provide guidance for the AC staff in its review of project progress; (v) develop channels for mutual exchange of experience between IDA, CWC and GOG staff; and (vi) provide early warning signals to IDA if problems are developing in implementation of the MIPs.

In cooperation with PPM, the AC would closely monitor progress of project preparation, implementation and operation. The following reports 1/would be prepared by AC and submitted to IDA for review:

(a) An "Annual Implementation Program" would be prepared after a review, with the GOG officials of projects under preparation and implementation. Special attention would be given to budgetary allocation for each sub-project in order to ensure that adequate funds would be provided in accordance with agreed implementation schedules.

(b) A "Progress Summary: Preparation" would be prepared after each visit to the Divisional Office where a sub-project is being prepared and preferably to the project site. Progress of sub-project preparation would be reviewed every six months.

(c) A "Progress Summary: Implementation" would be prepared and updated three times during each construction season, after visits to the MIP site.

1/ The format and content of these reports are given in the Implementation Report. See Annex E for a sample copy.

(d) A "Progress Summary: Operation" would be prepared once a year after a visit to the completed project to assess irrigation benefits and to review the quality and effectiveness of O&M.

The main thrust of IDA review would be to:

- (i) assess the quality of AC's appraisal and review work;
- (ii) spot check whether agreed criteria have been followed;
- (iii) review procurement procedures; (iv) check the financial records kept by GOI and GOG; (v) assess the appropriateness of established criteria; and (vi) examine the contents and timing of reports submitted by CWC.

B. AID ADMINISTRATIVE ARRANGEMENTS

Major responsibility for monitoring and reviewing project implementation rests with the World Bank as major donor. AID will however, participate along with IDA technicians in IDA's periodic review missions.

At present, it is anticipated that the Mission's administrative responsibilities will not require additional staff commitments; a loan officer will be permanently assigned to monitoring and will be assisted by the staff of the Mission Controller's Office. The World Bank has on assignment in New Delhi several capable irrigation engineers who will conduct on-site inspections of project performance as needed. Two of the IDA staff are expatriates, and a third is a former high-ranking GOI official knowledgeable of and respected in the irrigation and water management field in India. Furthermore, consistent with IDA centralized style of operation, IDA/Washington staff in the areas of inter alia finance, agronomy, irrigation engineering and economics will closely and continuously monitor the project. Some or all of the central staff will periodically join with the New Delhi IDA staff in conducting on-site review of the project. In consideration of the leading design and implementation role of IDA, the Project Committee considers that AID's interests as competent project administration are more than adequately served by IDA review and administration capabilities.

Funds for the local costs of the project are expected to be disbursed on the basis of advice from the GOI that it has incurred expenditures for completed work on irrigation projects. AID will reimburse approximately 14% (our contribution to the total project cost) of costs incurred but excluding those costs for consultant services, vehicles and equipment for the river gauging network. World Bank and AID audit requirements and procedures will verify GOI expenditures.

C. CONDITIONS AND COVENANTS

The Project Agreement will contain conditions or covenants to the effect that, except as A.I.D. may otherwise agree in writing:

- (1) Prior to the initial disbursement of A.I.D. funds under the Project, the Borrower shall furnish in form and substance satisfactory to A.I.D. evidence of the effectiveness of the IDA Development Credit and Project Agreement.
- (2) The Borrower will consider guidelines and recommendations identified by an environmental assessment of the Project financed by A.I.D. during Project implementation, if appropriate.
- (3) IDA will assume the principal administration and monitoring responsibility for this multidonor Project. In view of that fact, the IDA agreement will contain appropriate self-help covenants and conditions on the part of the Cooperating Country and the State of Gujarat. However, any violation of such covenants and conditions constituting an event of default under the IDA agreement, as determined by IDA, will also constitute an event of default under the A.I.D. Loan Agreement, thereby providing a linkage between the two donor's agreements with respect to such covenants and conditions. These covenants and conditions include:

(a) Gujarat shall undertake: (i) that each Medium Irrigation Project (MIP) to be financed under the Project shall be prepared, designed and constructed in accordance with technical and economic criteria agreed with IDA; and (ii) that provision shall be made for funds sufficient to complete the MIPs started under the Project in accordance with said criteria.

(b) Gujarat shall prepare a layout for each eight-hectare block served by an irrigation outlet, showing the design of water courses, field channels and land shaping, and shall assist the farmers in construction of water courses, field channels and drains and land shaping.

(c) Gujarat shall maintain staffing of its agricultural extension services in each MIP area in conformity with the statewide standards to be agreed upon between IDA and Gujarat.

(d) In order to meet the increased needs or irrigated farming for the MIPs constructed under the Project, Gujarat shall, if necessary, strengthen the credit, input supply, storage and marketing facilities available to farmers in MIP areas.

Other IDA Conditions and Covenants

Other IDA conditions and covenants, also linked to the AID Loan through the default mechanism described above, are:

(1) For the purpose of carrying out each MIP under the Project, Gujarat shall establish a Project Preparation Committee headed by the District Development Officer and consisting, inter alia, of the concerned Executive Engineer and District Officers from the Departments of Agriculture, Cooperation, Revenue, Forestry and Fisheries of Gujarat.

(2) Gujarat shall establish an irrigated demonstration plot in the area covered by each MIP.

(3) Gujarat shall adhere to the appraisal and progress monitoring procedures for MIPs as set forth in Schedule 3 to IDA's Development Credit Agreement. (See Annex N).

(4) Promptly after completion of the Project, but in any event not later than six months after the Closing Date or such later date as may be agreed for this purpose between Gujarat and IDA, Gujarat shall prepare, or cause to be prepared, and furnish to IDA a report, of such scope and in such detail as IDA shall reasonably request, on the execution and initial operation of the Project, its cost and the benefits derived and to be derived from it, the performance by Gujarat and IDA of their respective obligations under the Project Agreement and the accomplishment of the purposes of the Credit.

(5) Gujarat shall, under arrangements satisfactory to IDA, cause the dams and related structures constructed under the Project to be periodically inspected in accordance with sound engineering practice in order to determine whether there are any deficiencies in the condition of such structures, or in the quality and adequacy of maintenance or methods of operations of the same, which may endanger their safety. To this end, Gujarat shall propose to IDA appropriate arrangements for IDA's review no later than December 31, 1973.

(6) With the objective of ensuring recovery of annual operation and maintenance costs, and, to the extent possible, costs of infrastructure investments, having a regard, inter alia, to incentives for, and payment capacity of, farmers, Gujarat undertakes to (a) review the water and water-related charges in Gujarat by not later than December 31, 1982, and (b) implement an appropriate system of water and water-related charges, based on recommendations arising from the said review after paying due regard to IDA's comments, if any, on such recommendations.

D. IMPLEMENTATION ARRANGEMENTS As the major donor of this project, IDA has elected to retain primary leadership in the overall monitoring and implementation of project activities, except where AID's requirements necessitate joint involvement. Adherence to project conditions and covenants with the exception of that dealing with environmental assessment, will be carried out unilaterally, i.e. without referring decisions of compliance or non-compliance to AID. For example, MIP's in excess of \$3.1 million will be approved by the AC and IDA, rather than the AC alone and will not be specifically reviewed by AID. With regard to IDA's periodic monitoring and progress review missions, AID will jointly participate with IDA. This means that there will not be special AID evaluations in the strictest sense.

With regard to procurement, contracts for civil works will be awarded on a local competitive basis. For the construction of new and the completion of on-going MIPs, contracts awarded on a unit price basis (principally small, "labor"-type contracts) will not exceed 30% of the total amount allocated for such construction. This limit will not be applied to modernization works for which unit price contracts are a desirable means of undertaking construction. Where dam safety or quality are overriding considerations, or the use of machinery (difficult to provide by some contractors) is required, force account rather than contractor services will be the preferred method of undertaking construction if qualified constructors are not available. Such force account work (not to exceed 10% of total project costs) would be carried out by the GOG's Irrigation Wing.

With respect to all contracts costing more than \$750,000 equivalent, IDA will review prior to the invitation of bids the specifications and bidding documents along with a description of advertising procedures to be followed. Modifications to these bidding documents will require IDA's concurrence. Prior to the award of a contract, the GOG will notify IDA the name of the prospective contractor and will also provide a report on the evaluation procedures used in reaching a final award decision. For contracts costing less than the above amount, the GOG will furnish IDA two conformed copies of executed contracts along with an analysis of the bids and the recommendations made for the contract award.

IDA's requirements regarding contractor procurement are not inconsistent with AID's requirements and are therefore satisfactory. Accordingly, AID will in almost all cases rely on IDA's determination that the procurement process as outlined above is followed by the GOG. IDA's role in the procurement process notwithstanding, AID does anticipate to at least review the GOG's contract formats and procedures. This will be the subject of final AID/GOI negotiations.

E. MONITORING AND EVALUATION

The World Bank credit will call for several monitoring and evaluation studies. Those consist of:

1. Public Works Department (PWD) monitoring of canal conveyance efficiencies in selected projects, comparing conveyance losses in lined and unlined canal systems;

2. Department of Agriculture (DA), with assistance from Gujarat Agriculture University (GAU), assessment of benefits resulting from the reduction of outlet blocks from 40 hectares to 8 hectares; and

3. An independent evaluation by an economic research institute of medium irrigation projects (MIPs) financed under the credit. This evaluation would build on bench mark agro-economic surveys to be conducted for each MIP command area by the Economics Department of Sadar Patel University, as well as on reports from studies done under (1) and (2).

For these studies to have maximum usefulness to on-going irrigation planning in Gujarat, they must closely mesh and be adequately staffed and funded. Part of AID's loan funds should be available to help fund such studies, if necessary. Technical personnel from USAID/India, and from AID/W if requested, should participate in a collaborative style with the GOI, the GOG, and the World Bank in design of the studies. If requested by the GOG and the GOI, outside technical assistance should be made available to Gujarat institutions for particular aspects of the studies. Such assistance should also be eligible for financing under the loan or with PDS funds.

It is particularly important that these studies provide an in-depth understanding of problems of on-farm water use -- i.e., of translating irrigation deliveries into agricultural production -- and identify alternative solutions to the constraints on efficient and equitable use of irrigation water on the farm. This might best be accomplished if one institution has lead responsibility from the outset in conceptualizing and coordinating the various studies. The IIM is perhaps in the best position to provide this kind of leadership. The lead institution would assure that a common sampling frame is used for all of the studies, that the individual studies complement and reinforce each other in terms of

information generated, and that an appropriate mix of disciplines and methods of inquiry are used in the overall set of studies.

In assuring a coordinated and focused set of studies, especially detailed attention might be given to a sample of watercourses in four to six MIP command areas. Baseline and on-going monitoring/evaluation analyses should be made of agro-technical and socio-economic factors on these watercourses. Agro-technical analyses would include measurements with and without channel lining of:

1. seepage losses in government channels;
2. actual and scheduled deliveries to government turnouts;
3. seepage losses in field channels beyond the government turnout;
4. field efficiency of water use (consumptive use/water applied); and
5. cropping patterns and yields.

Socio-economic analyses on the same watercourses should include quantitative and qualitative examination of:

1. farm budgets (income and expenses for agricultural operations);
2. farms sizes and tenancy patterns;
3. extent of holdings fragmentation;
4. institutional arrangements (formal and informal) for water distribution and watercourse maintenance; and
5. actual access of farmers to extension services, credit, land leveling services, fertilizer, seeds, pesticides, and other inputs and services which must accompany irrigation.

It is important that on-going field investigations of this sort -- combining technical and socio-economic analyses -- be conducted on a combined, coordinated basis on the same set of watercourses.

Gujarat's irrigation and agriculture departments should be deeply involved in the studies. A joint steering committee or board consisting of personnel from the Department of Agriculture, the Department of Irrigation and the respective research institution(s) could provide overall direction to the studies. A.I.D. and World Bank technical personnel should also be represented on this steering committee. In addition to its advisory role on study design, the committee could pass recommendations regarding funding for studies out of loan credits to GOG, GOI, AID, and World Bank MIP project management. Although specific amounts of A.I.D. loan funds need not be earmarked in advance for these studies, the loan agreement should indicate that loan funds will be used as necessary to accomplish these studies.

The above studies will constitute an on-going monitoring and evaluation process, with continuous feedback to project management to facilitate modifications in approach to the project as necessary over its life.

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OUTGOING
 TELEGRAM
 ANNEX A

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APPROVED BY AA/ASIA/INSULLIVAN

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TAGS:

SUBJECT: FY 78 GUJARAT MEDIUM IRRIGATION PROJECT: PID
 REVIEW

REF: PID PREPARED IN AID/M, NOVEMBER 1977

1. ON 14 NOVEMBER APAC REVIEWED PID PREPARED IN AID/M FOR SUBJECT PROJECT DURING COURSE OF REVIEW A NUMBER OF ISSUES WERE RAISED WHICH WILL REQUIRE FURTHER EXPLORATION BEFORE APAC WILL BE IN POSITION TO AUTHORIZE FINAL PREPARATION OF PP. APPROVAL AT THIS STAGE IS CONDITIONAL. THESE ISSUES WHICH ARE SUMMARIZED BELOW WERE FURTHER REVIEWED HERE WITH KNOWLEDGEABLE AID AND WORLD BANK PERSONNEL. CONCLUSION OF THIS EXERCISE WAS THAT IDY BY AID/M TECHNICAL PERSONNEL IN JANUARY WAS DESIRABLE TO EVALUATE THE PRINCIPAL UNANSWERED QUESTIONS ARISING OUT OF APAC AND START PRELIMINARY WORK ON PP. IN EVENT WE CANNOT PROCEED WITH GUJARAT IN FY 78, WE PROPOSE EXPLORING OPTION OF ACCELERATING SMALL FARMER DEVELOPMENT TO FY 78.

2. AS PRESENTLY CONCEIVED AID/M PROJECT WOULD PARALLEL WORLD BANK'S, AND PROJECT DEVELOPMENT WOULD DRAW HEAVILY UPON WORLD BANK'S APPRAISAL REPORT AND OTHER DATA AVAILABLE WITH WORLD BANK. AREAS OF PARTICULAR CONCERN TO AID SUCH

AS IMPACT OF PROJECT UPON MANDATE TARGET GROUPS AND IMPACT UPON ENVIRONMENT, PROJECT MONITORING, TRACKING OF AID FUNDS, EVALUATION, ETC., NOT FULLY ADDRESSED IN WORLD BANK REPORTS ARE EXAMPLES WHERE ADDITIONAL WORK WILL BE REQUIRED. CONCERN ALSO EXPRESSED THAT PROJECT BE BOTH REPLICABLE AND SUSTAINABLE, FACTORS OF PARTICULAR IMPORTANCE IN IRRIGATION PROGRAMS. AID/M WILL ARRANGE FOR TEAM OF AID AND/OR CONSULTANT PERSONNEL TO COLLECT REQUIRED DATA AND HELP DRAFT PP.

3. THE GUJARAT PROJECT AS PROPOSED WOULD BRING WATER TO THE EIGHT HECTARE LEVEL RATHER THAN TO THE 100 HECTARE

LEVEL, SIGNIFICANTLY SHORTENING THE DISTANCE BETWEEN THE TERMINUS OF THE PUBLIC IRRIGATION SYSTEM AND THE END USER. HOWEVER, WE NEED TO EXPLORE FURTHER WHETHER SHORTENING THE DISTANCE, COMBINED WITH OTHER GOI PROGRAMS TO ASSIST FARMERS IN THE AREA, WILL SOLVE THE PROBLEMS HISTORICALLY PREVENTING EQUITABLE USE OF PUBLIC IRRIGATION FACILITIES. WE HAVE NOTED FACT THAT IDA ANTICIPATES PROVIDING FINANCING DURING 1978 TO FOUR INDIAN STATES (INCLUDING GUJARAT) FOR UPGRADING THEIR AGRICULTURAL EXTENSION CAPABILITIES. THIS PROJECT IS BASED ON REPORTEDLY FAVORABLE EXPERIENCE OF GOI AND IDA IN OTHER STATES IN IMPROVING EXTENSION SYSTEM. WHETHER THIS COMPLEMENTARY EFFORT COUPLED WITH FARMER ACCESS TO ARDC CREDITS PROVIDED UNDER ANOTHER COMPANION IDA LOAN WILL SUFFICE IN ENSURING EFFECTIVE ON-FARM WATER AND OVERALL AGRICULTURAL MANAGEMENT IS TO BE CONFIRMED BY AID/M TEAM. PUT ANOTHER WAY, GUJARAT STATE HAS SUCCEEDED IN IRRIGATING ONLY FIFTEEN PERCENT OF ITS CULTIVABLE LAND TO DATE, WHILE OTHER STATES HAVE ACHIEVED MUCH HIGHER LEVELS. WILL THIS PROJECT ADDRESS THE OBSTACLES PREVENTING IRRIGATION OF MORE LAND IN GUJARAT?

4. APAC STATED THAT IT WOULD BE DESIRABLE FOR INDIVIDUAL IRRIGATION PROJECTS UNDERTAKEN UNDER THIS PROJECT TO BE SELF SUSTAINING; I.E., WITH WATER CHARGES AT LEAST COVERING O&M EXPENSES. THE LIKELIHOOD OF SUCH SELF-FINANCING WAS EXPLORED WITH IDA REPS, WHO INDICATED THAT A) THESE SYSTEMS ARE GENERALLY SUBSIDIZED IN THAT FULL CONSTRUCTION AND OPERATIONS COSTS ARE SELDOM COVERED BY STATUTORY WATER OR LAND BETTERMENT CHARGES AND B) WHATEVER CHARGES ARE COLLECTED ARE REALLOCATED THROUGH THE NORMAL BUDGETARY PROCESS. IN ANY EVENT PP SHOULD EXPLORE HOW TO ASSURE ADEQUATE FUNDING FOR O&M REQUIREMENTS, AND SHOULD EXAMINE GOI POLICY REGARDING WATER PRICING. LIKEWISE, COST SHARING FROM STANDPOINT OF FARMER PARTICIPATION IN AID COMMITMENT TO THE UNDERTAKING NEEDS TO BE CONSIDERED. SUCH COST SHARING MIGHT BE IN THE FORM OF LABOR, AS WELL AS FINANCIAL CAPITAL.

5. APAC EXPRESSED CONCERN THAT THE WATER SUPPLY IN GUJARAT MAY NOT BE SUFFICIENT TO SUPPORT ALL IRRIGATION PROJECTS CONTEMPLATED. THIS ITEM TOO WILL BE CAREFULLY REVIEWED, FIRST WITH APPROPRIATE AID AND WORLD BANK PERSONNEL, AND THEN BY EXPERTS ON LOCATION IF APPROPRIATE. THIS REVIEW WILL INCLUDE EXAMINATION OF EXISTING RESEARCH LITERATURE CONCERNING GUJARAT.

6. APAC ALSO EXPRESSED INTEREST IN BENEFIT INCIDENCE AND BEFORE AUTHORIZING FULL-SCALE PROJECT DEVELOPMENT, WISHES GREATER ASSURANCE THAT GUJARAT PROGRAM WILL BENEFIT SMALL FARMERS BOTH IN TERMS OF ABSOLUTE NUMBERS AND IN TERMS OF RELATIVE IMPACT ON SOCIAL AND ECONOMIC STATUS VIS-A-VIS LARGER FARMERS. APAC WOULD PREFER A SOCIO-ECONOMIC ANALYSIS OF REPRESENTATIVE GUJARAT MEDIUM IRRIGATION PROJECT IN PP. IDA HOWEVER, DOES NOT PLAN THIS TYPE OF ANALYSIS AND INSTEAD WILL UNDERTAKE DISTRICT-BY-DISTRICT COMPARISONS OF, AMONG OTHER THINGS, BENEFIT INCIDENCE. AID/M TEAM WOULD HELP DETERMINE IF THE PROPOSED IDA METHODOLOGY SATISFIES AID'S NEEDS AND WILL, IF NECESSARY, CONDUCT ITS OWN LIMITED ANALYSIS OF THE ECONOMIC, SOCIAL, AND FINANCIAL IMPACT OF THE GUJARAT PROGRAM ON SMALL FARMERS.

7. AT THIS TIME, WE ARE HOPEFUL OF SECURING EXPERT SERVICES FROM TA AND ENGR (I.E., AGRICULTURALIST, ECONOMIST AND HYDROLOGICAL ENGINEER) FOR TRAVEL TO INDIA IN JANUARY FOR 2-3 WEEKS. PROJECT WILL ALSO REQUIRE AN ENVIRONMENTAL ASSESSMENT. WILL ADVISE SEPARATELY RE PLANS FOR THIS ASSESSMENT. YOUR GENERAL CONCURRENCE AND COMMENTS ARE REQUESTED.

8. COPIES OF PID POUCHED.

9. IF YOU SEE NO PROBLEM WITH THIS APPROACH, WE SUGGEST YOU OBTAIN GOI CONCURRENCE IN PRINCIPLE TO PROCEED WITH PROJECT DEVELOPMENT. CHRISTOPHER

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INCOMING ANNEX B
TELEGRAM

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E.O. 11652: N/A

SUBJECT: GUJARAT MEDIUM IRRIGATION PROJECT-611 (E)
CERTIFICATION

FOLLOWING IS THE CERTIFICATION PURSUANT TO 611 (E) OF THE
FAA, AS AMENDED, FOR THE GUJARAT MEDIUM IRRIGATION PROJECT:

" I, ALFRED BISSET, PRINCIPAL OFFICER OF THE AGENCY FOR
INTERNATIONAL DEVELOPMENT IN INDIA, HAVING TAKEN INTO
ACCOUNT, AMONG OTHER THINGS, THE MAINTENANCE AND
UTILIZATION OF PROJECTS IN INDIA PREVIOUSLY FINANCED OR
ASSISTED BY THE UNITED STATES, DO HEREBY CERTIFY THAT
IN MY JUDGMENT INDIA HAS THE FINANCIAL AND HUMAN
RESOURCES CAPABILITY TO IMPLEMENT, MAINTAIN AND
UTILIZE EFFECTIVELY THE PROPOSED GUJARAT MEDIUM
IRRIGATION PROJECT LOAN.

SIGNED: ALFRED BISSET, AID AFFAIRS OFFICER, INDIA

4/5/78

GOHEEN

UNCLASSIFIED

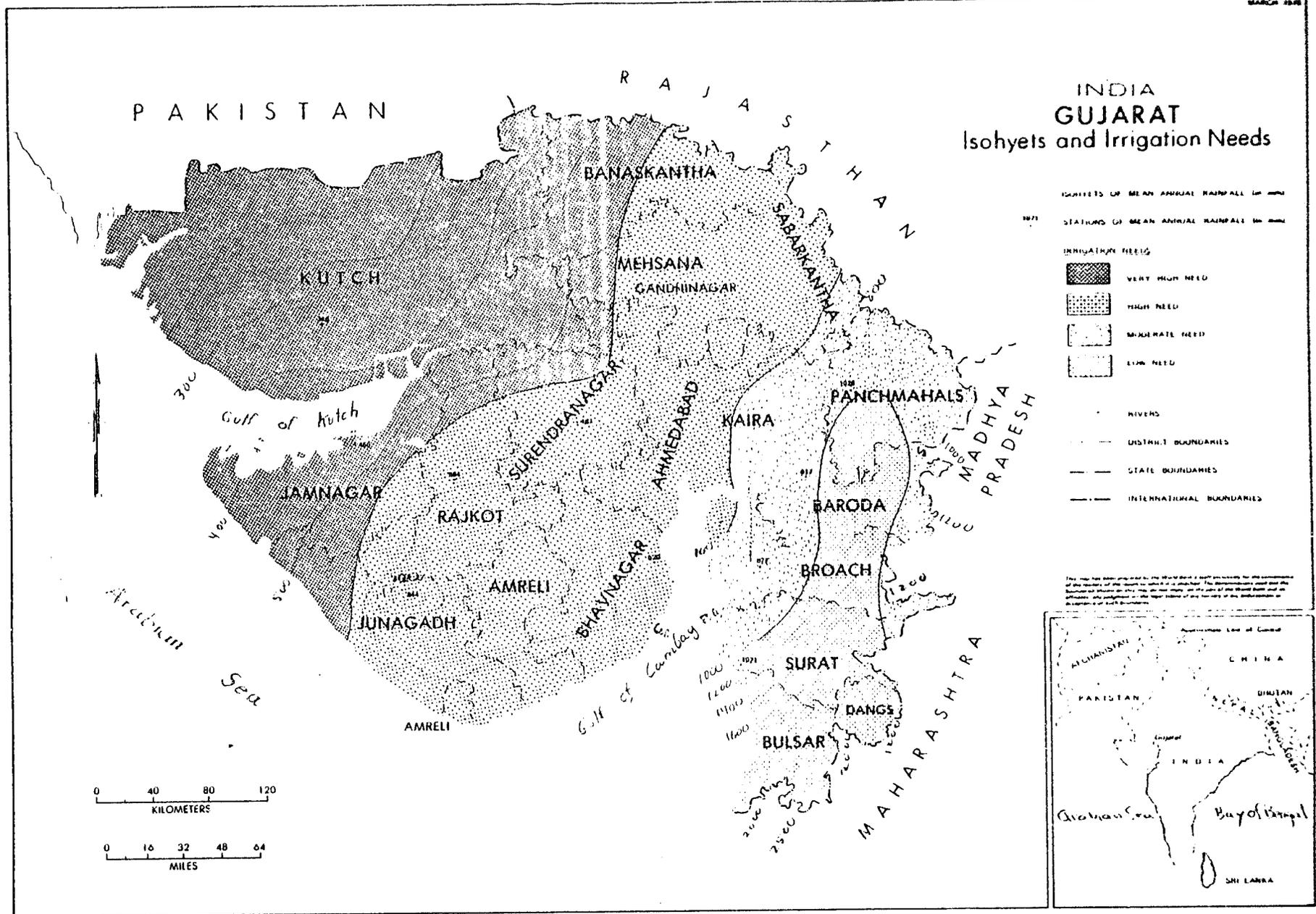
INDIA

GUJARAT MEDIUM IRRIGATION

Farm Characteristics - District-wise (1971)

	Persons per Cultivated ha	Farm Size		Irrigation			
		Average	Median	Canals	Groundwater	Others	Total
		(-----ha-----)	(-----ha-----)	(-----% of Net Cultivated Area-----)			
Kutch	0.94	6.5	4.4	0.7	5.6	0.3	6.6
Banaskantha	<u>1.28</u>	<u>6.2</u>	<u>4.3</u>	<u>0.9</u>	<u>8.9</u>	<u>0.3</u>	<u>10.1</u>
Zone I	1.13	6.4	4.4	0.8	7.5	0.3	8.6
Jamnagar	1.18	7.3	6.2	0.6	7.4	0.1	8.1
Rajkot	1.31	7.1	5.9	2.0	11.5	0.5	14.0
Surendranagar	0.87	8.4	6.7	1.2	4.9	0.2	6.3
Bhavnagar	1.50	6.7	5.2	1.8	6.9	0.0	8.7
Amreli	1.32	6.4	5.0	0.7	8.1	0.0	8.8
Junagadh	<u>1.89</u>	<u>5.5</u>	<u>4.5</u>	<u>0.4</u>	<u>16.6</u>	<u>0.3</u>	<u>17.3</u>
Zone II	1.34	6.8	5.5	1.2	9.2	0.2	10.6
Broach	1.99	3.7	2.4	0.2	4.1	0.3	4.6
Surat	2.63	3.0	2.0	8.8	3.0	1.0	12.8
Bulsar	3.89	1.8	1.0	2.7	1.7	1.2	5.6
Dangs	<u>1.67</u>	<u>5.0</u>	<u>4.0</u>	<u>0.0</u>	<u>0.2</u>	<u>0.0</u>	<u>0.2</u>
Zone III	2.66	2.9	1.8	3.5	3.0	0.7	7.2
Kaira	3.72	1.8	1.1	8.0	7.8	0.7	16.5
Panchmahals	3.24	2.6	1.9	1.7	1.0	0.1	2.8
Baroda	<u>2.51</u>	<u>3.0</u>	<u>2.0</u>	<u>0.9</u>	<u>9.8</u>	<u>1.1</u>	<u>11.8</u>
Zone IV	3.15	2.4	1.6	3.7	6.0	0.6	10.3
Sabarkantha	2.23	2.9	1.9	0.6	10.5	0.9	12.0
Manesana	2.39	2.9	1.9	0.5	19.6	1.3	21.4
Gandhinagar	3.32	2.4	1.6	0.0	16.6	0.1	16.7
Ahmedabad	<u>1.53</u>	<u>5.0</u>	<u>3.0</u>	<u>4.0</u>	<u>6.1</u>	<u>1.4</u>	<u>11.5</u>
Zone V	2.09	3.3	2.2	1.7	12.6	1.2	15.5
GUJARAT	1.89	4.1	2.5	1.8	8.3	0.6	10.7

MARCH 1958



STATE
XXXXXXXXXX PROJECT
PROJECT SUMMARY

Date Approved by CWC:
Approving Officer:
Project Summary Prepared by:

I. SALIENT FEATURES OF THE PROJECT

General

District/s in which project is located:
Name of River
Size of Catchment Area: km^2
Size of Cultivable Command Area: ha

Hydrology

Rainfall: Number of years of records inside project area
Number of years of records from station _____ which is located
_____ km from project area: .
Streamflow: Number of years of current meter measurements:
Number of years of other streamflow measurements:
Number of years of reconstituted streamflow for reservoir
operations study:
Reservoir Capacity: Total Storage: _____ m^3
Live Storage: _____ m^3 or _____ % of average
annual runoff

Irrigation

Conveyance efficiency: Main canal operating full (80% to 100% of capacity):
_____ %
Main canal operating at less than 80% of capacity:
_____ %
Field irrigation efficiency: Paddy: _____ %
Upland Crops: _____ %
Assumed Percolation Losses in Paddy Fields: _____ mm/day
Irrigated Areas: Kharif, paddy: ha or _____ % of CCA
Kharif, upland: ha or _____ % of CCA
Rabi, paddy: ha or _____ % of CCA
Rabi, upland: ha or _____ % of CCA
Sugarcane: ha or _____ % of CCA

Full kharif irrigation requirements would be provided _____ years out of 100.

Costs and Benefits

Total Project Cost: Rs _____ million
Benefit Cost Ratio:

(Subsequent Pages of the Project Summary would contain, at least, the following headings)

II. THE PROJECT AREA

Climate

(Most of the information would be in ANNEX 1, need not be summarized.)

Topography and Soils

(Summarize the conclusions of the soil survey. Discuss the land classification, Drainage problems. Need for land leveling/shaping.)

Population, Farm Sizes and Land Tenure

(Population within the gross command area. Land less population. Summarize the results of the relevant parts of the agro-economic survey.)

Agriculture

(Summarize the agricultural results of the agro-economic survey. Yields, cropping patterns, use of fertilizers and high yielding varieties.)

III. THE PROJECT

General

(Brief summary of the proposed works, size of CCA, etc.)

Water Supply, Demand and Quality

(Rainfall, hydrology and reservoir yields. Catchment area. Water demand and release curves for water releases from the dam. Reservoir storage capacity calculations. Results of reservoir operations. Study would be summarized in ANNEX 2.

Dam

(Description of dam site geology and design parameters of the dam.)

Irrigation and Drainage Network

(Description, design parameters, control structures, communication system.)

VI. PROJECT IMPLEMENTATION

Construction Organization

(Describe in detail the proposed organization for project implementation.)

Equipment Requirements

(List either in text or in an ANNEX.)

Implementation Schedule and Schedule of Expenditures

(Bar chart would be attached in ANNEX 3. The schedule of expenditures should have taken the projected price increases into account. A simple chart showing accumulated expenditures would be in ANNEX 4.)

Resettlement. (Comment on plans for resettlement of displaced persons)

VII. BENEFITS AND JUSTIFICATION

Agricultural Development

(Discussed the proposed cropping pattern against the background of the soil survey and land classification. Discuss any constraints to the agricultural development of the area.)

Benefit Matrix

(First discuss adjustments made to the financial costs in order to achieve the economic costs. Second, show the complete benefit matrix.)

VIII. RECOMMENDATIONS

(Does the project conform with the established criteria? Is it approved by CWC or does it have to be submitted to IDA for approval?)

- ANNEX 1: Climatic Data
- ANNEX 2: Summary of Reservoir Operations Study
- ANNEX 3: Implementation Schedule (Chart)
- ANNEX 4: Schedule of Expenditures (Chart)

- MAP 1: Project Area (showing dam, irrigation and drainage network, recommended scale 1:10,000 with 0.5 in contour intervals);
- MAP 2: Land classification;
- MAP 3: Large scale map of dam and typical cross sections;
- MAP 4: Length section of main canal showing off-takes, cross regulation and escapes;
- MAP 5: Typical layout of distributary with turnouts and the area commanded under each turnout.

ANNUAL IMPLEMENTATION PROGRAM: 19

PART 1: GENERAL INFORMATION

State:
Number of Projects under Preparation:
Number of Projects under Implementation:
Number of Projects under Operation:
Total World Bank Funds Available for Program: US\$ million
Total Disbursements to Date: US\$ million
Report Prepared by:
Dates When the Implementation Program was Discussed with State Officials:
CWC Staff Participating in Discussions:

PART 2: PROGRESS PREVIOUS YEAR

Project Preparation

	19	19
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems;	_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorating;	_____	_____
Types of Problems: (Enter Most critical factor first)	_____	_____
F-Financial/Budgetary; M-Manegeterial; T-Technical;	_____	_____
O-Other, Specify;		
C-Non-Conformity with World Bank Criteria, specify;		

Project Implementation

	19	19
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems;	_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorating;	_____	_____
Types of Problems: (Enter Most critical factor first)	_____	_____
F-Financial/Budgetary; M-Manegeterial; T-Technical;		
O-Other, specify;		
C-Non-Conformity with World Bank Criteria, specify:		

General Comments:

(One or two pages describing overall progress in preparation and implementation of MMIPs, mentioning principal problem encountered, issues raised, and highlights concerning project execution, costs and budgetary allocations and implications for the implementation of next years program.)

PART 3: GENERAL COMMENTS REGARDING THE IMPLEMENTATION PROGRAM FOR 19__
(Including summary of projected quarterly expenditures for each project.)

PART 4: PROGRAMS FOR INDIVIDUAL PROJECTS

Project 1

(A short summary of key events for the following year. Exhibit 1 from the "Supervision Summary" should be updated and attached. Comments on the feasibility of the proposed schedule.)

Project 2 etc.

:

PROGRESS REVIEW : PREPARATION

PART 1: GENERAL INFORMATION

Project Name:

State:

Probable Size of Command Area: ha

Probable Project Cost: Rs million

Probable Month for Submission of Project Report to CWC:

Supervision Report Prepared by:

PART 2: MISSION SCHEDULE

	Dates at Project Site		Dates in State	
	Fr	To	Fr	To
Present Mission				
Previous Mission				

Staff Participating in Present Mission:

PART 3: OVERALL PROGRESS

	<u>Present Mission</u>	<u>Previous Mission</u>
Estimated Month for Completion of Project Preparation	_____	_____
Probable Project Cost (Rs million)	_____	_____
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems:	_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorating;	_____	_____
Types of Problems: (Enter Most critical factor first)		
F-Financial/Budgetary; M-Managerial; T-Technical	_____	_____
O-Other, specify:		
C-Non-Conformity with World Bank Criteria, specify:		

General Comments:

(One page describing overall progress in project preparation, mentioning principal problem encountered, issues raised, and highlights concerning project preparation, costs and budgetary allocations.)

PART 4: DETAILED PROGRESS

(This part of the report should at least include the following headings:

- (i) Agroeconomic surveys;
- (ii) soil surveys;
- (iii) topographical surveys;
- (iv) geological investigations;
- (v) preliminary designs;
- (vi) cost estimates and construction schedule;
- (vii) plans for implementation and operation and maintenance; and
- (viii) report preparation.

A chart in the form of Exhibit 1 should be attached to the report; it will compare the actual progress with the original program. Other charts covering specific project preparation activities may also be attached.)

PROJECT PREPARATION

Suggested Method of Preparation

Progress Report
Month of 19

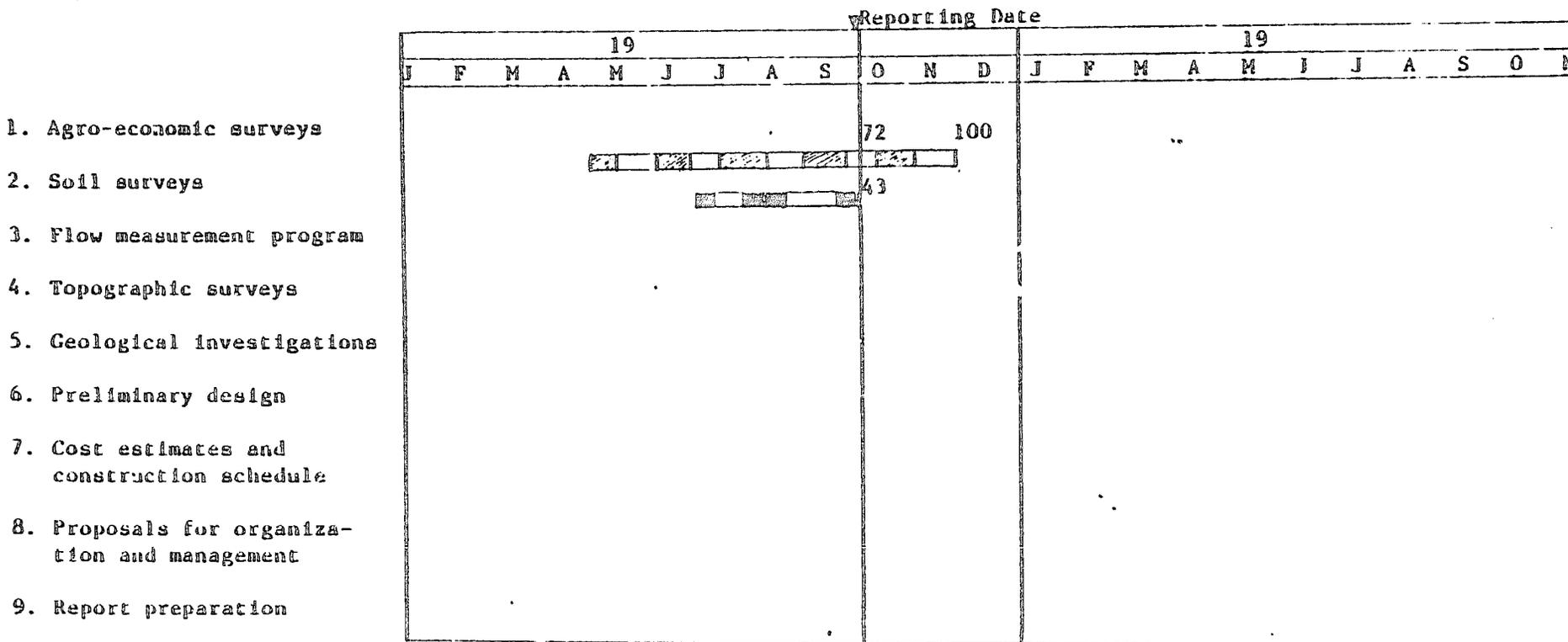


Chart Key. Scheduled work programs for each item in the schedule are shown on a line scale by a double line divided into alternately hatch shaded sections [▨▨▨▨▨▨], each section representing 10% of the physical work to be performed. As work need not be scheduled for even distribution in time, the length of sections of a bar need not be uniform even though each represents equal amounts of work. Actual progress is shown by a parallel double line similarly divided into alternately full shadowed sections [▣▣▣▣▣▣], each also representing 10% of the work. The percentage completion at the reporting date is given at the right hand end of progress lines. Commissioning dates are indicated by the symbol CD . In case scheduled programs should be revised, the first report being prepared after such revision goes into effect should show both the bar program being abandoned and the new one being adopted in its place. The reasons for such changes, and estimates of their effect on the overall completion of the project should be stated in the text of the report.

PROGRESS REVIEW : IMPLEMENTATION

MEDIUM IRRIGATION PROJECTS

PART 1: GENERAL INFORMATION

Project Name:

State:

Size of Command Area: ha

Estimated Project Cost at Appraisal: Rs million

Date Approved by CWC:

Supervision Report Prepared by:

PART 2: MISSION SCHEDULE

	Dates at Project Site		Dates in State	
Present Mission	Fr	To	Fr	To
Previous Mission	Fr	To	Fr	To

Staff Participating in Present Mission:

PART 3: OVERALL PROGRESS

	<u>Appraisal</u>	<u>Present Mission</u>	<u>Previous Mission</u>
Estimated Month of Project Completion	_____	_____	_____
Estimated Project Cost (Rs million)	_____	_____	_____
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems;		_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorating;		_____	_____
Types of Problems: (Enter Most critical factor first) F-Financial/Budgetary; M-Maneagerial; T-Technical; O-Other, specify: C-Non-Conformity with World Bank Criteria, specify:		_____	_____

General Comments:

(One or two pages describing overall progress in project implementation, mentioning principal problem encountered, issues raised, and highlights concerning project execution, costs and budgetary allocations)

(Subsequent pages of the "Supervision Summary: Implementation" should cover the following:)

PART 4: CONFORMITY WITH WORLD BANK CRITERIA

(Does the construction conform with the established criteria? If not, give reasons and actions taken.)

PART 5: DESIGNS, SURVEYS AND INVESTIGATIONS

(Progress, bottlenecks, if any, and remedies.)

PART 6: TENDERING AND AWARDS OF CIVIL WORKS CONTRACTS

(Details on preparation of tender documents, issue of tenders, contracts awarded and comparison between contract cost and engineering estimates.)

PART 7: FORCE ACCOUNT WORKS

(Description of works carried out under force account, reasons why force account works are executed, performance.)

PART 8: PROCUREMENT OF MATERIALS AND EQUIPMENT

(Progress, bottlenecks, if any, and remedies.)

PART 9: CONSTRUCTION PROGRESS

(A brief description on the construction progress during the reporting period. A chart in the form of Exhibit 1 should be attached to show scheduled and actual progress for each principal project feature. A comparison of the total accumulated anticipated expenditures vis-a-vis the actual expenditures should be provided in a form as shown in Exhibit 2. Explanations of and comments on:

- (a) actual or expected material deviations from the original (or amended) construction schedule;
- (b) actual or expected difficulties or delays, any measures taken or planned to correct them, and the probable effects on the construction schedule;
- (c) expected changes in the completion date of any major part of the project or the project as a whole;
- (d) any actual or expected event or condition which may affect the cost of the project.)

PART 10: LABOR SITUATION

(Approximate total laborforce, description of problems, if any, and remedies.)

PART 11: PROJECT MANAGEMENT

(Performance of project management, changes in key personnel, staff problems and vacancies.)

PART 12: BUDGETARY SITUATION

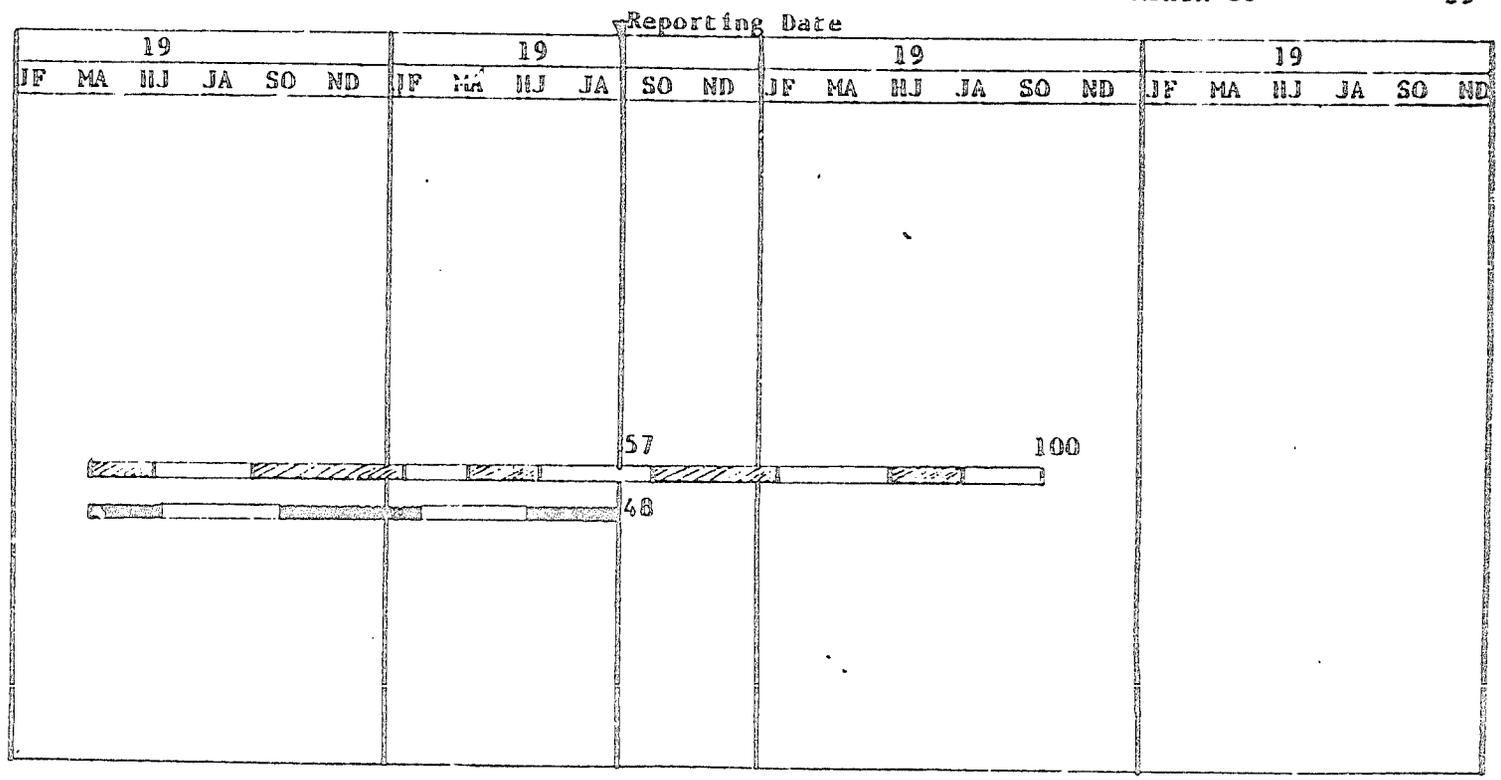
(Details of changes in budget allocation for the project, adequacy of budget allocation for the completion of the project in accordance with the time schedule.)

CONSTRUCTION SCHEDULE

Suggested Method of Presentation

Progress Report
Month of _____ 19__

- 1. Land Aquisition
- 2. Access Roads and Camps
- 3. Engineering and Design
- 4. Dam: Earthwork
Structures
- 5. Diversion Weir
- 6. Main Canals
- 7. Branch Channels
- 8. Distributaries
- 9. Roads
- etc.



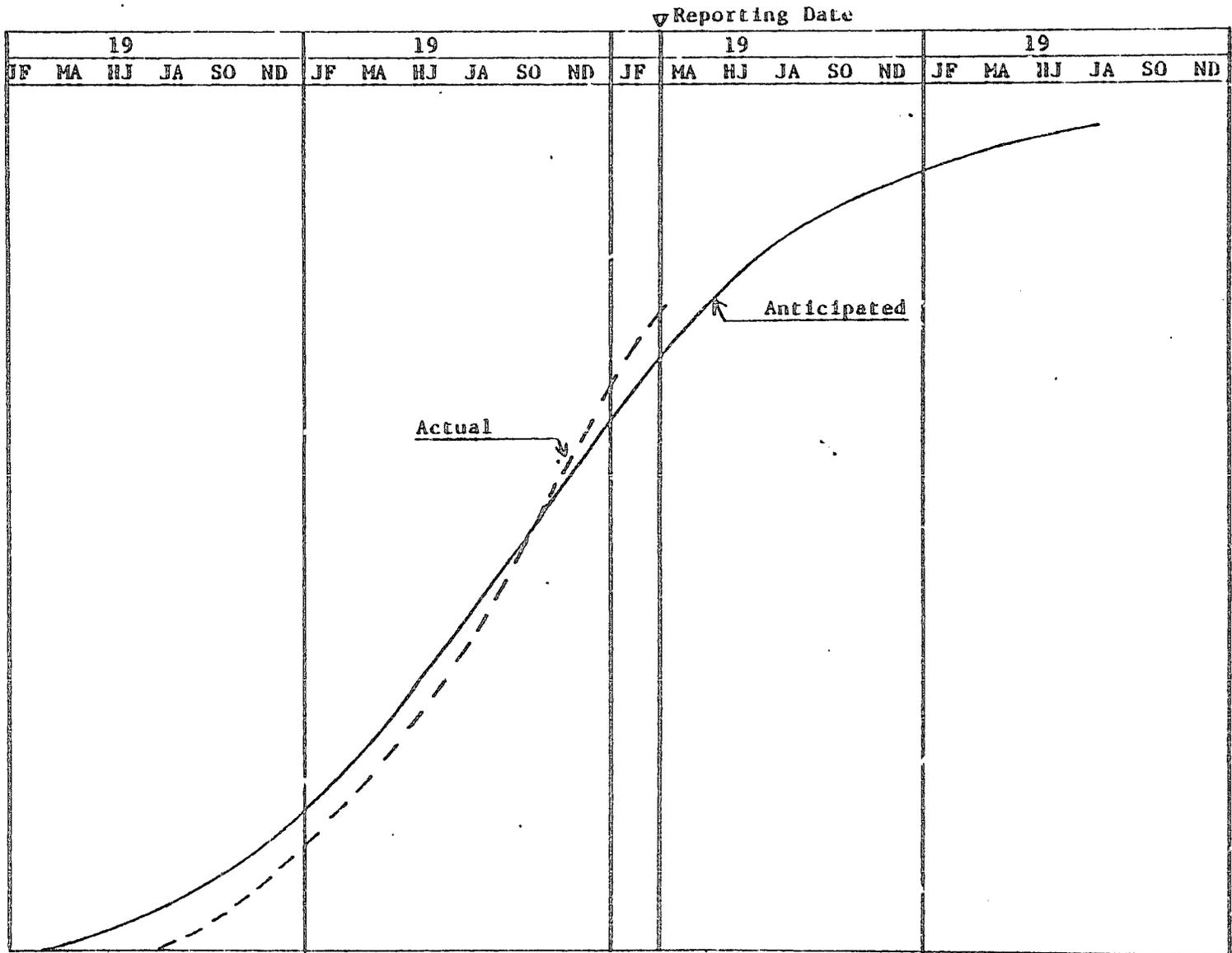
Revision in Schedule of Program

- Date
- 1.
 - 2.
 - 3.
 - 4.

Chart Key. Schedule work programs for each item in the schedule are shown on a line scale by a double line divided into alternately hatch shaded sections [▨▨▨▨▨], each section representing 10% of the physical work to be performed. As work need not be scheduled for even distribution in time, the length of sections of a bar need not be uniform even though each represents equal amounts of work. Actual progress is shown by a parallel double line similarly divided into alternately full shaded sections [▢▢▢▢▢], each also representing 10% of the work. The percentage completion at the reporting date is given at the right hand end of progress lines. Commissioning dates are indicated by the sumble CD. In case scheduled programs should be revised, the first report being prepared after such revision goes into effect should show both the bar program being abandoned and the new one being adopted in its place. The reasons for such changes, and estimates of their effect on the overall completion of the project should be stated in the text of the report.

SCHEDULE OF ACCUMULATED ANTICIPATED AND ACTUAL EXPENDITURES

Suggested Method of Presentation



Accumulated
anticipated and
actual expendi-
tures (in min
Rs)

PROGRESS REVIEW : OPERATION

PART 1: GENERAL INFORMATION

Project Name:
 State:
 Size of Command Area: ha
 Actual Project Cost: Rs million
 Date Approved by CWD:
 Date of First Release of Water:
 Date of Completion:
 Supervision Report Prepared by:

PART 2: MISSION SCHEDULE

	Dates at Project Site		Dates in State	
	Fr	To	Fr	To
Present Mission				
Previous Mission				

Staff Participating in Present Mission:

PART 3: OPERATION SUMMARY

	<u>This Year</u>	<u>Previous Year</u>
Area Irrigated in Kharif: Upland Crops	_____ ha	_____ ha
(Months:) Lowland Crops	_____ ha	_____ ha
Area Irrigated in Rabi: Upland Crops	_____ ha	_____ ha
(Months:) Lowland Crops	_____ ha	_____ ha
Area Irrigated in Hot Season: Upland Crops	_____ ha	_____ ha
(Months:) Lowland Crops	_____ ha	_____ ha
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems;	_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorat- ing;	_____	_____
Types of Problems: (Enter Most Critical factor W-Inadequate Inflow to Reservoir; M-Managerial; T-Technical; O-Other, specify: C-Non-Conformity with World Bank Criteria, specify:	_____	_____

General Comments:

(The overall irrigation supply situation. What is the supply situation in tail-end areas? When the irrigation schedule and the water allocation plan adequate? Complaints from farmers? Measured seepage losses in main canals and distributaries.)

PART 4: RESERVOIR OPERATIONS

Month 1 2 3 4 5 6 7 8 9 10 11 12

Area Rainfall
Inflow to Reservoir
Irrigation Releases
Spills

General Comments:
(Where releases.)

PART 5: MAINTENANCE

	<u>This Year</u>	<u>Previous Year</u>
Status: 1-Problem Free or Minor Problems; 2-Moderate Problems; 3-Major Problems	_____	_____
Trend: 1-Improving; 2-Stationary; 3-Deteriorating;	_____	_____
Types of Problems: (Enter Most critical factor first) F-Financial/Budgetary; M-Managerial; T-Technical; O-Other, specify: C-Non-Conformity with World Bank Criteria, specify:	_____	_____

General Comments:
(Are project works maintained properly? Where in the system are the problems most critical? Maintenance works carried out during the year. Equipment for maintenance.)

PART 6: STAFFING

(Staffing schedule of the project showing the various categories of staff employed and their number. Performance of key staff. Is the staff availability adequate for proper operation and maintenance?)

PART 7: O&M COST AND BUDGETARY SITUATION

(Breakdown of expenditures for O&M. Budget allocation. Is the budget adequate for proper O&M.)

PART 8: AGRICULTURAL DEVELOPMENT

(Project area yields. Constraints to agricultural development such as supply of credit and cash inputs, draft power, farm labor. Need for land leveling/shaping. Water distribution below the turnouts.)

TABLE

UNIVERSAL MEDICAL CORPORATION PROJECT PROFILE

Form for Establishing Economic Viability of Medium Irrigation Project

	Area (ha) (I)	Benefit Factor (C ₂ /ha) (II)	Irrigated Benefits (C ₁) (III)	Rainfed (IV)	Total (V)
BENEFITS					
A. With Project Cropping Pattern					
<u>Shaded Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Rabi Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Hot Weather Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
<u>Disseasonal Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Perennial Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Partly Irrigated 1	-----	X	-----	-----	-----
Partly Irrigated 2	-----	X	-----	-----	-----
Unadjusted Benefits with Project from Irrigated and Rainfed Crops					
Adjustment Factor for Rainfed Crops 1/					
Adjusted Benefits with Project (1)					
B. Present Cropping Pattern (Without Project)					
<u>Shaded Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Rabi Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Hot Weather Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
<u>Disseasonal Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Rainfed 1	-----	X	-----	-----	-----
Rainfed 2	-----	X	-----	-----	-----
<u>Perennial Crops</u>					
Irrigated 1	-----	X	-----	-----	-----
Irrigated 2	-----	X	-----	-----	-----
Partly Irrigated 1	-----	X	-----	-----	-----
Partly Irrigated 2	-----	X	-----	-----	-----
Unadjusted Benefits with Project from Irrigated and Rainfed Crops					
Adjustment Factor for Rainfed Crops					
Adjusted Benefits with Project (2)					
C. Economic Benefits from Project (3) = (1) - (2)					
COSTS					
Basic Project Cost (4)					
Adjustment Factor for Implementation Period (5) 2/					
Adjusted Project Cost (6) = (4) x (5)					
BENEFIT/COST RATIO (7) = (3)/(6)					

1/ Correction Factor Cor: Zone 1 = 0.67
 (Applied to Rainfed Benefits from Rainfed Crops)
 Zone 2 = 0.90
 Zone 3 = 1.00
 Zone 4 = 1.00
 Zone 5 = 1.00

2/ Correction Factor Cor: 5 Years = 1.00
 (Applied to Basic Project Cost) 4 Years = 0.94
 3 Years = 0.89

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: 83
From FY 78 to FY
Total U. S. Funding
Date Prepared: 3/14/78
Loan: \$30 MILLION

ANNEX C

Project Title & Number: Gujarat Medium Irrigation - India

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																																								
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <ol style="list-style-type: none"> Increase level & security of Small Farmer Income. Expand rural employment opportunities. Increased availability of food to rural & urban poor. 	<p>Measures of Goal Achievement:</p> <ol style="list-style-type: none"> Income increased 5 to 6 times over present levels. Increased employment: New MIPs Improved MIPs a. Farm 9,000 jobs 4,000 jobs b. Non-" 11,000 " 4,000 " Food grain & oilseed use in Gujarat & other Indian states. 	<ol style="list-style-type: none"> Farms & rural area baseline and follow-on surveys done as part of eval. plan. Government statistics on food consumption and prices. 	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> GOI/GOG maintains agricultural price policies which are favorable to small farmers. Changed production practices are labor demanding and not labor displacing. Construction activities of MIPs continue to use labor intensive methods. Present land ceilings are maintained. New ag processing facilities to handle increased ag production are located in rural area. Market & storage network remains adequate for increased production. 																																																																								
<p>Project Purpose:</p> <ol style="list-style-type: none"> Increase food production in Gujarat. Decrease the risk of drought. 	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> Food grain production increased by approx.: a. 102,000 tons - new MIPs b. 40,000 tons - Improved MIPs TOTAL: 142,000 tons Increased oilseed production... 32,000 tons. Reduced variability of food production. 	<ol style="list-style-type: none"> Farm surveys done as part of eval. plan. Gujarat crop statistics by District. 	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> Credit available at reasonable rates. Technological inputs remain accessible and at reasonable prices. Ag extension system strengthened thru separate World Bank loan. Ag & Irrigation Depts. coordinate activities well. Reservoir releases managed to minimize the kharif planting risks. 																																																																								
<p>Outputs:</p> <ol style="list-style-type: none"> Increased acreage under irrigation in the state of Gujarat. <ol style="list-style-type: none"> New MIPs constructed. Improvement modernization of existing MIPs. Network of automatic discharging measuring stations. Agricultural plans for each MIP completed. 	<p>Magnitude of Outputs: (Estimated) Acres)</p> <table border="1"> <tr> <td>1. (a+b) #Projects</td> <td>Irrigated Ha.</td> </tr> <tr> <td>- New MIPs: 13</td> <td>80,000 (200,000)</td> </tr> <tr> <td>- Improved: 20</td> <td>69,000 (173,000)</td> </tr> </table> <ol style="list-style-type: none"> Measuring stations established. Agricultural plans prepared for each MIP. 	1. (a+b) #Projects	Irrigated Ha.	- New MIPs: 13	80,000 (200,000)	- Improved: 20	69,000 (173,000)	<ol style="list-style-type: none"> Irrigation Dept. records. Review of baseline agro-econ. surveys and ag. plans for 2ach MIP area. Gujarat irrigated acreage statistics by district. 	<p>Assumptions for achieving outputs:</p> <ol style="list-style-type: none"> GOG engineering & contract mgnts capability adequate. Adequate number of feasible projects can be identified. Private contracting capability is adequate. 																																																																		
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Development of Benefit Matrix for Medium Irrigation Projects *

General

The medium irrigation projects (MIPs) would be appraised and approved by the AC of CWC within a free limit of Rs 70 M. In order to ensure that assumption of yields, inputs and prices are uniform and realistic and that projects financed by the IDA credit are economically viable, a benefit matrix, developed by IDA would be applied to the economic evaluation of projects submitted to the AC for approval.

Based on field visits and analyses of available climatic and agro-economic data, the following conclusions have been drawn:

- (i) the variations in rainfall and soil types between different parts of the State are reflected in both yields and cropping patterns under rainfed conditions;
- (ii) under irrigated conditions, the yields differ relatively little from one agro-climatic zone to another; however, there are relatively large variations in the irrigated cropping patterns of various zones; and
- (iii) for the purpose of evaluating MIPs, the State can broadly be divided into five agro-climatic zones.

Consequently, the benefit matrix has been designed to accommodate local variations in cropping patterns, both under "with project" and "without project" conditions. The "without project" cropping pattern would be derived from a survey of the present cropping pattern in the MIP area. The "with project" cropping pattern would be projected by the local agricultural staff and reviewed by the Project Preparation Committee (see para 6.10). Recommended ranges for the area under the major crops have been developed by IDA to guide AC in its appraisal of individual MIPs. The ranges have been specified for the five agro-climatic zones.

The benefit factors for each irrigated and rainfed crop are based on standardized yield and input assumptions that reflect the "average" situation in Gujarat. Differences in the yield levels between the agro-climatic zones are taken into account through an adjustment of the total benefits accruing from rainfed crops in the project area, both with and without the MIP.

Basic Assumptions

Yields and Crop Input Requirements. The State-wide average irrigated and rainfed yields in a year with normal rainfall are shown in SAR,

Annual, T-15. ^{1/} The same table also gives the projected future yields and the input requirements and economic crop budgets.

Prices. Economic prices and conversion factors of agricultural outputs, inputs and construction costs are discussed in Chapter IV.

Discounting Factor. A 12% interest has been chosen in the development of benefit matrix as this rate approximately represents the opportunity cost of capital in India. The final year of the construction period is chosen as the base year for discounting purpose.

Build-up Rates. In order to take into account the time perspective of yield development, build-up rates have been estimated for each crop under each situation (rainfed, irrigated). Full development of project benefits is projected to be reached six to seven years after completion of the MIP. Rainfed yields and yields of irrigated crops in the "without project" situation have similarly been assumed to grow -- at a constant annual rate -- for about six or seven years after.

Construction Costs. The annual rate of implementation of MIPs has been assumed as follows:

<u>Year</u>	<u>Implementing Period</u>		
	<u>5 Years</u>	<u>4 Years</u>	<u>3 Years</u>
	<u>Percent of Construction Costs Incurred Each year (%)</u>		
-4	9	13	22
-3	21	31	46
-2	30	35	32
-1	25	21	-
0	15	-	-

The discounted end value of the construction costs (K_0) can be

$$K_0 = k_0 \times CCF \times C = \sum_{i=-4}^0 \frac{P_i \times C \times CCF}{(1+r)^i} \quad (1)$$

^{1/} The monsoon rainfall has a large influence on both rainfed and irrigated yields. Because of the variability of the rainfall, the present yields for the major crops have been estimated by fitting an exponential trend line to the State-wide yields over the last decade. (However, the extreme drought years of 1972/73 and 1974/75 severely distort the trend and they have, thus, been excluded from the regression analysis.

ANNEX H

Where k_0 = a constant, the value of which depend on the construction period

CCF = construction conversion factor (CCF = 0.75; see Chapter IV)

C = total construction cost at financial prices

i = years

P_i = percent of construction cost spent in year i

r = the interest rate (12%)

For a 5-year construction period: $k_{05} = 1.243$
 4-year construction period: $k_{04} = 1.173$
 3-year construction period: $k_{03} = 1.111$

Benefit Factors

The crop specific benefit factors, expressed in rupees per hectare, are based on the discounted net present value (NPV) of the future production benefits from one hectare under the crop. Certain adjustments have been made to the discounted NPV in order to simplify the application of the benefit matrix for project evaluation. These adjustments are discussed below.

A project is economically viable if the discounted benefits are higher than the discounted costs:

$$\sum_c (A_c \times \sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i}) - \sum_c (B_c \times \sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i}) > \sum_{i=0}^0 \frac{P_i \times C \times CCF}{(1+r)} \quad (2)$$

Production with project	Production without project	Construction cost
-------------------------	----------------------------	-------------------

Discounted benefits derived from project

In addition to variables defined in para 19, the following variables are used in formula (2):

c = index for crops

A^c = area under crop c with project

B^c = area under crop c without project

b_i^c = net economic benefit in year i of one hectare under crop c

Formula (2) can be combined with formula (1):

$$\sum_c (A_c * \sum_{i=1}^{50} \frac{b_i}{(1+r)^i}) - \sum_c (B_c * \sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i}) > k_o * CCF * C$$

Divide both sides with $(k_o * CCF)$, which gives:

$$\sum_c (A_c * \sum_{i=1}^{50} \frac{b_i}{(1+r)^i} / (k_o * CCF)) - \sum_c (B_c * (\sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i} / (k_o * CCF))) > C \quad (3)$$

Define

$$X_c = (\sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i}) / (k_o * CCF) \quad (4)$$

22. The X_c , as defined in formula (4) above, is equal to the discounted value of all future production benefits from one hectare under crop c, adjusted to take the shadow pricing of construction cost and construction period into account. However, as noted in para 9, the value of k_o depends on the implementation period. Most MIPs would be implemented over a five-year period, which gives $k_o = 1.243$.

The benefit factor for crop C is defined as:

$$F = (\sum_{i=1}^{50} \frac{b_i^c}{(1+r)^i}) / (1.243 + 0.75) \quad (5)$$

Formula (3) can now be rewritten as:

$$\sum_c A_c * F_c - \sum_c B_c * F_c > K' * G$$

Total production benefits with project	Total production benefits without project	Adjusted project cost

Net benefits due to project (B)

The factor K' represents an adjustment for implementation periods shorter than five years. For four and three year implementation periods, K' is 0.94 and 0.89, respectively.

The benefit/cost (B/C) ratio for an IMP is:

$$B/C - \text{ratio} = \frac{\sum_c A_c * F_c - \sum_c B_c * F_c}{K' * C}$$

A summary of benefit factors for future with and without project conditions is presented in SAR, Annex 1, T-19. The discounted value of future agricultural production would be established by multiplying the "future with project" and present (approximation for the "future without project") cropping patterns with the relevant benefit factors. The difference between "with" and "without" production values would give the discounted net benefit of the project, which would be divided by the adjusted capital cost to obtain the benefit/cost ratio. A B/C-ratio above 1.0 indicates that the MIP is economically viable.

Adjustments to Benefit Factors

There are significant variations in yields between the different agro-climatic zones. Ideally, benefit factors should be developed for each crop in each zone. However, the available agro-economic data is not reliable enough to allow accurate estimates of the crop specific economic net returns for each zone. Instead, a general adjustment factor, applied to the total benefits derived from rainfed crops, has been estimated for each zone. Variations in irrigated yields are relatively minor, and, consequently, they have been disregarded.

The following five agro-climatic zones have been defined for the evaluation of MIPs. 1/ The zones are:

<u>Zone</u>	<u>Districts</u>
I	Banaskantha, Kutch
II	Amreli, Bhavagar, Janinagar
III	Broach, Bulsar, Dangs, Surat
IV	Baroda, Kaira, Panchmahals
V	Ahmedabad, Gandhinagar, Mahesana, Sabarkantha

1/ Normally, GOG works with eight agro-climatic zones, that represents variations in both yields and cropping patterns. Since the local cropping patterns are explicitly taken into account in the benefit matrix, the main purpose of the definition of agro-climatic zones for the evaluation of MIPs is to take local yield variations into account. For this purpose, five zones give the require accuracy.

ANNEX H

A brief description of the zones and the recommended ranges in cropping patterns for MIPs in each zone are given in Appendix 1.

Based on an analysis of present rainfed yields, the following yield indices have been developed for the major crops:

<u>Crop</u>	<u>Zone I</u>	<u>Zone II</u>	<u>Zone III</u>	<u>Zone IV</u>	<u>Zone V</u>
Kharif					
Pearl Millet	75	100	/a	120	105
Sorghum	60	80	180	150	80
Maize	-	-	-	100	-
Paddy	-	-	100	95	-
Pigeon Peas	90	100	100	100	100
Pulses	90	-	120	100	-
Groundnuts	80	90	110	110	90
Tobacco	-	-	-	100	-
Rabi					
Wheat	-	-	-	100	100
Gram	-	-	100	100	-
Bi-seasonal					
Cotton	80	100	85	120	100

/a Indicates that the crop is of minor importance.

28 Assuming an input elasticity in the order of 0.5 as a result of yield increase, economic crop budgets have been developed for each zone. Subsequently, the average actual return per ha for the zone has been estimated, utilizing the prevailing rainfed cropping pattern. The corresponding net returns based on the standard yield and input projections have been calculated. By dividing the actual net return per ha by the weighted "standard" net return per ha, an adjustment factor was estimated for each zone. This adjustment factor corrects the error that is introduced when the standard benefit factors are used for all zones. The estimated adjustment factors are:

<u>Zone</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>
Adjustment Factor	67%	90%	100%	110%	100%

29 The yield estimates for pearl millet, sorghum, groundnuts and cotton were also tested through a regression analysis based on district-wide and time

series data on kharif rainfall and irrigated yields. ^{1/} The results of these regressions, which are shown in Figure 1, are generally in line with the yield assumptions in para 27. However, there is a significant difference for ground-nuts. This can largely be explained by the fact that the regression analysis disregards the distribution of rainfall and the soil types.

IV. Prices for Economic Analyses

General

The economic prices of major traded agricultural outputs and inputs are derived from the IBRD projected 1985 world market prices expressed in 1978 currency value with appropriate adjustments for freight, handling and processing. The projected economic prices for non-traded foodgrains, on the other hand, are based on the historical ratios between these crops and that of wheat. The financial prices of various crops are projected on the basis of their historical price trends (para 33). Present and projected financial and economic prices are given in SAR, Annex 1, T-13. The detailed assumptions behind the estimates are described below.

Official Exchange Rate (OER)

Until September 24, 1975, the Rupee was official valued at a fixed Pound Sterling rate. Since then it has been fixed against a "basket" of currencies. As these currencies are floating, the US Dollar/Rupee exchange rate is subject to change. Conversions of financial prices have been made at US\$1 to Rs 8.60.

Standard Conversion Factor (SCF)

The benefits of the MIPs are evaluated at world market prices, i.e. they measure what India would have to pay for imports or receive for exports. Most of the costs, however, are for items that are not traded on the world

^{1/} Regression equation:
$$Y_R = a_0 + a_1 R_k + R_k^2$$

where Y_R = rainfed yields

R_k = Kharif rainfall

Other variables such as fertilizer consumption, cultivable area per agricultural worker and average farm sizes were included in the analysis but the regression coefficients were always insignificant at the 10% level and virtually no improvements in the correlation coefficient was achieved.

market. Tariffs and trade restrictions introduce a distortion in the price relationship between traded goods -- valued at world market prices -- and non-traded goods -- valued at local prices. Thus, the costs are not directly comparable with the benefits. In order to make them comparable, an SCF is applied to the price of non-traded goods and consumption. In the absence of trade restrictions, the SCF can be approximately calculated using the formula:

$$SCF = \frac{X + M}{X + S_x + M + T_m} \quad 1/$$

For the period since 1970, this calculation gives an SCF of 0.86. However, since this estimate does not take into consideration quantitative restrictions, it provides only an upper limit for the SCF. The Indian Planning Commission recommends for the evaluation of industrial projects the use of conversion factors for foreign exchange and for untraded goods that implicitly give a SCF of about 0.75. Because of the approximate nature of this estimate, a SCF of 0.8 has been used in the economic analysis.

Prices of Agricultural Outputs

The economic prices for traded goods such as rice, wheat, maize, sorghum, cotton, groundnuts and sugarcane are based on their border prices at the OER. The domestic cost components (i.e. local transport and marketing charges) are adjusted by the SCF of 0.80. The economic prices for non-traded foodgrains such as pulses are derived by applying the historical price ratios between these outputs and wheat to the economic price of wheat. Similarly, the economic price of non-traded oil crops has been derived from the economic price of groundnuts. The projected financial prices for various crops are based on the estimated historical price trends 2/ in India, adjusted for local conditions in Gujarat. In general, there is a close correspondence between the projected economic and financial prices.

Prices of Agricultural Inputs

Fertilizers have been valued at the projected world market price. Pesticides and insecticides have been assumed to be traded. It has further been assumed that no taxes, duties or subsidies are levied on them and, thus, the economic price is approximately equal to the financial price. The financial price of bullocks and miscellaneous charges have been multiplied

1/ X = fob value of exports at the official exchange rate (OER); M = cif value of imports at OER; S_x = export subsidies; T_m = import duties.

2/ See Draft on Economic and Financial Prices of Agricultural Projects in India, by staff of South Asia Projects Department.

by the SCF to express them in economic terms. Analyses of farm labor supply and demand in various Indian irrigation projects typically give an economic shadow wage rate for farm labor in the range of 1/2 to 2/3 of the average financial wage rate. For the analysis of MIPs in Gujarat a shadow wage rate of 67% of the market wage has been assumed.

Construction Conversion Factor (CCF)

The MIPs would be constructed using a mixture of equipment, skilled and unskilled labor. For the economic analysis, the CCF is estimated as follows:

- (a) Traded Component. This component includes capital-intensive works which require imported materials. Since it is traded, the conversion factor is 1.00. It is estimated that about 15% of the construction costs fall under this category.
- (b) Non-Traded Component. This component includes works that require skilled labor and locally manufactured materials. The SCF of 0.80 is used as the conversion factor for these works. About 30% of the construction costs are included in these category.
- (c) Unskilled Labor. A minimum wage for unskilled construction labor is in force in Gujarat. Since daily workers virtually never are paid above the minimum wage, it is likely that this wage is higher than the wage at which the workers would be willing to work (i.e. their supply price). Civil works construction is harder physical work than farming, and experience from similar areas in India indicate that the laborers require a premium of 25%-30% to shift from agriculture to construction work. By comparisons with agricultural wages in the State, it is estimated that the construction laborers' supply price is about 15% to 20% below the minimum wage. This gives a shadow wage factor which is 10%-20% below the SCF, or approximately equal to 0.67. It is estimated that unskilled labor constitutes about 55% of the construction cost.

Conversion Factor

Traded Items	1.00
Non-traded Items	0.80
Unskilled Labor	<u>0.67</u>
Construction Costs (weighted average)	0.75

Land Acquisition

Land used for reservoir and canals is evaluated in terms of agricultural production foregone.

V. Evaluation of Design Standards for Medium Irrigation Projects

General

In order to fully utilize Gujarat's scarce surface water resources, two major design improvements would be introduced for medium irrigation projects (MIPs) under the credit:

- (a) The canal system would be extended down to regulated outlets serving 8 ha blocks, on the average, instead of the traditional 40 ha blocks; and
- (b) All canals would be fully lined.

This Chapter provides the economic justification for these design standards.

Estimates of Water Losses in Existing and Improved MIPs

39. Conveyance Losses. For a 10,000 ha unlined system with 40 ha outlets, the wetted perimeter is typically 400,000 m² (40 m²/ha of CCA). For a corresponding lined system, the wetted perimeter is estimated at 350,000 m². The seepage losses are assumed to be 8 cusecs per M ft² in an unlined system (silty clay loam, see para) and 2 cusecs per M ft² in a lined system. The annual field irrigation requirements are estimated at 6,000 m³/ha of CCA for projects with a cropping intensity of about 120% and a mix of up-land crops.

The seepage losses when the canal system is running full are 0.975 m³/s and 0.213 m³/s for unlined and lined systems, respectively. When the releases are less than what corresponds to the full capacity of the canal system, the wetted perimeter is reduced. However, the reduction in wetted perimeter is less than proportionate to the flow. If the canal deliveries are rotated, the seepage losses are lower than if no rotation takes place. It is estimated that the average seepage losses are 75% of the losses when the system is running full. For a ten-month irrigation season, the total seepage losses would be about 19.2 M m³ and 4.2 M m³ for unlined and lined systems, respectively.

40. Operational losses occur both on farmers' fields and the canal system. Some of the losses on the fields are due to poor farm irrigation practices. However, wastages also occur when the releases from the canal system are not properly controlled, which results in water deliveries either at times when the farmer does not require water or in amounts that are larger than what he requires to effectively irrigate his crops. These types of

wastages are attributable to the canal system ^{1/} and are included in the operational losses in the canals, which also include wastages at the time of canal closings, breaches, etc. In general, the operational losses are higher in an unlined system than in a lined system. Based on a review of irrigation releases and field irrigation requirements in a number of MTPs, it is estimated that the operational losses in unlined systems is about 20% of the diversion. The operational losses in lined systems are assumed to be 15%.

41. The total conveyance losses in lined and unlined (10,000 ha) systems with outlets serving 40 ha blocks are thus estimated as follows:

	<u>Unlined</u> -----M m	<u>Lined</u> -----
Total Releases	99.0	99.0
Seepage Losses	-19.2	-4.2
Operational Losses	<u>-19.8</u>	<u>-14.9</u>
Used at the Field	60.0	79.9
Conveyance Losses	39.4%	19.3%
Rounded	40%	20%

42. The extension of the lined canal system down the outlets serving 8 ha blocks is assumed to increase the conveyance losses from 20% to 25%. The conveyance efficiencies corresponding to these losses are:

Unlined system with 40 ha blocks	60%
Lined system with 40 ha blocks	80%
Lined system with 8 ha blocks	75%

Field Irrigation Efficiencies. For a 40 ha block, the field ditch (channel) efficiency is estimated at 70% and the field application efficiency at 75%, giving a field efficiency of 52.5%. In a 40 ha block, the total length of field channels is typically about 70 m/ha. In an 8 ha block, the length of field channels is reduced by about two-thirds. Thus, it is assumed that the field ditch efficiency within an 8 ha block is about 90% which gives an overall field efficiency of 67.5%.

44. Overall Project Efficiencies. The estimates discussed above, and the corresponding project efficiencies can be summarized as follows:

^{1/} Many other studies count this as operational farm losses. As a result of this difference in definition, on-farm losses that have been observed in most studies are higher than what is assumed in this study. However, the overall system losses are of the same magnitude.

	<u>Unlined System</u> <u>40 ha Outlets</u>	<u>Lined System</u> <u>40 ha Outlets</u>	<u>Lined System</u> <u>8 ha Outlets</u>
Conveyance Efficiency	0.60	0.80	0.75
Field Efficiency	0.53	0.53	0.68
(Field Ditch)	(0.70)	(0.70)	(0.90)
(Field Application)	(0.75)	(0.75)	(0.75)
Project Efficiency	0.32	0.42	0.51

Factors Determining the Value of Water Savings

The economic value of water savings depend on a number of factors, the most important of which are:

- (a) the water supply situation;
- (b) the groundwater situation; and
- (c) the level of agricultural development and the efficiency with which farmers use irrigation water.

The Water Supply Situation. If the supply of water is plentiful and the water allocation to the project under investigation can be increased without any reduction in the supply to other projects, then the value of water saved through design improvements is zero (i.e. the opportunity cost of water is zero). In this case, modernization has to be justified through cost savings, reduced water logging and improved reliability of the irrigation supply. This might be the case in delta areas of large, perennial rivers or in a few river basins when the amount of cultivable land is limited. However, if the water supply is scarce, any water savings will result in increased agricultural production. This is virtually without exception the case in Gujarat and in all the low rainfall areas of India. Consequently, the present analysis is based on the assumption that the amount of water available is less than what can be productively used for irrigation in the command area.

The Groundwater Situation. It is possible to identify four possible groundwater situations, each of which require a separate type of economic analysis:

- (a) Surplus groundwater--deep aquifer. Under these circumstances, it would be feasible for the Government to install tubewells either for direct irrigation or for augmentation of canal supplies. Thus, the Government can provide additional water for irrigation either by pumping groundwater or by reducing losses in the canal system. Under these circumstances, canal lining is justified only if the cost of serving water through lining is lower than the cost of pumping.

- (b) Surplus groundwater--shallow aquifer. In this case public groundwater development would not be feasible. Since there is surplus groundwater, additional recharge of the aquifer is of no value. Water savings through better design of the irrigation system will directly increase agricultural production and if the production benefits are greater than the cost of the improvements, then the improvements are justified.
- (c) Limited groundwater resources. If the groundwater in the project area already is fully utilized or can be expected to be utilized in the near future, any reduction in the recharge to the aquifer will reduce the water available for pumping. In this case, lining, for example, results in making more water available at the canal turnouts while at the same time reducing -- albeit to a lesser extent -- groundwater irrigation. Thus, an economic evaluation of design improvements has to take the reduced groundwater recharge into account. This is the prevailing situation in Gujarat.
- (d) Non-useable groundwater. If the aquifer is saline or cannot be used for irrigation, any water going into the ground is lost from productive use. The economic justification of design improvements will follow the same principle as in (b).

The Central Groundwater Board of GOI has estimated that between one-third and half of the water lost through canal seepage gets absorbed in the top layers of the soils in areas close to the canal where it is lost through evaporation or non-productive evapotranspiration. Of the remaining quantity that reaches the groundwater table, only about 70% can be drawn out locally. The rest regenerates elsewhere where it may or may not be useable. ^{1/} Thus, between 35% and 67% of the seepage losses can be reused. For the purpose of this analysis, it is assumed that 50% of the seepage losses can be utilized through pumping of groundwater while the remaining 50% are inevitably lost.

The cost of pumping groundwater, which depends on the aquifer, ranges between Rs 0.12/m³ to Rs 0.23/m³ for shallow wells (Table 1) and is about Rs 0.09/m³ for augmentation tubewells.

Value of Irrigation Water. The weighted ^{2/} economic returns per hectare for irrigated and rainfed crops are Rs 2,780 and Rs 670, respectively. It is estimated that one hectare of irrigated crops replaces about two-thirds of a hectare of rainfed crops. Thus, the net benefits from one hectare under irrigation is about Rs 2,330.

^{1/} Interim Report of the National Commission on Agriculture on Modernizing Irrigation Systems and Integrated Development of Command Areas; New Delhi, 1973.

^{2/} The weights are based on the irrigated and rainfed cropping patterns in 1970 according to the agricultural census.

11. Based on projected future yields, input requirements and prices, the average returns from rainfed land are estimated at Rs 850 per ha. For irrigation projects designed at present standards, the expected future returns are estimated at Rs 4,210 per ha and for projects designed at the proposed standards with irrigation outlets serving 8 ha blocks, the estimated returns are Rs 4,730 per ha. The projected future net benefits from irrigation are estimated at Rs 3,640 per ha for projects designed at present standards and Rs 4,160 per ha for projects designed at improved standards.

12. The gross utilization of irrigation water in 1973/74 was about 6,360 Mm³ from groundwater and 8,850 Mm³ from surface water. The losses from the well to the plant can be assumed at 25%. Canal systems have not been completed for full use of the 8,850 Mm³ of surface flows that so far have been harnessed by dams and diversion weirs. It is estimated that about 1/3 of the diversions can not be utilized at present. In para 44 above, the overall efficiency for a typical MIP has been estimated at 32%. Records of diversions and actual irrigation in several major projects indicate even lower overall efficiencies for these projects. For all irrigation projects in Gujarat, the overall efficiency can conservatively be set at 30%. Based on these assumptions, the total amount of water available "at the plants" can be estimated at 4,770 Mm³ from groundwater and 1,770 Mm³ from surface sources, respectively, or a total of 6,540 Mm³.

13. According to land use statistics, the irrigated area in 1973/74 was about 1.5 M ha, which would give an average water application at the plant of 4,360 m³ per ha actually irrigated. However, it is likely that the agricultural census provides more reliable data than the land use statistics. Based on a comparison of the data for 1970/71, it is estimated that the land use statistics are over-estimated by about 30%, which would give an actually irrigated area of 1.15 M ha in 1973/74. In this case, the average water application at the plant would be about 5,690 m³ per ha actually irrigated.

14. By conservatively assuming that the water application is 5,690 m³ per ha, the value of water is estimated at:

	<u>Value of Water (Rs/m³)</u>
Present, surface projects	0.36
Present, groundwater	0.41
Future, surface projects designed at present standards	0.64
Future, surface projects designed at improved standards and groundwater	0.73

57. For the present analysis, the average value between present and future have been chosen as Rs 0.50/m² for surface projects designed at present standards and Rs 0.57/m² for groundwater and surface projects designed at improved standards. The higher value for the latter is due to a more reliable water supply.

Evaluation of Design Improvements for MIPs

58. The investment cost for the distribution network in an unlined canal system with 40 ha outlets is estimated at Rs 1,600 per ha of CCA. For a lined system the cost is estimated at Rs 3,080 per ha with 40 ha outlets and Rs 3,800 per ha with 8 ha outlets, net of engineering overheads (15%) and physical contingencies (20%). For the economic analysis, these financial costs are multiplied by the construction conversion factor (0.75).

59. For a typical 10,000 ha MIP with a gross water supply of 100 Mm³, the utilization by crops and the losses are (para 44):

	<u>Unlined Canals</u> <u>40 ha Outlets</u>	<u>Lined Canals</u> <u>40 ha Outlets</u>	<u>Lined Canals</u> <u>8 ha Outlets</u>
Used by the Plants	32	42	51
Operational Losses - Canals	20	15	15
Seepage Losses - Canals	20	5	10
Seepage Losses - Fields	<u>28</u>	<u>38</u>	<u>24</u>
Sub-total - To Groundwater	48	43	34
Reused from Groundwater (50%) /a	24	21.5	17

/a Assuming limited availability of groundwater (para 47).

The benefits and costs associated with these three situations are:

ANNEX H

	<u>Unlined Canals</u> <u>40 ha Outlets</u>	<u>Lined Canals</u> <u>40 ha Outlets</u>	<u>Lined Canals</u> <u>8 ha Outlets</u>
	<u>Rs</u>		
Canal water available at plant	32.0 Mm ³	42.0 Mm ³	51.0 Mm ³
Value of canal water	0.50/m ³	0.50/m ³	0.57/m ³
Total value (1)	16.00 M	21.00 M	29.07 M
Groundwater Pumping	24.0 Mm ³	21.5 Mm ³	17.0 Mm ³
Cost of Pumping	0.12 m ³	0.12/m ³	0.12 m ³
Total Cost of Pumping (2)	2.88 M	2.58 M	2.04 M
Net groundwater at plant /a	18.0 Mm ³	16.1 Mm ³	12.8 Mm ³
Value of groundwater	0.57/m ³	0.57/m ³	0.57/m ³
Total Value (3)	10.26 M	9.18 M	7.20 M
Net Benefits: (1)+(3)+(2)	23.38 M	26.60 M	34.33 M
Financial canal investment cost	16.00 M	30.80 M	38.00 M
Engineering overhead and physical contingencies	5.60 M	10.78 M	13.30 M
Total financial cost	21.60 M	41.58 M	51.30 M
Total economic cost (CCF = 0.75)	16.20 M	31.19 M	38.48 M

/a Assuming a 75% field efficiency.

Thus, canal lining costs about Rs 14.99 M and results in annual benefits of about Rs 4.22 M, which gives an economic rate of return of 18%. 1/ The extension of the lined canal system down to 8 ha blocks cost about Rs 7.29 M and results in annual benefits of Rs 6.73 M which gives an economic rate of return of 39%. The economic rate of return for all the design improvements taken together is 26%.

In What Soils Should Lining Be Undertaken?

The justification of canal lining depend on the seepage losses in unlined channels and the cost of lining. Utilizing the assumptions above,

1/ The following patterns are assumed for costs and benefits:

Year	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11-50</u>
Costs (% of total)	10	30	40	20	-	-	-	-	-	-	-
Benefits (% of ultimate)					35	60	75	85	92	97	100

canal lining is always justified (i.e. the economic rate of return is above 12%) when:

Cost of Lining (base cost in financial terms, excluding engineering overhead and physical contingencies)

Seepage losses in unlined channel at which lining is always justified

	Surplus groundwater or non-usable groundwater	
	Limited groundwater (-----cusecs/M ft ² -----)	groundwater (-----cusecs/M ft ² -----)
Rs 20/m ²	3.2	less than 3
Rs 30/m ²	4.2	3.1
Rs 40/m ²	5.1	4.0

vi The following seepage rates have been estimated for unlined canals in various soils:

<u>Soil Type</u>	<u>Etcheverry & Heading /a</u> (-----cusecs/M ft ² -----)	<u>PWD Gujarat /b</u> (-----cusecs/M ft ² -----)
Impervios clay loam	3-4	4.0
Medium clay loam	4-6	6.5
Ordinary silty clay loam	6-9	9.5
Gravelly or sandy clay loam	9-12	-
Sandy loam	12-17	17.0
Loose sand soil	17-20	-
Gravelly sandy soil	23-29	-
Porous gravelly soils	29-35	35.0
Very gravelly soils	35-70	-

/a Quoted from "A Guide for Estimating Irrigation Water Requirements", Ministry of Agriculture, New Delhi, July 1971.

/b Quoted from "Irrigation Agriculture in Gujarat: Problems and Prospects", by V.N. Asopa and B.L. Tripathi, Indian Institute of Management, Ahmedabad, 1975.

Besides the benefits that have been included in the analysis above, canal lining would:

- (a) Reduce water logging near the canals;
- (b) Reduce weed growth and the resulting deterioration of canal capacity;

- (c) Reduce O&M costs;
- (d) Improve the reliability of water deliveries through reduction of breaches etc; and
- (e) Reduce the costs for earthwork and structures.

The cost of lining is typically between Rs 20/m² and Rs 30/m². Since the benefits from items (a) through (d) above are more important for minor canals, it can be concluded that canals with a capacity of less than 100 cusecs should be always lined no matter which soil type it passes through. Canals with a capacity over 100 cusecs should routinely be lined in medium clay loam and more pervious soils. It is not clear cut whether major canals should be lined in impervious clay soils or not. However, in these areas the aquifer is usually low yielding and groundwater development of minor importance. The cost savings in terms of reduced earthwork and lower cost for structures in lined systems are usually quite substantial for larger canals. 1/ Thus, a general rule, also major canals should be lined in impervious clay loams.

1/ Usually in the order of 10-40% of the cost of earthwork and structures.

INDIA

GUJARAT MEDIUM IRRIGATION

Characteristics of Rural Population (1971)

	<u>Landless as % of Agric. Workers</u>	<u>Literacy Rate</u>	<u>Scheduled Castes</u>	<u>Scheduled Tribes</u>
Kutch	37.2	22.9	10.0	5.4
Banaskantha	20.3	13.0	10.1	6.6
Zone I	26.4	16.5	10.1	6.1
Jamnagar	20.9	23.0	6.9	0.3
Rajkot	24.9	28.5	7.5	0.0
Surendranagar	40.3	22.1	11.3	0.8
Bhavnagar	34.9	23.7	4.7	0.0
Amreli	29.6	30.1	8.2	0.0
Junagadh	29.5	23.4	8.6	0.6
Zone II	29.7	25.1	7.7	0.3
Broach	60.2	31.9	4.8	50.5
Surat	55.1	30.9	3.1	65.0
Bulsar	42.5	32.8	2.8	60.1
Dangs	23.0	14.0	0.4	93.5
Zone III	51.5	31.4	3.4	60.1
Kaira	33.0	38.4	6.3	1.1
Panchmahals	8.9	18.8	3.6	41.9
Baroda	49.4	31.5	5.3	33.0
Zone IV	28.1	30.0	5.4	23.4
Sabarkantha	22.4	29.0	8.9	16.3
Mahesana	34.9	36.0	9.2	0.3
Gandhinagar	42.1	39.8	6.3	0.2
Ahmedabad	48.1	31.7	11.1	0.5
Zone V	35.2	33.2	9.5	4.8
GUJARAT	34.3	28.3	6.9	18.3
(Urban	-	54.8	6.6	3.0)

INDIAGUJARAT MEDIUM IRRIGATION SECTOR CREDITSalient Features of Sukhi Irrigation Project

The Sukhi Irrigation project is one of the MIPs anticipated to be included under the line of credit. Preliminary work on the project started in 1977/78. The project was reviewed in detail by the IDA appraisal mission.

The project is located in the Baroda District in central Gujarat. It envisages the construction of a dam across the Sukhi River in the Narmada Basin, along with a distribution and drainage network. The project would benefit about 6,600 farm households mostly of the subsistence category which practice rainfed farming. Farm size distribution in the command area is 50% less than 2 ha, 35% between 2 to 5 ha and about 15% above 5 ha. Average per capita farm income is about Rs 450 and well below the poverty level. About 30% of the population belongs to tribal groups and about 47% of the agricultural labor force comes from landless households. Salient features of this project are:

Hydrology

Catchment	-	421.00 km ²
Intercepted Catchment	-	66.00 km ²
Free Catchment	-	346.00 km ²
Mean Annual Rainfall	-	1,092.00 mm

Reservoir

Full reservoir level (FRL)	-	145.82 m
Maximum water level (MWL)	-	145.82 m
Dead storage level (DSL)	-	133.60 m
Gross storage at FRL	-	170.00 Mm ³
Dead storage at DSL	-	14.20 Mm ³
Live storage	-	155.80 Mm ³
Top level of dam	-	149.10 m
Submerged area of MLW	-	2,510.00 ha

Main Dam

Type: Rolled earth filled zone type with a central impervious section

Total length of dam	-	4,739.00 m
Maximum height of dam from deepest foundation level	-	25.80 m

Spillway

Type: Ogee type with radial crest gates (10 nos.)

Size	-	12.50 x 8.23 m
Length of Spillway	-	149.66 m
Spillway capacity (design flood)	-	6,677.00 m ³ /s

Distribution System

Lined canal system with outlets serving 8 ha blocks

Length of main canals	-	31.50 km
Gross command area	-	27,100.00 ha
Cultivable command area	-	19,100.00 ha
Irrigable command area	-	17,200.00 ha
Area irrigated during kharif	-	16,100.00 ha
Area irrigated during rabi	-	12,500.00 ha

Cost Estimate

<u>Item</u>	<u>Rs '000</u>	<u>Rs/ha of CCA</u>	<u>% of Total</u>
Land Acquisition			
Dam (including resettlement)	14,480	-	-
Canals	780	-	-
Sub-total	15,260	800	4.9
Civil Works			
Dam			
Spillway	34,590	-	-
Earth dam	87,870	-	-
Head regulators	1,550	-	-
Miscellaneous	20,150	-	-
Sub-total	144,060	7,560	46.6
Distribution Network			
Main Canal	21,390	1,120	6.9
Distributors and Minors	22,740	1,190	7.3
Sub-minors	13,800	720	4.4
Structures	6,020	320	2.0
Drainage	2,930	150	0.9
Miscellaneous	5,790	300	1.9
Sub-total	72,670	3,800	23.4
Communication Network	1,480	80	0.5
Engineering and Administration	32,570	1,700	10.5
Base Cost	266,440	13,940	85.9
Physical Contingencies	43,720	2,290	14.1
Total Project Cost <u>1/</u>	310,160	16,230	100.0
of which			
Dam	209,500	10,960	67.5
Distribution Network	100,660 <u>2/</u>	5,270 <u>2/</u>	32.5

1/ The direct and indirect foreign exchange component of these labor intensive civil works is about 20%, which gives a foreign exchange component of about 17% for the project as a whole.

2/ The cost for an unlined canal system would be about Rs 45.17 M or Rs 2,360 per ha including engineering overhead and physical contingencies.

GUJARAT MEDIUM IRRIGATIONCOMBINED SCHEDULE OF EXPENDITURES (\$ MILLIONS)*GOG FISCAL YEAR

	<u>1978/79</u>	<u>1979/80</u>	<u>1981/82</u>	<u>1981/82</u>	<u>1982/83</u>	<u>TOTAL</u>
1. Construction of MIPs	23.2	35.9	38.9	33.5	41.5	173.
2. Modernization of MIPs	3.2	8.4	9.	10.6	9.3	40.5
3. River Gauging Network	.41	.22	.14	.13	.1	1.
4. Evaluation Studies	<u>.02</u>	<u>.05</u>	<u>.10</u>	<u>.13</u>	<u>.20</u>	<u>.5</u>
TOTAL...	\$26.83	\$44.57	\$48.14	\$44.36	\$51.1	\$215.0

* Includes inflation and contingency at 25%.

5C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

- | | |
|--|------|
| 1. <u>FAA Sec. 116.</u> Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights? | Yes. |
| 2. <u>FAA Sec. 481.</u> Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? | No. |
| 3. <u>FAA Sec. 620(a).</u> Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba? | No. |
| 4. <u>FAA Sec. 620(b).</u> If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement? | Yes. |
| 5. <u>FAA Sec. 620(c).</u> If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government? | No. |
| 6. <u>FAA Sec. 620(e) (1).</u> If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? | No. |
-

- A
7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos? No. No assistance will be provided to these countries.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? AID is not aware of any such involvement.
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? No.
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? No.
11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters, No such actions have been taken against U.S. fishing activities in international waters.
- a. has any deduction required by Fishermen's Protective Act been made?
- b. has complete denial of assistance been considered by AID Administrator?
12. FAA Sec. 620(q); App. Sec. 504. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default? No.
- *13. FAA Sec. 620(s). "If contemplated assistance is development loan (including Alliance loan) or security supporting assistance, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems?" (An affirmative answer may refer to the record of the taking into account, e.g.: "Yes as reported in annual report on implementation of Sec. 620(s)." This report is prepared at the time of approval by the Administrator of the Operational Year Budget.* Yes. India spends a relatively small amount of its foreign exchange on military equipment. Latest available figures are \$152 million for military imports or 2% of \$7.8 billion in total foreign exchange in FY 1975. India will spend only 16% of its central government budget on defense in FY 1978. India's military purchases include a variety of modern weapons systems, bought primarily from the U.K and France.

Upward changes in the Sec. 620(s) factors occurring in the course of the year, of sufficient significance to indicate that an affirmative answer might need review should still be reported, but the statutory checklist will not normally be the preferred vehicle to do so.)

14. FAA Sec. (620(t)). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? India is not in arrears regarding its U.N. obligations.
16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? No.
17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.
18. FAA Sec. 669, 670. Has the country, after August 3, 1977 delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977 although not a "nuclear-weapon State" under the non-proliferation treaty? Based on information received from the State Department, the answer to both of these questions is no.
19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate? No.

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively

Yes. These criteria are based on India's Five Year Development Plan (1978-83) and are being incorporated into the proposed AID strategy to be submitted by June 1, 1978.

involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

AID strategy to be submitted by June 1, 1978.

b. FAA Sec. 201(b)(5), (7)&(8);
Sec. 208; 211(a)(4), (7).

Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

(1) The Government of India has placed its highest development budget priority on agriculture and rural development with increased efforts in irrigation, dairy development, rural electrification, research on high yielding seed, cottage industries, agricultural credit etc. India has recently agreed with the World Bank (IDA) on a grain storage project to construct an additional 3.6 million tons of storage capacity and is beginning to plan another 1.5 million tons of storage with future assistance from other donors.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

(2) India welcomes foreign private investment in priority areas involving needed technology or production for export. Domestic private investment in India's mixed economy is encouraged.

(3) Increasing the public's role in the developmental process

(3) The present Government emphasizes decentralization of decision-making and is promoting greater state and local involvement in the development process.

(4) (a) Allocating available budgetary resources to development.

(4) (a)&(b). In recent years, Government of India defense expenditures have declined as a percentage of the total central government budget. Proportionally more funds have been available for development purposes. India is not intervening in other free countries' affairs.

(b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.

(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

(5) Democratic elections in March 1977 restored full political liberties, a free press, an independent judiciary, and respect for human rights.

(6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

(6) The present Government has a strong commitment to improving the lives of India's poor through a strategy of rural-based employment opportunities and agricultural development.

c. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made?

India is in both of these groups.

d. FAA Sec. 115. Will country be furnished, in same fiscal year either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs?

No.

2. Security Supporting Assistance Country Criteria

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section?

Not applicable.

b. FAA Sec. 531. Is the assistance to be furnished to a friendly country, organization, or body eligible to receive assistance?

Not applicable.

5C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT.1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

(a) Formal notification will be given to Congressional Committees.

(b) Yes, in country OYB.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

None needed.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

Yes.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Yes.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? Is so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?
- Project is co-financed by World Bank and AID, with the World Bank undertaking the major donor responsibilities for design and monitoring.
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
- Project is not directly applicable to foreign trade. It will reinforce and expand upon existing private initiative and competition. Further development of cooperative societies and credit institutions will be fostered. Through surface irrigation systems, agricultural efficiency will improve. The project is not directed towards labor unions.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- The project is not expected to directly foster U.S. private trade and investment abroad.
9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.
- The country is contributing sufficient amounts of local currencies for contractual and other services. (See item 10 for U.S. owned currencies.)

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

The U.S. owns Indian rupees that are being used for various U.S. government agencies' program and administrative support and these currencies are expected to be liquidated for current on-going activities over the next 10 years. A decision by the Development Coordinating Committee (DCC) on December 21, 1977 determined that local costs of projects in India will be financed by dollar appropriation for FY 78 and FY 79, not by U.S.-owned local currency.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281 a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

Project irrigation construction activities are labor intensive and will generate rural non-farm labor employment. Project sites are located in rural areas and will benefit large proportions of small farmers. Small farmers will participate in local water boards that determine water allocation for irrigated agriculture. The urban poor will benefit from increased amounts of food made available from the expansion of irrigated agriculture.

B1

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

- (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;
- (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:
 - (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;
 - (b) to help alleviate energy problem;
 - (c) research into, and evaluation of, economic development processes and techniques;
 - (d) reconstruction after natural or manmade disaster;
 - (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;
 - (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

Project is specifically designed to increase agricultural production, and incomes among the rural poor through the provision of increased irrigated agriculture.

(5) (197) by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

The Government of India is contributing approximately 46% of total project cost.

Not applicable.

The project directly contributes to the country's self-help efforts to increase foodgrain production and meet its own food needs. The project does not contribute directly to areas under items (1), (3), (4) and (5), but insofar as incomes will rise from increased production and provide opportunities for a better quality of life, there is likely to be indirect effects on these areas. Women will be integrated into the national economy in that greater employment opportunities will be provided to them.

world sources, including private sources within U.S.

- b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and lending terms of the loan.
- c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?
- d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

India's foreign exchange earnings continues to grow. IDA's and AID's loans will create increased potential for production the proceeds from which will contribute to loan repayment. Funds will be extended in compliance with Indian and U.S. laws and under AID's standard concessional rates.

The Government of India has presented to World Bank and AID technical and economic criteria (detailed in the project paper) that will ensure uses in a technical and sound manner.

Yes.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project addresses the need for increased food production and will also minimize the risks of drought periods through the development of irrigation systems. Institutional development will be fostered insofar as the host country's implementing agencies will acquire a strengthened capability to design, execute, and maintain an effective system of irrigation. It is expected that cooperative activities to effectively manage such systems will develop thus encouraging local, self-government efforts.

g. FAA Sec. 201(b)(2)-(4) and (8); Sec. 201(e); Sec. 211(a)(1)-(3) and (8). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

The project contributes directly to increasing agricultural production by developing surface water resources for irrigation purposes. Irrigation projects are designed according to defined technical and economic criteria and host government measures will be taken to assure the financial viability of projects. The project paper concludes that the project is technically and economically sound.

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

There will be no adverse effects on the U.S. economy.

2. Development Assistance Project Criteria (Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-

Sufficient funds will be made available from AID and the World Bank/IDA for this donor cofinanced project. AID is not aware of interest in financing from other free-world sources including private sources in the U.S.

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

Not applicable.

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

Not applicable.

3. Project Criteria Solely for Security Supporting Assistance

Not applicable.

FAA Sec. 531. How will this assistance support promote economic or political stability?

4. Additional Criteria for Alliance for Progress

Not applicable

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

b. FAA Sec. 251(b)(3); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

Not applicable.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

- | | |
|--|---|
| 1. <u>FAA Sec. 602</u> . Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed? | Not applicable. |
| 2. <u>FAA Sec. 604(a)</u> . Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him? | Not applicable. AID financing will not provide for commodity procurement. |
| 3. <u>FAA Sec. 604(d)</u> . If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed? | Not applicable. |
| 4. <u>FAA Sec. 604(e)</u> . If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? | Not applicable. |
| 5. <u>FAA Sec. 608(a)</u> . Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? | Yes. |
| 6. <u>MMA Sec. 901(b)</u> . (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. | Not applicable |
| 7. <u>FAA Sec. 621</u> . If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, | Yes.

Yes. |

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are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

3. International Air Transport. Fair Competitive Practices Act, 1974

Not applicable

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?

Construction contractors will be qualified, private Indian firms or individuals.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

Yes.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million?

Not applicable.

C. Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

Yes.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?

Yes.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.?

Yes.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?

Such is not permitted.

C.

5. Will arrangements preclude use of financing:
- a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions? Yes
 - b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property? Yes
 - c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs? Yes
 - d. FAA Sec. 662. for CIA activities? Yes
 - e. App. Sec. 103. to pay pensions, etc., for military personnel? Yes
 - f. App. Sec. 106. to pay U.N. assessments? Yes
 - g. App. Sec. 107. to carry out provisions of FPA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending). Yes
 - h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress? Yes
-

THE DEVELOPMENT COORDINATION COMMITTEE
WASHINGTON, D.C. 20523

MEMBER AGENCIES
DEPARTMENT OF COMMERCE
DEPARTMENT OF STATE
DEPARTMENT OF AGRICULTURE
DEPARTMENT OF LABOR
DEPARTMENT OF JUSTICE
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
DEPARTMENT OF ENERGY
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DEPARTMENT OF ENERGY INVESTMENT
DEPARTMENT OF ENERGY COORDINATION
SPECIAL REPRESENTATIVE FOR
TRADE NEGOTIATIONS
DEPARTMENT OF STATE
DEPARTMENT OF TREASURY

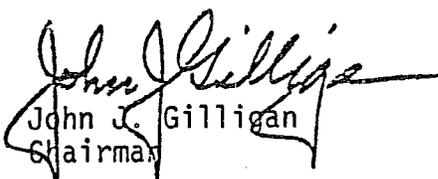
December 27, 1977

NOTE FOR DCC PRINCIPALS

SUBJECT: Minutes of December 21 DCC Meeting

I would like to provide you with a personal copy of the minutes of the most recent meeting of the Development Coordination Committee in order to apprise you of the DCC's ongoing activities.

As Chairman of the DCC, I would be pleased to discuss with you any issue or problem affecting the activities of our various development assistance programs, and to place on the agenda of an upcoming meeting any such issue you think it would be useful to discuss.


John J. Gilligan
Chairman

Enclosure:

Minutes

DEPARTMENT OF AID
 DEPARTMENT OF STATE
 NATIONAL SECURITY COUNCIL
 OFFICE OF MANAGEMENT AND
 BUDGET
 OVERSEAS PRIVATE INVESTMENT
 CORPORATION
 SPECIAL REPRESENTATIVE FOR
 TRADE NEGOTIATIONS
 DEPARTMENT OF STATE
 DEPARTMENT OF TREASURY

THE DEVELOPMENT COORDINATION COMMITTEE
 WASHINGTON, D. C. 20523

December 22, 1977

Minutes of the Development Coordination Committee Meeting
 Wednesday, December 21, 1977

Agenda

The DCC met to:

- resolve an issue between AID and Treasury regarding AID financing of local costs in excess currency countries, which threatened to delay Presidential announcement of the program during his upcoming trip.
- reach agreement on the appointment of the IFAD Executive Director.
- reach agreement on a schedule and work plan for the NSC-directed study of quantitative targets for development assistance.

Governor Gilligan, in his opening remarks, emphasized that the DCC had been created by legislation and Executive Order to provide a forum for the discussion of interagency development issues and to serve as a mechanism for the resolution of differences on these issues. The DCC will therefore make decisions on major development issues, referring those few which cannot be solved at the DCC (Under Secretary) level to the PRC.

1. IFAD Executive Director (ED)

The majority of DCC members agreed that:

- the IFAD ED should be personally responsive to and appointed by the U.S. Governor of IFAD (Governor Gilligan),
- the ED would provide more effective representation from Washington rather than Rome, and
- the possibility of naming an Alternate ED should be further and favorably considered.

Discussion

- Governor Gilligan proposed to name the ED since he had been named U.S. Governor by the President on the recommendation of the Secretary of State.
- State/IO supported appointment of a Minister-Counsellor of Embassy Rome as ED, since the position had been staffed to provide coordinated U.S. representation before various international organizations in Rome.
- State/EB argued strongly that the ED be responsive to and named by the U.S. Governor and be staffed from Washington rather than Rome, and suggested that an AID Assistant Administrator would be appropriate while an Alternate could be assigned to FODAG (Rome).
- OPIC supported IO's proposal, citing the need for "on the spot" access.
- USDA supported the Governor's appointment of the ED and requested that a USDA representative be named Alternate.
- OMB supported the State/EB suggestion.
- NSC noted the President's decision and supported the prerogative of Governor Gilligan to appoint the ED and urged pursuit of the Alternate position.
- Treasury supported Governor Gilligan's appointment of the ED and Alternate and suggested consideration of USDA's request to supply the Alternate.

Decision: Governor Gilligan stated he would consider all comments in reaching his decision, and that he would promptly inform DCC members.

2. AID Financing of Local Currency Costs in Excess Currency Countries

The issue was divided into two questions:

- procedural: whether Section 612(b) review would be done project by project, or country by country on an annual basis.
- India: whether dollars appropriated for India should be used to buy U.S.-owned excess currencies to meet the local currency portions of the program.

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Discussion

On the procedural question:

- AID/PPC suggested that Section 612(b) considerations be part of the annual program review to which Treasury is invited, and be taken into account in the subsequent OMB process. The final project review (DLSC) takes place only after lengthy preparation, including negotiations with recipients.
- Treasury stated that it had excess currency responsibilities but had been unable to make its views felt earlier than the DLSC review. Its intent was not to block AID programs but to get AID to plan rationally for excess currency use.
- AID/PPC stated it has a rational plan for use of excess currency through the Mondale amendment for Pakistan and excess currency appropriations for India. Treasury's views had been taken into account, but had not prevailed.
- OMB preferred project reviews, but suggested they be held at the time of the annual budget submission.
- State/E suggested the Congressional Presentation (CP) spell out the local cost financing needs of projects.
- AID agreed that the budget submission include examination of projects requiring local cost financing and that such requirements should be set forth fully in the CP.
- NSC asked for a clear procedure for annual project by project review.
- Treasury agreed this could be acceptable.

Decision: AID will draft procedures for annual project by project review of country programs, including plans for use of excess currencies, for circulation to members. Action: AID/PPC

On the India question:

- AID/PPC said the FY 1978 and FY 1979 programs were approved by the President in full knowledge of India's balance of payments position.
- OMB agreed, noting that, if India's aid was reduced in any way, the President would have to be involved. OMB would not support going back to the President and thinks it unlikely he would revise his decision.

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- AID/ASIA described the FY 1978 program, stating that neither the Indian Government nor the IBRD, with whom it collaborates on the local cost financing, would accept excess currency in lieu of dollars.
- State/NEA stated that India would reject excess currency if offered for any part of the program, and that the program had met no objections on the Hill.
- NSC agreed that the Administration intended, and the Indian Government expected, transfer of the appropriated \$60 million.
- Treasury stated it may wish to reserve an appeal on the India question, noting that no case for purchasing U.S.-owned currencies had merit if the India case did not.

Decision: In view of the President's early visit to India, the DCC will inform Secretary Vance of its decision that local cost financing proceed, noting Treasury's reservation. Action: DCC - Letter sent Jan. 1975

3. Quantitative Targets

Governor Gilligan noted the PRC directive for a DCC study of quantitative foreign assistance targets, noting the deadline of February 28, 1977, and emphasized that full cooperation was critical given the short time-frame. A work plan was distributed, indicating deadlines which must be met to ensure thorough analysis of the technical issues and DCC review prior to submission to the PRC.

Discussion

- Treasury pointed out areas of possible duplication.
- NSC indicated a need to consider recent international discussions on the Third Development Decade.
- State/EB suggested focus on policy rather than technical conclusions.

Action: Members will submit any additional comments on the outline and assign representatives to the working group to promptly review drafts circulated by the DCC by January 9.

ANNEX N

SCHEDULE 3

Procedures for Appraisal and Progress
Monitoring of Medium Irrigation Projects (MIPs)

- A. The Central Water Commission under the Ministry of Agriculture and Irrigation of the Borrower shall maintain an Appraisal Committee which shall be responsible for appraisal and monitoring of the progress of individual MIPs. Except as the Association shall otherwise agree, the procedures for appraisal and monitoring shall be as follows:

1. Preparation

Gujarat shall be responsible for the preparation of each MIP. The Appraisal Committee shall monitor the progress of the preparation of MIPs through field visits and review of reports, plans, specifications, contract documents, construction and procurement schedules.

2. Appraisal

Gujarat shall submit each MIP to the Appraisal Committee for appraisal. The Committee or its representatives shall (a) visit the MIP area, (b) review reports, plans, designs and specifications to ensure that the MIP has been designed in accordance with (i) established technical criteria, and (ii) sound engineering practices with special emphasis given to the safety of the dam structure and to the drainage plan, (c) review and, if required, adjust cost estimates and schedules of expenditures to properly reflect the likely cost of the MIP, (d) review the cropping pattern to ensure that it is realistic and suitable for the MIP area, (e) review arrangements for resettlement of families affected by the MIP in accordance with Gujarat's policies, and (f) review the adequacy of extension, credit, input supply, transport and marketing facilities available to farmers in the MIP area. The review of the design of the dam structure with regard to safety would be made by CNC with special emphasis on hydrology, geology and structural engineering.

3. Approval

Any MIP that meets the established criteria, is designed in accordance with sound engineering practices, costs less than Rs. seventy million excluding expected price increases, has a benefit cost ratio of not less than 1.0 as calculated in accordance with the established economic criteria, and has a cropping pattern that is realistic and suitable for the MIP area, may be approved by the Appraisal Committee for financing from the proceeds of the Credit. Any other MIP shall be submitted to the Association for approval.

4. Implementation

The Appraisal Committee or its representatives shall visit the site of each MIP under construction, and review relevant records, plans, specifications and procurement schedules in order to (a) ensure that the MIP is constructed in accordance with the established technical criteria and sound engineering practices.

(b) monitor the progress of the construction, and (c) assist Gujarat in solving any technical problems that might arise.

5. Operation and Maintenance.

The Appraisal Committee shall review for each MIP, for a period not exceeding two years after completion of each MIP, records maintained by Gujarat on (a) the area irrigated in each irrigation season, (b) monthly inflow and water release data, (c) costs of and organization for operation and maintenance of the MIP, in order to ensure that the MIP is operated and maintained in accordance with sound economic and engineering standards.

- B. Gujarat shall make available to the Appraisal Committee or its representatives plans, specifications, reports, contract documents, construction and procurement schedules and other records in respect of MIPs to be financed under the Project, as the Appraisal Committee might reasonably request.
- C. The Appraisal Committee shall prepare reports on the conclusions of its appraisal and monitoring, of such timing, scope and detail, as have been agreed between the Borrower and the Association.

Draft Project Description for Project Agreement

The purposes of the Gujarat Medium Irrigation Project are (1) to increase food production in Gujarat and (2) to decrease the impact of droughts. These purposes will be accomplished through the expansion of irrigated areas in Gujarat by constructing medium-scale irrigation projects (MIPs).

Achievement of the purposes will contribute to attaining the goals of (1) increased levels of and security of small farmer income, (2) the expansion of rural employment opportunities, and (3) the increased availability of food to the rural and urban poor.

Gujarat's long-range program for bringing cultivable areas under irrigation will be carried out over a span of several years. A five-year (FY 78 to FY 83) portion of this program will be co-financed by AID (\$30 million) and IDA (\$85 million) with a view to accelerating the rate of expansion of irrigated areas in Gujarat. Both AID's and IDA's contributions will finance the local costs of constructing medium-scale irrigation systems. A minor portion of IDA's contribution will finance the procurement of river-gauging equipment from both local and foreign sources.

The Project, which aims to alleviate a prime constraint to increased food production (the lack of a reliable water supply), consists of the following elements: (1) the completion of on-going and the execution of new MIPs in Gujarat, (2) the modernization of existing MIPs to bring these to standards established for new MIPs, (3) the establishment of automatic discharge measuring stations and the acquisition of vehicles for their operation (with financial assistance from IDA), and (4) the preparation of evaluation studies and monitoring of the Project. The Project is expected to be completed by June 30, 1983.

Individual MIPs will be designed and constructed according to agreed-upon technical and economic criteria as follows:

1. Technical: (a) Canal systems for both new and modernized MIPs will be lined and (b) public outlets will serve 8 hectare (20 acres) blocks of command areas.
2. Economic. Individual MIPs eligible for financing will have an economic rate of return of not less than 12% and a cost/benefit ratio of not less than 1.0, unless otherwise agreed by IDA.

The Government of Gujarat (GOG) through its Irrigation Wing of the Public Works Department (PWD) will be responsible for individual MIP preparation, implementation, operation, and maintenance with periodic review by the Appraisal Committee (AC) of the Government of India's (GOI) Central Water Commission (CWC) under the Ministry of Agriculture and Irrigation. The AC will also be responsible for the appraisal and monitoring of MIP progress and will approve MIPs in accordance with the established technical and economic criteria for those MIPs costing up to \$8.1 million (RS. 70 million). IDA will retain its approval authority for MIPs costing above this limit with information copies of its appraisal provided to AID.

ANNEX P

a linkage between the two donors' agreements with respect to such covenants and conditions. These covenants and conditions include:

(a) Gujarat shall undertake: (i) that each Medium Irrigation Project (MIP) to be financed under the Project shall be prepared, designed and constructed in accordance with technical and economic criteria agreed with IDA; and (ii) that provision shall be made for funds sufficient to complete the MIPs started under the Project in accordance with said criteria.

(b) Gujarat shall prepare a layout for each eight-hectare block served by an irrigation outlet, showing the design of water courses, field channels and land shaping, and shall assist the farmers in construction of water courses, field channels and drains and land shaping.

(c) Gujarat shall maintain staffing of its agricultural extension services in each MIP area in conformity with the statewide standards to be agreed upon between IDA and Gujarat.

(d) In order to meet the increased needs of irrigated farming for the MIPs constructed under the Project, Gujarat shall, if necessary, strengthen the credit, input supply, storage and marketing facilities available to farmers in MIP areas.

ANNEX P

in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source of Origin of Goods and Services

Except for ocean shipping, goods and services financed by A.I.D. under the Project shall have their source and origin in the Cooperating Country or in countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Loan shall be procured in any eligible source country except the Cooperating Country.

c. Conditions and Covenants

The Project Agreement shall contain conditions or covenants to the effect that, except as A.I.D. may otherwise agree in writing:

- (1) Prior to the initial disbursement of A.I.D. funds under the Project, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D. evidence of the effectiveness of the IDA Development Credit and Project Agreements.
- (2) IDA will assume the principal administration and monitoring responsibility for this multi-donor Project. In view of that fact, the IDA agreement will contain appropriate self-help covenants and conditions on the part of the Cooperating Country and the State of Gujarat. However, any violation of such covenants and conditions constituting an event of default under the IDA agreement, as determined by IDA, will also constitute an event of default under the A.I.D. Loan Agreement, thereby providing

DRAFT PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

INDIA

Gujarat Medium Irrigation
AID Loan No.

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan to the Government of India (the "Cooperating Country") of not to exceed thirty million United States dollars (\$30,000,000), to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project, (hereinafter called the "Project") consists of assistance in a multi-donor financed irrigation effort (AID and the International Development Association (IDA)), which includes the construction of new and the completion of on-going medium-scale irrigation sub-projects, the modernization of existing irrigation sub-projects (to bring these to the same technical standards established for new and on-going sub-projects), the establishment of automatic discharge measuring stations, and the preparation of evaluation studies and monitoring of the Project, in order to increase food production and decrease the impact of drought in the Indian State of Gujarat. The entire amount of A.I.D. financing herein authorized for the Project will be obligated when the Project Agreement is executed.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions; together with such other terms and conditions as A.I.D. may deem appropriate:

a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of first disbursement of the Loan including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D.