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...WATER SUPPLY AND
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PROJECT EVALUATION

OF THE

H.D. KOTE POTABLE WATER PROJECT

MYRADA/PLAN - H.D. KOTE
MYSORE DISTRICT, KARNATAKA, INDIA

FEBRUARY, 1991

Lyndon Navera
Project Evaluation Coordinator
Impact Evaluation Systems Unit
PLAN International

822-INKA91-11374

1. EXECUTIVE SUMMARY Health justification

The Myrada/PLAN (M/P) potable water project in H.D. Kote began in FY 1985 under PLAN's primary health care program to provide accessible, sufficient and safe drinking water to the villages. As of August, 1990, 73 M/P water systems had been initiated and these represent a major portion of the existing water systems in H.D. Kote. Although the project has broad potential impact on the lives of the village people, it has not achieved its objectives to date:

- **implementation is burdened with construction delays,**
- **only a minority of the expected beneficiaries have access to the M/P water systems because few systems have been commissioned, and**
- **based on the test results, water quality is unsatisfactory in the commissioned systems.**

The Project Evaluation (PE) was requested by the International Relations Department for donor accountability to AIDAB and for institutional learning. It was conducted in August, 1990. The PE Report was delayed due to the lack of water test results.

Background

The PLAN field office in H.D. Kote was established in 1982 in partnership with a local non-government organization, the Myrada Resettlement and Development Association (Myrada). This partnership was geared towards establishing an integrated rural and community development program covering all the 317 H.D. Kote villages with the aim at improving the well-being of the children, the families and their communities.

The potable water project of Myrada/PLAN is in conjunction with the National Rural Water Supply Program's massive drilling of borewells undertaken in the early eighties. About 75% of the M/P initiated water systems were tied to these existing government-drilled borewells. This project is being implemented in coordination with the local government unit, Zilla Parishad (Z/P), and each individual project implementation is broken down into an M/P portion and a Z/P portion. M/P does the planning and design with the participation of the beneficiaries. The M/P portion includes the construction of water tanks, the pipeline distribution and the construction of standposts (i.e., taps supported by concrete slabs). The Z/P handles the drilling of borewells (through the Public Health Engineering Department: PHED), construction of the raising main and the installation of the 3-phase electricity (through the Karnataka Electricity Board: KEB). Operation and maintenance is handled by the village level government administrative unit, Mandal.

1.1 Planning and Community Participation

The community participates in the planning stage of the project. The village Credit Management Group (CMG) initiates the project and forms a water committee to mobilize community contribution. The committee also monitors the construction of the project.

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1.2 Technical Review

1.2.1 Systems Design

Water is distributed to households through centrally located communal standposts. Ideally, taps or standposts should have corresponding platforms and spillways for waste-water disposal. **The systems design usually does not include platforms and spillways.**

The wastewater disposal (drainage and spillways) is not integrated with the planning and design of the water system. Platforms are not included in the design portion of most of the FY 1989-90 PDOs that were reviewed. While the systems provide drinking water to the villages, they pose a potential health hazard because of poor drainage.

1.2.2 Water Quality

The government (PHED) does not conduct water quality tests (bacteriological or chemical/physical) on new or existing borewells. M/P also does not conduct such tests before or after construction of the tanks. Water testing is not part of the normal procedure of either the government or M/P before commissioning of the systems. The household users therefore are not assured that what they drink is safe.

The water quality tests show that only 2 out of the 9 samples taken from the main sources were potable. This was based on the World Health Organization (WHO) guideline values for drinking water. The other 9 samples that were collected from household containers were all positive with coliforms, a group of organisms commonly used as indicators of pollution. These test results require follow-up testing to accurately assess water quality so that immediate measures are taken to improve quality.

1.3 Implementation

1.3.1 Construction Phase

There have been regular delays in the construction of both the M/P and the Z/P portions of projects. The average period of M/P delay is 1 1/2 years and is due to the contractors and the current M/P policy of hiring only local (H.D. Kote-based) contractors. The contractors' delays are caused by their multiple contracts and also by their limited working capital. The M/P policy of hiring only local contractors further delays construction because there are few competent contractors in the area. There are only 8 local contractors available to build 42 water systems.

Three water system projects in the Madapura sub-office are currently delayed due to the contractors. In the Sargur sub-office, 4 systems that were started in FY 1988 were delayed, 2 of which are still to be completed (Nanjipura and K.H. Shed).

The average Z/P delay is 1 year. The delay is due to the government bureaucracy which affects the timely disbursements of funds for the project. According to one Project Officer, about 60% of all M/P water systems have been or are currently delayed.

These construction delays translate into:

(a) **delays in providing water to the villages,**
(b) **likely increases in the cost of materials by the time purchases are made due to inflation and shortage of supply,**
(c) **higher depreciation costs incurred for materials already purchased or installed prior to the commissioning of water systems, and**
(d) **in some cases, pilferage of available materials.**

1.4 Project Results

Overall, Myrada/PLAN has initiated a total of 73 water systems for the period FY 1985-90 which represent 77% of the 95 systems in H.D. Kote Taluk (town). Only 30 (41%) of these M/P systems have been commissioned or are operational and 19 have their M/P portion completed.

Of these 73 systems, M/P initiated 42 systems during the AIDAB grant years (FY 1989-90) and to date, only 8 (19%) of the 42 have been commissioned.

This low number of commissioned water systems in relation to the number of systems that had been initiated was due to delays in the construction and in the release of funds by the Zilla Parishad. This therefore limits the number of target beneficiaries. In the Kasba/A'santhe sub-offices, only 5 were commissioned out of the 15 systems that were initiated in FY 1989-90. These 5 systems currently benefit only 755 families (34%) of the expected 2212 family beneficiaries.

2 BACKGROUND

2.1 General Background

Access to potable water[1] is one of PLAN's health sector goals. The other health goals are child survival and sanitation. Under PLAN's primary health care program, field offices seek to provide PLAN families with adequate potable water as part of basic hygiene and sanitation. In India as in other program countries, the construction of water systems is a major activity of the health sector.

The International Drinking Water Supply and Sanitation Decade (1981-90) was established by the United Nations to accelerate progress on potable water and sanitation. For the period 1980-87, 56% of the total Indian population (802 million in 1987) had access to clean water, with 80% of the urban population and 47% of the rural population having access ('The State of the World's Children 1989,' UNICEF). This was a substantial gain from the period 1975-80, when only 41% of the total population had access to clean water. This progress was due to technical advances and to more efficient strategies that reduced the per capita cost of providing a clean water supply. The average cost for the installation and use of hand-pumps supplying fresh water close to people's homes in hard-rock areas of India is less than 60 cents per person per year as calculated by UNICEF's New Delhi office ('The State of the World's Children 1985,' UNICEF). More efficient strategies include community involvement in the planning, siting, construction, installation and maintenance of its own water supply, and the community's training and education on basic hygiene and disease prevention. It is known that clean water has very little impact on health unless communities are well informed about hygiene. Also, most governments are now agreed that piping water to conveniently located standposts in each community (instead of putting taps in each home) is the strategy that stands the most chance of making clean water available to all[2]. These gains in both technique and strategy have reduced the cost of clean water supply to about $1 or $2 per person per year in Asia. In Africa and Latin America, annual per capita cost is about $5 per person.

Despite this progress, 60% of families in the rural areas of the developing world are still without potable water. In the urban areas, 23% do not have access to clean water. One out of every three people in the developing world who lack clean water and adequate sanitation, is Indian[3].

In light of the above, PLAN field offices have initiated the objective of providing safe drinking water to PLAN and non-PLAN families through the construction and repair of water systems and

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1 Accessibility refers to the distance of the house to the water source. PLAN's objective is to put in place the water source within the locally agreed distance (e.g., 100 meters) from house sites through the construction of communal taps.

2 It should be recognized that a risk of contamination from water point to consumption exists under this model.

3 'Safe Water and Waste Disposal for Rural Health: A Program Guide,' USAID, 1982, p. 9.

have been educating communities about basic hygiene and the proper use of PLAN's health-related facilities such as latrines, urinals, health clinics, and drinking water systems.

2.2 Background of H.D. Kote Potable Water Project

Heggadadevanakote (H.D. Kote) is a town (Taluk) in the Mysore district of the state of Karnataka in the southern part of India. It has an area of 1,618 square kilometers and a population of about 35,474 families. The Myrada/PLAN program area covers all the 317 H.D. Kote villages and currently implements programs which provide assistance to 48% of the total number of families in the Taluk: 10,447 PLAN families (APR, FY 90) and 6,704 of the 25,027 non-PLAN families (as of December 1989).

In the early eighties, the government drilled 677 borewells to provide drinking water to all the villages in H.D. Kote (SAGE, 1986). As of 1986, only 20% of these borewells proved reliable, supplying sufficient water. Thirty percent (30%) of the borewells were either dry (100 units) or not functioning (100 units) due to defective hand pumps, and about fifty percent (50% or 347 units) were yielding less than 500 gallons per hour. The major sources of drinking water therefore remained open wells, ponds and canals.

To provide safe and adequate drinking water year round, Myrada/PLAN (M/P) initiated a potable water project in H.D. Kote in fiscal year 1985 with the implementation of 7 water systems, funded solely by the field office (FO). This involved the construction of M/P-built 4,000-gallon water tanks. In fiscal year 1987, the project was implemented in coordination with and with the contribution of the district level government called Zilla Parishad (Z/P). The Z/P handled the drilling, raising main[4], and electrification components of water systems. As of August, 1990, there have been 73 water systems initiated by the FO, 31 of which are commissioned or operational. These water systems represent about 77% of the total (95) water systems in H.D. Kote, operational or under construction.

About 75% of the 73 M/P water systems had existing borewells from the government drilling program described above. Under the National Rural Water Supply Program, hand pumps were installed to these borewells and in some cases, mini-water tanks (500 gallons) connected to them.

Figure 1 shows the project phases of the potable water project: from the initiation of the village Credit Management Group (CMG)[5] to the preparation of the Project Design Outline (PDO) to the commitment made by the Z/P. Construction by M/P starts after the selection of a contractor.

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[4] Raising main is the pipeline distribution from the borewell to the tank.

[5] The CMG, formerly known as the village development association (VDA), is a small village functional group of PLAN families with similar needs and circumstances. It is organized around health, education and income-generation concerns. Its projects are funded by Myrada/PLAN through a revolving fund mechanism. To date, there is a total of 452 CMGs (sanghas) in M/P H.D. Kote.

After full completion of the construction phase, the system is commissioned and is operated and maintained by the village level government called Mandal[6].

2.3 Myrada/PLAN H.D. Kote Organizational Set-Up

Until the last fiscal year, the FO had 3 sub-offices: Kasba, Madapura and Sargur. This fiscal year, 1991, the Kasba sub-office has been split into Kasba and Antharasanthe sub-offices. A Project Officer (PO) heads each sub-office and supervises all the decentralized programs of the FO. He reports to the Project Coordinator (PC) who is equivalent to PLAN's Field Director.

Each sub-office is further subdivided into 'clusters of villages'. A Cluster Officer supervises his or her designated cluster of villages and reports to the PO. The Extension Officers handle the CMGs in the villages and report to their Cluster Officers. Each sub-office has also its own staff of Subject Matter Specialists who handle specific sectoral activities, an Assistant Accountant who manages the sub-office books of accounts and an administrative group responsible mainly for donor services. The Subject Matter Specialists (e.g., Health) in the sub-office coordinate activities with their corresponding FO Subject Matter Specialists (e.g., FO Health Coordinator).

Figure 2 shows the organizational structure of M/P H.D. Kote.

3 POTABLE WATER PROJECT GOALS AND OBJECTIVES

The SAGE goal for the health sector is to improve the health status of the entire population of H.D. Kote. An indicator for this improvement is the reduction of the infant mortality rate to 50 per 1000 by 1992 (SAGE, 1986)[7]. Under the primary health care program, one of the major activities for achieving this goal is to repair or expand existing government drinking water facilities, and construct new ones. The overall objective of the potable water project therefore is to provide Myrada/PLAN villages access to a safe and adequate drinking water supply, thereby contributing to a reduction in the incidence of water-borne diseases.

4 PROJECT EVALUATION PURPOSE AND METHODOLOGY

The International Relations Department requested that a Project Evaluation (PE) be conducted of the H.D. Kote water project for donor accountability to AIDAB and for institutional learning. The PE set out to assess the magnitude of the project in terms of villages and beneficiaries being serviced by the Myrada/PLAN water systems. As an input to institutional learning, the PE

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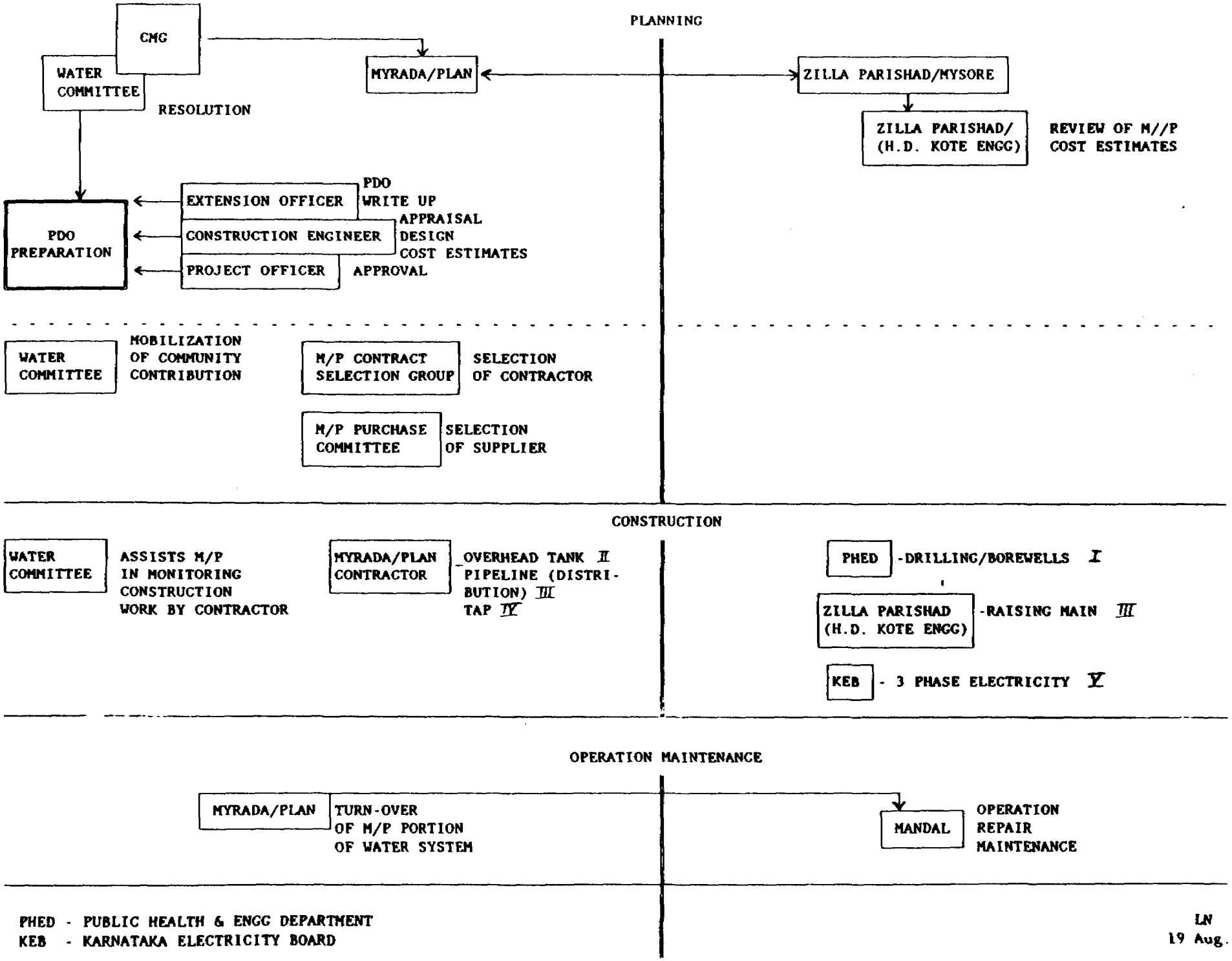
[6] Mandal is the smallest government administrative unit. It forms part of the town level government unit called Taluk (H.D. Kote) which in turn forms part of the district level unit called Zilla Parishad (Mysore). The district level government units constitute a province or state.

[7] The FY 1985 H.D. Kote level of infant mortality (0-1 year old) was 52.4 per 1000. It is suggested that the more reliable baseline figure for this goal establishment was the Karnataka state level of 114 per 1000.

H.D. KOTE POTABLE WATER PROJECT



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examined the systems and procedures of the project (e.g., the institutions involved in the planning, construction and operation/maintenance of the potable water systems).

The PE methodology consisted of water quality tests, an informal survey, project site visits, review of project documents, and interviews with M/P staff, local government officials and officers of a CMG.

4.1 Water Quality Test

The water quality test refers only to the bacteriological analysis to determine the presence of coliform organisms which indicate fecal contamination of the water. The analysis was based upon 18 samples from 2 types of sources: the main source (taps) and the end user source (household containers), 9 samples each.

The earlier tests were started in August, 1990 during the PE Coordinator's visit and were conducted by the Mysore district Department of Health and Family Welfare. The FO Health Coordinator who is a physician and specializes in tropical medicine, collected the water samples. Only the result of one sample was sent to IH in October, 1990 and the result was not useful.

The Central Food Technological Research Institute of the Government of India, Mysore carried out the second and latter set of tests with the same number of samples (18). The re-testing was conducted in November, 1990 and IH received the results end of December. As of this report, IH has still not received requested details concerning the collection process (e.g., who collected) and a description of the methodology used for the analysis.

4.2 Informal Survey

The informal survey was designed to investigate the status (e.g., reliability) of the existing M/P potable water systems and to elicit information on household water use and practices. The Extension Officers and Animators[8] conducted the survey under the supervision of the FO Health Coordinator in 2 types of villages: those with M/P water systems and those with non-M/P water systems.

Thirty three (33) villages were surveyed: 22 villages (10 households each) out of the 30 villages with M/P systems, and 11 villages (5 households each) taken from 22 with non-M/P systems. These 33 villages represent 62% of the total H.D. Kote villages (53) with existing water systems, both M/P and non-M/P.

The Survey Questionnaire is in Attachment 1.

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[8] An animator is a village extension worker hired by the CMG to assist in M/P funded activities. He or she functions as a trainer in the CMG literacy project, assists in book keeping and in some cases, assumes the position of the CMG secretary.

4.3 Project Site Visits

The PE Coordinator visited 7 M/P water systems in various stages of the project: 2 systems that were under construction and 5 systems that were operational.

4.4 Review of Project Documents

The review of project documents consisted mainly of Project Design Outline (PDO) reviews (total: 46) for fiscal years 1989-90, the project years with AIDAB grant. Other project documents reviewed included the Situation Assessment and Goal Establishment (SAGE) Report, Sector Program Outlines (SPOs), Annual Program Reports (APRs), Project Assessment Face sheets (PAFs), the Project Cost Control (PCC) sheets and other PDO supporting documents (e.g., system designs and cost estimates of construction materials). Refer to Attachment 2 for a description of each of these documents.

Data on actual implementation schedule, type of tanks and project costs of M/P water systems initiated from FY 1985-88 were also gathered and reviewed. These data are part of the PE fiscal and project management reviews.

4.5 Interviews

The PE Coordinator interviewed the following:

- the project staff (4 sub-offices) on project planning, implementation and management;
- a local government chief (Mandal Pradhan D'Sundardas) about the operation and maintenance of the water systems, the organizational structure of a Mandal, and its functions, activities, and funding sources;
- Officers of a CMG (Nooralkuppe village) involved in the early stages of a project on the process involved;
- Z/P Assistant Executive Engineer (Engr. M.C. Mahadevaiah) on the local government portion of the construction phase;
- Medical officer of the laboratory (Dr. B.N. Sujothi), and
- District Health Officer of the Department of Health and Family Welfare (Dr. Thimmaya) about the PE water test requirements.

5 PROJECT PHASES

As mentioned in 2.2, the key players in the project are:

- the **CMG** through its water committee for the initiation of the project, and the mobilization of community contribution,
- **M/P** for planning and design and the construction of tanks, pipeline distribution and taps,
  a. M/P for planning and design
  b. Contractor for construction of tanks, pipeline distribution and taps

- Z/P for borewells, raising main and 3-phase electricity, and
  a. PHED for drilling of borewells
  b. Z/P H.D. Kote Engineering for raising main
  c. KEB for 3-phase electricity
- the **Mandal** for operation and maintenance.

5.1 Planning and Community Participation

The Credit Management Group (CMG) in a village, initiates the potable water project. It forms a village water committee which includes non-CMG members to mobilize community contribution for the project. The contribution is separate and does not come from the CMG revolving fund. The committee of about 5 members, prepares a resolution signed by the villagers (CMG and non-CMG members) indicating the need for a potable water system in the area and also their commitment to contribute to the implementation of the project, either in cash or in kind (labor). This resolution is submitted to M/P and is a supporting document to the PDO.

Myrada/PLAN handles the PDO write-up through its Extension Officer, the system design and cost estimates by the sub-office Construction Engineer and the PDO approval by the Project Officer.

In PDO preparation, the water committee participates in the selection of a site for the tank and determination of the number and location of taps to be constructed. It provides information on the borewell yield[9] to the sub-office Construction Engineer for the design of the system, particularly for the type of tank that is needed. The committee gets this information on borewell yield from the Z/P.

During the construction phase, the committee monitors the construction of the M/P portion of the project. In some cases, it becomes a pressure group to hasten the work of the M/P contractor and/or the work of the Z/P.

5.2 Construction Phase

5.2.1 Pre-Construction

After the approval of the PDO by the Project Officer, Myrada/PLAN sends a copy of the system design and cost estimates to the Z/P H.D. Kote Engineering for review. The Zilla Parishad then sends a letter to M/P stating its commitment to contribute to the project. Upon receipt of Z/P's letter of commitment, M/P starts the process of selecting the contractor to do the M/P portion of the project and also the selection of the qualified supplier for the construction materials. The CMG's water committee is not involved in the selection process. This phase (pre-construction) is between the planning and construction phases of the project.

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9 Borewell yield is the volume of water that can be pumped during a specific period of time.

The selection of the contractor is done through sealed tenders from invited contractors. The contract selection group which includes the PC, all POs and the FO Construction Engineer, meets and selects the most qualified contractor. M/P then (through the PC) enters into an agreement with the contractor. The agreement details the mode of payment, required specifications and the completion date. The signatories of the agreement from M/P are the PC, the concerned PO and the Construction Engineers both from the FO and the sub-office (SO).

Payment to the contractor is normally in installments based on phases of work completed. M/P retains a security deposit of 5-10% of the total bill until the full completion of the construction job. Refer to Figure 3 for the sub-contracting process.

The purchase committee selects the supplier for the construction materials from sealed quotations of pre-determined suppliers. The committee includes the PC, the POs and the Purchaser. Payment is made to the supplier upon receipt of goods. Refer to Figure 4 for the purchasing process.

5.2.2 Schedule of Completion and Commissioning

The construction phase is divided into M/P portion and Z/P portion. M/P normally constructs the (overhead) tanks, distribution pipeline and taps. The Z/P portion is further divided into 3 construction units: the Public Health Engineering Department (PHED) which does the drilling and borewells, the Z/P H.D. Kote Engineering that constructs the raising main (pipeline from the borewell to the tank) and the Karnataka Electricity Board (KEB) that installs the 3-phase electricity. M/P coordinates only with the Z/P H.D. Kote Engineering for the whole project and in turn, Z/P H.D. Kote Engineering coordinates with the PHED and the KEB for the entire Z/P portion.

M/P starts construction of overhead tanks with the borewells already installed by the PHED. When the overhead tank is near completion, the Z/P starts work with the raising main. Before the release of funds is made by the Z/P Mysore for the raising main construction, the Assistant Executive Engineer has to certify that the M/P overhead tank is nearly completed. Usually, the raising main is simultaneously undertaken with M/P's construction of distribution pipes and taps. The last stage of construction is the installation of the 3-phase electricity by the KEB. Having done all these constructions, the system is then commissioned and operation and maintenance is handled by the Mandal. Refer to Figure 1 for the sequence under the construction phase (I through V).

There were 73 M/P potable water systems initiated for the period FY 1985-90. Thirty (30) water systems had been commissioned as of August 1990 and 43 are in various stages of construction. Of these 43 systems, 19 have their M/P portion completed. Table 1A shows that the 30 commissioned systems represent only 41% of the total 73 systems that had been initiated.

Forty two (42) water systems were initiated during the AIDAB years. Only eight (8) of these systems or nineteen percent (19%) have been commissioned and fourteen (14) have their M/P portion completed. Table 1B shows the status of these systems (FY 1989-90) by sub-office. In the Sargur sub-office, none has yet been commissioned out of the 12 systems initiated although 11 have their M/P portion completed. Kasba/A'santhe commissioned 5 or 33% of the 15 systems initiated with Madapura having 3 systems commissioned.

Table 1C shows the number of H.D. Kote villages with M/P and non-M/P water systems by sub-office. Twenty two (22) villages have non-M/P water systems which account for seven percent (7%) of the total villages (317). The 73 M/P systems that were initiated represent 23%, and the 30 commissioned systems account for only 9.5% of the total villages in H.D. Kote. The table illustrates the potential impact that the M/P water systems can have on the lives of the Taluk families since they comprise the major portion of the water systems in H.D. Kote.

5.3 Operation and Maintenance

All commissioned M/P water systems are handed over by the water committee (through M/P) to the Mandal. Full responsibility over the water system, its operation, repair and maintenance now rests upon the Mandal. M/P and the CMG through its water committee do not share any responsibility for the management of the commissioned water system.

5.3.1 Funding

A Mandal is composed of a number of villages with an average number of about 20. There are 16 Mandals in H.D. Kote. For every group of 500 adult villagers (voters), one representative is elected every 5 years to become a Mandal member. The elected Mandal members choose among themselves, a chief called Mandal Pradhan and a deputy chief, Mandal Upapradhan. A secretary is appointed and employed by the Z/P Mysore as a custodian of the books of accounts. For villages that pay monthly or yearly user fees, the Mandal employs a bill collector and a number of collection assistants depending on the number of villages.

Each Mandal's funding for the operation and maintenance of the water systems in its villages can come from 2 types of source: the Mandal's own revenue generating mechanism and the Z/P's annual budget for maintenance for each Mandal. The Mandal's revenue generating mechanism operates through the collection of user fees per household and revenues from various village taxes such as business taxes, license fees and property taxes (land sites and houses). The Z/P allocates an annual budget of 10 Rs per head (voter) for the operation and maintenance costs of the village facilities such as water systems, health centers, school buildings, etc. The 10 Rs are split into Mandal (7.5) and Z/P (2.5). The Z/P share is for its administrative costs.

TABLE 1

FY 85-90 MYRADA/PLAN POTABLE WATER SYSTEMS A

FISCAL YEAR	TOTAL INITIATED (A)	M/P PORTION COMPLETED (B)	COMMISSIONED (C)	PERCENT TO TOTAL (C/A)*100
FY 85-88	31	5	22	71%
FY 89-90	42	14	8	19%
FY 85-90	73	19	30	41%

FY 89-90 MYRADA/PLAN POTABLE WATER SYSTEMS B

SUB-OFFICE	TOTAL INITIATED (A)	M/P PORTION COMPLETED (B)	COMMISSIONED (C)	PERCENT TO TOTAL (C/A)*100
Kasba/A'santhe	15	3	5	33%
Madapura	15	0	3	20%
Sargur	12	11	0	0
TOTALS	42	14	8	19%

NUMBER OF H.D. KOTE VILLAGES WITH M/P AND NON-M/P WATER SYSTEMS C

SUB-OFFICE	NUMBER OF H.D. KOTE VILLAGES	VILLAGES WITH NON-M/P SYSTEMS	VILLAGES WITH M/P SYS (OPERATIONAL	VILLAGES WITH M/P SYS (NON-OPER.)*
Kasba/A'santhe	122	2	13	12
Madapura	72	5	10	13
Sargur	123	15	7	18
TOTALS	317	22	30	43

* Non-operational as of June, 1990.

The operating costs of the water systems include the electricity charges and the wages of the system operator[10] employed by the Mandal. Maintenance costs are for minor repairs and replacement of spare parts and cleaning of the tank.

M&O ?

5.3.3 User Training

Hygiene education ?

The beneficiaries attend a half day orientation (3 hours) on the proper use and maintenance of the water system before or upon commissioning. The Extension Officer arranges and conducts this orientation with the assistance of the FO Training Officer. This is in connection with the FO primary health care program for which potable water is a part.

6 TECHNICAL REVIEW

6.1 Systems Design

During the PDO preparation, the sub-office Construction Engineer draws out the general layout of the water system portion for which M/P is responsible, giving details of the different parts. This is in consultation with the other sub-office Engineers and with the FO Engineer who then approves the final design. The M/P portion of the system normally consists of the water tank, pipeline distribution and the taps.

The system design depends on a number of factors such as the borewell yield, the number of household beneficiaries, the future or expected water demand and the spread or concentration of the house sites. The design is also in accordance with the standard Indian design which requires, among other things, that overhead tanks with a capacity of more than 6,000 gallons must be circular in shape.

6.1.1 Tanks

There are three types of tanks that have been constructed by M/P. The majority of the tanks are the reinforced concrete construction (RCC) overhead tanks with the holding capacity that ranges between 4,000 to 10,000 gallons. M/P also builds the pre-fabricated 500-gallon mini-water tanks and ground floor size stone tanks with the average capacity of about 5,000 gallons.

6.1.2 Taps, Platforms and Spillways

Water in all the systems are distributed from the tanks to centrally located standposts (i.e., taps that are supported by concrete slabs). Ideally, standposts have corresponding platforms and spillways for wastewater.

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[10] The system operator is a village resident who is chosen and hired by the Mandal members to oversee the operation and maintenance of the water system. Z/P trains him for the job. At one time, M/P conducted the training for 8 system operators.

Platforms should be constructed as concrete standpost bases to prevent flooding and erosion of the surrounding area. Spillways are intended to direct the flow of wastewater to designated sites. Based on the project site visits, they are normally connected to existing ditches or to simple community drainage systems along the sides of the local roads.

6.2 Water Quality Test

To obtain reliable test results, the water sample must be collected strictly following the standard procedure that includes:

- A water sample between 250 - 300 ml capacity placed in a covered sterile glass bottle. The water specimen must not be sent in plastic bottles.
- The collection must be carried out with meticulous care to avoid any bacterial contamination from the outside source including the hands of the person collecting. All possible contamination must be avoided during collection.
- The bottles containing the specimen must reach the laboratory within 3 hours of collection. If not, the bottled specimen must be placed on a packed-in ice box at temperature 40°C - 10°C and must reach the laboratory within 12 hours of collection.

The procedure used in the tests was the Most Probable Number (MPN) to obtain coliform counts. The probable number of coliform bacilli in 100 ml of water are obtained from the various combinations of positive and negative results of the tests. A positive result means acid formation and gas production which indicate the growth of coliform bacilli (i.e., indicator organisms of fecal contamination). An acid formation shows a color change of the media from pink to yellow or golden yellow and gas production is equated with air bubble production and the durham tube floats on top of the media in the tube.

Eighteen (18) samples were collected: 9 samples from the main source (taps) and another 9 samples from the end user source (household containers). There were 9 villages chosen, 3 villages representing each of the 3 sub-offices. Two samples were taken from each village: one from a tap of the village water system and another from a household in that same village which draws its water from the tested system.

The water tests could have covered more samples or samples from all existing systems but the procedure was limited by the available technical resources and laboratory facilities. For the earlier tests, special arrangements had to made to the district Health Department to get the samples analyzed and it took sometime for the FO to find another agency to conduct the latter set of tests.

6.3 Water Quantity and Use

H_2O TRANSPORT

Based on the survey, the average family size in the villages is 6 and the average age of the household water carrier is 28 years old. The carrier is usually the mother of the household. In H.D. Kote, grown-ups are the usual carriers partly because there is frequent 'scramble' in queues

implied CRITICAL demand?

particularly at the mini-water tanks. Normally, queueing is not orderly and children carriers are easily shoved away or overtaken by grown-ups. Also, fetching water allows mothers to socialize with each other.

The average number of trips per day is 11 during the dry season and 8 trips during the wet season. This is for both the M/P and non-M/P water systems. The average daily household consumption is about 165 liters. In the Sargur and Kasba sub-offices, households with M/P water systems have more trips per day than those with non-M/P systems. In the A'santhe sub-office, households with non-M/P systems have more trips. Refer to Table 2.

The major sources of water in the villages with non-M/P systems include the river and pond, irrigation canal or the government's borewell connected to a handpump or mini-water tank.

The distribution hours at the M/P systems last from 2 - 3 hours per day depending on the season, borewell yield and the size of the tank. The system operator opens the gate valve in the morning and in the afternoon for 1 - 1 1/2 hours each time.

The existence of a user pay system depends on the financial status of the Mandal. Among the 22 villages with M/P systems, 13 villages (59%) pay water fees that ranges from 1 - 6 Rs per month per household. Mandals which have sufficient funds do not charge user fees for the water systems.

Households use the water for other than domestic use[11]. They use water for gardens and livestock production. At least 45% of the households have kitchen gardens. All the 27 households surveyed in A'santhe sub-office and 78% of the households (41) in Kasba sub-office, have kitchen gardens.

No mention of relative importance of different uses.

7 FISCAL AND PROJECT MANAGEMENT REVIEW

7.1 Fiscal Review: Cost Analysis

if livestock consumes significant amounts of H_2O, maybe they should pay more.

Since there are no similar water projects being undertaken in H.D. Kote by the government or by other non-government agencies, the PE could not make a comparative analysis between a M/P water system and a non-M/P system. The mini-water tanks by the government had been commissioned a few years back and most of M/P systems are of reinforced concrete construction overhead tanks.

then why use them?

[11] Domestic use refers to drinking, cooking, cleaning and bathing.

7.2 Project Management Review

7.2.1 Project Information Management

The PDOs are kept in the sub-offices. Each PDO is filed with a number of supporting documents such as the village resolution, the lay-out scale of the system, the cost estimates of construction materials, the brief appraisal report on the area by the SO Construction Engineer to verify the water needs of the village and the covering memo from the PO which indicates the PDO approval and stipulates certain expectations and assumptions in the implementation of the project. The PAF and the PCC sheet plus the payment vouchers are attached to the PDO at the end of the fiscal year.

7.2.2 Project Staff Responsibilities

The Extension Officer is M/P's link to the villages. He or she handles about 5 or 6 CMGs and provides technical assistance to CMG members on various activities. Together with other CMG activities, he or she monitors the progress of the water project implementation and reports these to the Cluster Officer. At the end of the fiscal year, he or she prepares the PAF in consultation with the community. The financial aspect of the PAF is verified by the SO Assistant Accountant. The Assistant Accountant also verifies purchase requisitions and purchase orders before these are sent to the PO for approval. Checks are always signed by the PO and the PC or in the absence of the PC, checks are signed by 2 POs. The SO Construction Engineer certifies the completion of work of the contractor in phases before partial payment is made.

8 FINDINGS

8.1 Technical Review

8.1.1 Systems Design

All taps are supported by concrete slabs hence they are called standposts but not all standposts have corresponding platforms. Although it is not clearly stated from the project documents reviewed that platforms are required, they are an essential part of the standposts for health and sanitation reasons. This potable water project is being implemented as part of the primary health care program. **The problem is the lack of consistency in the design i.e., some PDOs include platforms in their design and some PDOs do not.**

design problem ?

In about 70% of the FY 1989-90 PDOs that were reviewed (46), platforms for the standposts are not included in the design. In the Kasba/A'santhe sub-offices, 15 of the 16 PDOs reviewed do not include platforms in their design. They have no cost estimates for platform construction.

The wastewater disposal (drainage or spillways) is not integrated with the planning and design of the potable water system. In the 7 water systems that were visited, only a few taps have spillways that go to either kitchen gardens or a ditch.

8.1.2 Water Quality

Water quality tests (bacteriological or chemical/physical) are not conducted on new or existing borewells, after drilling by the District Public Health Engineering Department. M/P likewise does not conduct quality tests of the water before or after construction of the tanks. The analysis is not part of the normal procedure of the local government and M/P before commissioning of the water system. The local government does water testing only when there is an outbreak of water-borne diseases in a particular area or when the district health officer suspects water contamination in a water system. According to one Project Officer, the local rule of thumb is that if the water is sweet, then it is considered potable[12].

Table 3 shows the results of the water tests. **Based on the World Health Organization (WHO) guideline values for drinking water, 7 of the 9 samples from the main sources were not clean or potable in terms of the number of total coliforms and number of faecal coliforms.**[13] This may be due to the contamination of the main sources[14] or that the taps are not being cleaned which is a maintenance issue. This is based on the premise that the standard water sample collection procedure was followed.

All the water samples from the household or end user did not meet the WHO guideline values. They exceeded the maximum permissible coliform counts. This may be due to the handling practices of the end users even though they cover and clean their containers as the survey revealed. Refer to Attachment 4 for the WHO guideline values.

The test result of the water sample from a household in the Manuganahalli village shows that it has lesser coliform counts than its main source (tap). One possible explanation for this is that the household boils its drinking water.

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12 Potable in this context refers only to the aesthetic properties of water such as taste, odor and appearance.

13 The Most Probable Number (MPN) was the procedure used to get an estimate of the total coliforms or bacteria present in the sample. MPN is a multiple-tube dilution method. Faecal coliform is a subgroup of total coliform that represents better evidence of faecal contamination.

14 About 75% of the 73 M/P water systems had existing (old) borewells from the government drilling program during the early eighties.

This situation calls for immediate re-testing and/or regularly scheduled tests to accurately assess water quality of the systems, so that an appropriate plan of action is undertaken.[15]

8.1.3 Water Quantity and Use

In Kasba and Antharasanthe sub-offices, the average number of trips per day is higher than in Sargur and Madapura sub-offices. Similarly, Kasba and Antharasanthe have higher daily water consumption. This is partly due to the use of water other than domestic use, i.e., for gardens and livestock production.

In Sargur and in Kasba sub-offices, villages with M/P systems have more daily trips to the taps than those with non-M/P systems. This means that the former have higher daily water consumption.

Although there were no data gathered on the accessibility of water resources prior to the M/P systems, improved accessibility is evident with the construction of centrally located standposts. The average distance of houses from the primary source is about 83 meters. This greater accessibility reflects water sufficiency since existing M/P water systems have so far been reliable. The Child Survival Baseline (CSB) study shows that in H.D. Kote, water is 'always sufficient' for households during the dry and wet seasons (H.D. Kote CSB, September 1990, Table 4.4, p. 11). The CSB study reported that 100% of the households surveyed in the Madapura sub-office had always sufficient water during the wet season. Based on the informal survey, the major source of water of these households are the taps and the average water distance is 104 meters. There are 15 existing water systems in the Madapura sub-office area, 5 of which are non-M/P systems.

8.2 Implementation

8.2.1 Construction Phase

There is delay in the construction of both the M/P and the Z/P portions of the projects. This in turn delays the commissioning of the systems.

The M/P portion is delayed due to contractors. The delays are caused by the contractors' multiple job contracts and also by their limited working capital. The average delay period is 1.5 years. Three water system projects in the Madapura sub-office are currently delayed due to the contractors. In the Sargur sub-office, 4 systems that have been

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15 In addition to the PE-required bacteriological tests, the FO through the Research Institute conducted the physical and chemical tests of the water samples which included the pH, dissolved solids and iron contents, the alkalinity and total hardness. Although there was no interpretation made, the results were better than the bacteriological test results. The pH and iron contents were within the permissible level and total hardness was acceptable in most samples, 14 out of 18.

started in FY 1988 were delayed, 2 of which have not been completed to date (Nanjipura and K.H. Shed).

The current M/P policy is to hire local contractors (i.e., H.D. Kote-based contractors) who are limited in number and demonstrate low levels of competence. According to one PO, the rationale of this policy is to tap and develop local technical manpower and 'outside' contractors have relatively higher priced quotations[16]. The FO apparently has not taken any steps to address this delay by the contractors, except in some cases, e.g. terminating the contracts of delinquent contractors. There are only about 8 local contractors in the area compared to the number of water systems (42) that M/P is currently implementing or has initiated. Only in rare cases do these contractors complete their work on time as agreed upon in the contracts.

The Z/P portion is also delayed due to the government bureaucracy which affects the timely disbursements of funds for the projects. The delay starts from the construction of the raising main to the installation of the 3-phase electricity by the KEB. **The average delay is about a year. One PO estimated that 60% of all the M/P water systems have been or are delayed.**

M/P H.D. Kote believes that the only way to solve the delay at the Z/P level is for the FO to encourage the CMGs and other villagers to pressure (e.g., petition letter) the local government for the immediate release of funds for projects. In the Sargur sub-office, the PO tried in FY 1990 to take some measures by sending letters to the Z/P requesting the Z/P to put up front, an amount of least Rs 25,000 for every system before M/P began with its portion so that there would not be a delay in the release of funds. This was tried in 3 water systems but the Z/P had not responded to this request and M/P had already completed its portion.

There is lack of consistency in the implementation of projects. A case in point is in the Sargur sub-office where 6 of the 7 water systems that were implemented in FY 1990, had budgets for platforms (or platforms were part of the design) but were not constructed. According to the Project Officer, the platforms were not constructed due to a change in the implementation. The sub-office has requested the Zilla Parishad to share in the construction cost of the platforms. This change of implementation has consequences on the completion of these platforms considering the bureaucracy in the release of funds by the local government. Besides, M/P had already allocated budget for this part of construction.

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16 The FO though had previously hired contractors from Mysore during the early years of the project and these outside contractors are typically competent and are more stable in terms of working capital and work equipments.

8.3 Fiscal and Project Management Review

8.3.1 Fiscal Review: Cost Analysis

The FO is keeping in line with its budget. Based on the review of the Project Cost Control (PCC) sheets which are attached to the PAFs and PDOs, the expenditures are within the budget. Cost overruns are mainly due to price increases of construction materials during implementation. This is to be expected as delays in other phases relate to cost increases.

8.3.2 Project Management

8.3.2.1 Project Information Management

Practically all the 46 FY 1989-90 PDOs reviewed have no dates of signature by the Extension Officer, Cluster Officer, SO Construction Engineer and the PO. The date of signature is part of the minimum requirement in the PDO preparation based on PLAN's Program Manual. According to one Project Officer, the FO does not put dates after the signatures in the PDO form because the date is indicated in the covering letter which is an attachment to the PDO. The date of signature by the Extension Officer who prepares and is the first to sign the PDO, is not necessarily of the same date as in the covering letter. Also, the Cluster Officer and the Construction Engineer still have to sign before the approval and signature by the PO, and before the covering letter is prepared.

The PCC sheets are well documented with supporting receipts. There is one PCC sheet though at the Madapura sub-office which has incorrect entries and another with supporting receipts from a different water system construction.

8.3.2.2 Project Staff Responsibilities

There is control of project activities. The SO Assistant Accountant does the verification on the financial side and the SO Construction Engineer, on the construction side. The PO does the overall management of the project.

8.4 Sanitation/Environmental Concerns

8.4.1 Wastewater

Ideally, wastewater disposal should be integrated with the M/P water systems both at the standposts and in the house sites. At the standposts, platforms and spillways are to be constructed, and in the house sites, spillways, ditches or 'collection points'(for garden and livestock use) are required.

Based on the PDO reviews and the project site visits, wastewater disposal is not integrated with the construction of the water systems at the standposts. As discussed in 7.1.1, platforms are seldom constructed or included in the design. The surrounding area usually gets muddy and there are pockets of stagnant water around the facilities. These are breeding places of insects that pose a potential health hazard. This situation is similar to the PLAN Haiti water projects in Croix-des-Bouquets and Jacmel which were evaluated in 1983 by Dr. S. Buzzard. Proper drainage was the most common problem with the water systems constructed in Haiti[17]. According to the POs in H.D. Kote, they plan to start with the construction of platforms this FY 1991.

Sanitation drainage

In the house sites, 85% of the 300 households surveyed have spillways for their wastewater disposal. In 3 villages in the Madapura sub-office, more households have ditches (20) rather than spillways (5). Other households collect wastewater for their seedlings and trees. There is no flooding reported in the house sites.

8.4.2 Storage

Households cover their water containers and they have separate containers for drinking and cooking and for other uses. Based on the project site visits, H.D. Kote water carriers clean their containers before filling them. This is in contrast with practices observed in the households in Burkina Faso where water containers are seldom or never cleaned (Burkina Faso Water Analysis, 1988)[18]. In H.D. Kote, although households clean their containers, water is polluted as shown by the water test results. This may be due to the contamination from the taps or to households' handling practices. In the three Burkina Faso FOs (Kaya, Boulsa and Kongoussi), drinking water is polluted either during transport or in the water containers at home.

Hygiene: cleaning water containers

8.4.3 Prevalence of Diarrhea

Only twelve H.D. Kote households (4%) reported the onset of diarrhea among children, 0 - 5 years old during the previous 15 days. There is no comparative data on water-borne diseases before and after the operation of the water systems in the area. This therefore limits the PE to assess the impact changes on health.

The CSB data show that 26% of the children, 0 - 5 years old had diarrhea in the past 15 days (H.D. Kote CSB, Table 6.1, p. 22, see Attachment 4). Based on the crosstabs using the CSB data, there is no correlation between the type of water source (open versus closed) and the prevalence of diarrhea among children, 0-5 years old. Similarly, there is no significant difference regarding the prevalence of diarrhea between sub-offices.

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17 The PLAN/Haiti Water Projects in Croix-des-Bouquets and Jacmel: An Evaluation Report, 1983, p. 43.

18 Chemical and Bacteriological Analysis of 9 Boreholes, 9 Open Wells and 9 Domestic Water Containers in Burkina Faso, IWACO, 1988, p. 7.

9 CONCLUSIONS

The project's objective is to provide accessible, sufficient and safe drinking water to the villages in H.D. Kote. This is to contribute to the reduction in the incidence of water-borne diseases under PLAN's primary health program.

9.1 Technical Review

9.1.1 Systems Design

The water system design does not include wastewater disposal and platforms usually does not go with the construction of standposts. Poor drainage can outweigh the positive effects of the M/P water systems.

9.1.2 Water Quality

The absence of a regular water test both by the local government and M/P makes suspect the actual water quality of the commissioned systems. The test results of the 18 samples had already shed some light on the reliability of the M/P systems in providing clean water. As a basic measure of water quality, (bacteriological) water testing rather than tasting (the aesthetic property and local rule of thumb) assures beneficiaries that what they drink is safe.

9.2 Implementation

9.2.1 Construction Phase

The delay in the construction phase is two-fold: M/P contractors' delay and the Z/P delay in the release of funds. The average delay period in the construction of the M/P portion is 1 1/2 years and in the Z/P portion, 1 year. This delay translates into:

(a) a delay in providing water to the villages,
(b) likely increase in the cost of materials by the time the purchase is made due to inflation and shortage of supply,
(c) higher depreciation costs incurred for materials already purchased or installed prior to the commissioning of the water system, and
(d) in some cases, pilferage of available materials.

9.3 Project Results

The M/P potable water project has not achieved its objectives to date due to delays in the construction phase and in the release of funds by Z/P. Also, the expected project benefits are reduced by the potential health hazard posed by the lack if not absence of wastewater disposal (platforms and drainage).

So far, a total of 73 water systems have been initiated by M/P. Only 30 (41%) of the 73 systems have been commissioned and 19 have their M/P portion completed. During the AIDAB years (FY 1989-90), 42 systems were initiated and only 8 systems (19%) were commissioned. This low number of commissioned water systems delays the provision of water services to the expected beneficiaries. In FY 1989-90, the Kasba/A'santhe sub-offices initiated 15 systems with an expected beneficiaries of 2212 families (759 PLAN and 1453 non-PLAN). Only 5 systems were commissioned that currently benefit 755 families (220 PLAN and 535 non-PLAN) or only 34% of the targeted family beneficiaries.

Although there were no data gathered on the accessibility of water resources prior to the M/P systems, improved accessibility is evident with the construction of centrally located standposts. It is not so much on the reduction of the distance between the house and the water source but rather on the reduction in queueing time because most of the borewells were already installed before the M/P water systems. This greater accessibility reflects water sufficiency since existing M/P systems have so far been reliable. The PE does not, and is not able to measure the social and economic consequences of this accessibility (i.e., the energy and time saved).

9.4 Sanitation/Environmental Concerns

Wastewater disposal is not integrated with the M/P water systems at the standposts but most of the households surveyed (85%) have spillways and ditches for their wastewater.

9.5 Impact

Impact changes on health cannot be assessed due to the lack of baseline data. However, other studies show that diarrheal infections are highest among households that are farthest from the water source[19]. Based on the informal survey, the average distance of houses from the primary source is about 83 meters and only 12 (4%) of the 300 households surveyed reported any incidence of diarrhea among children, 0 - 5 years of age.

9.6 Sustainability

Sustainability of the M/P water systems relies heavily on the shoulders of the Mandals since they handle the operation and maintenance. Myrada/PLAN indirectly sustains the water systems by conducting user training and for one time, trained a group of system operators. At best, M/P currently contributes to this sustainability through its training activities on basic hygiene and sanitation, and by strengthening the CMGs for mobilization of community contribution. The H.D. Kote CSB study reported that only 6% of the surveyed households actively participated in the potable water project over the past year (page 35). This indicates that sustainability in terms of active participation of household beneficiaries is still low although this low rate of participation might have reflected only the members of the water committees.

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[19] 'Safe Water and Waste Disposal for Rural Health: A Program Guide', USAID, 1982, p. 11.

While M/P has a minimal role in the sustenance of the systems, it has substantial project contributions. Based on the PDO reviews, M/P contributes on the average, about 63% of the total project cost compared to the percent shares of the Z/P and of the community. **With this major financial exposure to the water project, it follows that M/P has a stake in the systems sustainability.**

FIGURE 2.A PLAN/MYRADA ORGANIZATIONAL CHART
S.D. KOTE

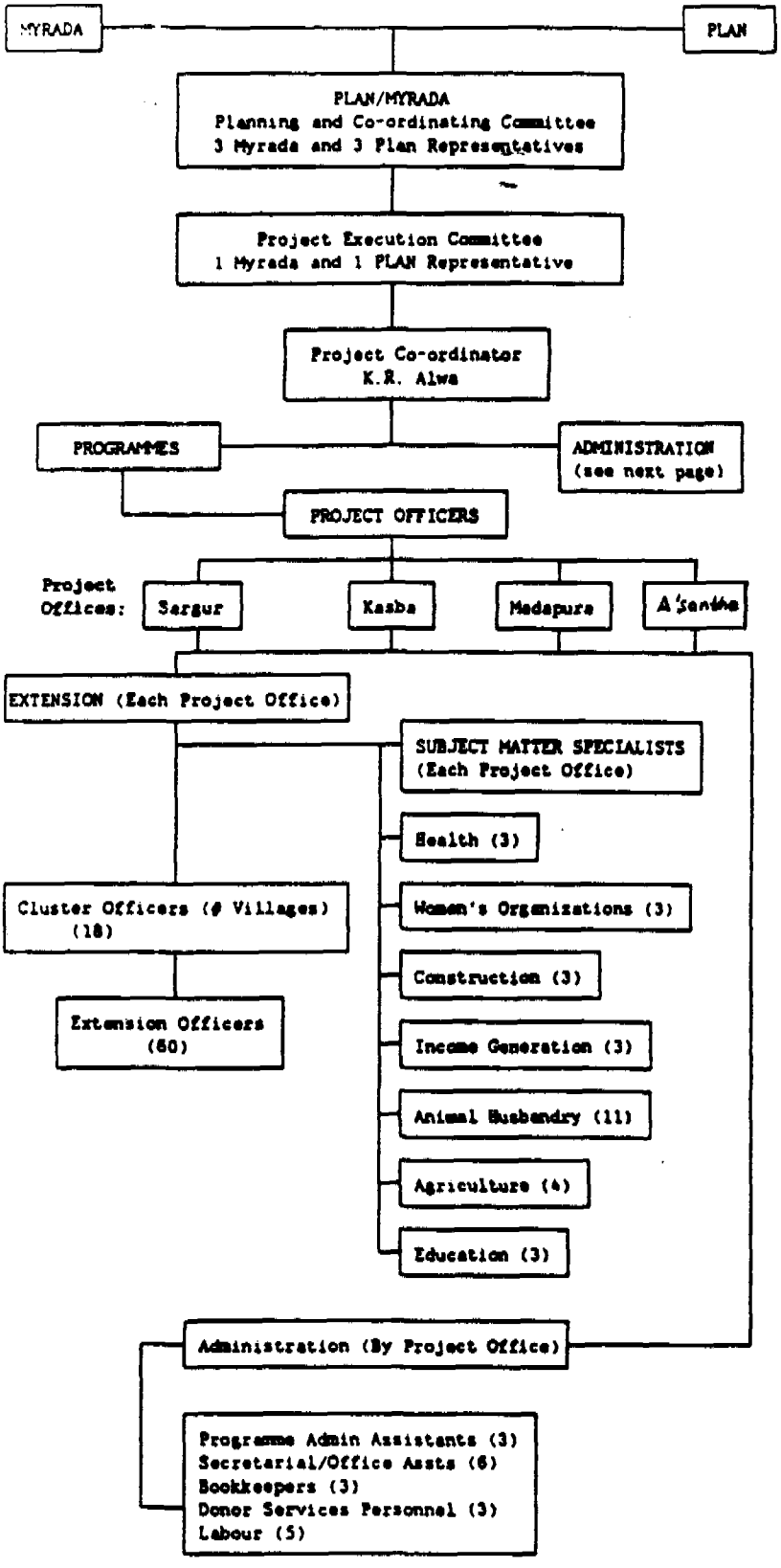


FIGURE 25 H.D. KOTE PROGRAMME OFFICE

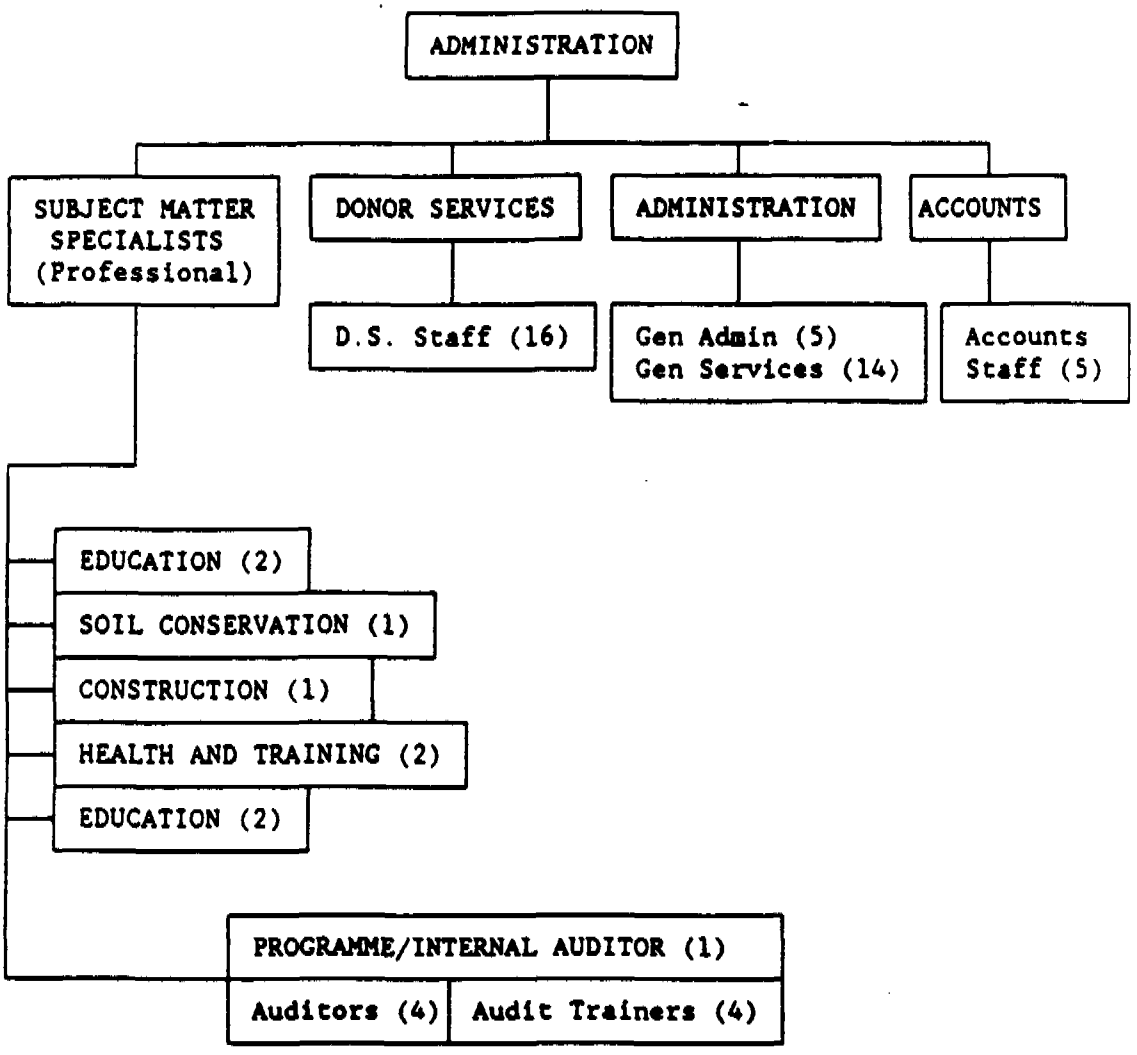
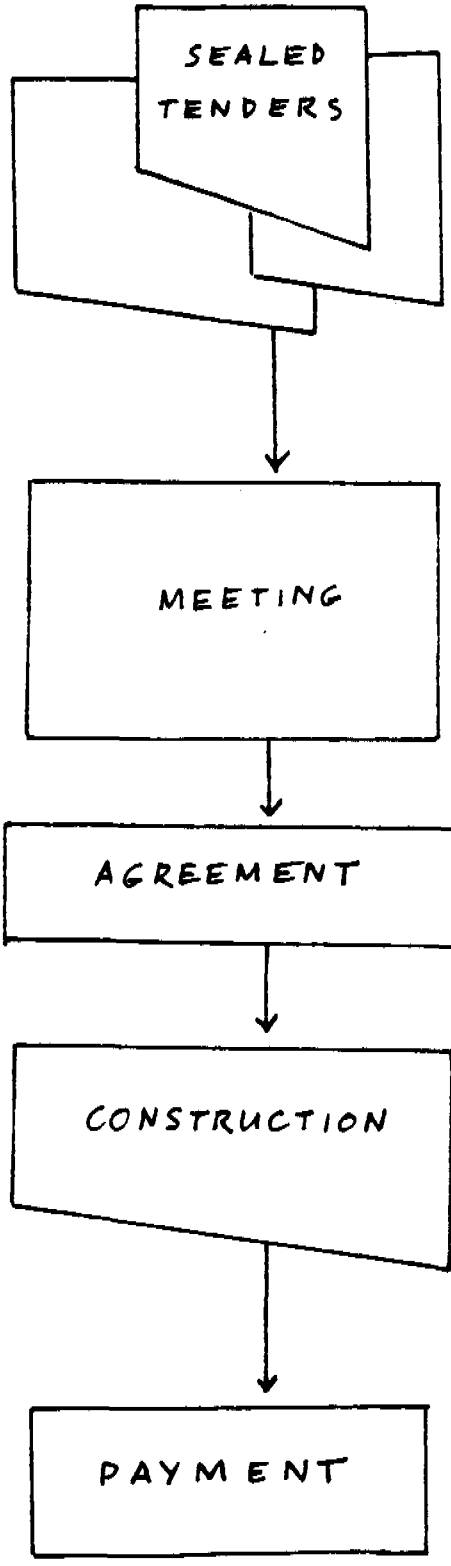


FIGURE 3

THE SUB-CONTRACTING PROCESS



1. UPON APPROVAL OF THE PDO BY THE PROJECT OFFICER (PO), THE PURCHASER, PO AND/OR THE CONSTRUCTION ENGINEERS (FO & SO) SOLICIT SEALED TENDERS FROM INVITED CONTRACTORS.

2. THE CONTRACT SELECTION GROUP OPENS THE SEALED TENDERS DURING THE MEETING FOR THE SELECTION OF A CONTRACTOR.

   THE GROUP INCLUDES THE PROJECT COORDINATOR (PC), THE CONCERNED P.O. AND THE CONSTRUCTION ENGINEERS (FO & SO).

3. MYRADA/PLAN THRU THE PC ENTERS INTO AN AGREEMENT WITH THE CONTRACTOR. THE AGREEMENT INCLUDES THE MODE OF PAYMENT, REQUIRED SPECIFICATIONS AND THE COMPLETION DATE.

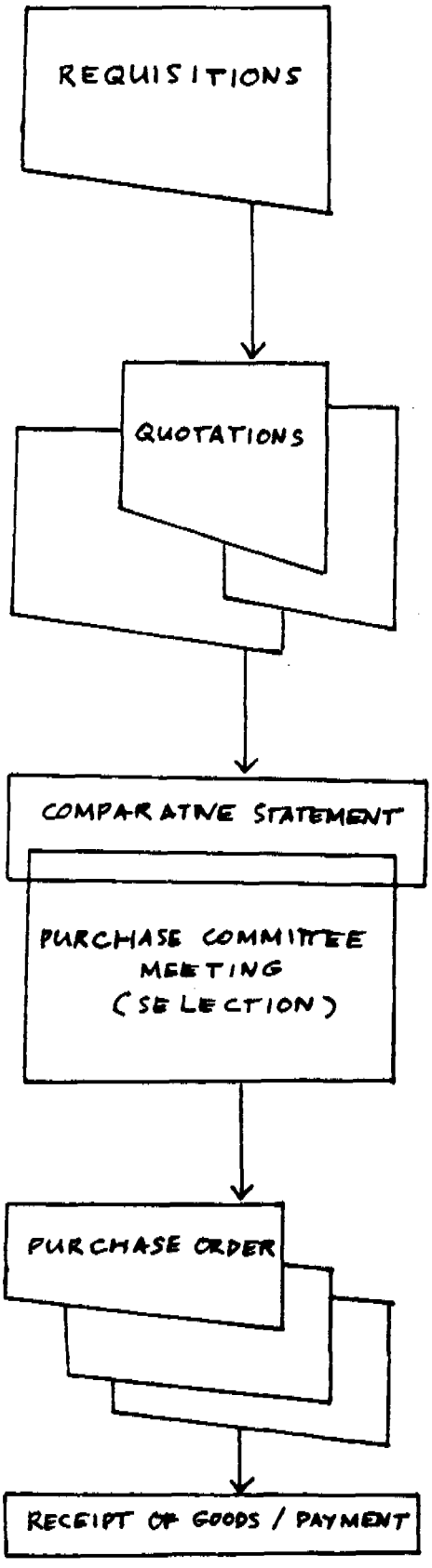
4. THE CONTRACTOR EXECUTES THE CONSTRUCTION JOB.

5. PAYMENT IS NORMALLY IN INSTALLMENTS BASED ON PHASES OF WORK COMPLETED. THE S.O. CONSTRUCTION ENGINEER CERTIFIES EACH PHASE OF WORK BEFORE PAYMENT IS MADE TO THE CONTRACTOR. THE MYRADA/PLAN RETAINS A SECURITY DEPOSIT OF 5-10 % OF THE TOTAL BILL UNTIL THE FULL COMPLETION OF THE CONSTRUCTION JOB.

LN
21 AUG 90

FIGURE 4

THE PURCHASING PROCESS



1. THE EXTENSION OFFICER OR THE PROGRAM ASST (STOREKEEPER) AT SUB-OFFICE (S.O.) PREPARES A PURCHASE REQUISITION IN TRIPLICATE WHICH VERIFIED BY THE SO. ASST ACCOUNTANT BASED ON THE APPROVED PDC. THE PROJECT OFFICER APPROVES THE REQUISITION AND A COPY IS FORWARDED TO THE PURCHASER AND ANOTHER COPY TO THE FO STOREKEEPER.

2. THE PURCHASER SOLICITS AND COLLECTS SEALED QUOTATIONS FROM PREDETERMINED SUPPLIERS EITHER BY MAIL OR BY PERSONAL CONTACT

3. THE PURCHASER OPENS THE SEALED QUOTATIONS AND MAKES COMPARATIVE STATEMENTS DURING THE PURCHASE COMMITTEE MEETING TO SELECT THE MOST QUALIFIED SUPPLIER. THE SELECTION IS BASED ON THE SUPPLIER'S ABILITY TO DELIVER REASONABLY PRICED QUALITY GOODS AT A PROPER TIME AND PLACE.

   THE PURCHASE COMMITTEE INCLUDES THE PROJECT COORDINATOR (PC), THE PO's AND THE PURCHASER.

4. THE PURCHASER PREPARES THE PURCHASE ORDER IN TRIPLICATE AND IS VERIFIED BY THE S.O. ASST ACCOUNTANT. THE PC APPROVE AND SIGNS THE PURCHASE ORDER BEFORE IT IS SENT TO THE SUPPLIER.

5. THE S.O. ASST ACCOUNTANT PREPARES THE CHECK SIGNED BY THE P.O. AND PC FOR PAYMENT OF GOODS RECEIVED.

ATTACHMENT 1

H.D. KOTE POTABLE WATER PROJECT QUESTIONNAIRE

NOTE: For families in an area NOT served by PLAN's water systems, answer I, II and V only.

Sub-office:_____ Village:_____
FC Number:_____
Respondent Name:_____ Relation to FC:_____
Family Size:_____

I Sufficiency and Use

1. Name of family's frequent carrier:_____Age:_____Sex:_____
2. Average Number of Trips per day:_____ Dry Season ____ Wet
3. Average Number of Pots/Buckets/Gallons(meters) of Water Consumed per day (for Domestic Use only):_____ (Domestic use: drinking, cooking, cleaning, bathing)
4. Do you use spilled water:__ Yes __ No If yes, for what:_____
5. Do you use greywater: __ Yes __ No If yes, for what:_____
6. Use of this water source other than domestic:_____

II Source and Distance

1.	Rain	6.	Drilled well
2.	River/stream/lake/pond	7.	Community water tap (closed
3.	Public open well		system)
4.	Public closed well	8.	Water tap in house site
5.	Mobile water tank distribution	9.	Water tap inside the house

Primary Source: ___ Dry Season _____ Distance; ___ Wet Season _____ Distance
Secondary Source:___ Dry Season _____ Distance; ___ Wet Season _____ Distance

III Maintenance and Reliability

1. Operation Schedule:_____ (hours/day) Dry/Wet
2. Maintenance (Repair) Schedule:_____ (monthly)
3. Do you clean the facility/surroundings before or after use:___ Yes ___ No

IV User Pay System

1. How much are the fees:_____ per family
2. Schedule of payment:_____ (weekly/monthly)
3. Who collects:_____
4. Are you in default:___ Yes ___ No

V Environmental Concerns

1. Water use practices

   1.1 Do you cover your water containers:___ Yes ___ No
   1.2 Do you have separate containers for drinking and cooking:___ Yes ___ No

2. Wastewater disposal

   2.1 Where do you dispose wastewater:___ Spillways ___ Ditch ___ Others
   2.2 Do you clean or clear your spillways:___ Yes ___ No
   2.3 Does flooding occur on house site due to wastewater:___ Yes ___ No

3. Water-related Diseases

   3.1 Has any child aged 0-5 years old in your family suffered from diarrhea during the last 15 days:___ Yes ___ No ___ N.A. (=> 3 loose motions/day)

4. Reforestation

   4.1 Have you planted trees or shrubs around the house since operation of the water systems:___ Yes ___ No
   4.2 Do you have a kitchen garden:___ Yes ___ No

Date:_____

Interviewer:_____

ATTACHMENT 2

PLAN INTERNATIONAL PROGRAM DOCUMENTS

1. The Situation Assessment and Goal Establishment (**SAGE**) Report

   The SAGE Report is the primary program planning document and addresses health, education, community development, and income generation. The report has three main components. First is an assessment of the social, economic, and cultural conditions of the area families and communities as well as an overview of the host country's long-range development plan for the area. Second is a clear statement of the program approach, which articulates the underlying programming philosophy. The third component of the report establishes realistic and measurable long-term goals which ensure program continuity and focus.

2. Sector Program Outline (**SPO**)

   SPOs are prepared for each program sector (health, education, social services, community development, and income generation). These documents summarize local conditions, current program status, the linkage with host government planning and support, and state specific sector objectives explaining their relationship to the projects proposed for the next three year budget cycle. In some field offices, projects from various sectors are combined to form such broader sectors as 'Family Development,' or 'Village Development.'

3. Project Development Outline (**PDO**)

   The PDO is an annual planning document containing specific, detailed budgets, time tables, location of project participants, description of activities, and the indicators to measure the projects' effects.

4. The Annual Program Report (**APR**)

   The APR is a fiscal year end report of all the program activities. It is the overall assessment of the field office program approach and status in relation to SAGE. The report discusses actual implementation by sector.

5. The Project Assessment Facesheet (**PAF**)

   The PAF is a summary sheet of a project's status prepared at the end of every fiscal year. This summary report is designed principally to compare actual implementation with the PDO.

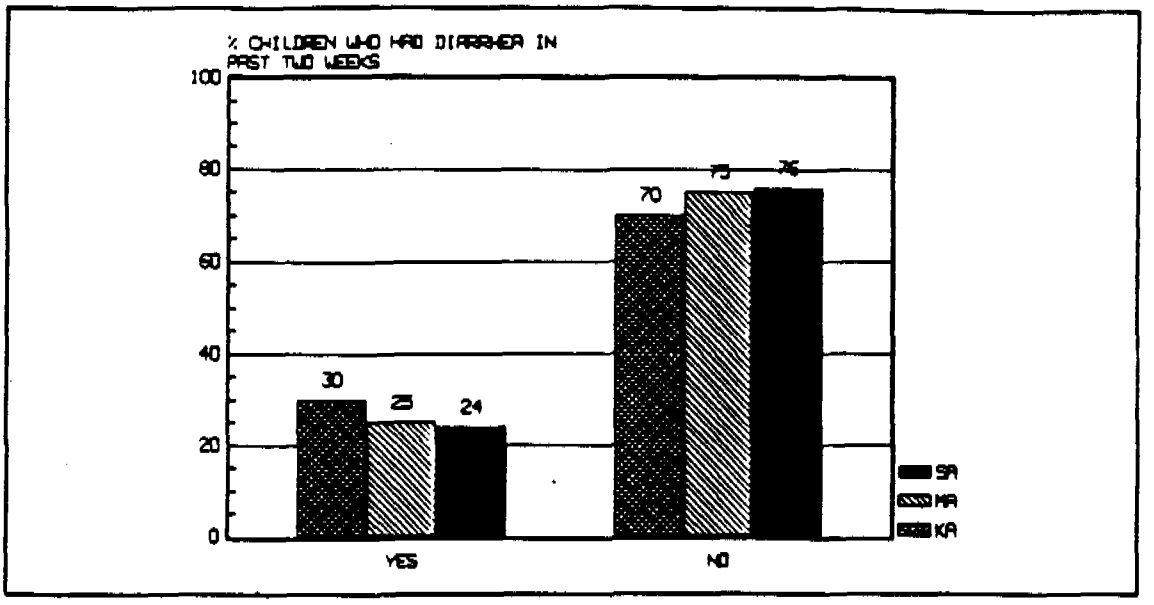
6. The Project Cost Control (**PCC**) Sheet

   The PCC Sheet is a project's expenditure logsheet which details every transaction made during the fiscal year.

6 MORBIDITY

6.1 PREVALENCE OF DIARRHOEA AMONG CHILDREN IN LAST TWO WEEKS

6.1a BY SUBOFFICE



26% children 0-60 months had suffered from a diarrhoeal episode in the past 2 weeks. Variation between suboffices is not significant (Chi-square test).

6.1b BY AGE GROUP
(count, col.%)

DIARRHEA IN LAST 2 WEEKS	AGE GROUP 0-60					TOTAL
	0 - 11 MONTHS	12 - 23 MONTHS	24 - 35 MONTHS	36 - 47 MONTHS	48 - 60 MONTHS	
YES	50	72	64	49	13	248
	34%	36%	29%	18%	13%	26%
NO	96	126	155	222	89	688
	66%	64%	71%	82%	87%	74%
TOTAL	146	198	219	271	102	936

The prevalence of diarrhea is highest in the age group 0-23 months and lowest in the 48-60 months age group. Variation between age groups is significant (p<.000,Chi-square test).

TABLE 2A

SUMMARY RESULTS OF THE INFORMAL SURVEY

Sub-office	Average Family Size	Average Age Carrier	Average Trips/Day Dry / Wet	Ave Daily Consumption (liters)	Ave Distance Primary Source (meters)
Sargur	6	28	7 / 5	119	92
Madapura	6	28	6 / 6	84	104
Kasba	7	29	14 / 10	238	87
Antharasanthe	6	27	16 / 11	217	49
AVERAGE	6	28	11 / 8	165	83
Sargur (M/P)	6	28	8 / 6	134	
(non-M/P)	6	29	6 / 4	93	
Madapura (M/P)	6	28	6 / 6	82	
(non-M/P)	6	29	6 / 6	88	
Kasba (M/P)	7	28	17 / 12	290	
(non-M/P)	5	32	6 / 6	79	
A'santhe (M/P)	7	24	15 / 11	206	
(non-M/P)	5	33	19 / 11	239	

TABLE 2B

INFORMAL SURVEY RESULTS

Village	Average Family Size	Average Age Carrier	Average Trips/Day Dry / Wet	Ave Daily Consumption (liters)	Primary Source Dry & Wet*	Ave Distance Primary Source (meters)
SARGUR						
Matakere	6	33	8 / 7	143	mini-tank	68
Hegganoor	7	24	10 / 6	128	borewell	66
Kenchanahally	6	27	10 / 8	133	borewell	102
Dadadahally	6	31	8 / 7	168	tap	13
Bankawadi	5	32	7 / 6	124	tap	30
Hullemaala	6	23	7 / 6	81	tap	16
Chennagundi	6	23	5 / 3	159	tap	84
Kothegala+	7	31	7 / 6	97	tap	63
Sargur+	5	24	5 / 3	96	canal	100
Tumbasoge+	5	33	5 / 4	58	river	375
Jakkahally+	7	29	7 / 4	120	pond; borewell	100; 100
MADAPURA						
Managanahally	6	21	4 / 3	44	tap	40
B.G. Hally	5	17	10 / 9	101	pond	471
C.H. Hundi	6	27	9 / 15	102	tap	177
Hatwal	5	40	4 / 4	57	tap	18
Alanahally	5	30	4 / 3	45	tap	26
G.B. Sargur	6	30	6 / 5	104	tap	103

TABLE 3

SUMMARY OF WATER TEST RESULTS

Location	Date of Collection	Sample Source	Coliforms MPN/100 ml	Faecal Col. MPN/100 ml
Kasba/A'santhe Sub-Office				
Hosahally	26 Nov 90	Tap	>180	>180
		House	>180	>180
N. Belthur	28 Nov 90	Tap	180	180
		House	180	180
Nooralkuppe 'B'	28 Nov 90	Tap	180	180
		House	180	180
Madapura Sub-Office				
B.G. Hally	21 Nov 90	Tank	1	Nil
		House	>180	20
Hoovinakola	21 Nov 90	Borewell	Nil	Nil
		House	>180	>180
Manuganahally	30 Nov 90	Tap	90	30
		House	8	2
Sargur Sub-Office				
Dadadahally	23 Nov 90	Tap	50	50
		House	90	50
Hullemala	26 Nov 90	Borewell	>180	>180
		House	>180	>180
Kenchanahally	23 Nov 90	Tap	90	90
		House	160	35

ATTACHMENT 4

MICROBIOLOGICAL ASPECTS

Guideline values for bacteriological quality

Organism	Unit	Guideline value	Remarks
A. Piped water supplies			
A.1 Treated water entering the distribution system			
faecal coliforms	number/100 ml	0	turbidity < 1 NTU; for disinfection with chlorine, pH preferably < 8.0, free chlorine residual 0.2–0.5 mg/litre following 30 minutes (minimum) contact
coliform organisms	number/100 ml	0	
A.2 Untreated water entering the distribution system			
faecal coliforms	number/100 ml	0	
coliform organisms	number/100 ml	0	in 98% of samples examined throughout the year—in the case of large supplies when sufficient samples are examined
coliform organisms	number/100 ml	3	in an occasional sample, but not in consecutive samples
A.3 Water in the distribution system			
faecal coliforms	number/100 ml	0	
coliform organisms	number/100 ml	0	in 95% of samples examined throughout the year—in the case of large supplies when sufficient samples are examined
coliform organisms	number/100 ml	3	in an occasional sample but not in consecutive samples
B. Unpiped water supplies			
faecal coliforms	number/100 ml	0	
coliform organisms	number/100 ml	10	should not occur repeatedly; if occurrence is frequent and if sanitary protection cannot be improved an alternative source must be found if possible
C. Bottled drinking-water			
faecal coliforms	number/100 ml	0	source should be free from faecal contamination
coliform organisms	number/100 ml	0	
D. Emergency water supplies			
faecal coliforms	number/100 ml	0	advise public to boil water in case of failure to meet guideline values
coliform organisms	number/100 ml	0	