

**WATER AND SANITATION
FOR HEALTH PROJECT**

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BENIN RURAL WATER SUPPLY AND SANITATION PROJECT MID-TERM EVALUATION

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WASH FIELD REPORT NO. 252

FEBRUARY 1989

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Prepared for
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WASH Field Report No. 252

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MID-TERM EVALUATION

Prepared for the USAID Mission to Togo
under WASH Activity No. 453

Prepared by:

Philip Roark
and
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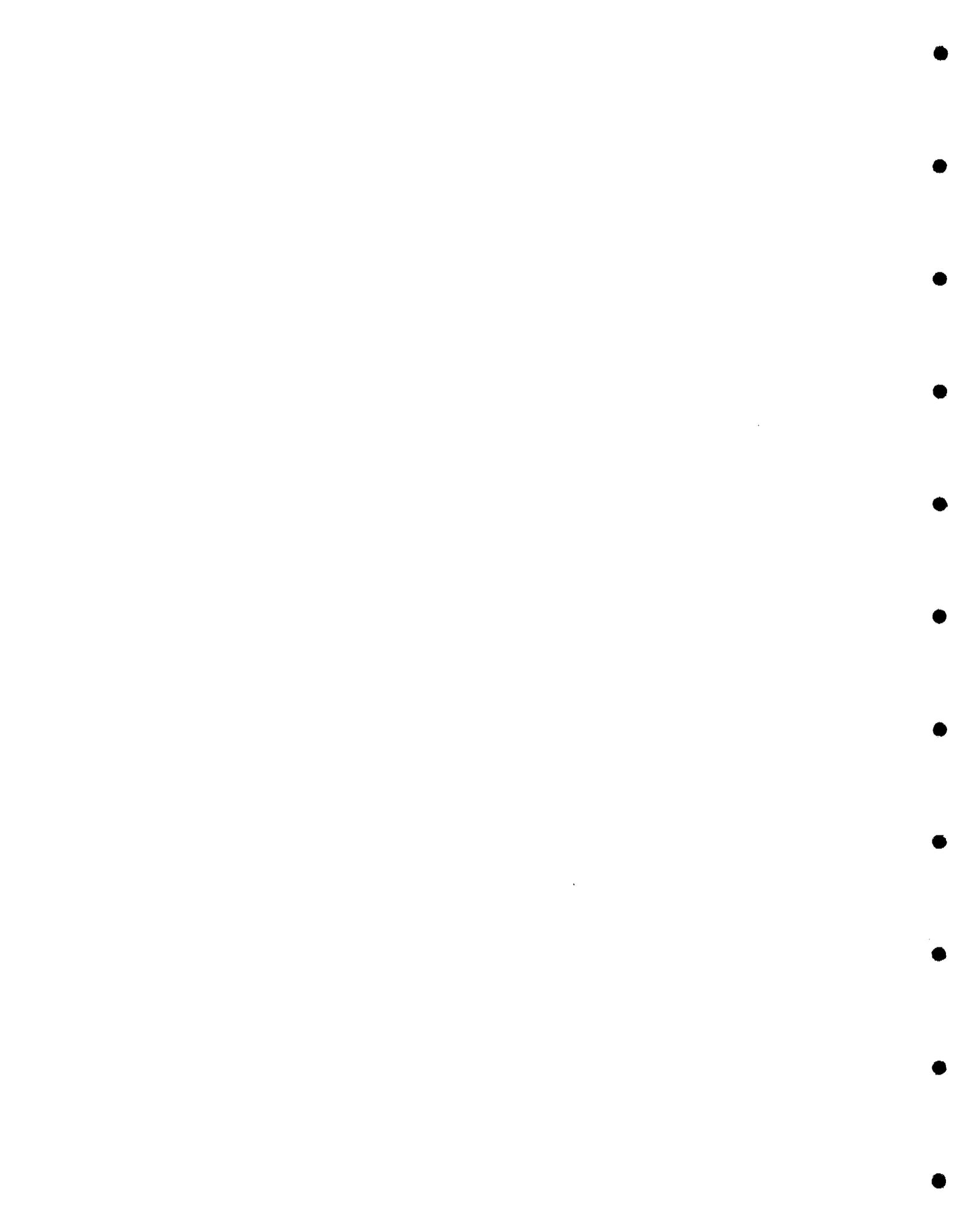
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ACRONYMS

CDSS	Socio-health development committees
cfa	West African Franc (\$1 = 300 cfa)
GPRB	Government of the People's Republic of Benin
ORT	Oral rehydration therapy
OCCGE	Organisation de Coordination et du Cooperation pour la lutte contre les Grands Endémies
PRAGMA/MCD	U.S.-based contractors
SEERT	Beninese pump distributor
UPROMA	Togolese pump manufacturer
WASH	Water and Sanitation for Health Project
WHO	World Health Organization



EXECUTIVE SUMMARY

Introduction

The goal of the Benin Rural Water Supply and Sanitation Project, as stated in the Project Paper Amendment of 1986, is to "assist the Government of the People's Republic of Benin (GPRB) to qualitatively improve the health and living conditions of the rural population." The project's purpose is to "assist the GPRB to improve the health practices of, and the adequacy and quality of water supply and sanitation facilities available to the rural poor in selected districts of central Benin." To achieve this, the project calls for the installation of 225 drilled wells equipped with handpumps, the construction of latrines (according to the Project Paper, 100 latrines are to be built; according to project implementation plans, 206 public and 150 family latrines were planned), the creation and training of village committees for self-management of the new water supply, and the organization of education campaigns related to health and water and sanitation. An important objective of the project is to reduce the incidence of Guinea worm by 30 percent in the heavily infested project zone through clean drinking water and preventive health education.

The project is a joint effort among USAID, the GPRB, UNICEF, and the Peace Corps, and is implemented through three GPRB ministries. Due to events beyond the control of project management, actual start-up was delayed until well after the Project Agreement Amendment was signed in 1986. The first training for extension personnel occurred in late 1987, and drilling did not begin until early 1988. Given this situation, the December 1990 PACD and the earlier completion of the technical assistance contract, USAID/Togo requested WASH assistance for a mid-term evaluation of project progress.

Purpose and Methodology of the Evaluation

The overall purpose of the evaluation was to assess both the appropriateness of project objectives and the adequacy of inputs in light of the change in the implementation timeframe. A team of four American and Beninese evaluators conducted a three-week field study of the project, interviewing project management, technical, and extension staff, as well as village beneficiaries. The evaluators also visited construction sites, observed activities in five of the six project districts, and reviewed relevant documentation.

Findings and Conclusions

- The team found that the project has recovered from its slow start-up and is advancing well toward its objectives. Project staff are carrying out recommendations concerning the implementation problems identified during a project review

workshop, with the result that field and coordination operations are relatively efficient and effective.

- The socio-health component is perhaps the most active. Field agents have created and trained over 90 village committees. They have begun the first health education theme on potable water in villages where pumps have been installed, and will add activities to prevent Guinea worm. While results from the interventions are noticeable in project villages, the rapid pace of activities makes it hard for agents to supervise and follow up village health education.
- The latrine construction program is gearing up to build 206 public latrines at schools and health facilities. Family latrines are planned for later in the project. The program is quite ambitious and complex logistically, which is likely to burden the agents responsible for supervising construction. It is also likely that the more visible but less effective public latrine program will overshadow the family latrines, thus diminishing the potential impact on health.
- Well drilling began in early 1988, and 37 boreholes have been completed with acceptable yield. To date, 34 pumps have been installed. This average rate of less than 5 productive boreholes per month is far below that needed to achieve the project objective of 225 productive wells. Water quality analysis has not yet begun.
- The proposed pump maintenance system, which relies on village funds, village watchmen, trained artisan repairmen, and spare parts supplied through private entrepreneurs, is appropriate. Given the slow rate of well drilling, however, a number of villages may remain unfamiliar with the maintenance system when the project ends.
- Data collection by means of monthly reports from all supervisory staff is adequate for project monitoring and problem solving. Epidemiological baseline data have been collected only for Guinea worm, not for other health problems. The reduction of Guinea worm appears to be a potential project impact of significant proportions.
- Construction of cisterns has not yet begun; however, the number planned exceeds the budget allocation and may overburden field staff.
- The headquarters building, to be completed late in the project, will house the different GPRB agencies and thus serve to reinforce the integrated nature of the water project for this and future efforts.

- Project coordination, management, and administration appear to be functioning efficiently after having addressed major impediments after the review workshop. The main concern at present is the completion of the contract with Pragma/MCD, the firms providing technical and financial management services for the project, and the separate completion dates of the health, engineering, and chief-of-party technical assistance contracts within Pragma/MCD. These timeframes do not fit scheduled project activities, which may compromise the overall success of the project.

Recommendations

In view of the evidence that project villages have organized to manage the new water supply and to act to enhance the health benefits of clean drinking water, the team feels that the project is basically sound and recommends that it continue in its current path. Nonetheless, the team recommends several adjustments to increase project effectiveness:

- The socio-health program should consider reducing the number of health themes so that agents can better follow-up village activities and focus on the most crucial behaviors.
- The hydraulics service and UNICEF must increase the rate of borehole production by settling administrative blockages and introducing a second rig.
- Public latrines should be reduced from 206 to 100, and villages benefiting from family latrines increased from 30 to 60. Family latrines should be started before the end of public latrine construction.
- The project (or UNICEF) should continue to supervise village pump maintenance for at least six months after the last pump is installed to assure that all beneficiaries fully understand the maintenance system.
- USAID should consider extending the technical assistance contract until PACD; otherwise, UNICEF should be approached to provide financial management services.
- USAID should further consider financing an extension of the project to provide pump coverage at a ratio of 250 persons per pump instead of 500 and to allow the socio-health program to operate more effectively in beneficiary villages. This modification could result in one of the most effective rural water supply, sanitation, and health projects to date in the sub-region.

Lessons Learned

The Benin Rural Water Project promises to be one of the best examples to date of the positive results that follow a community's involvement in owning and managing its improved water supply. The project model, developed and tested in neighboring countries and perfected in Benin, is ready for much broader application.

Chapter 1

INTRODUCTION

1.1 Purpose of the Evaluation

The evaluation of the Benin Rural Water Supply and Sanitation Project was carried out at the request of USAID/Togo. Its purpose was three-fold: to assess the project's advancement of the project toward its objectives, to identify problems encountered in doing so, and to recommend ways to address these problem, including possible reformulation of project objectives.

The evaluation addresses each issue contained in the Scope of Work (see Appendix C) and analyzes inputs, results, and effectiveness of each of the following major project components. The report is organized accordingly:

- Socio-Health Program
- Borehole Construction
- Latrine Construction
- Cistern Construction
- Construction of Project Headquarters
- Water Quality Analysis
- Epidemiological Surveillance
- Pump Maintenance
- Management and Administration

1.2 The Evaluation Team

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1.3 Evaluation Methodology

The team used the following methods for collecting and assessing project-related information:

- a) Interviewed project personnel at the national, provincial, and district level (see List of Persons Contacted, Appendix B).
- b) Reviewed project-related documents (see Bibliography, Appendix A).
- c) Made field trips to five districts and 11 project villages to observe project activities, which included training of project personnel and village development committees, village health education, well drilling, and informal inspection of pump areas and water storage in homes (see Villages Visited, Appendix E).
- d) Used questionnaires concerning both water supply and community health education to guide group and individual discussions with village committee members and district project team members (see Questionnaires Used, Appendix D).

It should be noted that the villages visited do not represent a random sample since they were selected on the basis of project program and activities that the team could observe.

Chapter 2

PROJECT BACKGROUND

2.1 Country Context

The People's Republic of Benin is a Francophone West African country with a population of about 4.5 million people, the majority of whom are farmers in rural areas. Their main crops are corn, sorghum, millet, and cotton. Some palm oil is also harvested and exported.

The country is roughly divided into two climatic zones: the southern half, which is humid and tropical with two rainy seasons, and the northern half, which is Sahelian with a long dry season and one rainy period.

The past ten or so years have been difficult for Benin. It suffered greatly from the drought of the early eighties, while the closing of the Nigerian border at the same time sent the economy into a deep decline. Benin is now considered one of the least developed countries in the world, and its rural populations endure high infant mortality rates, low life expectancy, and high prevalence of infectious diseases. Scarcity of food and water has further compromised the well-being of Benin's rural dwellers.

2.2 Project History

In response to the poor health conditions and dire water needs of Benin's rural populations, USAID designed the Benin Rural Water Supply and Sanitation Project (680-0201) in 1978. The original project design called for 225 boreholes equipped with Moyno pumps to be installed in the Borgou province of northern Benin, and for springs to be capped in the Atacora Province. These water resource development activities were to be combined with a community health education and sanitation program. The project was fully funded and operational by 1981, but was suspended by the Department of State in December 1981 for political reasons. The suspension was lifted in October 1984, and USAID conducted a water and health sector assessment. Based on that assessment the project was redesigned.

Due to the presence of several well-drilling projects in the Borgou Province, the GPRB asked USAID to consider transferring the project to the underserved northern districts of the Zou Province. This zone also suffers from heavy Guinea worm infestation, a debilitating disease transmitted by drinking contaminated pond water and the new project design thus called for reducing water- and sanitation-related diseases, specifically Guinea worm, by 30 percent. The project was to attain this goal by providing 225 boreholes equipped with India Mark II pumps in northern Zou villages (coordinated with sanitation and health education campaigns), by building latrines, and by constructing cisterns in those villages where drilling proved unproductive.

The redesigned project is a collaborative effort among USAID, three ministries of the GPRB, UNICEF, and the Peace Corps. Through a contract with USAID, UNICEF provides technical assistance for well-drilling and pump maintenance and participates in the village sanitation program. The executing GPRB agencies are the Division of Hydraulics (Ministry of Equipment and Transportation), the Division of Sanitary Engineering and Division of Health Education (both of the Ministry of Health), and the Division of Social Affairs of the Ministry of Labor and Social Affairs. The USAID technical assistance for public health, civil engineering, and project financial management is contracted to two U.S.-based firms, PRAGMA and MCD International. The U.S. Peace Corps provides eight community health education and two pump maintenance volunteers.

By early 1986, the Project Amendment Agreements had been negotiated and signed by all parties, and the GPRB had nominated and installed a national project coordinator. However, project start-up was blocked by Benin's arrears in paying its foreign debts, which prevented USAID from disbursing funds and delayed the signing of the technical assistance contract with Pragma/MCD. In spite of this, the Pragma chief of party arrived toward the end of 1986, Peace Corps volunteers were posted to project sites, and the GPRB assigned field staff from health centers and social affairs to the project.

Nearly a year went by before all components of the project could begin. WASH organized a project start-up workshop in April 1987, and the remaining technical assistance for public health and sanitation arrived in July 1987. During the interim, field personnel had conducted surveys of water and health needs in the project zone to identify participating villages. The first formal training for field agents to initiate the community organization and health education activities began in late 1987. Well drilling got under way still later, in early 1988. To date, over 90 villages have development committees, but only about 40 wells have been drilled.

Because of the difficult start-up of the project and the frustration felt by staff, WASH had another workshop in May 1988 to review progress to date, define obstacles, and propose working solutions. This workshop brought about much clearer definitions of project working norms and direction. Since then, several more training workshops have been held, including sessions on the first health education theme. Latrine construction will begin soon, and a major Guinea worm prevalence survey has been completed by UNICEF and others. Well drilling continues, along with pump installation, and the long-term pump maintenance system is being established. Financial and logistical management systems for the project are in place and functioning.

Chapter 3

ANALYSIS OF PROJECT COMPONENTS

3.1 Socio-Health Program

3.1.1 Overview of the Socio-Health Program

The aim of the socio-health component is to help villages receiving potable water supplies to

- a) acquire the organizational and financial management skills needed to own and maintain a handpump and
- b) adopt behaviors that enhance the health benefits of a clean water supply.

The component features long-term training and education activities carried out in project villages by extension teams composed of nurses, social affairs agents, and sanitation agents. At present, about 30 agents cover over 200 villages. A full time USAID-funded health education advisor, with three Beninese health, social affairs and sanitation technicians give direction for the component and design the curriculum. District agents are trained by the health education advisor along with the Beninese technicians and with the assistance of Peace Corps volunteers. Supervision is provided by three Beninese technicians and eight Peace Corps volunteers. A part-time UNICEF sanitation advisor collaborates in this component. The chief district medical officer functions as the nominal coordinator of all local activities.

Project support for this component includes providing motorcycles and gas to district teams and supervisors as well as to the district medical officers. Chief medical officers are eventually expected to assume the district-level supervision and coordination of activities when volunteer assistance finishes and the Beninese supervisors replace the expatriate advisors at the provincial headquarters.

The project pays per diem to district agents on the basis of work accomplished: 1,500 francs per committee installed, 1,500 francs per contract signed, etc. The project has also adopted a system of paying village committee members 500 francs each for attending the first three training or education sessions.

The phases of the component can be roughly described as training, community development, and health education. After participating in a preparatory training workshop designed and delivered by the project supervisors and the health education advisor, the district agents carry out training and educational activities for members of village socio-health development committees (CDSS). The committee members, in turn, are supposed to organize education and

mobilization activities with the village population. The activities are organized into "campaigns," each dealing with a separate health- or community development-related theme. Training methods are participatory and active.

Prior to, and as a condition for, construction activities including well-drilling and pump installation, the sequence of community organization and education events is as follows:

- Meetings with village notables and the village as a whole to explain the project, its conditions, and benefits.
- Election by villagers of a seven-member development committee, three of whom must be women. The committee consists of a president, vice-president, treasurer, two health workers, secretary, pump watchman, and a number of at-large members, such as teachers, rural development agents, and representatives from both the women's and youth organizations.
- Installation ceremonies held by villagers.
- 60,000 francs collected by villagers and deposited in a bank account.
- Contract signed between village and project.
- First training given to/conducted for village committee officers on their roles and responsibilities.
- Further training given to help committees to decide on a system for collecting pump repair funds.

After well-drilling and pump installation:

- Select committee members receive health education training on 8 themes related to water and sanitation at the rate of a new theme every two months.

The health education component uses non-formal learning methods including stories, songs, role plays, etc. These activities focus on specific behaviors and actions that villagers may adopt to safeguard their health by maintaining clean drinking water and a clean environment. Development of visual aids to support educational sessions is planned, but meanwhile agents use flipcharts developed in Cameroon. Six of the health themes will be accompanied by radio broadcasts in the local languages.

The health education training has just begun. To date only the first theme, "potable water," has been developed, and it is carried out in villages only when pumps have been installed. The next theme will be "prevention of Guinea worm," followed by "sanitary excreta disposal" in February.

The Guinea worm-reduction campaign has already begun with a comprehensive survey of all villages in the project zone. The survey has identified highest-incidence villages, infested ponds, and periods when the illness appears. Pond treatment and testing of water filter models will begin shortly, as will the health education training.

3.1.2 Assessment of Socio-Health Program

Since its start-up in July 1987, the health education/community development component of the project has advanced at an impressive rate. District teams have attended four training sessions, which have allowed them to proceed with the required pre-drilling organizational activities in approximately half of project villages in five out of six districts. A system of collaboration with a Swiss primary health care project in the district of Ouesse, the sixth district, is being worked out. In the district of Dassa, where pumps have been installed, the agents have begun health education activities concerning proper transport and storage of potable water. Even in villages where pumps were installed earlier without benefit of any community participation, agents have been able to help villagers organize committees and open bank accounts with the required 60,000 francs. However, this type of retro-organization generally requires many more meetings than for new villages and has a lower success rate.

In all villages visited by the team, pump ownership appears to have been clearly established. The villagers responded unanimously that they--the committee and the pump watchman--are responsible for repairs in case of breakdown and could describe the necessary steps. They could further explain the role of each of the committee members. In villages where health education on potable water had begun, local health workers described their approaches to helping their fellow villagers keep their drinking water clean. In fact, the difference between villages who had and who had not received training and health education was remarkable. Villagers who had participated in training had well-kept pump sites, knew that Guinea worm and other illnesses were caused by contaminated drinking water, and took an organized approach to village sanitation actions. The exact opposite was true for villages who had not yet received training/health education. In one village where the majority of committee members were affected by Guinea worm, only the secretary suspected that water was the cause.

Another positive result of the project's community organization approach is the high participation of women in project-related activities. The project stipulates that three of the seven committee members must be women. In fact, most of the committees the team encountered had more women members than required. They were vice-presidents, treasurers, village health educators, and representatives of the national women's organization. The agents themselves are clearly committed to promoting women's participation.

The Guinea worm campaign promises to be very successful, especially if enough time is allotted to carry it out to its conclusion. The survey already completed has pinpointed villages where over 50 percent of Guinea worm cases in the project zone are located. Water supply and education in these villages can have a rapid and very significant impact.

Health education training on potable water begins only after the new pump is installed. Many villages have organized committees, set up their bank accounts, and received initial organizational training, but given the slow rate of well-drilling, are now waiting without any project activity. Some agents voiced concern over potential discouragement and loss of credibility with their villages. The next theme, "prevention of Guinea worm," will, however, provide these villages with some activity while waiting for their pumps.

Another potential source of discouragement is the system of depositing the required sum of 60,000 francs in a local bank account. While this is acceptable in principle, and in some cases avoids placing the money in untrustworthy hands, there is evidence that some bank officials misunderstand the purpose of the accounts. The evaluation team heard several tales of villagers being unable to withdraw their money for pump repairs or otherwise to manage their own accounts.

The most critical issues facing the training and health education program concern the limited time remaining in the project because of late start-up, the ambitious amount of subject matter programmed, and the shortage of project staff to carry it out. Project agents who are nurses or social affairs agents are only assigned to the project 60 percent of the time. Sanitation agents work full-time for the project, but much of their time will soon be taken up by latrine construction. The current timing of activities allows agents to barely finish training village committees on one theme before beginning the next. This pace makes follow-up in individual villages difficult.

In addition, the health education advisor is scheduled to depart by mid-1989. Of the two counterparts the Beninese health education supervisor retires in January 1989 but will remain with the project until the end of 1990. The Beninese social affairs supervisor will replace the health education advisor upon her departure. This aspect is particularly critical considering the program's use of extension methodology based on non-formal and participatory approaches. These approaches force agents to use a new set of skills which need reinforcement and enhancement; the same is true for the new skills required of the village committees. Not enough emphasis is placed on training the village committee members to train fellow villagers and conduct community health education sessions.

A final dimension to the above-cited concerns is the current schedule of project activities, which calls for the well-drilling/pump installation activities to end at about the same time as community health education activities, i.e., at the end of 1989 or 1990, depending on a decision concerning the financial management contract. This means, in effect, that those villages at the end of the drilling list will barely benefit from training and health actions, which should be done after pump installation to ensure the continued maintenance and correct use of the water supply.

3.1.3 Conclusions

The methodology and the programming of activities for the health component of the project are appropriate and adequate to attain the objective of competent ownership of the pump by village beneficiaries. The composition of village committee membership ensures representation of diverse village interests, in particular of women. The only obstacle to real ownership of the pump appears to be occasional difficult access to village funds once they are placed in bank accounts.

The methods and content of organized training sessions for both agents and village committee members prepare the participants well for their roles in project activities. Training follow-up, however, is weak due to lack of skilled supervisory personnel and little additional time for agents to visit villages after training or health education sessions. The consequences of this may not be immediately apparent, due to the current high level of enthusiasm and participation, but for new skills and practices to be sustainable over time, this issue will need to be addressed.

Not all educational campaigns have been designed yet, but a preliminary assessment of the potable water campaign and plans for the prevention of Guinea worm campaign suggests that the design and approach used by the health team are essentially sound. Concerns about the quantity of campaigns, not their quality, are warranted given the limitations of time and personnel within the project.

3.1.4 Recommendations

In order to better ensure the sustainability of the health and community development campaign results, the program should be carried out for at least one year after the pump is installed in a village. This means that if the drilling phase ends in 1989, the health program must continue until 1990. If the drilling ends in 1990, the budget for the health program should be expanded over another year to cover (at least) gas and per diem for agents and supervisors, so they can finish activities in the last villages.

The project should take measures to strengthen the newly acquired non-formal, participatory extension skills of the agents. These could include:

- Organizing a training-of-trainers workshop as a special event outside of regularly scheduled training, using an outside facilitator and WASH assistance. The purpose of such a workshop would be for agents and supervisors to practice and strengthen skills and techniques used for all educational activities: conducting group discussions, giving demonstrations, using visual aids, planning health education training sessions, supervising village committee members, etc. The TOT should begin with the project supervisors as participants. They, in turn, would repeat it for the district teams with assistance from the consultant and the health

education advisor. This should also serve to strengthen the supervisors' training/supervisory skills.

- Project trainers should emphasize adult-education practice more during regularly scheduled training, paying particular attention to the training of village committee members to act as health workers in their own community.

In order to address the scarcity of project personnel and the ambitious program planned for the next two years, managers should consider reducing the number of health themes planned and concentrate on those with direct relevance to attaining project objectives: potable water, prevention of Guinea worm, sanitary excreta disposal, domestic and village hygiene. A reduced number of themes--and thus new behaviors--will permit agents to follow up the application of these behaviors by committee members and villagers, in general, rather than force them to introduce new subjects. Prevention of infectious diseases and ORT could be added themes if time and funding permit.

Program managers should assure the production and distribution of a set of appropriate visual aids on the key health themes for each agent or team of two agents.

A closer coordination of activities between the health and the sanitation (i.e., latrine construction) programs will avoid overburdening agents with multiple responsibilities and enhance the effectiveness of both components (see specific Recommendations for Latrine Construction Program). This coordination is especially important for the success of the "sanitary excreta disposal" campaign.

UNICEF and the PRAGMA contractors should continue to seek complementary roles in the socio-health program according to recommendations of the May 1988 project review workshop.

3.2 Borehole Construction

3.2.1 Overview of Borehole Program

Borehole construction is being undertaken by drilling crews furnished by the Hydraulics Service (Direction de l'Hydraulique sous le Ministère de l'Équipement et des Transport). UNICEF provides technical assistance and also furnishes the drilling equipment, support vehicles, and all related equipment. UNICEF also pays operating costs, including fuel and per diem for crew members who are hired by the Hydraulics Service on a temporary basis.

Villages in the borehole program are selected on the basis of water needs, size of population, distance to nearest potable water source, and prevalence of Guinea worm disease. Those meeting the criteria are then approached by district team members and given a description of project activities and requirements. Villages are required to organize a committee and to collect 60,000 francs for

pump maintenance, which must be deposited in a bank account. Villages are also obliged to sign contracts that delineate their responsibilities and those of the project. After achieving the above, the villages are put on the list of those destined to receive a borehole. The project standard calls for one pump per 500 persons.

Site selection within or near the village is done by agreement between the project hydrogeologist and the committee. In much of the Zou region well sites are necessarily placed near fracture zones located with the use of aerial photos. In some cases wells are drilled further from villages than is desirable. In areas where non-productive boreholes have been drilled, the project intends to use electrical resistivity equipment to aid in selecting promising sites.

Boreholes are being drilled with an Ingersoll Rand TH-55 using rotary (air and mud) and down-the-hole hammer techniques. Hole diameters are 9-1/4 or 6-1/2 inch, and PVC casing and screen of 5-inch inside diameter are being installed. Well development is undertaken by air lift until the water is clear, and pumps are tested using a constant one-step method at 1 m³/h for several hours. If their discharge exceeds 0.7 m³/h, wells are considered productive. In some cases, where villages are small and alternative productive sites are unlikely, yields less than 0.7 m³/h are acceptable.

Water quality analysis for chemical elements is to be done at the time of pump testing, but tests have not been completed to date. Bacteriological tests are to be done after pump installation but they also have not yet been undertaken. Water quality standards using French criteria, which are less exacting than those of WHO, are to be applied. UNICEF is responsible for training project staff in the following subjects:

- project management
- work planning
- hydrogeology
- geophysics
- pump testing
- installation and repair of handpumps
- drilling techniques
- mechanics.

Training is done on-the-job. To date, UNICEF construction personnel include a project manager, a driller, and a mechanic. In November 1988 a geologist and replacement driller were to be assigned to the project.

3.2.2 Assessment of Borehole Program

The project objectives are to complete 225 boreholes by the end of the project, to construct a concrete apron around each borehole, and to install an India Mark II handpump at each hole.

Drilling began February 16, 1988. By the end of October 1988, 48 boreholes were drilled with 37 providing acceptable yields. This provided a success ratio of 77 percent, which is acceptable under the geologic conditions of the Zou region. The wells have averaged 54 meters in depth, static water levels of 15 meters, and yields of 2.5 m³/h. To date 34 aprons and pumps have been installed. Only one village has failed to fully establish its bank account and their well will be sealed until this is done.

On average, during the first seven months of 1988, there were fewer than five boreholes with acceptable yield per month. Taking into consideration a nine-month work year, with time off for the rainy season and rig repairs, at this rate of borehole construction it will take five years to complete project objectives--an unacceptable duration considering the USAID project completion date of December 31, 1990. The rate of borehole construction is perhaps the least satisfactory aspect of project implementation. In part, the slow production appears to stem from an administrative problem between UNICEF and the Hydraulics Service. In theory, rig crews are to spend 21 days in the field each month with one week off and two days for travel to and from the project site. No work is done on weekends and so the actual work days average about 154 days per year. Delays have occurred in processing per diem which has delayed the departure from Cotonou. During the first half of 1988, 83 work days were spent at the rig site, which resulted in a well every three days. This is a good rate of production per day worked, considering that training is a part of the UNICEF program, but the number of days worked over the period needs to be increased.

Improving the rate of well construction has been the subject of recent discussions within the project, and several changes have been agreed upon. The director of the Hydraulics Service will look into the problem of speeding up administrative procedures for paying per diem and other compensation to rig crew members so as not to delay their departure from Cotonou. The rig crews will work continuously until 21 December on a six-day work week (Sundays off). At the end of this period, work progress will be reappraised to evaluate the effectiveness of his procedures. In addition, a driller and a hydrogeologist from UNICEF will arrive in November which will improve supervision. In January a second drill rig (IR TH-55), which is at present en route to Benin, will begin operation.

Based on recent improvements in the drilling rate (7 boreholes in 15 days during October) and the changes indicated above, it appears that the project objective of 225 wells can be reached by mid-1990. This objective is obtainable only if the schedule below is followed

<u>Year</u>	<u>Productive Wells</u>
1988	63
1989	126
1990 (June)	<u>63</u>
	252

This assumes seven production wells per month, nine months of scheduled work per year, and two rigs operating from the beginning of 1989. This is a reasonable expectation, which can be achieved under existing capabilities, and project staff should avoid any lapses that allow production to fall below this schedule.

This schedule allows for an additional 25 wells beyond the project target of 225. These extra wells have been requested by the World Bank (CARDER) and agreed to by UNICEF/Hydraulics Service in the Zou region. The World Bank agreement requires clarification, however, to avoid negatively affecting the USAID project objectives of total wells and to assure that all wells for village use follow the established project procedures for community participation and health education.

It is particularly important that project activities be programmed to complete well drilling no later than mid-1990 in order to allow established project follow-on activities relating to pump-maintenance procedures and health education to be completed by the end of the project (end of 1990). These activities are needed to assure full benefits of pump sustainability and health impacts from potable water.

If the above-indicated changes in the project do not achieve the production rate expected, several other changes should be considered. One change would be to place the drilling component under project administration, which would streamline some administrative procedures related to per diem. At present, per diem is reimbursed by UNICEF after payment by the Hydraulics Service. Eliminating this procedure and advancing per diem, which is the only approach that should be used, would assure that rig crews are in the field as scheduled. UNICEF should also consider establishing a pay scale based on production, with bonuses paid for wells completed. Moving the project headquarters to Abomey would be beneficial in lowering travel times but may cause problems with workers who have homes established in Cotonou.

3.2.3 Conclusions and Recommendations

The quality of well construction appears sound and is to be commended.

With some exceptions, the cleanliness and drainage around wells is acceptable. However, it is recommended that fences of 15-meter circumference be constructed around wells to avoid animal pollution. Thorn bush fences offer a low-cost solution.

The rate of production should be improved and a schedule established that will allow completion of 225 to 250 wells by mid-1990. Any decline in this schedule should prompt project staff to find solutions to indicated problems.

Water should be tested for chemical elements during pump testing. Bacteriological testing should be completed periodically after the well is placed in production. The well should be chlorinated after pump installation and whenever below-ground maintenance work is performed.

Water quality standards need to be established by Benin that consider the benefits of providing improved water quality and quantity. French standards, which are less stringent than WHO, are acceptable. It should be noted that condemning a well which is somewhat below international standards means, for most project villagers, returning to a source that is considerably below standards and clearly unhealthy.

The project standard of 500 persons per pump is higher than desirable for handpump yields. After the project has covered the initial list of villages, it is recommended that the standard be changed to 250 persons per pump and that those villages with populations in excess of 250 be provided with a second borehole. This could be done with remaining funds in the drilling budget or by an extension of the project. In either case, new villages should not be added to the list until this standard is achieved.

3.3 Latrine Construction Program

3.3.1 Overview of the Latrine Construction Program

The latrine construction component as currently planned, expects to build 206 public latrines (with a total of 646 holes) in primary and secondary schools, health and maternity centers, and social affairs centers. These latrines will be single- or double-pit, ventilated models with a concrete block superstructure. Next, the program intends to help families in 30 project villages build low-cost family latrines. After a sensitization phase, the project will provide the concrete latrine platform to interested families. Five families in each participating village will benefit. Hygiene agents will train village masons in pit and superstructure construction using either cement or local materials, depending on the family's preference and means.

The cost of the public latrines is estimated at 59,000 francs (\$196) for a two-hole model, 121,800 francs (\$406) for a five-hole model. The cost nearly doubles for a double-pit model. The project expects to provide trained masons, construction material, tools, sand and gravel, transportation for personnel, and per diem and incentive payments for sanitation agents. The total cost for the public latrine program is estimated at 42,154,471 francs (\$140,515) for 206

public latrines and 4,174,100 francs (\$13,913) for 150 family latrines. The cost for public latrines is an estimate based on construction of all single pit latrines. Construction of double pit latrines will certainly raise the cost of public latrine construction.

The latrine program will be carried out in conjunction with health education/community component activities whose objectives are the acceptance and support of the latrine program, the involvement of the community, and the prevention of hydro-fecal diseases. Initially, project agents will conduct detailed surveys on villagers' attitudes and practices concerning sanitation and excreta disposal, and this information will provide the basis for health education activities. The district sanitation agents will serve as both health educators and construction coordinators in about 20 villages, each. Their duties will include encouraging teachers in target schools to address proper latrine usage and maintenance, promoting family latrines, conducting village sanitation surveys, supervising masons at construction sites, arranging logistics for materials and personnel, and holding village health education sessions on sanitary excreta disposal. They will receive incentive payments for latrines built, contracts signed, and sanitation surveys conducted.

The program is being managed by an expatriate civil engineer provided by MCD and a counterpart from the Sanitation Division of the Ministry of Health, who is also a project supervisor for the health education program. The two Peace Corps volunteer pump mechanics will assist the fairly complex logistics management of the program.

Two latrine-construction workshops for sanitation agents, project supervisors and district masons have been completed. The program is gearing up to begin constructing public latrines before the end of 1988. A list of health and educational facilities in villages and towns of the northern Zou which are to receive public latrines has already been established.

3.3.2 Assessment of Latrine Construction Program

The purpose of the village sanitation component is meant to reduce the potential for fecal contamination within the village environment and thus presumably to reduce the incidence of fecally transmitted diseases. In villages throughout the project zone, the connection between sanitary excreta disposal and health status is not well understood and latrines are virtually nonexistent. At best latrines are viewed as status symbols, and much education will be required before latrines are wanted and used.

The latrine construction program plans to construct a considerable number of public latrines at health and educational facilities, where it will depend on teachers and health center staff to educate pupils and patients after motivational meetings with project staff. Ownership of and responsibility for the public latrines will belong to teaching and health personnel, not the pupils or patients. Many of the facilities are located in the district seats, which are large towns not participating in other aspects of the project and which therefore have no committees or clean drinking water provided by the project. Family latrines are known to be much more likely to affect health if their

construction is combined with education and supervision of maintenance and use, and a potable water supply. The family latrine component is quite small compared to the public latrine effort, despite its higher potential impact on health. Only 30 of the 200 project villages will be covered.

Although the program plans call for integration, at present the public latrine construction program is somewhat ahead of the health education program. The latrine training conducted so far has mainly focused on construction skills of masons and sanitation agents. The health education training for district teams and village committees on sanitary excreta disposal are scheduled to begin in February 1989, and plans are currently being designed. Public latrine construction will begin in December 1988.

In examining the role of sanitation agents in the latrine program as well as in the health education program, it is evident that a large number of tasks are expected of them. In addition to coordinating the sanitation program in their districts, they will continue to be responsible for training and follow-up of village committees during health education campaigns. Two agents have been assigned to each district, which will average about 30 project villages. At present, one district is missing an agent. Since the agents will receive bonuses based on latrine contracts signed and construction completed, and since construction requires constant attention, they are likely to concentrate their efforts on building rather than educating, in the opinion of the evaluation team. As with the health education training, shortage of personnel and the relatively fast pace of activities will make follow-up for correct use and maintenance of latrines very difficult. In addition, the lengthy surveys planned for the sanitation program are likely to be too detailed and time-consuming to be useful at this point in the project when implementation time is limited.

3.3.3 Conclusions

The latrine and village sanitation program is one of the key components of the project. However, its combined construction and education objectives and program design are too ambitious for the existing staff to achieve in the time remaining. In addition, the program emphasizes more costly public latrines in schools and health facilities, often in towns where no drilling is scheduled, over low-cost family latrines. This diminishes the likelihood of a health impact in project villages. The effort required to supervise logistics and construction, as well as to ensure proper maintenance and usage, will surpass the capability of the already overburdened sanitation agents since there is limited possibility for village committee participation.

The approach envisioned for the family latrine program is more appropriate for several reasons: only interested and motivated families will benefit, the model is low-cost (\$50), and families will be expected to participate in the design and construction. It also includes a role for village committees that the public latrines do not. But as it now stands this program is planned on a much smaller scale than the public latrines. The latrine program would enhance its potential for the positive health effects by increasing family latrines and village education, and reducing the scale of the public latrines program.

3.3.4 Recommendations

To increase its potential for a positive health impact, the project should reduce the target number of public latrines from 206 to 100 and plan to complete construction by the end of 1989. At the same time, the project should double its family latrine program, increasing the number of target villages from 30 to at least 60 and providing latrines for five families per village as originally planned.

Public latrines should be built only in project villages with active village committees. Sites located in towns should be eliminated from the list, because no other project activities are planned there. Schools should be selected as latrine construction sites rather than health facilities and social affairs centers because of the greater likelihood of longer-term education of pupils. Those schools with teachers who are village committee members and/or actively involved in village development affairs should be given priority as latrine construction sites. The project should provide teachers with relevant materials on latrine use and maintenance.

The family latrine program should be integrated with the "sanitary excreta disposal" campaign scheduled for February 1989. This campaign should be extended as necessary to allow time to construct family latrines and to provide education on correct use and maintenance. All project extension agents--not just sanitation agents--should be trained for both the education and construction aspects of this activity. As much as possible, the homes of the village health educators or other members of the committee should be selected for family latrine sites. They can serve as role models and encourage others to do the same.

At the beginning of the "sanitary excreta disposal campaign," the project agents should conduct a very simple survey assisted by selected members of the village committees. These surveys should identify practices related to defecation and sources of fecal contamination in villages and should determine whether a majority of small children suffer from diarrhea and parasites. These surveys should serve as educational tools for the village rather than baseline epidemiological surveys.

Project staff responsible for latrines should consider a study visit to the CUSO water/sanitation project in the Maritime Region of Togo. The CUSO project has developed a family latrine program that is remarkably effective, low-cost, and participatory.

3.4 Cistern Construction

3.4.1 Overview of Cistern Construction

The project design, taking into account the difficult terrain for seeking water, provides for the construction of cisterns in those project villages where

drilling was unproductive. This activity is scheduled to begin in December of 1988 and to continue for the life of the project.

The cistern component plans to have the following phases:

- Village selection
- Village orientation and education
- Training for cistern construction
- Construction and management of cisterns

The expatriate MCD civil engineer and her counterpart are in charge of this activity. Project masons and sanitation agents assigned to the project will be responsible for implementation in the villages.

3.4.2 Assessment of Cistern Construction

The cistern activity is budgeted at 22,500,000 francs or \$75,000. The estimated cost of a group of cisterns providing drinking water for 40 to 60 persons is three to four million francs (Togo Rural Water Project figures). This would mean that the budgeted monies would build only five or six groups of cisterns of the same type as in Togo. In Togo a cistern consisted of one hangar (80 square meters of roof) and four storage tanks (6,000 liters each). However, the project envisions drilling 225 wells. Of the 30 already drilled, two have been unproductive. A simple calculation shows that if this rate continues, the project can expect 15 or so negative drillings.

The main question with regard to cisterns is which villages to choose. The choice should be made on the basis of greatest need for water and desperate health conditions (for example, where Guinea worm is very prevalent).

Given the fact that the budget will in all likelihood not permit coverage of all dry villages, this activity becomes, a priori, a pilot one and should be treated as such: it should serve as a basis for lessons that can be used later in a more generalized effort, under a different funding source.

3.4.3 Conclusions and Recommendations

The funds budgeted for this activity are not enough to cover the needs of villages where drilling has been unproductive. Ideally, additional funds should be solicited in order to satisfy the needs of all project villages. Since it is unlikely that USAID can respond to this request, the cistern activity should be taken as a pilot activity and should be well planned and managed to provide a model replicable in the future when other funding can be found.

The project agreement calls for an expatriate engineer and a Beninese engineer from Public Works to be assigned to this activity. It is recommended that the GPRB assign such a person as soon as possible to take charge of the activity, as the MCD engineer is very occupied with the latrine construction program. The Public Works engineer would be responsible for the following tasks:

- assuring that cistern design is adequate and appropriate from an engineering standpoint;
- exploring the uses of local materials to lower cistern cost, making them more accessible to rural populations.

If need be, project engineers should visit neighboring countries (such as Togo) to assess accumulated experiences and thus avoid repeating mistakes.

Given the scarcity of field personnel and the large number of tasks assigned to the sanitation agents over the next year, it would be advisable to delay start-up of cistern construction until the public latrines are completed (the end of 1989). The drilling would also be more advanced, and presumably the number of dry villages would have increased.

Finally, since this activity represents an innovation in collective water supply, it should be approached as a research opportunity.

3.5 Construction of Project Headquarters

3.5.1 Overview

The construction of project headquarters was recently begun (October 1988) at Bohicon. Construction was originally planned for project inception, but contracting changes by USAID caused delays. A construction contract was let with the Benin firm of Artico 80, to be supervised by Afrique Omnitech, a separate architectural firm. The project engineer is expected to spend about ten percent of her time in overseeing the construction process. Completion of the buildings, with utilities and other facilities ready for occupancy, is expected for May 1989. At that time the project will be about 75 percent complete (75 percent of total project funds expended).

3.5.2 Assessment

A question logically arises as to the value of these buildings, since their use will come late in the project. The original intent, apart from providing work space for project staff, was to integrate project activities from three ministries by placing staff under one roof. It was expected that, by having close access to one another, the project directorate could coordinate activities efficiently. This approach remains valid and important to project success. The integration approach is unusual, possibly unique, in Benin and as such serves as a model for continuing present project activities and for future water

supply/sanitation/health-related projects. It is, therefore, considered that the headquarters will serve as a positive contribution to overall objectives in spite of its late completion.

3.5.3 Conclusions and Recommendations

One area of concern expressed by project staff deserves mention. Since the buildings are being constructed on land owned by the Ministry of Public Works, that ministry may tend to exert undue pressure on project activities for its own interests. This should be avoided if the principle of a coordinated and integrated approach to project goals is to be maintained. Written agreements between the ministries involved as to the use of the project headquarters both during and after project closure are advised.

3.6 Water Quality Analysis

3.6.1 Overview

An important objective of the project is to improve the quality of the water furnished to the rural populations in the Zou Region. The construction of wells will clearly improve water quality beyond the present sources which, for most villages, are ponds or streams. It is noted that, in most cases, the wells also provide an element of convenience in bringing the water closer to the homes of villagers, thus increasing the quantity of water used.

The measurement of water quality is a stated component of project activities and includes both physio-chemical analysis and bacteriological analysis. To date, no analyses have been conducted although they are planned and expected to begin within the month. The reasons for the delay were problems associated with financial arrangements and accords with the water agency laboratory, including transportation arrangements.

Physio-Chemical Tests

Recently, it has been agreed that a rig technician will conduct basic physio-chemical analysis during the pumping tests, while the well is being developed. Of particular importance is the pH of the water, which influences the selection of the pump pipe. Water conductivity will be measured to estimate total dissolved solids (salinity) as well as several other parameters. This will be done with a portable test kit and will also allow a decision by the hydrogeologist as to whether the well water meets project quality standards. Other more extensive physio-chemical tests will be concluded by the hydraulics service laboratory from samples collected by the technician and sent to Cotonou.

Bacteriological Tests

Bacteriological tests are to be conducted by the national bio-medical laboratory. The project is expected to furnish supplies for these tests, and

which are expected to begin in January 1989. The plan is to undertake a preliminary analysis of all wells constructed under the project and then to continue testing quarterly. Initial tests will determine quantitative results of total bacteriological contamination. For those wells containing elevated counts, a qualitative test to determine coliforms present will be undertaken. Recommendations based on the results will then indicate treatment procedures for rendering the wells potable. It is expected that tests will be conducted at a laboratory set up at the Zou provincial hospital in Abomey and that laboratory technicians will also conduct some tests at the well site.

Water quality standards officially used in Benin are those of WHO for bacteriological tests. They are:

- total bacteriological counts 500/ml
- total non-fecal coliform counts 10/100 ml
- fecal coliform counts 0

It is expected, however, that for practical reasons less stringent standards will be necessary, as indicated in Section 3.2.2.

3.6.2 Conclusions and Recommendations

At this point in the project it is important that water quality testing be instituted and that regular testing begin without further delays. All arrangements among concerned organizations should be completed so that the water quality component may begin as a routine part of project activities.

3.7 Epidemiological Surveillance

3.7.1 Overview

The importance of epidemiological surveillance in the context of a water supply project lies in its presumed ability to determine advancement toward the health-improvement objectives. It further serves to identify problems related to the effectiveness of the various interventions; for example, if the incidence of Guinea worm remains unchanged or increases in spite of available potable water, there is likely a problem with the health education training efforts.

It is important for a project such as this to begin with a full complement of baseline epidemiological data: local hydro-fecal pathology, seasonality of water related illnesses, etc., as well as a surveillance protocol. Indeed, this is what was called for in the original project plan, to be carried out with the short-term services of an epidemiologist. No baseline survey was conducted, however, and project activities are too far advanced to consider carrying one out.

3.7.2 Assessment of Epidemiological Activities

What has been done

Several studies and surveys have been undertaken since project start-up:

- General village information to help finalize drilling list
- Epidemiological study on Guinea worm in the project zone jointly undertaken by UNICEF, USAID, and OCCGE (Office des Grandes Endémies) in Cotonou

This study of the most debilitating waterborne disease in the project zone revealed a high incidence in the six concerned districts. The two most infested districts, Savalou and Dassa, showed infection rates of 29.5 percent and 25 percent respectively. The surveys were conducted in villages with and without pumps installed during earlier projects; the overall incidence in villages with pumps was three percent, in villages without pumps, five percent. It should be noted that these pumps do not necessarily cover a village's water needs, nor did any villages with pumps benefit from health education.

In addition, the study revealed the seasonality of the disease by locality and identified the most seriously infested localities. Fifteen percent of the villages surveyed accounted for 60 percent of all cases. These localities represent only 15 percent of all villages surveyed. Concentrating water supply and health education efforts on these specific areas could greatly reduce waterborne illnesses there.

What remains to be done

In addition to the above-cited parameters, which are very useful for project implementation and evaluation, the following remain to be done:

- Collect statistics that already exist in district and commune health centers on selected water and sanitation related illnesses such as diarrhea, parasites, skin diseases, etc., instead of a village baseline survey.
- Establish a timeframe to periodically monitor health center statistics for monitoring purposes.
- Chlorinate wells routinely during pump installation to correct any pollution before the well is operational.
- Establish a periodic bacteriological check for operational wells in order to ascertain the continued potability of the

water. Pollution of boreholes is known to happen due to poor maintenance.

- Establish a protocol for long-term Guinea worm surveillance using the current statistics as baseline.
- Establish an approach to combat those water supply/sanitation related diseases that surveillance activities identify.

3.7.3 Conclusions and Recommendations

While a full epidemiological baseline activity is no longer appropriate, a certain number of surveillance tasks are still important. During the course of the May 1988 Project Review Workshop, the terms of reference for an epidemiology consultant were proposed. Recruitment was recommended for December 1988. These terms of reference should be slightly modified according to the tasks described in the previous section (3.7.2), since this activity is behind schedule.

The May workshop participants further recommended the recruitment of a Beninese epidemiologist instead of an expatriate. Although recruitment is already under way in the U.S., efforts should be made to identify and recruit specialists within the GPRB MOH that have such capabilities. Hiring a local specialist would cost the project considerably less than hiring an expatriate, and the savings could be applied to under-budgeted activities.

3.8 Pump Maintenance

3.8.1 Overview of the Pump Maintenance System

The pump maintenance system established by the project has three tiers. Inputs are required at the village level, through district artisan repairman and at the province level for oversight and spare parts procurement. A summary of the process is described in the following paragraphs.

Village water and sanitation committee	-	committee
Village pump watchman	-	watchman
District artisan repairman	-	artisan
Banks holding maintenance account	-	bank
District chief	-	district chief
District merchant of spare parts	-	merchant
National or regional distributor of spare parts	-	distributor
Provincial Hydraulics Service (Service Hydraulique)	-	water agency

When a pump breaks down, the village watchman notifies the president of the village committee who, in turn, notifies the artisan repairman of the nature of

the breakdown. The artisan then procures the necessary spare parts from the locally authorized merchant. At present, spare parts are held at the district chiefs' offices, but this is a provisional arrangement until a local merchant is established. The artisan then proceeds to the village and completes the repair. The village pays the artisan for his work at the rate of 1,000 francs per repair for below-ground work and 500 francs for above-ground work and reimburses the actual costs of the spare parts and transportation. Both spare parts and transportation will have been established at a fixed price so there are no negotiations involved. In the event of non-payment the artisan is empowered to close the pump. The committee maintains an account at a district bank--60,000 francs (\$200), renewed annually--and keeps a small portion of the money in the village for immediate use.

The artisan undertakes preventive maintenance monthly. He is paid 400 francs per visit plus transportation. His role is to check the pump operation and replace any worn parts that are required. Based on a project study of repairs required for pumps installed in the region under a previous UNICEF project, the annual cost per village of 60,000 francs appears more than adequate. Each visit is entered into a notebook kept by a committee secretary, and each disbursement of money is noted in a separate book by the village treasurer.

At the provincial level the Hydraulics Service maintains a monitoring control over all activities. At present, two Peace Corps volunteers provide training for artisans and monitoring pump maintenance. The Hydraulics Service authorizes the artisans and monitors their work, monitors spare parts availability, and serves in an emergency capacity if a repair is beyond the artisan's capability. Normally this would not be required except in the case of a collapsed casing, as the artisans appear capable of all repairs.

The pump being used on the project is an India Mark II model which is now manufactured in Togo. In consideration of its relatively low cost, ease of repair, and local manufacture, the Mark II pump is a proper choice. There should be 625 Mark II pumps in the Zou region by the end of the project in 1990 and 1,200 pumps by 1994. There are now 89 in the Borgou Region, and increases in other areas can be expected as well. The large number of pumps should be sufficient to maintain a market for spare parts and keep the artisans active as repairmen.

3.8.2 Assessment of Pump Maintenance Service

Several concerns deserve to be discussed for the pump maintenance program. The basis for the design of the maintenance system is the belief that the private sector can better provide services than the government and, further, that decentralized financial and operational control in the villages will improve pump servicing and maintain a permanent source of potable water. Both of these premises have certain weaknesses. Reliance on a private sector of local merchants to provide spare parts and to maintain their interest through a reasonable volume of business and profit involves a certain faith that market forces will indeed be sufficient to sustain the system. Giving ultimate responsibility to the villages for pump maintenance implies that they are convinced that the price, in terms of cash and their time, is worth the benefits

of improved health, convenience, and related values of improved water supply. The extent to which they are convinced depends, to a large degree, on the effectiveness of the health education component of the project.

Considering the conditions under which rural villages in Benin presently operate both of these premises require faith. Nonetheless, it is the judgment of the evaluation team that these premises are a better approach than relying on the government. The project has achieved remarkable success in persuading villages which already have pumps to establish a fund to use for system maintenance. New villages destined to receive a pump have likewise established funds. The project will face a test, however, when the villagers are asked to replenish their bank account with another 60,000 francs for the second year.

For Benin the project maintenance system is expected to become established as the national system. The project therefore is rightfully in a critical position and needs to assure that all programmed activities for firmly establishing the maintenance system are fully achieved.

Local merchants must be authorized at district headquarter towns. Ideally, these merchants have experience with stocking spare parts such as for mopeds, but in some towns this may be stretching their business capabilities. Also, distances from some project villages to district towns are more than 50 km, which creates significant transportation costs.

Further concern should be mentioned regarding the supply of spare parts. Spare parts are fabricated in Togo by UPROMA and imported into Benin by SERT, which is expected to ensure that spare parts are distributed to district merchants. Again market forces are required to assure the continued operation, but they have not at present been thoroughly tested.

Another problem plaguing the project involves local banks who keep village maintenance accounts. Some banks have informed village committees that they may withdraw funds only once a year. These banks will need to be fully informed of project requirements and must cooperate with village requests to meet their maintenance requirements. The national coordinator has scheduled meetings with involved banks to establish their cooperation.

A final area of concern is the district of Ouesse. A Swiss project established in that region had adopted a somewhat different maintenance system prior to this project's beginning. The Swiss project relies on a village committee to collect funds for maintenance but has established a district government committee to oversee maintenance. The system reportedly works adequately. While it is not desirable to have different systems in the same region, it is probably better to leave the Swiss system as it is, as long as it operates efficiently, rather than to insist on changes.

3.8.3 Conclusions and Recommendations

In spite of the concerns indicated in the previous section, the evaluation team considers the proposed maintenance system to be correctly designed and to be the

best alternative in meeting the needs of Benin. Vigorous attention, however, must be directed at avoiding the concerns expressed herein.

Project activities must be assured of continuation for at least six months, and preferably longer, after the last group of boreholes are outfitted with pumps. Peace Corps volunteers are important in monitoring all phases of this process to see that it is firmly entrenched.

Ultimately, the Hydraulics Service must provide its own budget resources to assure its role as a monitor in the maintenance system. Personnel, transportation, and fuel will be required.

Local banks must be apprised of their role in the maintenance process and the project should receive their assurances of support in dealing with village committees.

3.9 Administration and Management

3.9.1 Overview of Administrative System

The administrative system adopted by the project follows the organizational chart shown in Figure 1. This system was influenced by recommendations formulated at a project start-up workshop held in April 1987. The workshop was conducted by WASH in Bohicon, and participants from all participating organizations were represented.

At the national level the project is under the overall direction of the Ministry of Equipment and Transportation (Ministère de l'Équipement et des Transports). A national coordinator, assigned from the Hydraulics Service, provides project management and is assisted by a technical advisor from PRAGMA/MCD, the USAID technical assistance contractor. A coordinating committee assists the project managers by approving work plans and helping in problem solving. The committee is composed of representatives of each of the ministries involved (Equipment, Health, Labor and Social Affairs, Foreign Affairs, and Planning) USAID, UNICEF, and Peace Corps. Project headquarters are located in Cotonou, with secretarial and accounting services; however, new headquarters are being built in Bohicon. UNICEF houses technical advisors in Cotonou for drilling and health and sanitation.

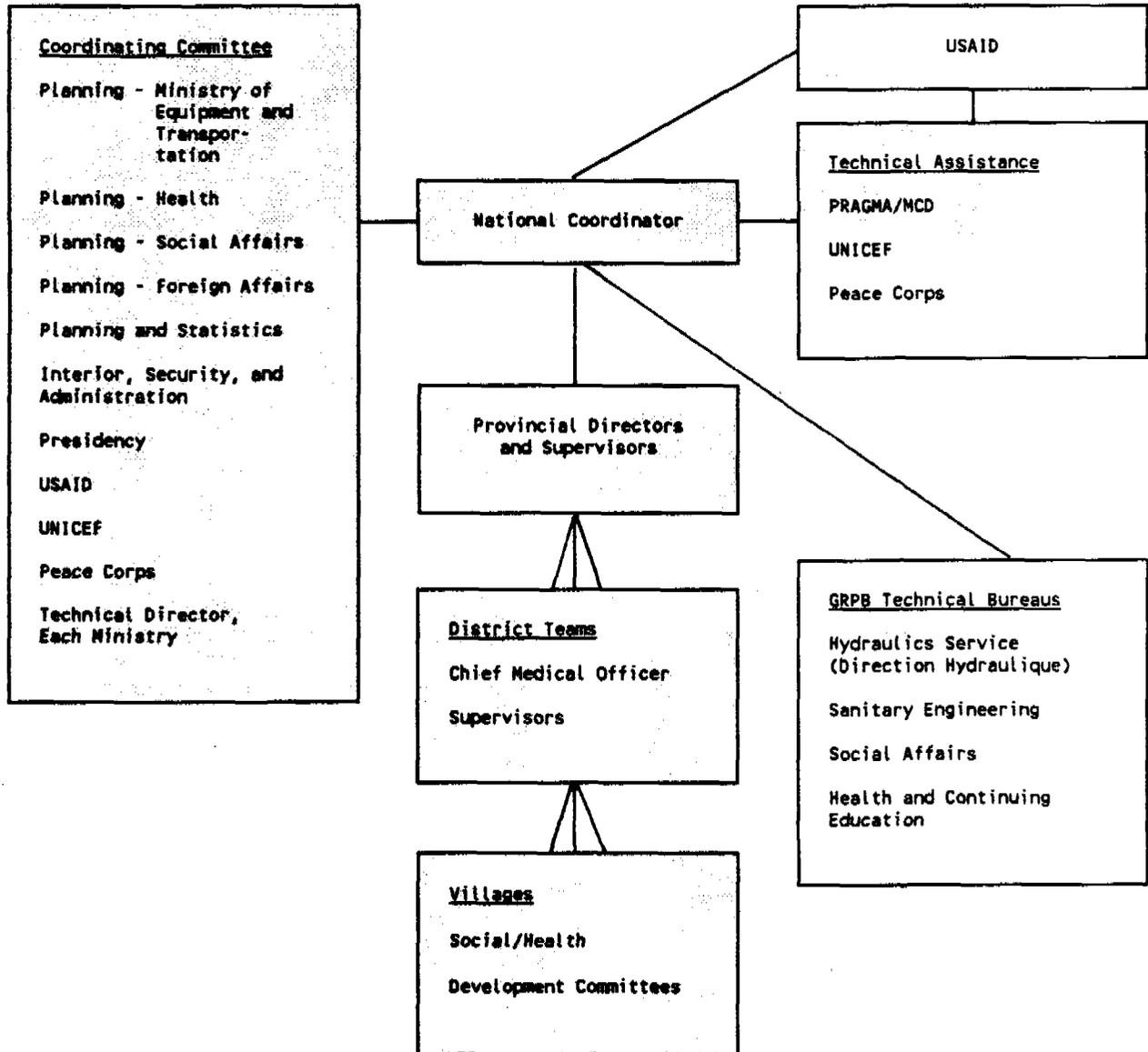
At the provincial level in Abomey, technical directors for health and engineering are provided by PRAGMA/MCD. The GPRB provides technical directors in drilling and pump installation.

At the district level, chief medical officers provide overall supervision. Project activities are conducted by teams of individuals specializing in health, social affairs, and sanitation. Peace Corps provides volunteers for these teams to assist in supervision. Peace Corps volunteers also supervise the pump maintenance and help supervise the latrine construction programs.

Figure 1

ORGANIGRAM FOR
RURAL WATER AND SANITATION PROJECT

Ministry of Public Works and Transportation



At the village level, development and socio-health committees consisting of seven members have been formed. These committees receive training and advice from the district teams and provide the focal point for managing and disseminating all project activities within the village.

3.9.2 Personnel

Table 1 provides a list of project personnel.

3.9.3 Finances

Table 2 provides a budget showing expected expenditures by line item.

3.9.4 Project Management

In the view of the evaluation team, project organization and management are generally acceptable. Staff have indicated significant improvements since the May 1988 workshop, although some complaints were directed at a lack of sufficient feedback from project management. This was also the theme of some discussion during the project workshop, and it is suggested that management should, in the future, strive to provide more positive feedback, showing consideration for suggestions made by staff and indicating praise for work well done.

The quarterly work plans show adequate planning and are sufficiently detailed for all project operations. Some changes for improving the format are suggested, however. The work plans, particularly the graphics, are rather difficult to read for any staff unaccustomed to computer printouts.

Field visits are also suggested for national directors of GPRB ministries responsible for project implementation (Directorates of Health Education, Sanitation, and Social Affairs) outside of the project management. To date, no field visits have been made by these directors. It would be helpful for selected members of the coordinating committee to also make occasional field trips and observe project operations first hand. Coordinating committee members should be invited to accompany project staff on regularly scheduled field trips.

At the provincial level, except for the Hydraulics Service, provincial technical directors have shown little involvement and this should be improved.

The district medical officers, although responsible for overseeing all district operations, rarely participate in the project. Generally, their other duties take much of their time, and they also lack transportation.

Table 1
PROJECT PERSONNEL

National Level

National Coordinator	1
PRAGMA Chief of Party	1
Accountant	1
Secretary	1
Driver, Messenger, Etc.	2
Drilling Director (UNICEF)	1
Environmental Health Director (UNICEF)	1
	8

Provincial Level

Health Director (Pragma)	1
Engineering Director (MCD)	1
Drilling Director (Hydraulics Service)	1
Pump Installation Director (Hydraulics Service)	1
Driver	2
Messenger	3
	9

District

Chief Medical Officers	5
Supervisors (GPRB and Peace Corps)	7
Social Affairs Agents	8
Nurses	12
Sanitation Agents	11
Hydrogeologist	1
Drill rig team	10
Pump Maintenance Supervisor (PC)	2
Chief Mechanic (UNICEF)	1
Chief Driller (UNICEF)	1
Pump Installation	6
	63
GRAND TOTAL:	81

* Includes personnel who are assigned primarily full time to project operations, although the percentage of time varies among individuals.

Table 2
PROJECT BUDGET

USAID

Long-term technical assistance (AID direct contract) UNICEF cooperative agreement: drilling, pump purchase	\$1,101,439
Installation, pump maintenance	2,090,000
Short-term technical assistance (AID direct contract)	180,000
Support to Beninese project coordinator	16,380
Vehicles, new rolling stock for drilling, spares, POL	501,350
Drilling rig and POL, pumps, drilling operation expenses	635,750
Rural health education and training	146,440
Bohicon headquarters construction, remodeling, equipping, operations	345,000
Latrine construction material	225,000
Rainwater catchment system construction materials	100,000
Participant training	210,000
Water quality testing	26,125
Contingency (10.76 percent)	<u>672,516</u>
Life of project	<u>6,250,000</u>

GPRB

in-kind & personnel 1,330,880

Peace Corps

Volunteers 475,000

UNDP

Drill rig 400,000

UNICEF

Drilling and Sanitary Engineering 1,092,000

PROJECT TOTAL \$9,547,800

Among the district teams several agents have not been assigned as planned. It is suggested that these posts be filled if qualified agents are available. District teams in most cases do not have office space and work out of their homes; it is desirable for these teams to be given office space, if available. Several Peace Corps volunteers are reaching the end of their terms. In most cases it would be desirable to extend their services, as several play key roles in project implementation and replacement volunteers have not yet had sufficient time for overlap.



Chapter 4

FUTURE OF PROJECT

In the view of the evaluation team, the project currently operates on a sound basis and is making good progress toward achieving project objectives. The project began slowly but ultimately benefited from lessons learned from USAID projects in Togo and Burkina Faso, and staff have instituted many of the positive attributes of those projects. Project approaches being implemented have successfully integrated community participation, health education, well construction, and a pump maintenance program, which should provide project sustainability.

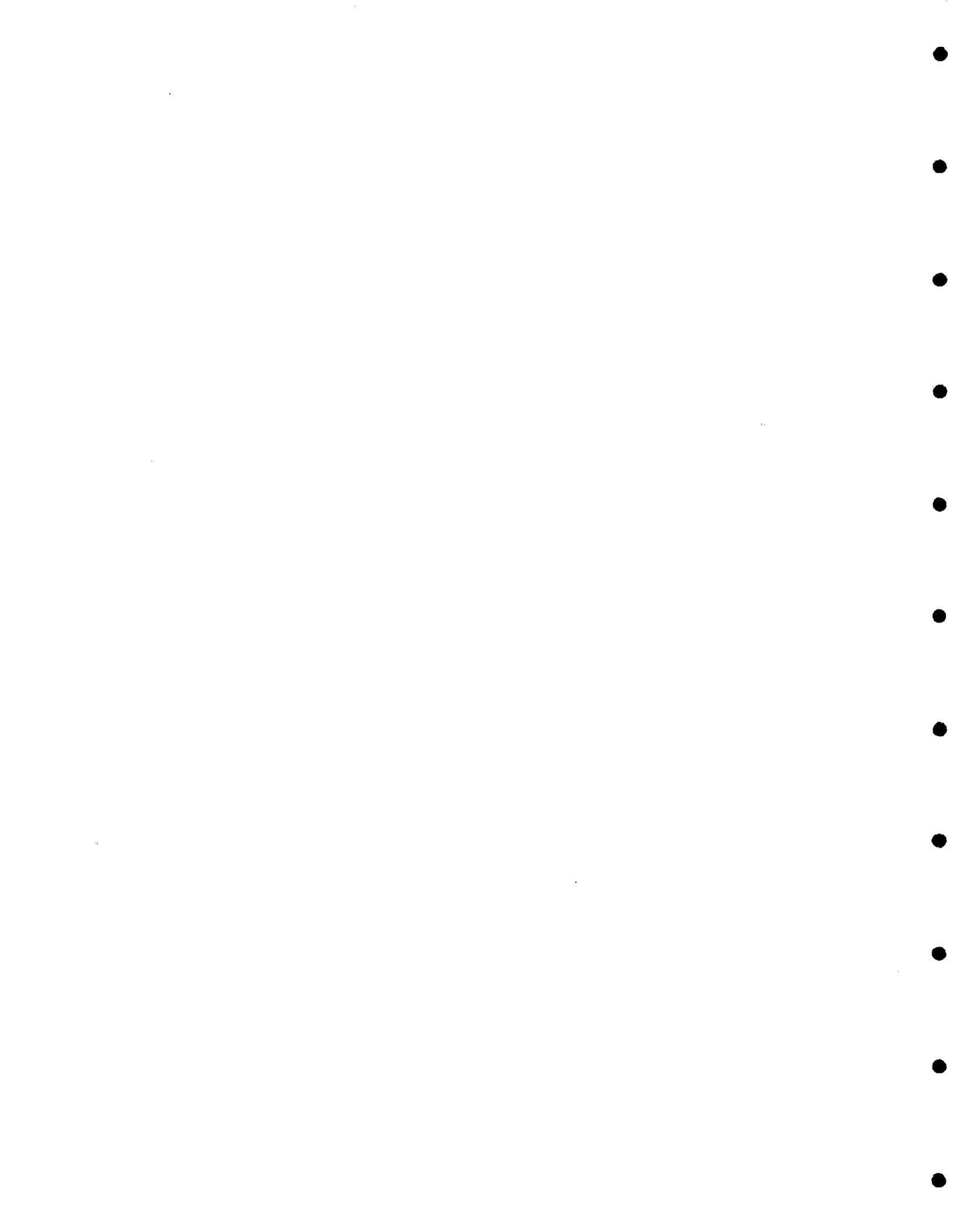
Questions have arisen, however, concerning the future of the project through December 1990. Well construction will not be completed until mid-1990, but it is critical that villagers be experienced in well-maintenance procedures and receive the requisite health education training before the project is completed. The personnel provided under the PRAGMA/MCD contract will complete their tours as shown in Table 3, which is disadvantageous in maintaining project coordination.

The contract of the PRAGMA team leader may, it appears, be extended to the end of 1989 without increasing the total contract amount. The PRAGMA/MCD contract also provides accounting and certifies project expenditures. The question then becomes, assuming no further USAID financial inputs, one of how to continue project activities without PRAGMA/MCD participation.

It is suggested that project activities may be continued by requesting UNICEF to take over financial management responsibility for the project. The current national coordinator would continue in his present capacity, and current Beninese supervisors would take over provincial director positions in health education and engineering. District teams presently in place would continue their activities. Peace Corps should assure volunteers in positions presently under way until the end of 1990, as their pump maintenance supervisors are particularly important in meeting project objectives. UNICEF technical assistance is assured financially until mid-1990 and is likely to continue through 1994.

Project headquarters should be moved from Cotonou to Bohicon after the new headquarters building is completed. Recurring costs required for continued operations are rather small and consist primarily of fuel, vehicle repairs, and per diem for transporting project staff plus miscellaneous funds for utilities, telephone, and office operations. Salaries of Beninese staff are assured by the GPRB. Peace Corps will need to support its volunteers as under previous arrangements, as will UNICEF for its staff. With the arrangements indicated above, it should be possible to continue project activities with minimal USAID involvement. The impact expected in improving health and other benefits in the project zone warrant continuation of the project until the grant agreement closure date at the end of 1990.

Considering the effectiveness of the integrated project approach being used, the delayed project start-up, and the increased assurance of health impacts from longer-term community health actions, the evaluation team agrees that the greatest benefits from project inputs will result from an extension of the project, with additional funding from USAID. This extension would allow the project to increase the number of boreholes in project villages in order to change the ratio of village population per well from 500 to 250, carry out the cistern construction program in villages with unproductive boreholes, increase coverage of family latrines, and assure that all health education campaigns are carried out with adequate follow-up. However, cistern construction will be difficult for GPRB personnel to carry out without financial, administrative, and training assistance.



Chapter 5

CONCLUSIONS

The conclusions presented in this chapter summarize the analysis of project activities by the evaluation team, as described in preceding chapters, and respond directly to questions raised in the Scope of Work (Appendix C).

5.1 Project Design

The project design is adequate to achieve improved health practices among project villagers. Observations have shown significant improvements in participating villagers and more health education campaigns are planned. Water quantity and quality is also improved by borehole construction for villagers living near the borehole. The design objective of 225 boreholes with an adequate maintenance program can probably be met, although improved production is needed.

Project design for constructing 100 rainwater catchment systems is overly ambitious and underfunded. Design objectives for constructing and maintaining 100 latrines is possible, although the expectation that 225 villages will want and have the capacity to build and maintain latrines is not realistic. Project resources are somewhat inadequate for meeting all objectives of the latrine program as designed.

5.2 Implementation Plan

Initial implementation of planned activities has distorted the integration of some project components. For example, UNICEF well-drilling staff and facilities and Peace Corps volunteers were available before they could be fully used. The contractual tours of PRAGMA and MCD staff are also out of phase with project needs.

Rolling work plans are generally good and updated quarterly. Most targets as currently planned are realistic, although there is little room for unanticipated problems given remaining project resources.

5.3 Monitoring and Data Collection

At present, monitoring of project activities is undertaken by supervisors at the district level; by the directors of health, engineering, drilling, and pump installation, respectively, at the provincial level; and by the national coordinator, his counterpart assistant, and UNICEF directors of well construction and sanitary engineering at the national level. These individuals are a combination of Beninese government staff and expatriate technical advisors and represent a good mix of local staff who can be expected to continue project activities at the end of the project given financial and other support.

Data collection consists of monthly progress reports that are required of all supervisory staff to monitor progress and identify problems. Specific data are also collected during borehole construction concerning hydrogeologic conditions and well yields. These data are presented in good form in UNICEF progress reports. Water quality data collection has not yet begun but is planned.

The health education component of project activities is adequately monitoring village committee organization. During the initial stages of the drilling component, the establishment of the maintenance account for pump repair is verified by district staff who then provide this information to staff planners for programming well construction.

Training and supervisory staff are not adequately following up, however, on the application of training lessons at both the agent and village committee levels. Additional effort is needed in monitoring the effectiveness of training and education.

Other areas of data collection include occurrence, extent, and degree of Guinea worm infection. Data collected to date appear exceptionally thorough and are being used to program eradication efforts in areas of highest infestation. These data are presented in a separate UNICEF report entitled "Survey of Incidence of Guinea Worm in Six Districts of Northern Zou Province."

In summary, monitoring and data collection are adequate.

5.4 Impediments to Project Progress

Several impediments at present affect project progress. The most important is the rate of well construction. While the quality of construction appears good, construction is advancing too slowly in comparison to other project activities. The establishment of village committees to manage their wells must occur before well construction is programmed, but at present the number of villages awaiting wells is large and the well construction needs to catch up. The addition of a second drill rig in January 1989, plus other changes as indicated in Section 2.3, should remedy this situation.

Another area of concern is the role of local banks in handling pump maintenance accounts. Some villages have trouble establishing these accounts and withdrawing needed money from them. It is expected that the national coordinator will elucidate with the banks their role in meeting project expectations.

Concern has also been expressed in integrating the sixth district, Ouesse, into project activities, because a Swiss project has already established approaches somewhat different from this project's initiatives. Rather than insist on project approaches, it is recommended that the Swiss-established procedures be retained. The differences seem insignificant and probably not worth trying to change.

A final area of concern to project implementation lies ahead. The projected completion of PRAGMA/MCD personnel tours of duty are not synchronized with project needs. The team leader will complete his tour three to ten months ahead

of other PRAGMA/MCD staff. In addition, the PRAGMA contract provides for the accounting of local project expenses. It is recommended that the team leader be extended until the end of 1989 and that consideration be given to UNICEF's monitoring local accounts until the end of project, on December 31, 1990.

5.5 Inputs and Outputs

Generally efforts as described in Section 3.9 are achieving the expected goals. A major change is needed in cistern construction, as available project resources are vastly under-budgeted to achieve the indicated number of cisterns. It is recommended that the number of villages to be served by cisterns be reduced to a total of six.

5.6 Progress toward Achieving Project Outputs

The extent to which progress has been made, to date, toward achieving project goals is shown in Table 4. After a slow start, overall progress is at present programmed to achieve expected objectives.

5.7 Meeting Responsibilities of Participating Organizations

With a few relatively minor exceptions, all organizations (GPRB, USAID, UNICEF, PRAGMA/MCD, Peace Corps) are meeting their responsibilities. GPRB's financial problems are causing difficulties and raise questions concerning future operating costs, but the project is managing to adapt to these conditions.

5.8 Management and Coordination

After a slow start the project appears to have achieved reasonably good coordination. The WASH Project Start-up Workshop and the May 1988 Project Review Workshop both focused, among other things, on improving management and coordination. The workshops appear to have had a significant effect on obtaining a consensus regarding project issues. Rolling work plans updated quarterly provide good detail and coordination of various project tasks, although it appears that some individuals still do not follow the work plans rigidly. Also, the work plans need more care in formatting and graphics, which would improve their readability. Nonetheless, the work plans are an appropriate tool and serve the project well.

5.9 Appropriateness of Equipment, Materials, and Methodologies

Perhaps the single most important technology transfer is the handpump chosen by the project. The India Mark II model offers low-cost, rather easy maintenance, durability, and local (Togo) manufacture. This choice was a good one and is critical to the maintenance program, which depends upon the ready availability of spare parts at low cost.

Table 4
PROGRESS TOWARD ATTAINMENT OF PROJECT OBJECTIVES
 (as of 30 Sept. 1988)

<u>Objectives</u>	<u>Quantity</u>	<u>% Complete</u>	<u>Comments</u>
1. A functioning, replicable system for integrating health interventions into all water supply and sanitation projects;	1 plan	100	System established
2. Provincial and district Social Affairs, health education, and sanitary engineering agents, and other village level workers, trained in village mobilization and in village health campaigns;	50 agents	40	Campaigns planned and under way. 40% of TOT completed.
3. Functioning village health committees in each participating village;	225 committees	43	214 committees established, of which 96 are in villages not previously having pumps. Combining old with new villages will enable the project to significantly exceed this objective.
4. Effective Cooperation between village health committees and rural extension services for integration of all project components;	N/A		Collaboration planned and under way
5. Active collaboration among concerned GPRB rural extension services for village health improvements;	N/A		Collaboration planned and under way
6. Pre, concurrent, and post water supply installation health education and pump maintenance repair campaigns;	N/A		Series of campaigns planned and under way
7. Reliable, clean village water supplies developed and improved	225 wells	13	Drilling program underway, 29 wells completed, 28 pumps installed
8. Pump installation, and maintenance/repair program in each participating village	225 pumps	17	Maintenance system under way. Villages have established fund. Objective is to establish for old and new pumps totalling more than 400 villages.
9. Master plan maintenance and logistics plan;	1 plan	100	Maintenance plan formulated but requires fine tuning.

<u>Objectives</u>	<u>Quantity</u>	<u>% Complete</u>	<u>Comments</u>
10. Upgraded technical competence of hydraulics personnel assigned to drilling/pump installation teams;	N/A		UNICEF is responsible for training.
11. Warehouse and repair shop for equipment and vehicles, and provincial project office and training center;	1 headquarters	50	Bids solicited. Selection of contractor made. Construction began in October 1988. Expect completion May 1989.
12. Adequate village-based capacity to construct and maintain rainwater catchment systems, resources permitting;	N/A		No action to date. Recommend revision of plan to construct cisterns in one village in each of 6 districts.
13. Sanitary excreta disposal facilities constructed and maintained	225 villages	0	No action to date on construction. Plan developed.
14. Adequate village-based capacity to construct and maintain sanitary excreta disposal facilities;	13 masons 11 sanitarians	50	Training of latrine personnel completed for public latrine construction. Family latrine construction remains to be done.
15. Upgraded skills of rural sanitarians;	11 sanitarians	100	Training sessions completed for rural sanitarians in latrines
16. Water quality testing of each new well, subsequent testing as appropriate;	225 wells	0	No testing undertaken but plan has been developed
17. Upgraded skills of all personnel receiving long- and short-term participant training;	4 participants	75	Training provided for project coordinator and 3 supervisors
18. Training Plan of training needs, recommended training facilities;	1 plan	75	Several training plans and manuals completed
19. Commodity, Equipment and Vehicle procurement plan;	1 plan	100	Procurement plan complete
20. A.I.D.-UNICEF Cooperative Agreement; and,	1 agreement	100	Complete
21. Evaluations	2 evaluations	50	Mid-term evaluation under way

<u>Objectives</u>	<u>Quantity</u>	<u>% Complete</u>	<u>Comments</u>
<u>(Project Agreement Amendment No. 2)</u>			
The GPRB shall:			
22. Provide timely reports re project activities	N/A		Monthly reports currently being submitted
23. Provide sufficient numbers of qualified personnel	N/A		More personnel are needed at some positions
24. Assign AID financial materials, equipment, vehicles to project	N/A		Complete
25. Submit commodity, equipment and vehicle procurement plan	1 plan	95	Complete except for 3 trucks
26. Prepare pump maintenance plan before end of first year	1 plan	100	Complete but refining still required
27. Prepare pump logistics plan before end of first year	1 plan	100	UNICEF has sufficient stock on hand and additional orders being processed
28. Request PC volunteers for project implementation	N/A		complete
29. Assure that women participate and partake of advancement opportunities in all project components	N/A		Better than expected. Most committees have at least 3 women members
30. Submit plan for meeting any recurrent costs during first month of final project year.	N/A		Plan is not due until January 1990.
31. Within first three months of TA arrival submit project implementation plan for life of project	1 plan	100	Rolling work plans are being updated on quarterly basis

The purchase of locally sold and maintained project vehicles was an important decision. Although all passenger vehicles and trucks are of European manufacture, they are represented locally and are more easily maintainable than comparable vehicles of U.S. manufacture. The choice of off-road motorbikes with a mid-range of horse power for field staff was also appropriate.

Training and health education methodologies are non-formal and participatory, using the trainer as facilitator, not teacher. This is the appropriate approach for encouraging community participation and enabling villagers to manage their water supply and other development efforts. Since these methods are new, they require constant practice and reinforcement, which may be difficult to ensure given the many new subjects being introduced.

5.10 Financial Management System

The financial management system is the responsibility of the PRAGMA Corporation. A manual was created by PRAGMA for project accounting. While the evaluation team has only briefly looked at the accounting system, it would appear that the local accountant has marginal capacities. To avoid potential problems at a later date, it is suggested that PRAGMA and/or USAID review the situation.

5.11 Training Objectives and Plan

The overall training plan for the socio-health program calls for a series of themes to be introduced at all project levels by first training district agents. Trainers of district agents are the health education advisor and her counterparts. District agents, in turn, train village committees. Training objectives have been established only for those subjects already covered and the very next one--i.e., "prevention of Guinea worm." This training-of-trainers approach is inherently effective, although it takes a long time for all levels to be trained. As the thematic campaigns are currently scheduled, agents can barely finish training villagers before the next training takes place. This leaves inadequate time to follow up on the application of villagers' training. In summary, training objectives and plans are adequate to achieve health benefits, but follow-up and supervision need to be improved.

5.12 Drilling and Pump Installation System

The drilling program needs to improve its production as discussed in Section 3.2. Pump installation is following well construction at a proper pace. The quality of construction for wells, aprons, and pumps appears sound.

5.13 Pump Maintenance

The pump maintenance system as proposed is well designed and is the most appropriate system for conditions in Benin. However, project staff must be careful to assure that the system is well established before the project ends. A vulnerable aspect of the system is the dependence upon private entrepreneurs

for the supply of spare parts. This privatization effort will need time to gain the confidence of all concerned--villagers, artisan repairmen, local spare parts dealers, and national spare parts distributors. Initially, the Peace Corps maintenance-program supervisors play an important role in monitoring and supporting maintenance. Later, the Hydraulics Service will continue to act as a monitor for the system but should be careful not to interfere unnecessarily in the privatization efforts.

5.14 Village Sanitation

Drainage around wells varied among sites. Some older wells had walls and animal drinking troughs. In most cases the troughs, while themselves a good idea, should have been constructed farther from the well (15 meters is recommended). Several wells had poor drainage and stagnant water nearby. Project staff will need to advise villages on maintaining proper drainage around the well. Conversely the apron itself was kept quite clean in all cases observed and the project is to be commended in these efforts.

Refuse disposal appeared to be rather typical for rural villages, with stock raising a normal part of village life. Project advisory efforts on improving village cleanliness will need to be continued.

Latrine construction is scheduled to begin before the end of 1988.

5.15 Village Plan for Emergency Water Supply

Questions regarding alternative plans to obtain potable water in the event of a breakdown had varied responses. Most indicated that they would go to a neighboring village to fetch water. Some stated, candidly, that they would necessarily return to their old unpotable sources (ponds, streams, etc). Others indicated confidence that the maintenance system would fix their pump quickly. Some said that they would filter water but none said that they would boil it. Health education efforts will need to be oriented toward this concern.

5.16 Procurement Plan for Equipment

A procurement plan has been established and is generally adequate. Three trucks remain to be ordered, which should be done immediately. An additional drill rig is en route and needs to be placed in operation soon after arrival. The trucks are needed to support this rig and to use for other construction components. At present pumps are stock-piled in adequate supply and more are to be ordered by UNICEF. Adequate numbers of vehicles are available except for latrine and cistern construction where two small pick-ups are inadequate.

5.17 Water Quality Testing

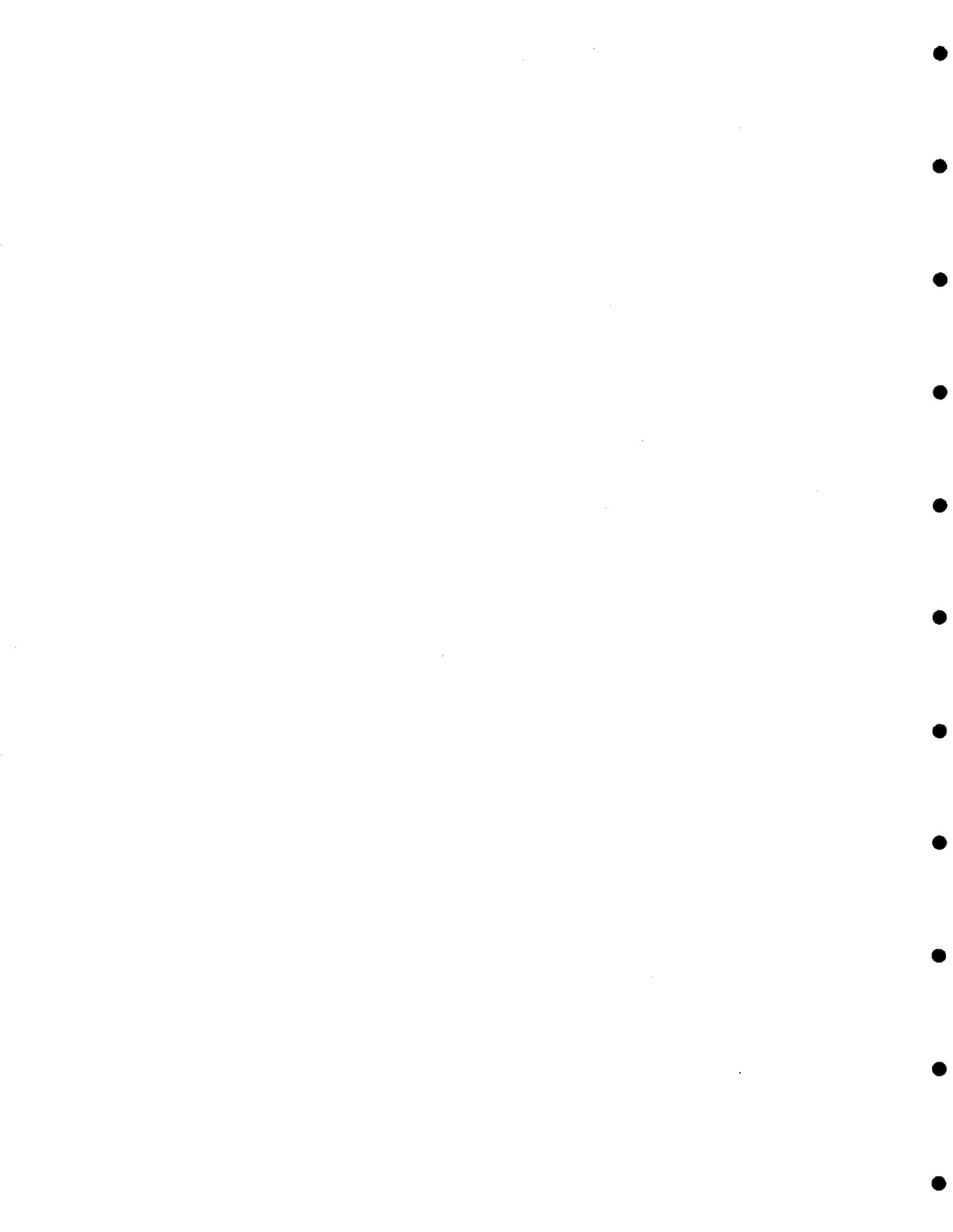
Water quality has not been tested to date but plans have been made to begin. During pump testing emphasis should be on site-selected chemical elements.

Testing for bacteria should be done periodically (twice a year, if resources are available) after pump installation. Wells should be chlorinated after pump installation and ideally after below-ground repairs. Wells with persistent bacteriological contamination should be observed for poor drainage surrounding the well and drainage improved as necessary.

Water quality standards need to be applied that are suitable to Benin. Improved water quality and quantity have been shown to benefit health, in many cases despite their being below WHO standards.

5.18 Sanitary Excreta Disposal

The project paper amendment calls for the construction of 100 single-pit latrines in project villages. The project is currently planning to build 206 single- and double-pit latrines with cement superstructures in schools and health facilities in villages as well as towns. In addition, it plans to build 150 low-cost family latrines in 30 villages. An expatriate civil engineer and a Beninese counterpart from the Division of Sanitary Engineering manage this component. Eleven sanitation agents have been assigned full-time to the project. They will coordinate latrine construction and village education concerning sanitary excreta disposal. Given construction objectives of 206 public latrines and 150 family latrines, limited personnel and time remaining in the project, the sanitation program should take care to ensure that education of beneficiaries is adequate for latrines to have a positive impact on health. Reducing the number of public latrines from 206 to 100 should allow for more emphasis on education.



Chapter 6

RECOMMENDATIONS

Socio-Health Program

1. Given current constraints regarding time, personnel, follow-up needs, and objectives, the project should concentrate its efforts on priority themes (and behaviors), i.e., "clean drinking water"; "prevention of Guinea worm"; "sanitary excreta disposal"; and "village and domestic hygiene"; then, continue with "ORT" and "prevention of infectious diseases" if more time or more funding become available.
2. Project supervisors and technical advisors should follow up training given to agents and village committee members to help strengthen new skills and verify the application of new behaviors. Three measures will ensure this:
 - Supervisors should observe health education training in villages and provide feedback.
 - Each new training event at the village or project staff level should begin with a review of the previous one and of work done since then.
 - Supervisors and agents should schedule visits to villages between training sessions, if time permits.
3. The project should provide each district team with a set of visual aids appropriate to the various themes to be elaborated.
4. In order to strengthen the participatory adult education skills of the agents, it is recommended that the project organize a WASH-assisted "training-of-trainers" workshop for project extension staff. This workshop would focus on specific techniques such as role plays and group discussions, demonstrations, planning and evaluating training and health education sessions, etc., rather than preparing agents for the next project activity.
5. Insofar as possible, the GPRB agency in charge of adult literacy programs should select project villages with active village development committees for literacy teaching.

Borehole Construction

Given the very slow advancement of the well drilling and the stated objective of completing 225 wells by mid-1990, UNICEF/Hydraulics Service should ensure that:

1. the drilling teams spend the required 21 days per month in the field;
2. UNICEF provides the technical assistance required by agreement; and
3. a second drilling rig with a complete crew be put into operation.

Latrine Construction

1. The project should reduce the planned number of public latrines from 206 to 100 and increase from 30 to 60 the number of villages to benefit from family latrines.
2. The project should choose public latrine sites according to criteria related to potential health impact:
 - only in villages benefitting from new pumps;
 - in schools rather than health facilities, and preferably schools where a teacher is a member of the village committee.
3. Socio-health staff should select villages for family latrine construction based on demonstrated willingness and interest during the "Sanitary Excreta Disposal" campaign.
4. The latrine construction programs should build demonstration family latrines in the homes of village committee members whenever possible.

Cistern Construction

1. Given the inadequate budget, the project should reduce the planned number of cisterns from 150 to 6 and seek other funding to continue the program.
2. The project should select villages for cistern construction based on priority water needs and imperiled health conditions.
3. The GPRB should assign a Public Works engineer to the cistern component as stipulated in the project agreement.
4. The project should send the technicians responsible for cistern construction to Togo to study the USAID project's experiences.

Construction of Project Headquarters

The concerned GPRB ministries should maintain the agreements to integrate the different project components in regard to occupation and use of the project headquarters.

Water Quality Analysis

1. Given the delays in starting this activity, the project should encourage the relevant laboratories to begin analyzing water quality.
2. The project should train a pump testing technician to perform preliminary chemical analyses at the drilling site.
3. In order to attain the objectives of improved health due to improved quality and quantity of water supply, the project should continue to use norms established by the GPRB in lieu of WHO norms.

Epidemiological Surveillance

PRAGMA/MCD should contract the services of a Beninese epidemiologist, if possible, to establish a surveillance protocol for water- and sanitation-related illnesses in the project zone. At a minimum, Beninese candidates should be included in the list of potential consultants being established in the United States.

Pump Maintenance

1. Since PRAGMA/MCD assistance will end before drilling operations are completed in mid-1990, UNICEF should accept responsibility for the supervision of the pump maintenance system for at least six months after completion of drilling.
2. The Hydraulics Service should establish a mechanism to follow up the pump maintenance system after the project completion date.
3. National project management should immediately clarify and reaffirm the collaborative mechanisms between the project and the local banks concerning the deposits of village pump repair funds.
4. In the district of Ouesse, the project should adopt the pump maintenance system that is already operational.

Management and Administration

1. National project management should enlist the help of the national supervisory committee and the GPRB technical divisions to deal with periodic problems encountered during project execution.

2. National project management should provide feedback to field personnel after receiving activity reports, paying particular attention to positive aspects of performance and accomplishments.
3. Peace Corps should exempt the two regional pump maintenance PCVs from its rule prohibiting the use of PC motorcycles outside of the district of residence.
4. In order to attain all objectives of all project components, USAID should consider retaining PRAGMA/MCD to provide continued technical and financial management assistance until PACD (31 December 1990). Alternatively, UNICEF could be retained to manage the project.
5. The GPRB, the project, and UNICEF should as of now develop a plan for the assumption of recurrent costs once the project ends.
6. Given the mid-1989 end of Mrs. Laurin's contract and the imminent retirement of her Beninese counterpart, the GPRB should find and assign a replacement to coordinate the socio-health program for the rest of the project.

Project Future

Given the solid design of the project as far as integration of water supply, sanitation, and health education, USAID should seriously consider extending the project beyond its current PACD. Additional funding should serve to provide additional wells for those villages with more than 250 persons. An extension would also permit the training and health education program to be carried out to its fullest potential, especially in those villages at the end of the drilling list.

APPENDIX A

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BIBLIOGRAPHY

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APPENDIX B

PERSONS CONTACTED



APPENDIX B

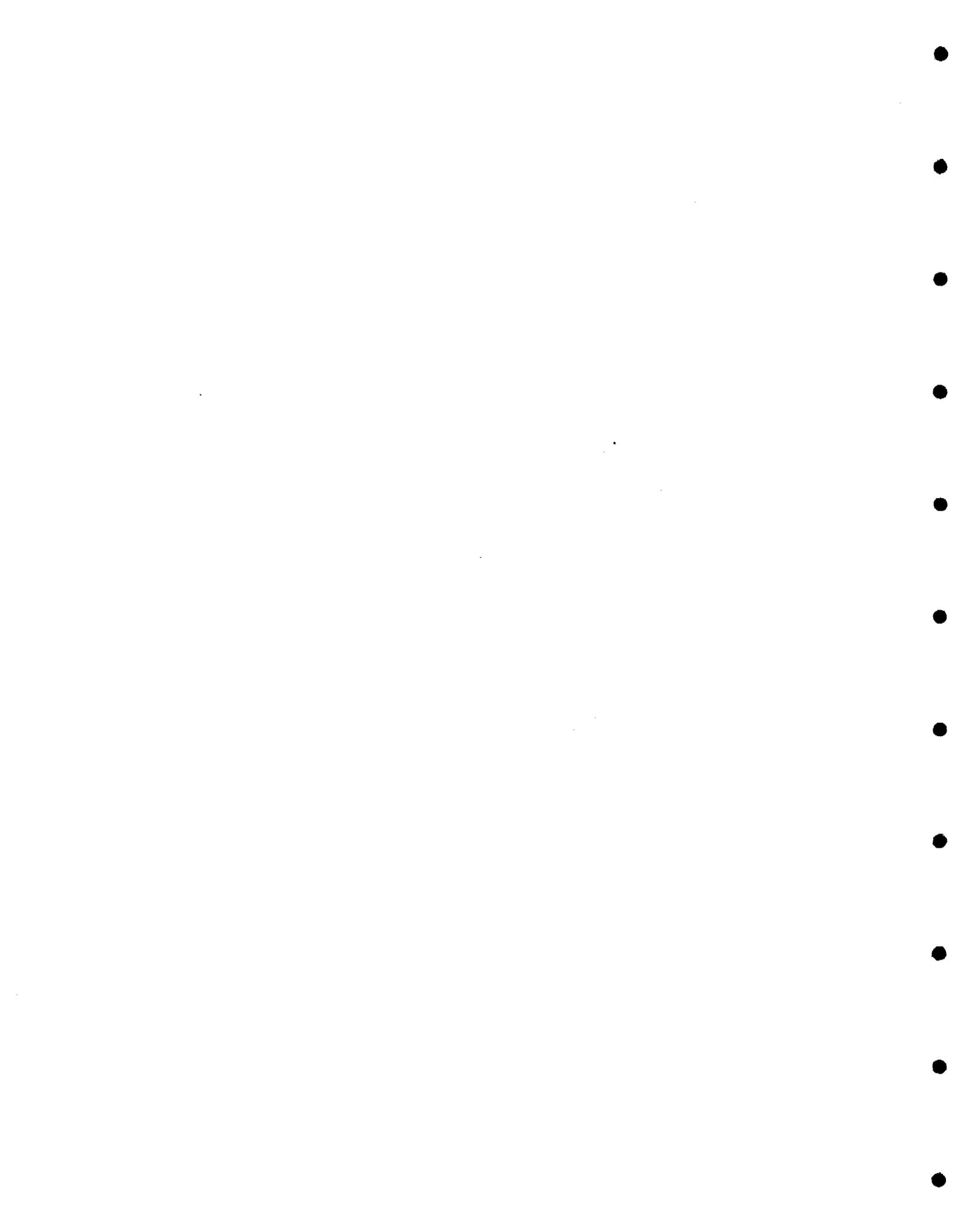
PERSONS CONTACTED

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AARONS, Sigrid	PCV Supervisor, Ouesse
ALPERT, Dena	PCV Supervisor, Bantè
DONOVAN, David	PCV Pump Maintenance, Savé
CARON, Peter	PCV Pump Maintenance, Savalou
NICHOLSON, Kristin	PCV Supervisor, Dassa
WOJNAR, Andrea	PCV Supervisor, Savalou
MATHIEU, Tracy	PCV Supervisor, Savalou
AGBOTON, Jeannot	Director, Division of Hydraulics, MET
HOUETO, Damien	Director, Sanitation Division, MOH
DEMARTEAU, Jean	Peace Corps Country Director
DOSSOU-GBETE, Théophile	Sanitation Agent, Dassa
DOSSOU-GOIN, Léon	Sanitation Agent, Dassa
AGOSSADOU, Firmin	Nurse, Dassa
DJIKPO, Firmin	Nurse, Dassa
LALEYE, Solange	Social Affairs, Savalou
LOKONON, Bonaventure	Sanitation Agent, Savalou
GANSE, Célestin	Chief Medical Officer, Glazoué
ZOSSOUNGBO Jean	Sanitation Agent, Glazoué
SOGLO, Nicolas	Sanitation Agent, Glazoué
DAH, Léonard	Nurse, Glazoué
JEKINNOU, Pierre	Social Affairs, Savé
CHITOU, Issa	Nurse, Savé
GBODOGBE, René	Sanitation Agent, Savé
AGOH, Paul	Sanitation Agent, Savé
KISSIRA, Issa Idrissa	Chief Medical Officer, Bantè
LOUKPE, Joseph	Nurse, Bantè



APPENDIX C

SCOPE OF WORK



APPENDIX C

SCOPE OF WORK

The scope of work for the services of the Rural Water Supply and Sanitation Specialist and the Health Education/Community Development Specialist, to be funded under this PIO/T, is as follows:

Rural Water Supply and Sanitation Specialist

Responsibilities

1. Coordinate with USAID/Lome-Benin AID Representative and the Evaluation Officer, and the Program Assistant (Benin) on the schedule for the team for the duration of the evaluation, the logistical arrangements, team's work, the design and data collection methodologies to be used for the evaluation; ensure that resources are adequate to fulfill evaluation requirements in a timely manner; and prepare the evaluation report.
2. Participate in the selection of villages for site visits and develop the questionnaire.
3. Review and analyze the drilling and pump installation process.
4. Review and analyze the drilling and pump maintenance system.
5. Review the village sanitation actions undertaken (e.g., drainage and protection of water sources, proper garbage disposal) and planned in project villages.
6. Review and analyze the village (committees) plan for potable water in the event of a pump breakdown.
7. Review and analyze the procurement plan for drilling equipment, pumps, and vehicles.
8. Determine the adequacy of water quality control testing system plan and make recommendations.
9. Determine the adequacy of sanitary excreta disposal facilities component of the project.
10. Ensure that questions in Section C related to the provision of water supplies and sanitation facilities have been addressed.

Health Education/Community Development Specialist

Responsibilities

1. Determine the adequacy of the health component of the project to enable project villages to participate effectively in the water supply process and preventive health actions.
2. Review and assess the village development committee organization, specifically composition, arrangements for meetings, record-keeping, funds management, health education activities relating to water/sanitation, and its linkage with the GPRB directorates (Health Education and Social Affairs).
3. Assess the results of the surveys conducted for the prevalence of Guinea worm.
4. Assess training of extension agents and their training of village committees to carry out educational campaigns.
5. Examine the plans for educational campaigns for Guinea worm, oral rehydration, personal and domestic hygiene, disposal of fecal material, village hygiene, and prevention of infectious disease.
6. Determine the adequacy of the educational campaign for proper collection, storage, and use of clean water.
7. Provide inputs on assigned areas for the evaluation report.
8. Ensure that questions related to health education and community development components have been addressed.

APPENDIX D

QUESTIONNAIRES



VOLET EDUCATION/FORMATION

Questions à Poser aux Agents de District

Nom du district: _____

Nombre d'agents: _____

Nombre de villages:

- a) nouveaux _____
- b) anciens _____

1. Combien de fois par trimestre pouvez-vous visiter chacun de vos villages?
2. Est-ce que les moyens logistiques mis à votre disposition sont suffisants pour effectuer le travail qui vous est confié?
 - a) oui
 - b) non (préciser)
3. Est-ce que les formations que vous recevez suffisent du point de vue contenu et méthodologie pour vous permettre d'exécuter vos tâches?
 - a) oui
 - b) non (préciser)

Questions à Poser aux Comité Villageois

1. Quel est le rôle du comité de développement socio-sanitaire dans ce projet d'eau?
2. Qu'est-ce que vous avez appris à votre dernière formation?
3. Qu'est-ce que vous avez fait au village après la dernière formation?

4. Comment cotisez-vous l'argent pour la réparation de la pompe?

5. (Pour les responsables sanitaires) Comment allez-vous assurer que les autres villageois appliquent ce que vous leur apprenez?

6. Est-ce que ce village souffre de vers de Guinée?
a) oui b) non

7. Selon vous, qu'est-ce qui cause les vers de Guinée?

8. Selon vous, est-ce qu'il y a d'autres maladies qu'on peut attraper de l'eau de marigot?

VOLET EAU

Questions à Poser aux Villageois

1. Avant la construction de ce nouveau point d'eau, où alliez-vous puiser l'eau?
 - Pendant la saison des pluies:
 - a) marigot
 - b) puits
 - c) rivière
 - d) mare
 - Pendant la saison sèche:
 - a) marigot
 - b) puits
 - c) mare
 - d) autre

2. Avant l'arrivée de ce forage, combien de temps vous fallait-il pour chercher de l'eau pour une journée?
 - a) moins d'une heure
 - b) entre 1 heure et 2 heures
 - c) plus de 2 heures

3. Depuis l'arrivée de ce forage, est-ce que l'eau que vous apportez à la maison vient uniquement de la pompe ou d'ailleurs? Si ailleurs, préciser le lieu.
 - a) pompe seulement
 - b) pompe et marigot
 - c) pompe et rivière
 - d) marigot seulement
 - e) autres

4. La pompe satisfait-elle vos besoins en toute saison?
 - oui
 - non

5. L'eau de pompe a-t-elle un bon goût?
 - oui

non

6. Selon vous, qui est responsable de la réparation de la pompe quand elle tombe en panne?

- a) responsable de pompe
- b) comité villageois
- c) les villageois
- d) le gouvernement
- e) artisans réparateurs
- f) les agents
- g) le projet
- h) je ne sais pas

7. Si la pompe tombe en panne, comment allez-vous vous approvisionner en eau potable?

- a) ancien point d'eau
- b) eau bouillie
- c) eau filtrée
- d) autre

Questions à Poser au Responsable de Pompe

1. En tant que responsable de pompe, quelles sont vos responsabilités?

- a) contrôle quotidien de l'utilisation de la pompe
- b) chercher/acheter les pièces de rechange
- c) aménagement des alentours
- d) appeler l'artisan en cas de panne
- e) aviser le Comité en cas de panne
- f) autre

2. Est-ce que vous avez reçu une formation qui vous a préparé à vos tâches?

oui
non

3. Avez-vous reçu des outils et du matériel pour votre travail?

oui
non

4. Est-ce que vous pouvez nous montrer ces outils de travail? (contrôler leur état)

oui
non

5. Quels moyens de transport avez-vous pour avertir l'artisan et pour chercher les pièces de rechange?

a) marcher à pied
b) vélo
c) mobylette
d) autre moyen (préciser)

6. Si la pompe tombe en panne, comment allez-vous vous approvisionner en eau potable?

a) ancien point d'eau
b) eau bouillie
c) eau filtrée
d) autre



APPENDIX E

LIST OF VILLAGES VISITED



APPENDIX E

LIST OF VILLAGES VISITED

(October 27 - November 4, 1988)

Bantè:

- Towé
- Agbon

Dassa:

- Gnonkpingnon
- Larménou
- Minifin
- Dovi-Somé

Glazoué:

- Tankossi

Savalou:

- Sohédji
- Segui-Honnoukon

Savé:

- Alafia Attesé
- Gobé