WATER AND SANITATION FOR HEALTH PROJECT

Operated by
CDM and Associates

Sponsored by the U.S. Agency for International Development

1611 N. Kent Street, Room 1002
Arlington, Virginia 22209 USA

Telephone: (703) 243-8200
Telex No. WUI 64552
Cable Address WASHAID

FINAL EVALUATION

USAID / BURKINA FASO

RURAL WATER SUPPLY PROJECT

WASH FIELD REPORT NO. 191

AUGUST 1986

Prepared for
the USAID Mission to Burkina Faso
WASH Activity No. 243

WASH FIELD REPORT NO. 191

FINAL EVALUATION
USAID/BURKINA FASO RURAL WATER SUPPLY PROJECT

Prepared for the USAID Mission to Burkina Faso
under WASH Activity No. 243

by

Philip Roark
Bonnie Kittle
Joseph Yanogo
Daouda Nignan
Raymond Yonli
Rigobert Tindano
Mamadou Gnoumou

August 1986

Water and Sanitation for Health Project
Contract No. 5942-C-00-4085-00, Project No. 936-5942
is sponsored by the Office of Health, Bureau for Science and Technology
U.S. Agency for International Development
Washington, DC 20523

Table of Contents

Chapter | Page

FIGURES

ACKNOWLEDGEMENTS

Many people had a role in assisting the evaluation team in its efforts to produce this report. Particular thanks are due to George Thompson and Bruno Bambara of USAID for their overall assistance in supporting the evaluation effort.

Bruno Bambara deserves special recognition, not only for his daily work in arranging team logistics, but also for his overall knowledge of the project's history. His knowledge, obtained from having worked on the project since its inception in 1978, proved to be an invaluable resource. Much of the overall project success can be attributed to Mr. Bambara who served as a constant reminder of past project successes and failures.

In addition, thanks are due to the project technical directors, Mamadou Diallo and Alexandre Hema, and the administrative director, Pascal Leossogo, for their assistance in providing needed information. Our gratitude must also be extended to the Burkinabe people of the many villages that we visited who in most cases interrupted their planting work to patiently answer questions about the project.

Finally, we wish to thank the USAID secretaries who worked so hard in typing this report. They are Noelie Gnoumou, Jeanne Marie Sedogo, Alizeta Kabore, and Rose Sanou.

EXECUTIVE SUMMARY

At the request of USAID/Burkina Faso to WASH (Water and Sanitation for Health Project), the final evaluation of the Rural Water Supply Project was undertaken in June and July 1986 by an interdisciplinary team of seven members. The team was composed of both expatriate and Burkinabe specialists in water, health, and project administration. Two U.S. team members were supplied by WASH and five members came from the Government of Burkina Faso.

In consideration of the fact that two evaluation missions had previously taken place during the six-year life of the project the present mission concentrated on the last two years of the project, the so-called "extension period." The objective of the mission was to focus on project performance, particularly as to water use, and on possible impacts of the project on the target population. Specific issues were identified relating to changes or modifications which would be recommended if the project were to be continued or if similar projects were to be started.

The evaluation mission concluded that, in general, the project reached most of its objectives and can, therefore, be considered a success. Specifically, the project constructed 678 wells which have significantly increased the water availability to the population. Because of these successes it was concluded that the project merits a continuation in order to meet water demand for the remaining population of the area.

The success ratio of constructing wells with acceptable yields improved with experience as the project progressed. During the last campaign the project achieved better than a 90 percent success ratio in constructing both drilled and hand-dug wells.

The key element for any rural water supply project is operating and maintaining a pumping system. The project utilized a Moyno pump which has been moderately successful in avoiding breakdowns. Comparative tests, however, indicate that other pumps may be more suited to Burkinabe conditions and therefore the Moyno pump may require replacement in the future.

Without a doubt, the greatest failure of the project is the lack of a functioning pump maintenance system. As the project is reaching a close a new maintenance system has been formed but is not yet in operation. The new system is most innovative and relies on the private sector for its implementation. The pump maintenance system should be periodically evaluated in the future to assure its continuation.

The project has been innovative in its conception by combining a water component with a health education component. Unfortunately, the two components have not proceeded in tandem and the operations of the health component have been truly functional only during the last two years of the project. Interministerial coordination has improved significantly during the extension phase with the naming of the present two technical directors and a Dimpex (technical assistance contractor) team leader. These three people formed the technical coordinating committee. In order to assure the necessary

interministerial coordination in future projects a national director is recommended who would oversee all project operations.

In order to measure project performance, particularly in terms of water use, a field survey was undertaken of randomly selected villages. The survey found that sanitary storing and use of water was not a common practice among villagers. Distance to the water point, irrespective of water quality, continued to be the overriding factor in determining water use. Within a pilot zone, which was established to try an integrated water and health approach in project operations, somewhat better results were found. This has led to the recommendation that water well construction not be undertaken until after the health education and village extension (animation) has taken place.

Unit costs of well construction within the project were found to be rather high. It is recommended that future projects utilize the private sector for drilling wells. Within the project improvements in efficiency could be anticipated if a system of basing wages on production were instituted.

The management systems established are well adapted to the needs of the project although more attention to detail is required in their application. The management systems themselves should be considered as a model for other development projects of this type.

Chapter 1

INTRODUCTION

This report constitutes the final evaluation of the USAID/Burkina Faso Rural Water Supply Project (686-0228). The evaluation took place in Burkina Faso over a period of six weeks from June 10 to July 21, 1986. The evaluation team was formed with both expatriate and Burkina (Burkinabe) specialists who were qualified in water resources, primary health, and/or project administration.

1.1 The Evaluation Team

The overall purpose of the final evaluation is to enable the Government of Burkina Faso (GBF) to continue the unique successes of the first phase of the Rural Water Supply Project (RWSP) in order to make continuing improvements in developing rural water supplies in Burkina Faso, while identifying the problems in order to avoid them in the future.

The team members were as follows:

Philip Roark	Team Leader, Water Resources Expert, WASH
Bonnie Kittle	Primary Health and Sanitary Education Expert, WASH
Joseph Yanogo	Administration, Management, and Accounting Expert, Ministry of Water
Daouda Nignan	Division Chief of Evaluation, Ministry of Health
Raymond Yonli	Sanitary Engineer, Ministry of Health
Rigobert Tindano	Counselor in Economic Affairs, Ministry of Water
Mamadou Gnoumou	Water Resources Engineer, Ministry of Water

1.2 Objectives of the Evaluation

The specific objectives of the evaluation are listed below under the three components: health, water, and project administration.

Health

- Study how the health and sanitation component was integrated with the rural water supply component during the project;
- analyze the means used to penetrate and educate the project village communities; and
- based on the results obtained, make necessary recommendations to the GBF concerning the design and implementation of similar projects.

Water Supply

- evaluate the water supply component and make procedural recommendations for water supply planning and design;

- determine an appropriate model or models for execution of water points (i.e., contract, force account, artisanal cooperatives, combination, etc.);
- determine an effective pump maintenance system; and
- determine the most appropriate types of water points.

Project Management/Administration

- Evaluate the administrative and accounting system of the project and, based upon a review of the effectiveness and appropriateness of the existing system, make recommendations for improving the administration and management of future projects.

1.3 Evaluation Model

To facilitate the evaluation, a model was applied which viewed the project from three perspectives: operations, performance, and impact (see Figure 1). Project operations have been well documented and analyzed by previous evaluation missions and in the Dimpex Final Report. Therefore, only a brief description of project inputs, outputs, and operations is provided in this report. Specific areas of interest, as specified in the objectives for the evaluation, have been the focus of attention particularly in the domain of operations, for both water and health, and in overall project management and administration in this final project evaluation. Recommendations on improving the effectiveness of the project provide alternative approaches to solving water, health, and administration problems. Most of the recommendations are related directly to the RWSP but many also relate to water and health projects in general. Finally, project impacts are considered, although such impacts are more potential than actual to date because of the complex relationship between water and health.

Figure 1

Evaluation Model for USAID/Burkina Rural Water Supply Project
Water, Health, and Administration Components

	Project Operation		**Project Performance**	**Project Impacts**
Project Inputs	Institutional Development	Project Outputs	Well Construction Alternatives	
By USAID	Project development. Water system maintenance, management and staffing.	Construction status.	Water use	Health
				Environment
By GBF	Information systems. Wells construction alternatives. Health workers.	Operational Status.	Household sanitation Practices.	Socio-economic
			Management and administration.	Women
	Community activities.			
By Local Communities	Interministerial coordination.		Community support.	Institutional
	Efficiency Level		**Effectiveness**	**Impact**

Chapter 2

BACKGROUND

2.1 Historical Perspective

The Burkina Faso Rural Water Supply Project (RWSP) was developed in 1978 to improve the living conditions of the inhabitants of 550 villages of southwestern Burkina Faso by providing these villages with potable water supply systems and establishing a community health education program to maximize the benefits of the water supply systems. The project agreement was signed in July 1979. The project closing date was eventually extended from July 1984 to July 1987, with a total USAID grant of $13,500,000. The Government of Burkina Faso (GBF) contribution was $1,126,000.

The water-supply component was implemented by the GBF Ministry of Water (Direction des Puits, Forages et Hydrologie). The health component was implemented by the GBF Ministry of Public Health (Direction Centrale des Formations Sanitaires). Technical assistance was provided under a contract to an American consulting firm, Dimpex Associates, Inc.

The project area covers four provinces in southwestern Burkina Faso: Houet, Kenedougou, Bourgouriba, and Poni.

2.2 Project Chronology

The significant events in the life of the project were tabulated in the Dimpex Final Report. These events are summarized below.

1977
- In November and December Pacific Consultants, Inc., sent a sanitary engineer, drilling expert, social anthropologist, and hydrogeologist to three countries in West Africa, including Burkina Faso, for a preliminary analysis of water and sanitation projects. The consultants submitted their report to USAID in March 1978.

1978
- During the first trimester, the Ministry of Rural Development requested USAID in writing to finance a well construction project.
- In June and July Dimpex Associates, Inc., and a counterpart organization, the HER (the Directorate of Rural Water Supply and Equipment of the Ministry of Rural Development) conducted a study to design a rural water supply project under contract with USAID. In October the Dimpex team submitted its report, which proposed a dug well and borehole well construction project with a modest health education component.

1979
- In June the project paper prepared by USAID/Burkina was submitted for approval to the AID administrator. In this document more emphasis is placed on the health component than in the previous reports.

- On July 25 the grant agreement was signed by USAID and the GBF. In the grant agreement the role of the Ministry of Health was still further expanded and the National Health Program was taken into consideration. Since then, the grant agreement has been amended five times, the last time in March 1985, to extend the project.

- In August the Ministry of Rural Development assigned Francois Kabore of the HER as the water supply technical director while the Ministry of Health assigned Dr. Maximim Ouaba as the health technical director. These two civil servants participated in the preparation of the financial plan of the project. USAID then assigned Larry Dominessy as project officer and Bruno Bambara as his assistant. Since then a number of people have held these positions. Only the assistant project officer has remained on the job.

- In September the HER first named Lamine Konate and then Florent Ouedraego as the new technical director for the water supply component of the project.

- In November the first brigade chiefs started work on the water supply component.

1980

- From March to June the first mini-well digging campaign was conducted with equipment provided by the GBF.

- In June Dr. Mebe Kagone (at present in training in the United States) was assigned as the new technical director of the health component.

- In October the first member of the technical assistance team, Robert Vorhis, a hydrogeologist, arrived in Burkina Faso. The technical assistance contract had been signed earlier that month.

1981

- The second well digging campaign was begun in February. This time it included both well digging and borehole drilling, again using GBF equipment, including the FORACO drilling rig.

- The first village health workers were recruited and trained by the expatriate health educators (technical assistance team), the Burkinabe sanitarians, and Peace Corps volunteers.

- In mid-year it was agreed that the project would ensure the training of village birth attendants and that the GBF would provide their equipment.

- In May the first Peace Corps volunteers for the project arrived.

- In June the first sanitarian (Burkinabe) was assigned to the project.

- In September the Ingersoll-Rand TH-60 drilling rig began operations.

1982
- From March to December the first group of itinerant health workers was recruited and trained.
- In July the International Science and Technology Institute (ISTI) conducted the midway project evaluation.
- In December a water supply and sanitation seminar was held.

1983
- The HER administrative building was put into use.
- In July the FORACO drilling rig was transferred to Ouagadougou.
- In August and September a National Seminar on Rural Water Supply and Sanitation was organized.
- From September to December a survey was conducted in 374 project villages.

1984
- In January the new garage-warehouse complex was put into use.
- During February and March a WASH team conducted a project evaluation/assessment.
- In August the PIO/T (Project Implementation Order Technical Assistance) amendment for the project extension was approved.

1985
- In March the contractor chief-of-party arrived.
- Also in March a wells and borehole specialist provided technical assistance.
- In July a finance and administration specialist provided technical assistance.
- From July to November a warehouse management specialist provided technical assistance (focus on spare parts management).
- During the period from July to December the Practical Guide to Community Health was designed and prepared.
- From September to December a baseline data survey was taken.
- From November to December a drilling specialist provided technical assistance.
- In December the active participation of the technical assistance team on the project was completed.

1986
- In March the Dimpex final report was prepared and submitted in draft.

- June is the anticipated date at which all recurrent costs relating to the itinerant health workers (salaries, etc.) are to be assumed by the Ministry of Health.

- Final project evaluation by a WASH/Burkinabe team in June and July.

2.3 The ISTI Evaluation

A mid-term evaluation of the project was undertaken by the International Science and Technology Institute (ISTI) in 1982. A summary of their evaluation is provided below.

After a somewhat slow start-up of about two years owing to delays in delivery of commodities and equipment, arrival of contract personnel, and other factors, both the wells and the health components of the project achieved very good results during 1981 and 1982 in terms of tangible outputs. Some 155 wells were completed and 60 pumps installed as of the end of the 1981-82 field season out of the end-of-project target of 620 completed wells all equipped with pumps. On the health side 22 itinerant health workers were in training and 107 village health workers had been trained by contract health educators as of the end of the 1981-82 field season. The end-of-project target is a total of 110 itinerant health workers and 550 village health workers, each working in a different village. The foregoing achievements were good indicators that the available personnel and equipment were being utilized and managed on a sound basis. Since the beginning of the project, however, the wells and health components were operating as virtually separate entities with only occasional or intermittent coordination.

The ISTI evaluation team concluded that as of the end of the five-year term (July 1984) some 80 percent on the wells side and approximately 50 percent on the health side of the end-of-project objectives would be attained, provided the project maintained its present momentum. The most salient problem observed by the team was the lack of coordination between the wells and health components of the project. Several specific suggestions were offered to correct the existing imbalances in achievement and to integrate the two components so as to meet project objectives. Also, there was a priority need to set in place as soon as possible a pump maintenance capability and a means for financial support of the maintenance costs. To provide sufficient time for the fulfillment of project objectives the evaluation team recommended a one-year extension of the project at no increase in funding. The team also recommended consideration of a new phase to follow the present project. The present target of 620 wells with pumps will cover only approximately 40 percent of the needs of the rural population in the project area. Also the handpump maintenance and the health education deli ery systems might not be fully operative even with a one-year extension of the project.

2.4 The 1984 WASH Evaluation

WASH evaluated the project in 1984. As a result, several changes in the organization and orientation of the project were made, particularly to ensure that the health component objectives would be attained. The project was

extended to 1986 in order to carry out the recommendations.

The most important remedial actions recommended by the WASH team were a structural and organizational integration of the water and health components, both at the project management level and at the village level. Thus, the emphasis was shifted from training village health workers to helping communities organize themselves around owning and maintaining an improved water supply system and participating in health promotion activities. The new strategy has been to enter and animate project villages prior to water point construction, to help them understand the relationships between health and water, and to establish health committees and a pump maintenance fund. Health education sessions continue to be the responsibility of village health workers, supervised by itinerant health workers in conjunction with the Health and Social Welfare Center officers.

2.5 The Dimpex Final Report

The Dimpex Final Report provided a complete summary of project activities and was submitted in provisional form in March 1986. Unfortunately, some important chapters including the conclusions and recommendations were not included in the provisional version and, therefore, were not available to the evaluation team.

2.6 Project Objectives

During the course of the project several modifications and changes have been made in accord with the recommendations of evaluation teams. Also, some of the objectives were found to vary from document to document. This has resulted in some confusion. The current project objectives as provided in amendment No. 5 to the project amendment, are listed below. The following is the expected end of project status:

- construction of project headquarters and vehicle maintenance facilities;

- construction of 289 new hand-dug wells, deepening of seven existing wells, and construction of 347 mechanically drilled wells. These wells will be tested for water producing ability, and water treated as required by project sanitarians to meet the health standards of the Directorate of Public Health, capped and supplied with a hand-operated pump;

- functioning pump maintenance program in at least 50 villages and continuing GBF program for developing pump maintenance programs for all other project villages;

- functioning preventive health education program in at least 20 villages and required protocols established to extend the program into other villages;

- satisfactory operation of 50 demonstration latrines and protocols established for extending program into other villages;

- a directorate personnel trained on the understanding of goals, objectives, methodology, multi-disciplinary relationships and planning of rural water supply systems.

- an operational administrative-accounting system with at least two administrative accountants capable of using Sahel-wide accounting system.

- a technical coordination unit fully operational and capable of integrating in a satisfactory manner the health and hydraulic activities.

- replacement of expatriate positions by GBF personnel returning from long-term training: (1) M.S. in public health educator and (2) water well technologist. The GBF personnel would have received specialized training in order to have the following expertises available:

  - equipment repair and maintenance, garage and parts management,
  - well development and water recharge testing,
  - pumps installation and maintenance.

Chapter 3

EVALUATION METHODOLOGY

The evaluation of the RWSP began with a planning meeting to coordinate approaches within the multidisciplinary team and to set objectives. Then the team collected data in the field and through interviews with project officials. Next, conclusions and recommendations were formulated and presented in a synthesis workshop attended by individuals from both the GBF and donor organizations. Finally the final report was prepared.

3.1 Team Planning Meeting

Since the seven members of the evaluation team were assigned from different ministries and agencies, it was deemed appropriate to begin the evaluation exercise with a team planning meeting. The meeting was facilitated by the USAID project manager and the WASH team leader. Team members reviewed the history of the project, set objectives for the evaluation, identified the clients, discussed the evaluation methodology, prepared a work plan and a preliminary outline of the evaluation report, devised team work strategies, and settled logistical issues. At the end of the meeting, the team presented its objectives and strategies to representatives of USAID and the participating ministries.

3.2 Articulation of Evaluation Objectives and Methodology

During the planning meeting it was decided to evaluate the project by assessing its efficiency, effectiveness, and impact. It was assumed that during the assessment of these aspects the major problems encountered and lessons learned by the project would be identified. The report also closely follows this format. The following objectives were agreed to:

- The efficiency of the project was to be assessed by analyzing the project inputs, operations and outputs, including project administration and management.
- The effectiveness of the project was to be assessed by analyzing the use and performance of the project's outputs, e.g., wells, health workers, latrines, manuals, etc.
- The impact of the project was then to be assessed by determining how the outputs and their use and performance had affected the socioeconomic conditions of the inhabitants of the project villagers, particularly with regard to health.

Given that major changes in project objectives and strategies had been agreed upon during the extension period (the last one-and-a-half years), it was decided to put special emphasis on project impact in the pilot zone. The pilot zone was an area set aside within the project to test new project strategies recommended by a previous WASH evaluation.

3.3 Data Collection

It was decided at the planning meeting that the necessary data and insights into the project would be obtained in four ways. First, team members would visit the project area and interview project personnel at all levels. Second, they would visit infrastructure established by the project. Third, they would review and analyze administrative documents, program and evaluation reports, manuals, curricula, etc. And finally, they would conduct a village survey. The evaluation team therefore traveled to Bobo-Dioulasso, which was used as their base of operations for nearly three weeks. An administrative team (two members) a water supply team (two) and a health team (three) collected data at project headquarters and related institutions. (A list of persons contacted is included as Appendix A.) The village survey was conducted by the water and health teams, who regrouped for this purpose into three different teams, two of which consisted of one water supply specialist and one health specialist and a third consisting of a health specialist operating on his own.

A survey was designed (Appendix B) to facilitate a uniform assessment of project efficiency, effectiveness, and impact at the village level. It was then field tested in one village and finalized. A total of 36 villages were selected using stratified random sampling techniques. Of the 36 villages, 10 were located in the pilot zone (28 percent of the sample) while 26 were divided among the four provinces of the project area. A list of the villages and a visiting schedule are given at the end of Appendix B.

Because the survey would be done among several different ethnic groups speaking different languages, four multilingual students were hired as translators to complement the language capabilities of the Burkinabe evaluators. Approximately one day was spent reviewing the questionnaire with the translators, standardizing the vocabulary to be used in translation, and teaching interviewing techniques.

The survey included a total of eight questionnaires and one observation sheet. Five questionnaires were used by the health specialists (interviews with itinerant health workers, village health workers, village birth attendant, the village cell, and ordinary villagers) to determine knowledge, awareness, and accomplishments relating to health, sanitation, and community organization in the village. Three questionnaires were used by the water supply specialists (interviews with the village health cell, the well and pump caretaker, and ordinary villagers) to determine changes in water consumption, community organization, and operations and maintenance of the well or pump. In addition, the health specialists completed a list of observations regarding the sanitary use of water. The questionnaires and results are given in Appendix B.

Thirty-four villages were ultimately visited. It should be noted that the size of the sample is not sufficiently large to provide statistical validity for a project which encompasses more than 600 villages. Furthermore, because the survey was conducted during the rainy season when the majority of villagers are working in the fields, fewer villagers than would have been desirable answered the questionnaire. For these reasons, the reliability of numbers and percentages given in this report is below statistical standards. However, as an indicator of general conditions, views, and practices within the villages visited, the conclusions drawn from the questionnaires may be considered valid and representative of the actual situation.

3.4 Data Analysis, Reporting, and Review

Upon completion of the field work, the questionnaires were analyzed and the results compiled and discussed among team members and with project staff in Bobo-Dioulasso. At that time complementary information and statistics were also gathered, and team members began the preparation of a first draft of the evaluation report. Prior to leaving Bobo-Dioulasso, the team prepared and discussed a list of preliminary conclusions and recommendations with the project technical directors. The draft report was completed in Ouagadougou and the list of conclusions and recommendations finalized.

The findings, conclusions, and recommendations of the evaluation were discussed during a synthesis workshop in Ouagadougou on July 14 and 15, 1986, with approximately 30 representatives from the Ministry of Water, Ministry of Public Health, and other GBF agencies, Faso Yaar (a general merchandise retail distributor), and donor organizations. A final draft of the report was prepared by the team leader with assistance from other team members from July 16 to 21, 1986.

Chapter 4

WATER COMPONENT

The RWSP began with the primary objective of improving the water supply of villages in four selected provinces, and the majority of resources have been used for the water component of the project. Hence, the analysis of project operations should begin with the water component.

4.1 Operations

Within the water component of the project, the construction of drilled wells, hand-dug wells, and the rehabilitation of existing wells was undertaken. Project operations also included the selection of villages for wells construction, providing for pump maintenance, and the training of project personnel.

4.1.1 Geology of the Project Zone

The water component operations are determined to a large extent by the geology of the zone, for the geology determines the choice between drilled and hand-dug wells. Within the four provinces of the project there are two major geologic formations -- a sedimentary zone and a crystalline zone.

The sedimentary zone is formed by a plateau 150 to 200 meters above the crystalline peneplane. This formation underlies most of the area within the Houet and Kenedougou provinces. The sedimentary zone is composed primarily of sandstones which have been subjected to intense fracturing and faulting.

Aquifers in this zone are encountered at depths generally below 40 meters. Yields are good (relative to rural village needs), and, in those wells which have tapped into a zone of intense fracturing, yields are very good. Thus, because of the depth and hardness of the aquifers in the sedimentary zone, drilled wells have been the dominant choice for wells along the western side of the project area.

The crystalline zone covers a small part of Houet and Kenedougou provinces and all of Poni and Bougouriba provinces. This zone is formed by a low lateritic plateau with poorly differentiated drainage. The upper portion of the formation consists of lateritic clays. This portion gradually becomes a weathered zone of granites and schists. In low areas the weathered zone provides a low-yielding aquifer which is accessible with hand-dug wells. Where fracturing has been intense, wells which penetrate into the crystalline basement are productive. Both drilled and hand-dug wells are employed in this zone. The choice usually depends on the depth required to reach a permanent water-bearing formation. The project has generally constructed hand-dug wells in areas where the water table is less than 25 meters below the surface, and drilled wells where it is more than 25 meters.

The evaluation team noticed that the choice of well is actually driven by considerations of pump reliability. Drilled wells have many advantages over

hand-dug wells. However, hand-dug wells are the appropriate choice in many instances because of the unreliability of handpumps, an integral part of a drilled well. The issue of pumps is addressed in greater detail later in this report.

4.1.2 Drilled Wells

Six teams are required to construct a drilled well: a drilling team, a well-development (pump testing) team, two teams of masons (well apron) and two pump installation teams.

Wells are constructed in four separate steps. The drilling team, which is composed of 14 people including drillers, drivers, and laborers carries out the first two steps. To drill the wells, the project utilizes an Ingersoll Rand TH-60 drilling rig which is equipped for mud or down-the-hole hammer drilling. In hard rock, particularly in the sedimentary zone, the hammer is usually employed. Wells are generally drilled to a diameter of 6 1/2 inches or greater, equipped with 4 1/2 inch PVC casing, and packed with gravel.

The second step is to develop the well. First it is pumped out with an air-lift method of pumping. This is continued until all fine particles are removed and the water is clear. This step varies in time but normally takes approximately two hours. The well is judged acceptable if the yield is greater than 500 liters per hour. The annular space is cemented to six meters below the surface.

Testing is also a part of the well-development step. The pump testing team (14 people) utilizes a submersible electric pump. It is normally recommended that such tests take place over a 24 to 48 hour period. In practice, however, many project wells do not yield sufficiently and the tests are abbreviated. Useful information from these tests has been collected by the project but has not yet been sufficiently analyzed.

After pump testing, the masonry team (16 people) installs a concrete apron and sets the supports for the pump. This step normally takes two days to complete. The evaluation team found the design and construction of the apron to be acceptable. However, the drainage around the well was found to be in a poor state in many cases. Greater attention should be given to assuring that no holes are left near the well and that there is a slope away from the well. The requirements for well drainage are developed in greater detail later in this report.

The final step is pump installation. The pump installation team normally follows the masonry team, after the concrete has set, about a week later. The evaluation team observed that several wells had sat several months before receiving a pump. This delay should be avoided if possible, because the villagers are eager to use their well after it has been constructed, and delays lead only to uncertainties and disappointments.

The efficiency of the teams that work on drilled wells has been previously evaluated by Richard Bourguione, a project consultant. He believed that these teams could be made more efficient by training them in rig operation and offering them wage incentives. The evaluation team would add that each team

uses a variety of mechanical equipment, some of which is quite complex. Breakdowns are extremely costly because they may, in certain instances, immobilize the entire system. Improved preventive maintenance and a network of repair alternatives (such as calling an Ingersoll Rand repair specialist) are necessary to avoid costly breakdowns. The efficiency of the drilled wells component is entirely dependent on the number of productive wells that are constructed during each campaign. Lengthy down periods to repair equipment will be fatal to achieving that efficiency.

4.1.3 Hand-Dug Wells

Hand-dug wells of a large diameter (1.2 meters inside diameter within aquifer zone) are constructed with the aid of the community. Under the supervision of a project supervisor the villagers dig the well by hand until the aquifer is reached. At that point a wells team equipped with pumps, compressors, and jack hammers begins digging into the aquifer. If the rock is very hard, dynamite is sometimes employed. It is expected that the wells team will penetrate three meters into the aquifer during dry-season water levels. The well is tested by pumping it down to a low level and then leaving it to refill. If the water level returns to the 3 meter mark within 12 hours the well is judged successful.

Two brigades of 10 teams each work in the hand-dug wells program. It normally takes one team at least two months to complete a well.

There appears to be some confusion in the project objectives about "well development." Well development is normally applied only to small-diameter drilled wells in spite of a reference in the objectives for the extension period to develop all wells. Well development of hand-dug wells is not undertaken within the project.

In general, the construction of the hand-dug wells has been satisfactory. It appears that in some cases digging to greater depths would be desirable in order to assure a permanent water supply during periods of drought.

4.1.4 Comparison of Drilled and Hand-Dug Wells

Drilled Wells

The advantages of drilled wells are as follows:

- They can be constructed fast (depending on the rock formation they can be drilled at an average speed of 15 meters/hour).
- They can penetrate deep into the aquifer to assure perennial yield.
- The water quality of a drilled well is assured because the well is sealed.
- The yields can be high, depending on aquifer characteristics and pumping technology.

The disadvantages are as follows:

- A pump is required, and, because breakdowns are common, water users lose

confidence in the well. This may lead to major problems.

- Village participation in the well construction is minimal. This is not conducive to establishing village responsibility in well operation and maintenance.

Large-Diameter Wells

The advantages of the large-diameter hand-dug wells are as follows:

- Villagers may still obtain water by traditional means if the pump breaks down.
- Larger quantities of water can potentially be obtained with the traditional rope and bucket than with a handpump.
- Village participation in construction and maintenance is within village means.
- For shallow depths construction costs are generally lower than drilled wells.

The disadvantages are as follows:

- They take a long time to construct, often more than two months.
- They penetrate only a few meters into the aquifer and therefore may not provide a steady supply during dry years.
- If the wells are left open, the quality of the water is compromised.
- Well yields are generally low.

4.1.5 Wells Rehabiliatation

The project has deepened and rehabilitated some existing wells, both drilled and hand-dug. This is to be encouraged. The existing wells already represent a significant investment, and it does not take as long to rehabilitate a well as to construct a new one. In addition, the villagers are already using these wells. The potential problem of locating a well in a place which might be unacceptable to the villagers is avoided.

4.1.6 Criteria for Village Selection

The villages in which wells would be constructed were selected at the beginning of each campaign (at the end of the rainy season). The procedure was to obtain lists of proposed villages from the administrative authorities including the high commissioners, prefects, (chiefs of the prefectures), and the Revolutionary Defense Committees (CDR -- Comité de Défense de la Révolution). These lists were compared with available information from both the water and health components of the project. A definitive list of villages was then established during a meeting of the Provincial Coordinating Committee

composed of the two technical directors from water and health, the high commissioner, prefects, chief of the wells brigade, sanitation assistants, and delegates from the village CDRs.

During the village survey the evaluation team noticed that the wells in some villages were over-used, while those in other villages were underused. Apparently some villages which have not yet been included in the project need water more than some existing project villages. This indicates that a more thorough village survey is required by the project to determine real needs and to prioritize those needs. The village survey should include not only a water survey of existing water points and their yields but also information on the distance to water points, health, and socio-economic factors. If such technical information was available, it would be possible to balance the political realities better in order to maximize resources to benefit the greatest number in meeting village water needs.

4.1.7 Hydrogeologic Methods

At the beginning of the project, geomorphological methods alone were employed by staff hydrogeologists in siting wells, but since 1984 aerial photos have also been used. The aerial photos have made it possible to identify fracture zones. Consequently the success ratio for drilled wells has improved. Skill in using these techniques by project staff has increased to the point that nine out of ten wells are now successful.

In some areas where fault or fracture zones are not evident on aerial photos the use of geophysical instruments (electrical resistivity) may prove useful. Otherwise, the existing photo interpretation methods appear satisfactory.

4.1.8 Pump Maintenance

A system of pump maintenance is absolutely critical to the success of a drilled wells program. Initially, the project began with the expectation that the government's Rural Engineering Division would be responsible for pump maintenance and would establish four provincial maintenance teams. These teams would be supplemented by a group of artisan repairmen scattered throughout the project area. In fact, to date, the project has undertaken all pump repairs through the provincial repair teams. A new system, not yet functioning, proposes to place all responsibilities for pump maintenance with the private sector.

4.1.9 Moyno Pump

The RWSP has purchased and installed Moyno handpumps on all drilled wells and many hand-dug wells within the project zone. The project design team chose the Moyno pump for three reasons. First, a Canadian project in northern Ghana chose the Moyno pump after it comparatively tested approximately 20 pumps of different manufacture over the period of one year. Practically all major pumps were tested. Second, when it was selected, the Moyno pump was being manufactured in the United States and was recommended by USAID. Finally, the pump had a reputation for being particularly solid and well built.

4.2 Requirements for Water Supply Planning and Design

The water supply planning undertaken during the project was minimal. After the village was selected, as explained in Section 4.1.6, hydrogeological surveys were conducted to choose the well site. The only other interventions were based on the individual initiatives of the hydrogeologists who, in some cases, attempted to determine existing water availability within and near the village. The wells were based on standard designs recommended by the project design team, and no changes were made in these designs during the life of the project. Since the technology of well construction was prescribed largely by the equipment purchased, including the Moyno pump, no other designs were considered by the project.

A significant omission in planning was the lack of consideration for springs in the sedimentary zone of the project area. Many springs are known to exist in certain areas and these have not been sufficiently analyzed as to their potential for supplying village water needs. It is an advantage that springs do not require pumps and can be developed at a comparatively small cost. However, a disadvantage may be that the springs are not sufficiently close to the villages in need of water.

The following information is required for the development of any rural water supply project:

- an inventory of all existing water points, their yield, and their reliability throughout the year;
- data on the distance and time traveled by villagers to the water points;
- an assessment of the water quality (Is the source protected? Are there pollution problems?);
- an analysis of the uses to which the water will be put (animals, agriculture, industrial);
- hydrogeological information, including topographical and hydrogeological maps, aerial photos, and reports of hydrogeological studies undertaken in the zone;
- an assessment of health needs, health workers, and their plans for animation; and
- an assessment of village interest in undertaking wells construction and the role they are willing to play.

Obtaining the above information requires skills in hydrogeology, village animation, and health. The data collection is most efficiently done if three individuals, each with one of the skills, visit the village as a team. Three visits are required for each village. During the first visit, the team informs the villagers of the purposes of the survey, asks their assistance in obtaining the information, and sets the date for the second visit. During the second visit, the villagers and the team compare information collected and discuss the alternatives and possibilities of well construction. The team

explains to the villagers what their responsibilities are, such as establishing a pump maintenance fund. A third visit date is then established. During the third visit, a decision is made as to the village interest and willingness to participate.

The costs of the village survey are variable. Generally each village would require a half day for each visit, including travel time. The cost calculation is as follows:

3 visits X .5 days X no. of villages X salaries of team members = total cost

In addition to the above calculations, vehicle costs must be included. While village survey costs are not negligible, it must be emphasized that the surveys are necessary to assure the proper utilization of wells.

Some of the above recommendations have been used by the project in the pilot zone, but not the complete package. The plan sketched above is the minimum requirement for data collection and village animation. It obviously requires complete coordination between the water and health components to be successful.

4.3 Choice of Organization to Construct Wells

A number of organizations are involved in constructing wells: private enterprises, government entities, artisanal cooperatives, and any of these in combination.

4.3.1 Private Enterprise

Experience in Burkina Faso indicates that private enterprises can construct better quality drilled wells at a lower cost than the government. There are currently four drilling enterprises that are now doing well drilling in the country. For large contracts there are some additional drilling firms who might bid on an international basis. The competition generated by the four enterprises currently operating in Burkina Faso appears to be sufficient to maintain their price for drilling wells below the government cost.

4.3.2 Government (en régie)

Government construction is appropriate for either drilled or hand-dug wells as demonstrated by the RWSP. However, there is a need for improved efficiencies in constructing the project's drilled wells. The wells consultant, Richard Bourgoin, recommended a wage structure based on bonuses. The project has not been allowed to pay bonuses, however, and so one can only speculate on how they might have improved efficiency. An analysis of project costs would show that if drilling production could be maintained at a high level -- for example 100 wells per campaign -- then the costs per well would be competitive with private enterprise. It must also be noted that a repair and maintenance system is imperative in keeping project efficiencies at an acceptable level. When spare parts are locally available, the private sector appears to be more efficient in repairing vehicles and machinery than the government.

The government produces large-diameter hand-dug wells cheaper than drilled wells, but with the inherent disadvantages indicated earlier in this section. A comparative cost analysis is presented in Section 6.3.

Although drilled wells are constructed more efficiently by the private sector, there are three reasons for the government to continue in drilling operations:

- Government operations at present serve as competition to private enterprise to prevent monopolistic practices.
- The government has the flexibility to undertake special or emergency operations (test wells, disaster emergency wells, etc.).
- The government can amortize equipment that is left over at the end of a project to undertake new projects or maintain old ones.

4.3.3 Artisanal Cooperatives

For large-diameter wells the artisanal cooperatives have a long history of successful wells construction projects. The use of village participation has allowed the costs of these projects to be generally less than government operations.

As a subset of this category, the construction of large-diameter wells through private voluntary organizations (PVO) has shown to be effective and inexpensive compared to government organizations. Again village participation is a key ingredient in reducing costs within these programs.

Generally, the artisanal cooperatives and the PVOs do not participate in drilled wells construction. In other countries, however, PVOs have been involved in drilling programs but the results have been mixed.

4.3.4 Combination

A parastatal operation combines private enterprise and government-managed programs. Parastatals can be operated in a variety of combinations. Perhaps the key element in defining parastatals is whether profits are shared by employees in the form of production bonuses or whether profits are returned to the state. The advantages of wage bonuses have already been mentioned. Since each individual parastatal would have to be carefully examined to determine its real efficiency, no statements can be made regarding recommendations on the use of parastatals. It will be noted that parastatals have had very mixed results throughout Africa with both notable successes as well as total failures.

4.4 Outputs

The outputs of the water component have generally been impressive. In fact, the number of wells constructed has exceeded expectations. A comparison of outputs with project objectives is provided in the following paragraphs.

Tables 1 and 2 provide a summary of these objectives and a tabulation of wells completed.

One of the project objectives was to construct 620 wells in 550 villages. The project had completed 678 wells in 617 villages as of July 1986. It should be noted that wells construction will probably continue until the end of 1986 under existing project funding.

It was expected that 320 wells would be drilled, 150 wells dug, and 150 wells rehabilitated. The project has actually completed 340 drilled wells and 300 hand-dug wells and has rehabilitated 57 hand-dug wells. The project identified fewer wells that could be productively rehabilitated than originally expected.

As mentioned in Section 4.1.3 the project has developed drilled wells as a standard practice. Hand-dug wells are not normally developed in the technical sense of the term. This practice is considered acceptable by the evaluation team.

A project objective was to install pumps on all 620 wells constructed. At the time of the evaluation all drilled wells had pumps (or pumps were in the process of being installed) but only a few hand-dug wells had operating pumps. In general the villagers preferred an open (large-diameter) well rather than having to face the inevitable breakdowns which occur with pumps. It is noted that the reason the original plan called for constructing half drilled and half dug wells was that project designers lacked confidence that a pump maintenance system could be established. Therefore, it is not surprising that the project has not achieved the goal of placing handpumps on all large-diameter wells.

For pump maintenance the project objective was to form four provincial brigades and to train 60 artisan repairmen. The four brigades are in operation. To date, 47 artisans have been trained, but they have not yet begun to work under the new system of pump maintenance.

Table 1

Wells Completed

(June 30, 1986)

Designation	Campaign 1979 to 1980	1980 to 1981	1981 to 1982	1982 to 1983	1983 to 1984	1984 to 1985	1985 to 1986	Total	Objectives	Percent Completed
Numbers of villages served	13	48	175	164	106	27	84	617	550	112%
Productive drilled wells	0	25	93	95	46	14	67	340	320	106%
Negative drilled wells	0	7	32	19	12	3	23	96	-	-
Project drilled wells rehabilitated	-	-	-	-	-	(2)	-	(2)	-	-
Other drilled wells rehabilitated	-	-	-	-	-	(6)	-	6	-	-
Productive large-diameter wells	15	37	77	87	67	17	-	300	150	200%
Project large-diameter wells rehabilitated	-	9	9	5	3	(74)	29	(129)	-	-
Other large-diameter wells rehabilitated	1	1	2	1	-	16	36	57	150	38%
Total wells	16	63	172	183	113	53	103	678	620	113%

Table 2

Wells Completed by Province
(June 30, 1986)

Provinces	Productive Drilled Wells	Productive Large Diameter Wells	Drilled Wells Rehabilitated	Large Diameter Wells Rehabilitated	Total
Bougouriba	82	64	-	42	188
Poni	89	77	-	7	173
Houet	92	86	4	8	190
Kenedougou	58	73	2	-	133
TOTAL	321	300	6	57	684

Chapter 5

HEALTH

An analysis of the operations and outputs of the health component of the RWSP is presented in this chapter. Consideration is given to health component design, personnel training, and health education materials. An analysis of the efficiency of the village health cell, sanitation activities, village survey, and the pilot zone is provided in specific subsections. Finally, a summary of project outputs in comparison to objectives is presented.

5.1 Health Component Design

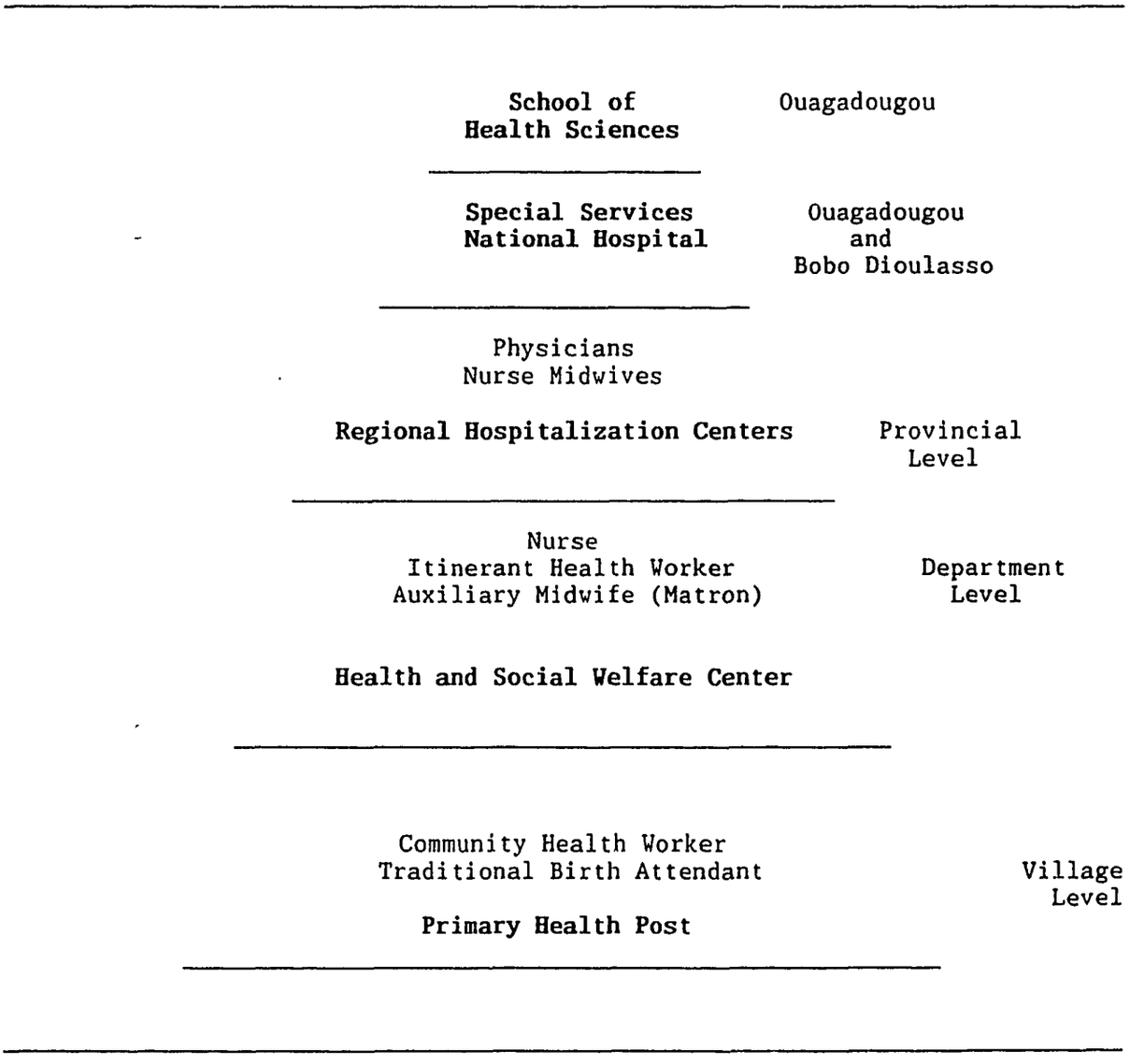
Without a doubt it can be said that the health component of the project suffered greatly from an ill-defined design and a vague implementation plan. In 1979 the Ministry of Health was not ready to take on a project of this size and type, and yet AID insisted there be a health component. Consequently, the health activities of the project have evolved and changed as the government health plans have changed, making implementation of the project health activities a rather haphazard procedure. Furthermore, once the government clearly defined its Primary Health Care Program, the project allowed its funds to be used to achieve the ministry's objectives. In the process the project's own objectives became indistinguishable from those of the ministry. Thus, at the end of the project, due to very poor record keeping and this unforeseen integration of objectives, it is not possible to determine such things as the number of village health cells, the number of health workers, and the number of demonstration latrines in the project villages.

This overlap of project and ministry objectives is a potentially positive sign of shared goals. In the case of this project, however, it appears that at least since September 1985 the itinerant health workers (IHWs) have been used to promote a particular objective of the Ministry of Health with little attention given to the project objectives. More specifically, the Ministry of Health is in the process of establishing the base for its health care program, the primary health post. The IHW is its primary tool in this effort.

The National Primary Health Care System and its corresponding personnel are illustrated as a pyramid (see Figure 2).

Figure 2

The National Primary Health Care System



From the Practical Guide to Community Health (see Section 5.4).

5.2 Training

5.2.1 Itinerant Health Workers

In 1982 as part of a national primary health care plan, the project began training a new category of health professionals called itinerant health

workers (IHWs). IHWs are based at the departmental Center for Health and Social Welfare (CSPS - Centre de Santé et de Promotion Sociale) where they work under the supervision of a nurse. As the name suggests, these workers are expected to spend the majority of their time in the villages surrounding the CSPS helping the local populations to address their health problems. The creation of this new category of health personnel, whose focus is on community development for better health, marks a significant departure from the traditional approach to improving health through curative service alone.

To prepare the IHWs for their jobs, the project helped to establish within the National School for Public Health a training program accentuating communication skills, particularly with regard to health, sanitation, and community organization.

Following the nine-month training course, the IHWs are expected to be able to

- assist in the provision of primary health care curative services,
- help community members to solve their health problems through health education,
- encourage community activities that would improve the quality of life, and
- participate in training community health workers and supervise their work.

The training methods used reflect a departure from the usual didactic approach in education. More time is spent working in small groups and doing practical work both at the school and in the field than simply listening to lectures. Although the program's definition of "animation" (a French term used to express the combined ideas of extension work, villager motivation and mobilization, and in particular communication skills) may be broader than most, it is apparent that the center has tried to emphasize the community development side of the IHW's job.

While adequate emphasis has been placed on animation techniques, it must be said that not enough time has been reserved for learning the practical aspects of sanitation. Only five days are set aside for the project sanitarians to teach this important subject. That is simply not enough time to teach someone how to construct a latrine or a well drainage system. These types of hands-on skills must be learned in a practical way.

If all of the students now enrolled in the course graduate as expected in July 1986, a total of 109 new IHWs will have been trained under the project (one fewer than expected). At present there are 78 IHWs in the field.

Table 3

Number of Itinerant Health Workers Trained

1982 to 1983	1983 to 1984	1984 to 1985	1985 to 1986	Total as of July 1986
22	29	30	28	109

5.2.2 Training of Trainers

Because the itinerant health workers are expected to participate in the training of the community health workers (CHWs), the IHW course includes a week devoted to training methodologies and design. In effect, this is a mini training-of-trainers course which is supposed to enable the IHWs to assist the staff of the Health and Social Welfare Center in designing and conducting a one-month course for the CHWs within their area of supervision. One week is obviously not enough time to create effective trainers of students, no matter how good the course is. As a result, the CHWs do not receive adequate training.

5.2.3 Village Health Workers

At the foundation of the primary health care pyramid are the village health workers (VHWs) and the traditional birth attendants (TBAs). CHWs are provided with a supply of basic medicines and first-aid materials with which to provide simple curative services. They are also expected to encourage and help organize community health and sanitation activities through health education. TBAs are expected to carry out prenatal consultations, give advice to pregnant women, and deliver babies.

Training VHWs and TBAs became the responsibility of the staff of the Health and Social Welfare Center in 1983 when the first group of IHWs graduated. The IHWs and the Center's nurse train the CHWs, while the TBAs follow a separate two-month course at the Center's maternity under the direction of the auxiliary midwife. Prior to 1983, the CHWs were trained by the project sanitation assistants and expatriate technical staff. As of June 1985, a total of 380 CHWs and 191 TBAs had been trained in the project villages.

Under the project, young men from various villages within the administrative area of the Health and Social Welfare Center are invited to follow a one-month course to become CHWs. A training schedule for CHWs is worked out during the IHW training program, but because staff capabilities, training facilities and means vary from one center to another, the content and quality of training also vary significantly. The nurse, who is the senior health professional at the Center, is officially in charge of training the VHWs even though he has had little or no training himself in methodologies or village animation. As a result, too much emphasis is placed on the curative aspects of the CHW job and not enough on the preventive medicine/sanitation/community organization side. The curative side is further emphasized because during training the CHWs

assist the Center staff in their everyday work. This is unavoidable since the health center must continue to function during the training. Few health centers are equipped with training materials or visual aids, and field work is thwarted by lack of transport. Time is a further constraint given the great number of subjects to be covered.

5.2.4 Nurses

In the Centers for Health and Social Welfare the IHWs work under the supervision of either a registered nurse (infirmière de l'état) or a nurse practitioner (infirmière brevetée). Because the training of these nurses is almost exclusively clinical, they are not well equipped to supervise the field work of the IHWs. In response to this problem two in-service training sessions were organized in 1984, one at Hounde and one at Diebougou. Seventeen nurse practitioners, seven registered nurses, and several other health agents were assembled. The courses, which covered various subjects in public health, health education, and sanitation, were given by six sanitarians and health educators, the project's hydraulics technical director, five physicians, and the well brigade chief.

The results of these in-service training workshops, in terms of improved supervision of IHWs and generally improved understanding of primary health care is not clear. Also, many nurses in the project area have yet to receive this in-service training.

5.2.5 Stateside Training of Burkinabe

In mid-1985 Dr. Mebe Kagone and Mr. Robert Toe went to the United States for training as provided for in the grant agreement. Dr. Kagone is enrolled in the University of California in a public health program and Mr. Toe is following a program that will lead to an Associate of Science degree in water technology. A recent report on their progress indicates that both are doing well in their studies, and that Dr. Kagone, who has surpassed expectations, may be returning sooner than anticipated.

Because the project paper and the grant agreement do not specifically identify the problem(s) that this stateside training is to address, it is difficult to evaluate the usefulness of the programs the two are following at present. Furthermore, the descriptions of the courses the two students are taking were not available to the evaluators. Without these descriptions it is impossible to know, for example, whether Dr. Kagone is likely to have learned the subjects described in amendment 5 of the grant agreement.

Nevertheless, at this point one can question the value of sending French speakers to American schools where they will have to overcome a language barrier before they can even begin to benefit from the program and where the health system is so different in structure and technology.

5.3 Health Education Materials

According to the Project Paper, visual aids were to be created under the project in order to facilitate the work of the health workers, particularly those at the village level, in teaching villagers the concept of disease, the transmission of disease, and disease prevention. The project was to collaborate in this effort with the national center for health education and Sanitation, (DESA) which was supposed to strengthen the center's ability to produce appropriate visual aids in the process. The project categorically failed to achieve this objective. As a result none of the health workers have visual aids provided by the project.

Instead of preparing appropriate visual aids, it was decided for some unknown reason to make several films on various health themes. Professional film makers were hired, equipment was purchased, and one vehicle was modified to mount the cameras. Approximately $100,000 was spent making six films which no one in the project area has seen (not even the present health technical director), even though the films were made in 1983.

In addition to the films, several videos were made by Deborah Dishman, the Dimpex health educator. The video recordings, which cover topics such as village animation, well drilling, and well drainage construction, were shown during the itinerant health worker training and used to update USAID/Burkina and other project-related personnel on project progress. The videos were subsequently sent to the United States for editing and have yet to be returned to the project.

Although the video recordings made by the project may have facilitated some aspects of itinerant health worker training and were apparently effective in demonstrating project progress, audio-visual aids of this sort are not appropriate on the village level. Furthermore, since there is no indication that DESA participated in making the videos, it is doubtful that any skill transferal occurred.

It is not clear why so little effort was made to develop and produce appropriate visual aids for use in the field. Perhaps the fact that the DESA office is located in Ouagadougou with no real branch in Bobo-Dioulasso had an "out of sight, out of mind" effect on the project personnel. Nevertheless, the project is guilty of having neglected this very important aspect of the health education component.

5.4 The Practical Guide to Community Health

An important accomplishment of the project was the creation of the Practical Guide to Community Health. This health manual was indeed a collaborative effort with inputs from numerous people from within the National Center for Health Education, the SNPH, USAID, and of course, project personnel. To achieve the rather impressive final product, the project hired a professional writer and several other skilled personnel.

Although the manual can be used by many different levels of health workers and even extension agents in other fields, it is meant to be used by the itinerant health workers and aptly complements their training. The guide is divided into

six chapters: socio-economic study; organizing health activities; health education; communication techniques; constraints; and case studies. It also has many very useful technical annexes including ones on ethnic groups, diseases and health surveys, pump maintenance, latrine construction, and much more. The technical annexes covering well drainage systems, however, need to be revised. A soak pit should be described in addition to the animal drinking trough, and the length of the drainage canal should be stated. An annex showing traditional latrine construction would also be useful. The approach of the guide is practical on all subjects and the layout is very attractive. The guide is bound in a loose-leaf format so that extra chapters can be added as necessary. Five hundred copies were printed.

The only disappointing part of the guide was that it was produced too late to be of use during the life of the project. In 1985 steps were taken to introduce the guide, including a week of pre-use testing during an in-training course for itinerant health workers. However, the final product did not leave the printing press until June 1986. Thus, while it is possible to evaluate the manual itself in terms of content and layout, because it has not been circulated and used, it is impossible to determine the impact the manual might have had on the project.

5.5 Village Health Cells

As part of the Ministry of Health's Primary Health Care Program, a campaign is underway in Burkina Faso to establish a village health committee in every village in the country. This plan, which was clearly defined in 1982, corresponded well with the project's call to establish village health committees in each of the villages in the project area. Health committees have existed in many villages for several years -- some had been established even before the official campaign -- but now an effort is being made to standardize the composition and the responsibilities of the committees. Today, the official name of the group is the village health cell (VHC). The VHC is composed of the community health worker (CHW), the traditional birth attendant (TBA), a president who must be the deputy CDR (political party) representative, a treasurer, and a controller. These members are responsible for overseeing all health matters in the village, including the work of the CHW and the management of the village Primary Health Post, and for helping to persuade their fellow villagers to follow the advice of the health workers. Although it is stated in the Practical Guide to Community Health that the VHC is also supposed to choose a well caretaker, it is not apparent that this particular responsibility was made clear to the cell members.

The VHC is formed after the itinerant health worker (IHW) visits the community, tells why a cell is needed and explains its composition and the responsibilities of its members. Aside from the two health agents, the other members of the VHC receive no formal training whatsoever. It was explained, however, that the monthly visits of the IHW serve as a sort of training, and that by working side-by-side with the CHW and the TBA the other cell members would surely learn something. In the four provinces covered by the project, there is a total of 848 VHCs.

5.6 Latrine Design and Construction

Because the responsibilities assigned to the Ministry of Health under the project agreement for this first significant integrated water supply and health project were never translated into a comprehensive implementation plan, the latrine design activities of the project have not been very well focused. Initially the four sanitarians assigned to the project designed a first prototype latrine consisting of a concrete foundation, a reinforced concrete squatting slab, cement brick walls, a door complete with frame, and a galvanized sheet-metal roof. This type of latrine was never constructed. Given its extraordinary expense (approximately 46,000 CFA or $132*), it was declared dead on arrival by the project.

The sanitarians were forced to redesign the latrine taking into account the socioeconomic situation in the project area. The second prototype, like the first, featured a concrete foundation and a reinforced concrete squatting slab. In this case, the superstructure was to be left up to the imagination and initiative of the owner. However, the cost of even this modified latrine proved to be prohibitive for most villagers. Therefore in 1984 the WASH team recommended that the latrine be redesigned using entirely local materials. This, the third latrine, is easy to construct using local labor, small tree branches, earth, and one or two sacks of cement. It appears to be the most appropriate design given the socioeconomic situation in the project area and the means available to the rural population, but USAID rejected the proposal to use this latrine design in place of the modern cement version.

While the major components of the latrine underwent changes in design in terms of construction materials, little attention was paid to details such as the size and shape of the hole in the squatting slab, the need for a cover for the hole, and adequate drainage for spilled ablution and washing water. Even in the technical annexes of the Practical Guide to Community Health details such as size and shape (round holes do not accommodate women users) have not been addressed.

Demonstration latrines have been constructed in most project villages. By April 1986, 436 demonstration latrines (79 percent of the objective) had been constructed, usually at the residence of the community health worker, the village chief, or the CDR representative or at the village health post. Furthermore, it was reported that 659 private latrines had been constructed by private individuals. It is difficult to estimate the exact number of latrines that have been constructed to date, as training activities and the construction of new latrines continue every day in the project area. Many latrines are still under construction, especially in the pilot zone where many of the village health workers have just been trained.

From the survey conducted by the evaluation team in 35 villages, it was found that 71 percent of the community health workers in the pilot zone had completed their demonstration latrines as compared to 30 percent of those outside the pilot zone.

---

* Exchange rates are calculated at 349 CFA per U.S. dollar.

According to plan the demonstration latrines were to be constructed by the community health workers with assistance from their fellow villagers. The villagers' contribution consists of rocks, gravel, sand, and labor for excavating the hole and constructing the latrine. From the survey results it was found, however, that the villagers actually helped to construct the demonstration latrine in only about 35 percent of the cases. The project contributed the cement, rebar, and forms for the squatting slab. Technical direction and supervision were provided by either the sanitarian or the itinerant health worker.

In the absence of any standard plans or a latrine construction manual (prior to the publishing of the Practical Guide to Community Health), it is not surprising that the actual latrines constructed vary significantly from one to the other, in terms of size, quality, and construction details. As no form was provided for the defecation hole, its size and shape vary -- although in most cases the hole was either round or square and usually too small for convenient sanitary use, as was already observed by the WASH team in 1984. The superstructures consisted generally of mud brick walls, sometimes covered with a traditional beam and mud roof. In other instances the enclosure was constructed of sticks and woven grass mats. It was observed that, latrines were generally at least 50 meters from the nearest well.

In 1985, due to budgetary constraints, the quantity of cement made available for the construction of latrines was reduced from two bags to one. As this quantity was not deemed sufficient to ensure good quality concrete squatting slabs, the demonstration latrines made with traditional construction materials gained considerably in popularity. The measurements of the latrine were not changed, but the foundation and the reinforced concrete squatting slab were replaced by a structure of local materials (either small tree trunks or branches) and sticks covered by a thick layer of either clay or soil-cement mixture. The defecation hole was usually made square or rectangular in this case. Again the superstructure was left to the initiative of the individual. As of 1985, the villagers in the project area are supposed to build both a demonstration latrine with a reinforced slab and a demonstration latrine using local materials.

The evaluation team observed that the demonstration latrines in the pilot zone were all well constructed, whereas in the remaining project area only 57 percent were. This certainly reflects the evolution of latrine construction efforts by the project and shows the value of the more intensive training and supervision of the village health workers in the pilot zone by the itinerant health workers and other project staff.

The health technical director reported that 659 private latrines had been constructed in the provinces by April 1986. The evaluation team believes, however, that this number may in fact be much higher. Members of the village health cells were asked how many latrines had been constructed in their village since the establishment of the cells. No latrines had been constructed in only 16 percent of the villages; in 57 percent of the villages from one to five latrines had been constructed, and in 26 percent of the villages more than ten latrines had been constructed. Even a conservative extrapolation of these figures indicates that over 3,000 latrines may have been constructed in the project area as a result of the project's awareness

raising and demonstration efforts. The prevailing attitude of the villagers was such that many more latrines may be constructed if the health workers can maintain the momentum.

5.7 Sanitary Protection of Water Points

The project paper states that sanitary protection and disinfection of all 620 wells is required. This includes appropriate siting and drainage for the 620 wells. In 1984 the WASH team concluded that proper sanitary conditions had not been provided on all wells and that there was inadequate drainage, leading to foraging by pigs and other animals and puddles of grimy sludge which are the foci of diseases that may eventually contaminate the water source. The WASH team recommended changes in the design of the structures in the project to remedy this. Project staff members must reorient their attention to the importance of providing sanitary conditions and not leave a well site until all protection requirements have been met.

The design of sanitary protection structures should ensure the following:

- rapid evacuation without stagnation of all spilled well water and rainwater runoff away from the well so as to prevent this water from contaminating the water source through infiltration too close to the well,
- drainage of this excess water to prevent the formation of stagnant puddles of water and mud which serve as insect breeding grounds and harbor disease, and
- exclusion of animals from the well area (facilities should be provided for watering animals away from the wells).

Before the Practical Guide to Community Health was published no formal plans had been made to guide the construction of the sanitary protection structures. In fact it was expected that these structures, except for the apron in the case of borehole wells, would be made, not by the well construction brigades, but by the villagers under supervision of the sanitarians and itinerant health workers. To guide the construction, the project sanitarians simply adapted descriptions and illustrations from various books. Basically they proposed that a circular concrete drainage canal be constructed around the apron of the well to receive all spilled water. From this the water was to flow through another concrete canal 8 to 15 meters away from the well to either a soak pit or a watering trough, the latter either in masonry work or in concrete. Just outside the circular canal it was planned to cover the soil with a layer of gravel to prevent it from becoming muddy. Outside this zone the soil was to be covered with rocks to prevent mud puddles from forming. Finally, it was thought to enclose the area by means of either a wooden fence made of tree branches or a brick wall.

Apparently there was some confusion about the functions of and relationship between soak pits and watering trough, for both the plan devised by the sanitarians and the technical annexes to the Practical Guide for Community Health indicate the need for either a soak pit or a watering trough. But no thought was given to what would happen to excess water once the watering

trough was filled.

According to project records, sanitary protection structures have been completed to date for only 57 percent of the productive wells. During the evaluation team's visits to ten sites in the pilot zone it was observed that no sanitary protection structures had been constructed at all, even in those villages where pumps had recently been installed. The project staff attributed this failure to the delay encountered in drilling and equipping the wells with handpumps (especially in the pilot zone) and the limited interest on behalf of the population for these structures, given that they have to contribute sand, gravel, and rocks and purchase part of the cement required (four bags in the case of a large-diameter well, one bag in the case of a drilled well).

As no formal plans had been drawn up, the construction of the sanitary protection structures described above depended on the initiative and judgement of the supervising health agents (either sanitarians or itinerant health workers). As a result, there is considerable variation in the actual completed structures, and the envisaged design was never followed in its entirety. The evaluation team observed that the circular canal around the apron, the evacuation canal, and either a soak pit or a watering trough had been constructed. In some cases either a mud brick wall or a wooden fence had been constructed around the well area.

In general the quality of construction was below acceptable standards. This appears to be a result primarily of the absence of technical plans and the poor supervision of the villagers during construction.

5.8 Establishment of a Water Analysis Laboratory

In order to provide housing for a water analysis laboratory, one of the buildings of the National Center for Health Education and Sanitation (DESA) in Bobo-Dioulasso was renovated with funding from a private French organization, Raoul Follereau, and with some assistance from the project. All equipment, materials, and chemicals in the laboratory were financed by the project. The equipment includes portable water-testing kits for both minerals and bacteria analyses. It should be noted that the laboratory is not fully equipped. Certain substances for bacteriological tests and sterilization equipment have not been provided.

5.9 Village Survey of 1983

In 1983, after nearly four years of activity in well construction and health training, the technical directors of the project conducted a survey of 380 villages in the project area. The purpose of the survey was to highlight important problems and thus serve as a guide for programming future activities. The survey was conceived, developed, and organized in September and was conducted during October and November in collaboration with the HER (Hydraulique et Equipement Rurale) and ORD (Office Régional du Développement) of Bobo-Dioulasso. Of the 380 villages surveyed, 374 valid questionnaires were completed. The 22-page questionnaire included sections on health, water, and administration. Itinerant and community health workers, nurses, and village residents were the key respondents.

Despite the amount of work a survey of this scope represented, its value was limited from the start. It was undertaken in the middle of the project when time was really too short to take advantage of the results. Furthermore, the results of the survey could not be used as base-line data upon which the project's impact could be more accurately evaluated. Nevertheless, at the suggestion of USAID and the expatriate technical assistance staff, a data analyses group, Strengthening Health Delivery Services, was asked to help analyze the results. The experts severely criticized the survey design and finally analyzed only 11 of the several hundred questions posed in the survey. However, they did describe a system that, if followed in the future, would result in a survey that would provide useful information for both planning and evaluation purposes. Thus, even though the survey itself was of little use, some lessons were learned in the process.

5.10 Pilot Zone

One of the most important results of the 1984 WASH evaluation was the creation of the so-called "pilot zone," which was set up along the lines discussed in the WASH report, "Rural Water Supply, Sanitation, and Health Education Paradigm". The pilot zone is a group of 50 villages in Bougouriba Province where a greater effort was made to integrate and coordinate the activities of the two implementing ministries to improve the possibilities of attaining the project goals. As a result, the implementation plan and schedule followed in the pilot zone differed significantly from those used outside the zone. For example, within the pilot zone health activities preceded -- rather than followed -- well drilling and pump installation. Furthermore, an effort was made to establish a pump operation maintenance system from the start. Figure 3 illustrates the differences between the pilot zone and the other villages.

As the figure shows, at the beginning of the project, village organization and health and sanitation education began only after the well was installed. The two implementing ministries had little to do with one another after the initial selection of villages. Not until much later in the project, actually during the last year when the pilot zone was designed, did the ministries begin to coordinate their efforts and keep track of each other's progress. A technical subcommittee was set up, composed of the two project technical directors, the four provincial-level sanitarians, the sanitation engineer, and the well drilling brigade chief.

The changes made in the pilot zone were expected to give the villagers a chance to prepare and organize themselves for the improved water point by selecting people to serve on the VHC and having two people trained as health agents. The cell was also supposed to choose a well caretaker who would be responsible for regulating the daily use of the pump and making sure the area around the pump was kept clean. Further to this, the establishment of a pump maintenance fund totaling 70,000 CFA was made a prerequisite for having a well in the pilot zone. This money, required as a reserve to cover the eventual repairs of the pump, was part of the project effort to establish a pump operation and maintenance system which would place full responsibility for pump operation, maintenance, and repair on the villagers themselves. Up to this point the project had made all repairs itself and provided spare parts at no cost to the village. In addition, to improve pump maintenance and repair,

Figure 3

Project Activities in the Pilot Zone Villages and Other Villages

1982 to 1984

PROVINCIAL LEVEL	DEPARTMENT LEVEL	VILLAGE LEVEL	VILLAGE LEVEL	VILLAGE LEVEL
	Meeting between sub-prefect and health representative	Village chief chooses CHWs for training	VHWs trained by sanitarians and expatriate health educator	VHWs installed in the village; animation begins
Choice of villages by Provincial Coordinating Committee	Meeting between department head and water technical director	Installation of water point according to usual work plan		

PILOT ZONE 1985 TO 1986

PROVINCIAL LEVEL	DEPARTMENT LEVEL	VILLAGE LEVEL	VILLAGE LEVEL	DEPARTMENT LEVEL	VILLAGE LEVEL	VILLAGE LEVEL
Choice of villages by Provincial Coordinating Committee	Meeting between health, water representative and prefect	IHW visits village to form VHC	VHC formed, choose people for training; pump repair fund established	CHW and TBA trained by nurse and IHW at CSPS Training of local artisans in pump maintenance	VHW and TBA installed in the village; animation begins	Water point installed by water component

Table 4

Summary of Project Outputs in Health*

Provinces	Number of Villages	Number of Itinerate Health Workers	Number of Well Drainage Systems	Number of Demonstration Latrines	Number of Follow-up Latrines	Number of Village Health Cells	Number of Community Health Workers	Number of Traditional Birth Attendants
Houet	140	22	82	73	240	97	85	35
Kenedougou	180	21	49	76	97	82	86	44
Poni	134	18	69	121	35	92	99	78
Bougouriba	137	17	43	108	250	109	110	34
Total	591	78	243	378	622	380	380	191

*Source: Project Trimestrial Report, April/May/June 1985

health agents were to be trained prior to well installation. Their efforts in health and sanitation education would help make the villagers more aware of the importance of potable water and thus would increase the positive impact of the well on the health of the village.

5.11 Summary of Health Component Outputs

To conclude the health operations section of this report a summary of project outputs within the health sector is provided in Tables 4, 5, and 6. The actual outputs or achievements are compared with the expected outputs as indicated in the project agreements.

Table 5

Summary of Health Objective Achievements

	OUTPUTS	
	Expected	Actual
1. Wells will be disinfected if polluted as needed. A stock of chlorine will be available for purchase for family use under Health Extension Agents supervision.	12	-a/
2. Adequate well maintenance program being developed.		achieved
3. 450 village health committees initiated in 450 villages	450	450
4. 20 village health committees trained on sanitary organization and participation	20	0 b/
5. 150 village health committees operational	150	150
6. 110 trained Itinerant Health Workers	110	78 c/
7. 50 demonstration latrines operational in each of the 50 high-impact villages.	50	NA d/

NA Information not available.

a. This activity was discontinued, apparently due to some danger involved in the handling of the chlorine.

b. The village health cell has not received any formal training; see Section 5.5

c. If all of the students now enrolled in the course graduate as expected in July 1986 the total will be 109.

d. Separate records for the pilot zone have not been kept by project technical directors. However, far more than 50 latrines have been constructed in the project area as a whole.

Table 6

Summary of Health Objectives Achieved in the Pilot Zone

	OUTPUTS	
	Expected	Actual
1. Wells will be disinfected before delivery to the community for consumption as appropriate.		a/
2. A stock of chlorine will be available for purchase for family use under the supervision of health extension agents.	12	a/
3. Adequate well maintenance program will be completed for 50 high-impact villages.	1 program	0
4. At least 50 village health cells will be initiated.	50	50
5. 50 village health cells will be operational.	50	50
6. 20 village health cells will be trained in sanitary organization and participation.	20	0 b/
7. 50 demonstration latrines will be operational in each of the 50 pilot zone villages.	50	NA c/

NA Information not available.

a/ This activity was discontinued, apparently due to some danger involved in the handling of chlorine.

b/ The village health cell has not received any formal training; see Section 5.5

c/ Separate records for the pilot zone have not been kept by project technical directors. However, it is certain that the objective of 50 demonstration latrines in the pilot zone has not been met.

Chapter 6

ADMINISTRATION AND MANAGEMENT

To achieve the outputs in water and health, an extensive administration and management system was established within the project. This system is composed of personnel, financial, and administrative subsystems. These subsystems are described and evaluated. The indicated conditions are those that existed at the end of May 1986.

6.1 Description of Administrative Systems

6.1.1 Personnel

The personnel employed by the project within the three components of water, health, and administration are given in Table 7. The table also provides the relative numbers of men and women employed by the RWSP.

Table 7

Project Personnel
(as of May 31, 1986)

	Water	Health	Administration	Total
Men	205	57	50	312
Women	0	25	5	30
Total	205	82	55	342

As seen in the table the majority of employees work in the water component, although most of these are seasonal workers who do not work for about two months during the rainy season. Most of these employees are directly concerned with drilling or digging wells, installing concrete aprons, installing and repairing pumps, or operating trucks and machinery. It should also be noted that 32 (64 percent) of the administrative employees are attached to the water component. The administration component includes not only management staff but also secretaries, mechanics, and warehousemen. Within the health component most of the personnel are itinerent health workers. There were 78 as of the date of reference. Almost half (45 percent) of these are women.

Although they are not indicated under project personnel, the rural artisan pump repairmen are an integral part of the project. These individuals have been trained under the project but will not be salaried. Rather, they will collect fees from the villages for their services. At the time of this report, 46 artisans had been trained but had not yet begun work.

6.1.2 Funding

The project was financed by USAID, which provided $13,500,000, and by the GBF, which provided $1,227,000. To date, expenditures have totaled $13,056,487 or 4.924 billion CFA as shown in Table 8.

The water component of the project has spent 3.946 billion CFA (80 percent of the total) primarily for equipment purchase, operating costs of equipment, technical assistance, and local salaries. The health component utilized 20 percent of the funds, primarily for technical assistance, operating costs, and local salaries.

Table 8

Project Expenditures
(as of May 31, 1986; in millions of CFA)

Item	Water Component	Health Component	Total
Salaries	512	157	669
Training	39	50	89
Technical Assistance	856	610	1,466
Materials and Operating Costs	1,271	160	1,431
Equipment	1,122	1	1,123
Construction	146	-	146
Total	3,946	978	4,924

A complete review of project expenditures was not possible during the evaluation. Not all expenditures have been completely documented at the project headquarters. Therefore some of the data used in this report, while it is essentially complete, may not be verified. It is recommended that the project accounting staff assemble all documentation relating to project expenditures. In addition, they should establish a register of all vehicles and other mobile equipment.

Table 9 provides a summary of the principal capital items by quantity.

It should also be mentioned that the local communities have invested a great effort in the project, particularly in their participation in digging wells and constructing latrines. These contributions are not quantifiable but rather are calculated under the heading of citizens' voluntary contributions.

Table 9

Summary of Principal Capital Expenditures by Quantity
(unit numbers)

Immobilizations	GBF	USAID	Total
Land	41,720 m^2	0	41,720 m^2
Buildings	0	1,000 m^2	1,000 m^2
Drilling rigs	1	1	2
Heavy trucks	0	10	10
Light vehicles	12	32	44
Compressors	5	13	18
Generators	0	5	5
Derricks	0	39	39
Hammers	0	54	54
Pumps-motorized	0	98	98
Furniture & office supplies	*	*	*
Miscellaneous	*	*	*

* Data not available.

6.1.3 Organization

As a partial result of the previous evaluation missions the organization of the project has undergone several changes during its life. The present organization is shown in Figure 4.

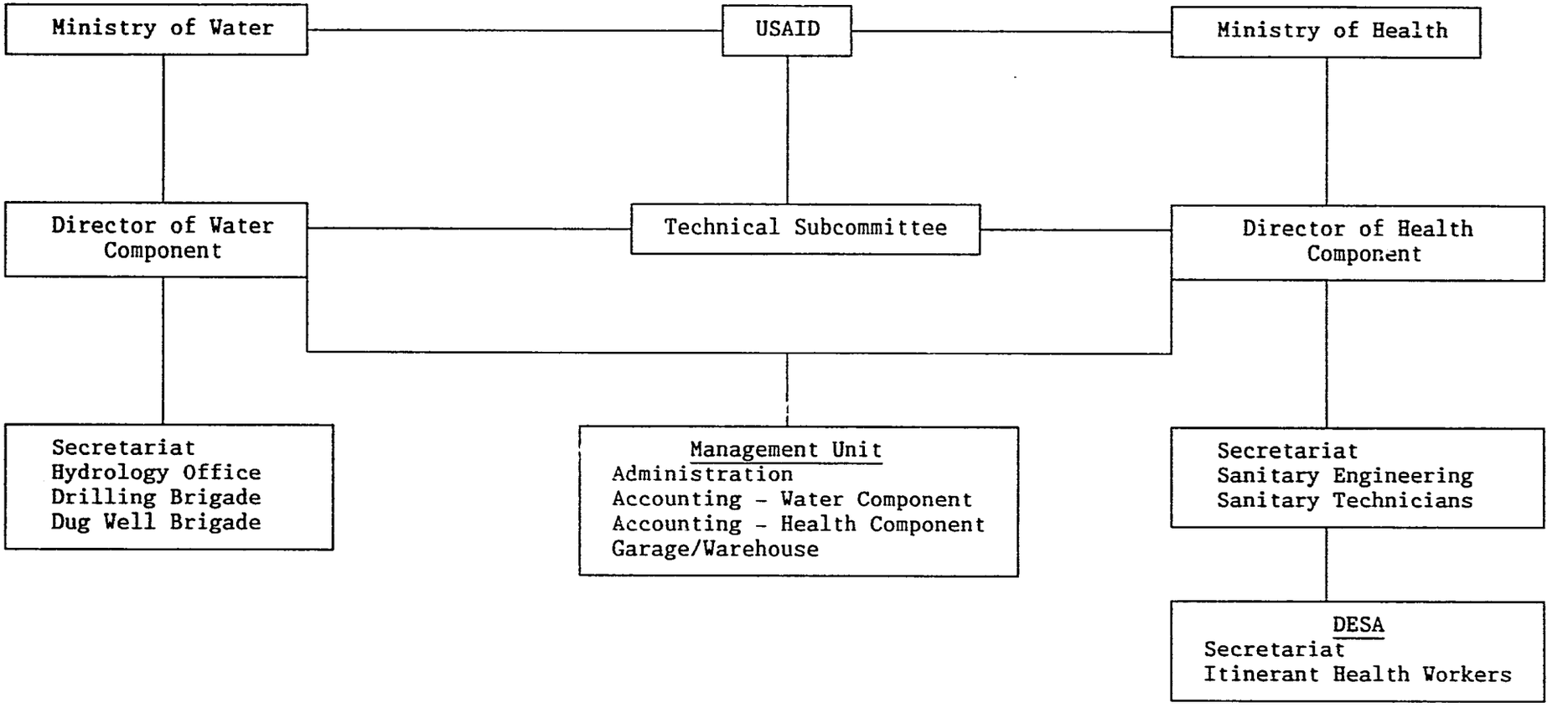
In organizing the project, emphasis was placed on integrating the water and health components as much as possible. Nonetheless, the project depends on separate ministries, and coordinating their activities has proven to be cumbersome. A control committee composed of the ministers of water, health, and planning and development was established theoretically to coordinate the two ministries. In practice there has been only one meeting of the control committee during the life of the project.

In 1985 a technical subcommittee composed of the two technical directors plus the Dimpex team leader was created. This proved to be a positive step. The committee has met monthly during the past 18 months of the project. In addition, establishing the management unit, which is used by both components, has improved coordination significantly.

The unit, under the direction of the unit manager, is responsible for planning, organization, operations, coordination, and supervision. The unit

Figure 4

Organigram for Rural Water Supply Project



has three subdivisions: accounting, administration, and garage/warehouse. In addition, the management unit controls fuel allocations to project vehicles.

6.1.4 Accounting

Separate accounting offices for the water and health components were established in the management unit, but the quality of work is not comparable. Four successive accountants have worked in the health accounting office since 1982. They were all suspended for incompetence or theft of funds. As of May 31, 1986, a cumulative total of 1,197,846 CFA had been lost or stolen. In contrast the water accounting office has maintained the same accountant since 1981.

In 1984 an accounting system known as the Sahel Regional Financial Management Project (SRFMP) was established by AID. It is an accounting method which is based on establishing budgets and then approving expenditures through letters of execution. The system makes it possible for USAID to prepare monthly financial reports which satisfy the needs of the GBF as well as the project directors for current financial information. The SRFMP utilizes bank journals and a series of eight accounting forms to register all financial transactions of the project.

The bank journals are used to register all movements of funds, credits, and debits for each of the two project components. The accounting forms include the following:

- expenditures by budget line item,
- expenditures outside of budget,
- projected expenditures,
- inadmissable expenditures,
- reimbursable expenditures,
- other expenditures by USAID,
- interest on account, and
- donor account.

This method is described in a manual produced by SRFMP and entitled, Manual of Accounting and Preparation of Financial Reports for USAID Financed Projects in Burkina Faso.

This system has generally been well maintained by project accountants. However, it takes a long time -- about two months -- for project expenditures to be entered in the books. This weakness needs to be corrected, particularly in order to allow the "certification of available funds" so as not to delay disbursement of remaining funds.

A major omission of project accounting was the failure to establish a vehicle fuel log. This was not done during the life of the project in spite of recommendations by USAID.

6.1.5 Administration

The project financial administrator (recruited through Dimpex) and his Burkinabe assistant oversee the accounting system and are responsible for establishing funding needs by the various project brigades, collecting bids from sales organizations, and establishing a system of purchasing.

The purchasing system provides internal control by requiring endorsements throughout the process, from purchase to receiving to disbursement.

6.1.6 Garage/Warehouse

Given the project's reliance on relatively sophisticated equipment (drilling rig, compressors, generators, heavy trucks, etc.) the garage is essential for the success of the project. The garage is headed by a chief mechanic who is assisted by 20 mechanic aides, three workers, and three watchmen. The garage is divided into four sections--heavy vehicles, light vehicles, welding, and electrical repair.

In the warehouse system spare parts are kept in one of three departments according to their primary use: light vehicles (Jeep, Toyota), heavy vehicles (Mack, Ingersall Rand), and other (compressors, derricks, etc.).

In addition, one warehouse is devoted to storing large equipment such as compressors, wheel barrows, pumps, and shovels, while a second warehouse contains steel rebar, cement, pipe, etc.

A stock inventory system was established under the direction of Dimpex to provide control over equipment and materials valued at more than 2 billion CFA. The system basically consists of stock registration, periodic reporting, and physical inventorying. Stock is registered on identification cards which provide the name of the article, factory number, and identification number. In addition, stock cards list quantities available, dates of receipt and departure, unit prices, manufacturer, and shelf location. The stock reporting requirements include monthly receiving and disbursement reports. Inventories are undertaken periodically by sampling. Once a year a complete inventory is carried out in coordination with the accounting office.

6.1.7 Fuel Management

Fuel consumption for the project has been high; to date 306 million CFA have been spent, about 17 percent of local costs. During the well construction season the water component alone consumes 5.3 million CFA worth of fuel per month. The vehicles, which are primarily of American manufacture, are heavy fuel users. Some consume as much as 12,000 liters/month.

Fuel is purchased through credit at TOTAL-TEXACO stations throughout the project zone. Fuel allocations are made monthly according to the needs of individual brigades. A system of individual vehicle fuel logs has been set up but is not yet operating effectively.

6.2 Performance of Administrative System

The following subsections evaluate the performance of the project's administration and management in the areas of human resources, financial resources, organization, and management.

6.2.1 Human Resources

At the present time a personnel problem exists within the management unit of the project. After the departure of the Dimpex financial administrator, the unit was reorganized and new tasks were assigned to the accounting and purchasing departments. Also, the suspension of the health component bookkeeper has increased the workload of the other bookkeeper. Further, the one project hydrogeologist is overburdened with work whenever operations are working at full speed.

The evaluation team recommends that three persons are needed in the following categories to solve the personnel problems: an assistant accountant, an assistant administrator, and a hydrogeologist.

It is further recommended that additional training (recycling) be provided to health workers (on the field level) and garage and warehouse stock keepers.

As Table 7 shows, most of the project's workers are assigned to the water component where 90 percent of the workers are seasonal. Nonetheless, these workers are essential. Consultants to the project as well as private sector experts have demonstrated that these workers perform best if they are offered wage supplements based on their work accomplishments. Therefore, wage incentives are recommended whenever feasible.

In the health component of the project the itinerant health workers are to become salaried members of government service. This process is not yet complete but is underway.

6.2.2 Financial Resources

A critical analysis of the repartition of project finances (See Table 8) has shown that 30 percent of project funds were absorbed by technical assistance, 29 percent by materials and operating costs, and 23 percent by equipment costs. Too high a proportion of funds has been spent on technical assistance, especially for a project in wells construction and health education for rural populations. This appears particularly true for the health component where the impact of project activities has been slight. The large amount spent on technical assistance has greatly increased the unit costs of project output.

The water component, which relies heavily on equipment of U.S. manufacture has high operating costs. This equipment uses a lot of fuel and, given the high cost of fuel in Burkina Faso, represents a drain on financial resources. Also, breakdowns have caused long delays in operations because of the time required to procure spare parts. For example, during the 1985-86 drilling season the TH-60 drilling rig broke down and required repairs costing 7 million CFA, not counting the time lost in work activities.

As the promoter of the project the GBF has intervened but little in the financial management of the project. The Ministry of Water is normally attentive in the technical and financial control of publicly funded projects. It is suggested that the GBF maintain a similar control of projects such as this one through specific interventions in the management and accounting systems in order to provide proper management and reassure the donor organizations.

It is important to point out that significant material resources exist as the project is drawing to a close. While the light vehicles have little remaining life (they are four years old and have logged 80,000 kms on an average), most of the construction equipment and the heavy vehicles are still in relatively good condition. The drilling rig has considerable usage remaining. The National Wells Office (ONPF -- Organisation Nationale des Puits et Forages) should use this equipment to its maximum advantage.

6.2.3 Proposed Organigram

In order to increase coordination between the water and health components of the project a new organizational chart (Figure 5) is proposed by the evaluation team. Three specific changes are recommended.

First, the position of national director should be created. The nomination of a project manager for both health and water components has been before the GBF since 1982. Since this has not been acted upon, the post of national director for the project is essential. A national director would serve as the most efficient means of integrating the water and health components. The person named to this position should be well experienced in managing rural development projects.

Second, the project manager should be upgraded to the same level as the two technical directors. This would tend to institutionalize the responsibilities attached to the project manager. In effect, the project manager serves as a source of integral information for the technical directors, the donor organization, and the project beneficiaries as well.

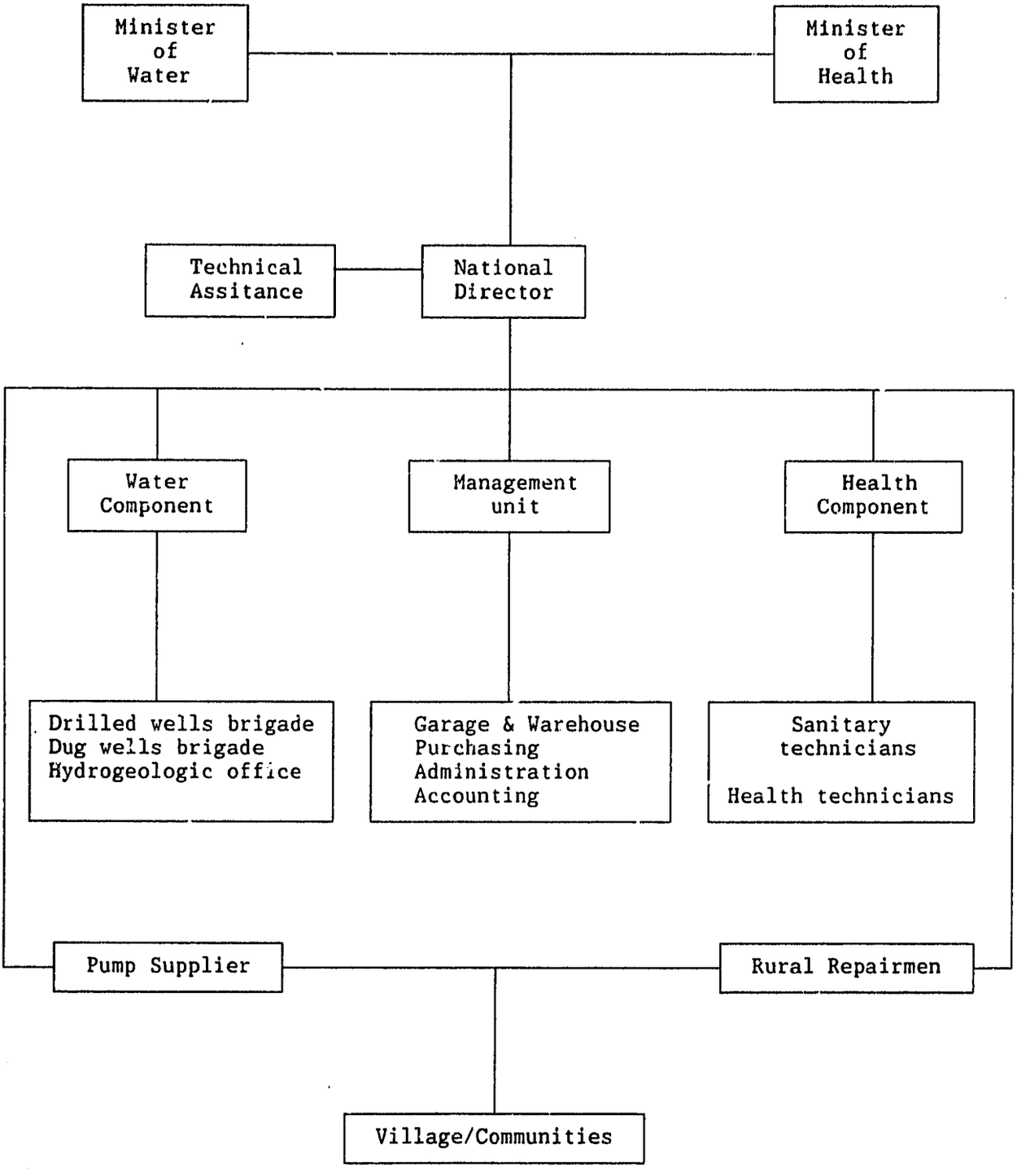
Third, pump maintenance should be made the responsibility of the national director to signal the importance of this task. Everything depends on the efficiency of the pump maintenance system. Formal procedures must be established and maintained between the villagers, the health committees, rural artisans, and Faso Yaar (a government store dealing in general merchandise). The national director must be attentive to and must immediately resolve all problems which may develop in this system.

6.2.4 Accounting

The accounting system utilized by the project is a basic system which has been adapted to the needs of USAID. The system allows continuous verification of bank balances and project expenditures. The financial reporting system allows the USAID Office of Fiscal Management to confirm financial balances.

Figure 5

Proposed Organizational Chart



It is noted that budget line item expenditures are authorized through "letters of execution." Occasional requirements for expenditures outside of the budget have been allowed through amendments to the letters of execution.

For the purposes of analyzing accounts an in-house system of registering costs and expenditures was initiated under the project. It is regrettable that this system has not been completely followed. The failure results from a lack of administrative control. Also USAID did not regularly provide all available information (in the form of project receipts and Project Implementation Order/ Commodities - PIO/C), on payments made directly by USAID to the project accountants. In the future it is recommended that USAID assure that all financial data be sent to the project accounting office.

6.2.5 Fuel Management

The absence of vehicle fuel records is a serious omission which should be rectified as soon as possible. Each vehicle should have a log that is updated daily. The system should be controlled by the brigade chiefs for all drivers and vehicles within their jurisdictions.

6.2.6 Stock Inventory Management

There are several omissions in the stock inventory system. First, the results of the last complete inventory were not available to the project. Second, the GBF central office of inventory control has not been involved in the project. This should be immediately changed.

The system has not been applied very satisfactorily. This judgement is based on a small sample of stock cards reviewed by the evaluation team. Because of the size of the sample (16 out of a possible 2048 spare parts), conclusions are only indicative. However, the following results were obtained.

- Three of 16 parts on the shelf did not correspond to what was indicated on the stock cards, a 19 percent error.
- The price of the spare part was not always indicated on the stock card.
- Request and receipt slips were not arranged in order.
- Stock indentification cards were not always arranged in order.
- Periodic inventories are not reliable since the complete master inventory is not available to the project.

The inventory control system was instituted in 1984 but has not been followed with the necessary diligence. The evaluation team makes the following recommendations:

- The complete master inventory results should be obtained immediately through Dimpex.
- Unit prices of all parts should be obtained from PIO/C documents and entered on the stock cards.
- Card classification in standard format should be reinstated as a practice by warehouse personnel.

6.2.7 Technical Assistance

Dimpex belatedly provided a team leader and thus was able to provide more effective technical assistance. In particular, the team leader instituted garage and warehouse management systems which were most beneficial. The creation of the technical coordination unit improved project performance as did the pilot zone, which provided a test for improved project approaches. It is apparent that the project has matured in a positive manner in the past six years.

Looking toward the future it is clear that the completion of the project will create an economic and social void in the area. Because of a lack of certain documents, the evaluation team, to its regret, was not able to furnish a budget for alternative modes of continuing the project.

6.2.8 Administration Component Conclusions

In the absence of preestablished indicators of performance the evaluation team has necessarily relied upon subjective judgements in analyzing the RWSP. The recommendations of previous evaluation teams have generally been carried out. It is noted that USAID provided the necessary funds for the extension period which allowed many of the recommendations to be carried out. Also the USAID method of financial reporting has been particularly helpful in facilitating project accounting. It is also important to note that the GBF has made available from counterpart funds the sum of 245 million CFA to allow the project to continue until the end of 1986.

In conclusion, the evaluation team believes that the accounting and management system developed under the project is functional and well suited to the personnel involved. At the same time the systems must be rigorously kept in force and negligent workers must be continually pushed to adhere to the standards imposed.

6.3 Unit Costs

To judge the performance of individual components of the project, unit costs have been calculated. Costs for dug wells, drilled wells, latrines, and training health workers are included.

Certain problems are inherent in the calculations to determine the unit price for wells construction. Many construction costs are not directly related to the structure but rather are included in activities leading up to the construction itself. In addition, it is debatable how long equipment costs should be amortized. Costs for labor and fuel vary considerably from site to site depending on depth, rock hardness, travel distances, etc. The availability of spare parts and the speed of repair are also important elements in determining costs.

The costs for these calculations are based on the actual costs during the 1984-85 wells campaign. The total number of productive wells during the campaign was 94 dug wells and 21 drilled wells (see Table 10).

6.3.1 Administrative Costs

Administrative costs were divided equally between the two components. Costs of administration and equipment, personnel, operations and maintenance, and services are shown in Table 11. Administrative costs are for both the drilled wells and dug wells as well as for other project components, such as health (itinerant health workers, training, latrine construction, etc.). The administrative costs for the campaign which completed 115 productive wells (both dug and drilled) totaled 135,989,092 CFA or 1,182,514 CFA per well.

Table 10

Dug and Drilled Wells
1984-85 Campaign

DUG WELLS

Province	New Wells		Rehabilitated Wells		Total
	Total Wells	Productive	Total Wells	Productive	Total Productive
Houet/ Kenedougou	9	8	50	45	53
Bougouriba/ Poni	7	5	41	36	41
Total	16	13	91	81	94

DRILLED WELLS

Drilled Wells	Total	Productive
New	17	15
Rehabilitated	7	6
Total	24	21

Table 11

Administrative Costs
Administration, Equipment, Personnel, Operations and Maintenance, and Services

1984-85 Campaign
(in CFA)

Category	Purchase Cost	Amoritiz-ation	Annual Cost	Total Cost
A. Buildings				11,234,115
Garage	37,430,161	5%	1,871,508	
Office	91,188,592	5%	4,559,430	
Other Buildings	2,653,696	5%	132,685	
Access Garage	2,624,612	-	2,624,612	
Workshop	3,979,112	5%	198,956	
Warehouse Fixtures	869,725	10%	86,972	
Warehouse & Lot	23,664,272	5%	1,183,214	
Garage fixtures	272,001	10%	27,200	
Garage Accessories	460,552	10%	46,055	
Parking apron	503,483	-	503,483	
B. Vehicles and Equipment				13,357,928
1 CJ7	2,064,486	33%	688,161	
1 404 Pickup	3,000,000	33%	1,000,000	
2 Toyota	6,000,000	33%	2,000,000	
1 Service truck	19,035,207	25%	4,758,801	
1 Work truck	20,000,000	10%	2,000,000	
Furniture	13,525,094	20%		
Other Material	29,109,660	10%	2,910,966	
C. Personnel				84,634,208
Technical Assistance	68,247,000			
2 Engineers	1,907,940			
3 Technicians	2,480,844			
Office	4,182,904			
Warehouse Garage	7,815,520			
D. Operations & Maintenance				18,915,484
E. Other Services				7,847,379
Grand Total				135,989,114

6.3.2 Cost of Dug Wells

The total direct cost of dug wells undertaken by the Houet/Kenedougou team which produced 53 productive wells was 75,528,151 CFA (see Table 12) which gives a unit cost of 1,425,059 CFA. When the administrative costs (1,182,514 CFA) are added then the cost becomes 2,607,573 CFA ($7,472) per dug well or 104,303 CFA per linear meter ($299). (Exchange rates are calculated at 349 CFA per U.S. dollar).

It should be noted that the cost of non productive wells is included in the calculations, but village labor, which was free, was not given a monetary value. The average depth of hand-dug wells was 25 meters.

If a pump is added at a cost of 354,933 CFA then the cost becomes 2,962,506 CFA ($8,489) per well. It is interesting to note that if, in the future, no technical assistance (593,452 CFA per well) was required then the cost of a hand-dug well without pump would be reduced 23 percent to 2,014,121 CFA ($5,771).

Table 12

Cost of Dug Wells
Wells Teams (Houet/Kenedougou)
(in CFA)

A. Equipment Costs

Number	Category	Purchase Cost	Amortization Rate	Annual Cost	Total
5	Compressor	20,000,000	20%	4,000,000	
10	Derrick	16,980,000	20%	3,396,000	
5	Hammers BR 20	2,772,000	20%	554,400	
5	Hammers BR 30	2,475,000	20%	495,000	
1	SG 4	4,550,000	25%	137,500	
10	Drills	3,528,000	20%	705,600	
10	Pumps	2,500,000	20%	500,000	
2	Truck	32,369,756	25%	8,092,439	
1	Pick up	3,200,000	33%	1,066,666	
	Work Materials	1,500,000			
	Total for Equipment				23,072,605

B. Personnel, Consumables, & Operating Costs

Category	Cost	Total
Personnel	31,810,675	
Consumables		
- Rebar	2,735,325	
- Explosives	862,432	
- Cement	4,063,500	
Operations	12,983,614	
Total for Personnel, etc.	52,455,546	
Grand Total	75,528,151	

6.3.3 Cost of Drilled Wells

During the 1984-85 campaign 21 productive wells were completed (15 new drilled wells and 6 rehabilitated). The average depth was 60 meters.

Direct costs of drilled wells include equipment, personnel, operations and consumables as shown in Table 13.

The average direct cost of a drilled well based on 21 productive wells was 4,087,245 CFA ($11,711). When the administrative costs (1,182,514 CFA) and a pump (354,933 CFA) are added then the total cost becomes 5,624,629 CFA ($16,116) per drilled well.

The linear meter cost is 93,744 CFA/m ($269/m).

If technical assistance is subtracted and the work is performed entirely by Burkinabe technicans then the cost is 5,031,240 CFA ($14,416) or a reduction of 11 percent.

Table 13

Cost of Drilled Wells
(in CFA)

A. Equipment

Number	Category	Purchase Cost	Amortization Cost	Annual Cost	Total
1	Drilling Rig	170,000,000	10%	17,000,000	
1	Flat truck	19,035,207	25%	4,758,801	
1	Dump truck	16,184,878	25%	4,046,219	
1	Water truck	19,035,207	25%	4,758,801	
1	Service truck	27,000,000	25%	6,750,000	
3	Jeep-20	13,125,699	33%	4,375,233	
1	Jeep-8	4,590,631	33%	1,530,210	
1	Pick-up	3,200,000	33%	1,066,666	
1	Drill-bit 8	1,811,766	-	1,811,766	
	Drill-bit 6	255,000	-	255,000	
1	Hammer	2,900,000	-	2,900,000	
	Total for equipment				49,252,695

B. Personnel, Operations, Consumables

Category	Cost	Total
Personnel	21,282,551	
Operating	8,856,146	
Consumables		
Cement	892,500	
Rebar	75,000	
Screen	847,134	
PVC casing	2,924,736	
Drill mud	1,620,143	
Gravel	81,250	
Total for Personnel, etc.		36,579,460
Grand Total		85,832,156

6.3.4 Comparisons with Other Projects

The RWSP costs may be compared with other projects. For example, a FED-(European Development Fund) financed project calculated the unit cost of a drilled well at 3,954,000 CFA. This is 30 percent less than the costs (5,624,629 CFA) of a comparable RWSP drilled well.

The cost breakdown is shown in Table 14.

Table 14

Yatenga Comoe Project
Drilled Well Costs
(in millions of CFA)

	Drilling	Tests and Superstructure	Pump	User Costs	Adminis-tration	Training Extension	Total
Yatenga	3,560	222	305	33	139	162	4,421
Comoe	2,585	222	290	33	139	162	3,431
Average for the Project	3,100	222	298	33	139	162	3,954

Sources: Project Yatenga/Comoe - Vol. 3
End of Project Report - November 1985

6.3.5 Latrine Costs

The costs of constructing latrines using reinforced concrete is 15,150 CFA per latrine. However, several variants are possible. For example, some of the left-over construction materials can be used for constructing a second latrine, in which case the unit cost is reduced to 12,060 CFA. If villagers provide their own sand and gravel and make their own bricks, then the cost is reduced to 8,090 CFA. If the wooden forms are reused and their cost is divided among 10 villagers then the cost is reduced to 7,130 CFA ($20 per latrine).

In conclusion, it appears that latrine costs should be affordable to most villagers, assuming they are convinced of their importance.

6.3.6 Costs of Training a Health Worker

The calculation of training costs should be of interest to the Ministry of Health in determining their budget. For the 1984-85 school year 31 students were trained. Costs included personnel, office furnishings, operations,

amortization of vehicles, and other service costs. The unit cost is 359,047 CFA ($1,029)per health worker.

It is interesting to note that, if enough health workers were trained so that a ratio of one worker per 20 villages could be maintained (there are 7000 villages in Burkina Faso), then the total cost would be 125 million CFA, a sum which would likely pose problems for the budget of the Ministry of Health.

Chapter 7

PERFORMANCE

The following sections consider the factors involved in determining the performance and effectiveness of the RWSP in achieving project goals. The RWSP has two fundamental goals. The first is that an improved supply of water be provided to project recipients and the second is that the water provided be utilized in a sanitary manner. When these goals are met, then a favorable impact on health is possible.

To evaluate project performance in meeting the goals, this chapter will discuss water consumption, water quality, the Moyno pump, and the pump maintenance system for the water component and sanitary use of water, operations and maintenance of sanitation structures, village health cells, and the pilot zone for the health component.

7.1 Water Consumption

The quantity of water consumed by villagers in the project zone has clearly been increased by the construction of wells. However, the use of project wells by villagers is primarily dependent upon the distance to the well in comparison to the distance to the closest alternative source, be it a traditional well, a pond, or an intermittent stream. Not surprisingly this is the case in many developing countries.

Water consumption from project wells varies seasonally. When the traditional sources dry up during the dry season, greater reliance is placed on the project wells. The seasonal variation in the use of project wells has been accurately measured for 21 selected sites in Houet Province. Wells were equipped with a metering device which provided a daily record of water pumped. These recorded values are shown in Table 15. The average quantity of water pumped during the rainy season was 2.2 m^3/day. This increased to 6.5 m^3/day during the dry season, a three-fold increase. The study did not attempt to determine per capita consumption.

Table 15

Seasonal Comparison of Average Daily Yields from Moyno Pumps

Daily Volume (m^3/day)

Villages	August to September 1985		March to May 1986	
	Number of Days	Daily Volume m^3	Number of Days	Daily Volume m^3
Koumi	50	5.5	39	12.6
Tiara	52	0.3	87	3.4
Goniou	33	0.3	87	3.0
Guena	33	0.3	87	4.1
Sidi	33	0.9	87	3.6
Mina	52	0.8	87	2.3
Badougou	52	2.4	58	7.6
Toussiamasso	52	0.5	87	7.0
Darde	51	0.1	90	2.9
Bakaribougou	31	0.5	90	9.5
Koundougou	51	1.7	53	4.0
Fô II	51	0.2	53	5.3
Darsalamy	48	3.2	49	6.0
Sokourani	27	0.1	88	1.4
Peni	48	4.8	91	9.7
Taga	48	2.9	88	3.3
Toussiana III (S/P)	48	4.7	87	6.9
Toussiana II	48	0.33	88	2.7
Kouentou	47	6.8	85	11.4
Sala	47	2.2	46	7.0
Hounde II (March)	43	7.3	84	22.7
Average		2.2 m^3/day		6.5 m^3/day

During the evaluation team's field study, however, a few women in each village were asked how many trips they had made to the well that day, and how many people were in their family. The volume of the containers they used was estimated. Most women carried water in wide porcelain pans which hold approximately 25 liters each. Since the field study was conducted during the wet season, most of the people using the wells lived relatively close by. The evaluation team found that consumption was above ten liters per capita per day (lcd) with widely ranging totals. While these findings can only be considered indicative, it is probably true that the majority of people within a reasonable radius of the well do achieve the project goal of consuming at least 10 lcd throughout the year.

7.2 Water Quality

The quality of water consumed varies greatly. The field studies indicated that most people would rather use a traditional source, which was clearly polluted, than travel a longer distance to a project well which was of better quality.

Project wells vary significantly in bacteriological contamination and mineral content. Many of the wide-diameter wells are open and have not been equipped with pumps. These are all very likely below preferred standards of bacteriological content. However, these wells usually contain better quality water than traditional wells.

Drilled wells are normally free of bacteriological contamination, but their mineral content varies. Iron (Fe) and nitrites (NO_3) were found in unacceptable levels in project wells (see Table 16.) The iron, which assumedly occurs because of geological influences, imparts an undesirable taste to the water. This probably reduces consumption at some sites. The cost of removing the iron from well water is prohibitive and cannot be recommended.

Table 16

Chemical Analysis of Iron and Nitrites

Province	Number of Wells Analyzed	Percent with Levels Exceeding Fe 1 mg/l	Percent with Levels Exceeding NO_3 50 mg/l	Average Content Fe*	Average Content NO_3**
Houet	43	44%	9.4%	1/500 to 1mg/l	1/100 to 10 mg/l
Kenedougou	49	40%	10.0%	Trace	1mg/l to 20 mg/l

Note: After protection measures were constructed around the well, the NO_3 levels were found to recede. For example, in Peni the NO_3 level fell from 70.4 mg/l to 48.4 mg/l and in Gonio from 7.2. mg/l to 3.8 mg/l.

*Acceptable levels of Fe are less than .5 mg/l
**Acceptable levels of NO_3 are less than 50 mg/l

The nitrites are probably indicative of animal pollution resulting from poor drainage around the well. They can usually be reduced to an acceptable level by providing proper drainage around the well. Two examples, the villages of Poni and Gonio, are noted in Table 16. It is doubtful that the high level of nitrites has caused any reduction in consumption from a particular well because of taste.

Some wells newly equipped with pumps have a strong taste and smell of grease. While the taste reportedly abates over time, it is clearly repulsive and probably reduces consumption to some degree. In some villages people used water from a pond rather than from a well with the greasy taste. Some villagers said they preferred the cleaner water from project wells for drinking but used traditional sources for purposes such as washing.

7.3 The Moyno Pump

The use of the Moyno pump has had a significant effect on the availability and the consumption of water by the villagers. Two aspects of the pumps affect water availability. One is pumping rate, or quantity over time of operation, and the other is operational status, or frequency of breakdowns.

The quantity of water available to the villagers is a function of pumping rate (revolutions per minute) and length of time (hours per day) that the pump is in use. As shown in Table 15, during the dry season some villages use the pump to obtain quantities above $10m^3$/day. In some extreme cases, where pumping is said to have taken place almost continuously with long lines of people waiting until late at night, very high daily rates have been recorded. The record was the village of Hounde II which recorded a daily average of 22.7 m^3 during the 1986 dry season. In such extreme cases it may be deduced that consumption is reduced because of the long waiting time (and that another well is needed). Project studies have shown that the Moyno pump can reach 16 to 18 l/min at 50 rpm or approximately 1 m^3/hour for shallow wells.

The standard that has been set by the project is one well per 500 people. This standard is adequate for the capabilities of the Moyno pump.

Pump breakdowns also affect water consumption. Breakdowns have occurred periodically on many project wells. In some villages breakdown during the dry season poses a major problem. The project has kept records on the number and nature of all pump breakdowns. An analysis was undertaken by the project on a sample of 150 pumps which had been installed for a period of from 3 to 51 months. The average time of utilization was 30 months. For each breakdown the cost of the repair part was calculated. The analysis found that the average repair cost was 58,000 CFA ($166) and that the most common breakdowns in order of occurrence are the rotor/stator, pump head, handles, drop pipe, pump housing, and foot valve.

There are no records available on the amount of time it took to repair the pumps. The village survey revealed that there was not always a clear understanding of who was responsible for pump repair. This fact undoubtedly increased the time required to notify the pump repair crews. Assuming that the time required to return a pump to operation is approximately one month, then the pumps were operating approximately 90 percent of the time.

Any mechanical system will necessarily require periodic repairs and replacements. The question is what percentage of down time is acceptable in a specific situation. Since the goal of the project is to improve health through the provision of improved water sources, the operational rate of 90 percent is arguably below what is desirable. An operational rate of 95 percent is often extended as a goal for handpumps operating in rural conditions, but this goal

is seldom achieved.

The above calculations are based on samples only. It is recommended that the project undertake a complete study to determine the real operational history of the Moyno pumps. It appears, however, that the Moyno pump has a higher than desirable breakdown rate. Comparative studies by the World Bank rated several pumps superior to the Moyno pumps. At some point in the future, consideration should be given to replacing the Moyno with a pump which provides the highest operational status at an acceptable cost. Consideration should also be given to setting standards for pumps to be used in Burkina Faso and to manufacturing pumps within Burkina Faso. During the extension phase of the project the country's pump manufacturing capabilities were to have been analyzed, but this analysis was not completed. It is recommended that standardization and local manufacture be studied as viable alternatives to present practices. If outside assistance is desired by the GBF then USAID should consider using the WASH Project to perform the analysis.

7.4 The Pump Maintenance System

The proposed maintenance system has not yet been placed in operation, therefore, it is impossible to judge its effectiveness. It can be said that given the requirements that, (1) villages must be responsible for maintaining their own wells, and (2) the Moyno pump is in place and should be used, then the proposed system appears to be sound. However, there are potential loopholes. Also the project must periodically evaluate the effectiveness of the pump maintenance system to assure its continued operation.

The proposed maintenance system operates as follows:

1. When a breakdown occurs the "person responsible for wells" notifies the community health worker.

2. The community health worker contacts the artisan repairman who inspects the well and determines the problem.

3. The village health cell, which has previously established a pump repair account, authorizes the repairman to purchase the required parts from Faso Yaar. (It has a spare parts contract with Robbins and Myers, the Moyno pump manufacturer.)

4. The repairman makes the repair and is paid for his services by the village health cell.

5. The GBF maintains contact with the operations through the National Wells Office (ONPF) but the basic responsibility for the system is with Faso Yaar.

It is recommended that the system be modified as follows:

1. In the event of a pump breakdown, a "well guardian," whose job is simply to control usage of the well, contacts the treasurer of the village health cell.

2. The treasurer, perhaps through the community health worker, contacts the artisan repairman.

3. After assessing the problem, the artisan repairman estimates costs and the treasurer authorizes payment immediately so that repairs can be made without delays.

4. Final responsibility for the operation rests with the ONPF, which evaluates the system periodically and assures a back-up system in case the proposed system fails.

7.5 Sanitary Use of Water

Although it can be said with certainty that the project has increased water activity and improved water quality in the villages where new wells have been installed or improved, it is in part the sanitary use of this water that will determine its positive impact on the health of the consumers.

Before sanitary use can be evaluated, however, it must be verified that the well water -- not polluted sources -- is being used, as there is no point in evaluating the sanitary use of polluted water. In this respect the project paper accurately identifies "close proximity" to the consumers as "the overriding factor that dictates water use." The paper goes on to explain that while women will surely use the newly installed well when their traditional sources have run dry, normally they will use whatever source of water is the closest, regardless of quality.

However, even potable water is prone to contamination between collection and consumption. Several sources of contamination were observed during field visits in villages where women were using the new well. First, unsanitary conditions around the well due to poor drainage system construction or maintenance was a potential cause of well water pollution in 77 percent of the villages visited. Second, at large-diameter wells without a pump observers identified the water drawing vessel as a pollutant in 100 percent of the villages. There was no clean place to keep the vessel when it was not being used. The receptacles used for transporting the water are also sources of pollution since in only 13 percent of the villages did all the women rinse the vessels before filling them. The benefit of rinsing is often negated, however, because women often put branches into the vessel to reduce spillage during the walk home. The water is not even safe once it reaches its storage place. The evaluation team observed unsanitary methods of removing the water from the storage container. Most often the storage jars are left uncovered and communal drinking cups are used to remove water.

These findings point to an important gap in the health education process. While health workers have succeeded in increasing awareness of the role of polluted water in causing diseases, apparently they have not followed through on the idea by giving detailed instructions to villagers as to how to avoid polluting the well water between collection and consumption. Until this final step is taken the full effects of the well installation will not be felt.

7.6 Operation and Maintenance of Sanitation Structures

7.6.1 Latrines

Whether or not latrines are used and how they are used depend on how aware the population is of the importance of latrines for health. It was observed that the demonstration latrines in the pilot zone and 75 percent of those in the remaining project area were in frequent use. Eighty percent of the demonstration latrines in the pilot zone and 67 percent of those in the remaining project area were kept clean.

The evaluators found that the lack of any kind of cover for the defecation hole in virtually all demonstration (and other) latrines was a major problem. When flies and other insects breed in a latrine, the positive health impact it is supposed to have is completely negated. Furthermore, it was apparent that the lack of a urine and wash-water drainage system hampers the use and maintenance of the latrine. Finally, in the case of open latrines, the evacuation of rainwater also has been ignored as all latrine slabs have been made absolutely flat as shown in project designs.

7.6.2 Protection of Wells

As discussed in Chapter 5, sanitary protection measures have been completed at only 313 of the 581 productive wells. At the remaining 268 wells the chance of contamination of the source and the presence of puddles of stagnant water and mud-harboring disease will largely negate the positive impact the wells were supposed to have.

Due to inadequate design, poor construction, and limited maintenance, the situation is not much better at those wells where sanitary protection structures have been constructed. The evaluation team found that sanitary conditions around the well were satisfactory in only 29 percent of the wells outside the pilot zone. In the pilot zone no sanitary protection measures have been taken as yet. Typically, stagnant pools of filthy water full of insect larvae were found around the wells.

The evaluation team visited a number of large-diameter wells in which the pump and its covers had been removed at an earlier stage to be installed on a borehole well or to be cannabilized for parts. It was noticed that none of these wells had a stick or hook on which to hang the drawing vessel. As a result, this vessel frequently ends up on the ground, when it is not being used. This increases the chance of contaminating the well.

Furthermore, in all cases where the well covers and pump had been removed, the steps built to climb onto the covers were still in place. Villagers reported in two instances that youngsters had climbed up to the edge of the well, fallen in, and drowned. It is desirable, therefore, to order the destruction of all of these steps at wells where no pump will be installed in the future.

7.6.3 Water Analysis Laboratory

The water analysis laboratory is not yet in operation due to the absence of certain substances and equipment mentioned under Section 5.8. To date only the project sanitarians have periodically made use of laboratory equipment (the

portable kits) to conduct chemical water analysis tests in the field.

The bacteriological analysis of water samples from a large number of project wells was conducted in one short period by the project sanitarians and a team of French experts from a fully equipped laboratory.

Because the laboratory is not in use at present, it is likely that some of the chemicals will expire without having been used. Furthermore, in the future, use of the laboratory will often be hampered because of the long time it takes to order and receive the necessary chemicals and spare parts.

7.7 Health Personnel

7.7.1 Technical Directors

Without a doubt the health component of the project suffered from too frequent changes in the health technical directorship. No fewer than five directors were assigned by the Ministry of Health during the life of the project, the length of their assignment ranging from two weeks to two years. Each director had to take considerable time to review the project activities and get to know the personnel. Each contributed his own ideas to the project. It is no wonder then that the focus of the project changed repeatedly.

All of the health technical directors were physicians, and because there is such a great shortage of physicians in Burkina Faso, all the directors were required to practice medicine and manage the project at the same time. As a result, the project received half of the directors' attention at best, hardly enough to ensure good leadership. In addition, because project management is not the average physician's forte, the project necessarily suffered. The project's training programs, trimestrial progress reports, and personnel supervision were not up to standard. Most of these factors were completely beyond the control of the directors, and even if a particular director had wanted to avoid these pitfalls, he would probably not have been able to.

7.7.2 Burkinabe Sanitary Engineer

The Burkinabe sanitary engineer was not assigned until March 1985. He remained in that position for approximately one year, hardly enough time to contribute to the project as much as might have been desirable. Nevertheless, during this period he designed the layout and renovation of the laboratory, participated in siting a number of wells with the hydrogeologist, and improved the data collection and reporting system for the health component. The other sanitation activities were carried out in the main by the four sanitarians.

7.7.3 Sanitarians

During the life of the project and until mid-1985, when Robert Toe was sent to the United States for training, four sanitarians were employed by the project. These sanitarians, provided by the Health and Sanitation Education Division (DESA), were based in each of the four provincial capitals. Although their role has changed significantly throughout the project, these sanitarians have

always been essential to the function of the project. In the beginning, before the itinerant health workers (IHWs) were trained, the sanitarians, along with the expatriate technical staff, initiated all of the health activities from the village level on up. After the IHWs were deployed, the sanitarians' role at the village level was reduced to supervising the IHWs and from time to time directly supervising the construction of a latrine or a well drainage system. The sanitarians also helped to choose well sites and occasionally did well water analysis.

The project did not provide any formal training for the sanitarians but they did receive some on-the-job training as they worked alongside the expatriate technical assistants. This lack of formal training is evident in the latrine and well-drainage system designs for which the sanitarians are at least partly responsible. It has also posed some problems in well siting and certain types of water analyses.

Despite their deficiencies and inadequacies in some areas, however, it must be said that the sanitarians have been the backbone of the health component throughout the project. They have seen technical directors and expatriate staff come and go and have worked without the supervision they deserved. They have responded to the various needs of the project, being creative and flexible as needed, even when they knew they might fall short of the project's expectations.

7.7.4 Itinerant Health Workers

As far as the project is concerned, the most important tasks of the IHWs are training, supervising, and supporting the community health workers and village health cells, which interact to carry out the health and sanitation activities. If they work effectively, there is an increased likelihood that the provision of potable water will indeed improve health in the village.

Much depends on the ability of the IHWs to do their job conscientiously and be effective change agents. First they must have had an appropriate and thorough training themselves. The course provided by the National School for Public Health, especially as it has evolved, has been quite effective in instilling in its students a sense of responsibility and enthusiasm for their work. The course quite properly emphasizes village organization and animation. However, it does not pay enough attention to the practical side of sanitation, nor is it particularly effective in training IHWs as trainers. As a result, many demonstration latrines and well-drainage systems were badly constructed and most of the CHWs interviewed could not demonstrate effective animation skills.

In order to do their jobs properly, IHWs must understand completely what their responsibilities are. In this respect, there seems to be a fair amount of accord. Of the 14 IHWs interviewed, 77 percent knew that they were supposed to supervise the work of the VHCs and advise them (69 percent) on matters pertaining to health and sanitation in the village. With regard to the CHWs, though, only a little over half of the IHWs interviewed thought that they were supposed to check the CHW's box of medicine and the number of health education lessons he delivered. Most IHWs agreed that evaluating and encouraging village cleanliness was definitely their responsibility.

It is probably true that pure logistics, more than anything else, governs how much impact IHWs will have on their villages. If they cannot reach a village frequently enough, their influence will be greatly reduced. According to the project paper, 110 ORD "animatrices" were to be trained so that each one would have to cover only five project villages. When it was decided to switch from animatrices to IHWs as part of the Ministry of Health's Primary Health Care Program, however, each IHW was required to cover not only the project villages but also all the villages within his area of supervision. Ideally each IHW should be assigned no more than 22 villages, but in reality 38 percent of the IHWs interviewed had more than 22 villages in their area of supervision, and a few had as many as 40 or 50.

Those IHWs whose workload exceeds the set limit cannot provide the intensive supervision and support that is normally required. Thus, it is not surprising that only 15 percent of the IHWs surveyed reported that they actually were able to visit their villages once a month as required. This information was corroborated several times by VHCs, CHWs, and traditional birth attendants who reported not having seen the IHW for a couple of months.

An appropriate means of transport is also necessary if the IHWs are to complete their appointed rounds. Under the project each of the IHWs received a Camico "mobylette" (motor bike), a monthly allowance of fuel, and reimbursement for repairs. A little over half of the respondents, however, said that mechanical problems often hampered their mobility.

In order to perform their assigned tasks effectively the IHWs must be part of an established structure that can provide adequate support and supervision. While the project did provide this structure for a time, it was nonetheless a temporary structure. The fact that the IHWs were not a part of the civil service, but rather employees of the project, caused many problems. First of all the salaries paid to the IHWs did not conform to the standard set by the government. The project IHWs earned less than their counterparts in the Ministry of Health. This made them feel cheated, and they took legal action to rectify the matter. Second, friction between the IHWs and the nurses at the departmental level sometimes compromised the function of the health center. And on the provincial level, the independent nature of the IHWs made coordination of health interventions by some provincial health directors very difficult.

Despite these problems, however, there is no question that the IHWs have made a positive contribution in promoting community health. The VHCs and CHWs are a direct result of their animation and training efforts, and the many demonstration latrines and well-drainage systems are also, at least in part, attributable to them. Less tangible evidence of their influence is apparent in the heightened awareness in many people of the cause and prevention of disease. Although the credit for some of these accomplishments must surely be shared, it is fair to conclude that without the effort of the IHWs progress in achieving project goals would have been much slower.

7.7.5 Village Health Workers

In September 1985, a government order was issued calling for the establishment of a primary health post (PSP) in every village in the country. The campaign

is called "one village-one PSP." The order specified that each village should do its best to build a small health center and have a village health worker and a traditional birth attendant trained by January 31, 1986. As a result, of the 31 CHWs interviewed for the evaluation, half had been trained between November 1985 and January 1986. While this means that 50 percent of the sample CHWs have been at their posts for approximately six months, it does not necessarily mean that the village has just recently benefitted from the services of a VHW. In some cases one or even two VHWs had been trained previously but, for one reason or another had been replaced. Unfortunately, it is not known how many of the 15 villages had VHWs prior to November 1985.

Ironically, however, discussions with the newly trained CHWs and their trainers, the IHWs, revealed some interesting information. For example, although a major part of the VHW's job involves health education and community mobilization, most of the newly trained VHWs and their supervising IHWs agreed that the work of the VHWs could not begin until they had their medical supplies in hand. One can draw varying conclusions from this information, particularly in regard to training that the CHWs received. Nevertheless those CHWs who have not yet received their medical supplies consider themselves in a state of limbo.

This emphasis on the curative aspect of the CHW job was further accentuated in September 1985 when village primary health posts were established. These are generally considered to be the office of the two health agents. It is not surprising then that 48 percent of the CHWs interviewed consider curative services their most important task and that 66 percent felt that their fellow villagers appreciated curative services the most. These figures may seen somewhat high given the noncurative focus of the actual CHW job description, but experience has shown that prevention-oriented activities usually gain popular support only after basic curative services have been provided. Therefore, it is not realistic to expect a one-month training course, no matter how good, to totally reorient a health worker away from curative services toward preventive actions. Nor is it realistic to think that one individual could successfuly reorient an entire village in a few years. At least an effort is being made to meet the basic curative medical needs so that more people will be open to considering prevention measures.

Despite the usual difficulties preventive activities have in gaining support, there are some clear signs or progress due, at least in part, to the health education efforts of the IHWs and the CHWs. Seventy-one percent of the villagers interviewed knew they should drink well or pump water to avoid diarrhea, and literally everyone could accurately cite several ways that illnesses are transmitted. These responses indicate a heightened awareness with regard to the importance of clean water and the role of water in the transmission of diseases, and are important in and of themselves, even though they do not always lead to concrete actions.

One area where the action has preceded the awareness, however, is in latrine construction. Even though only 41 percent of the CHWs have actually built a demonstration latrine, more than a quarter of the villagers interviewed had already built their own latrines, and a fair number were in various stages of completion. Despite this surge of activity, however, the fact that none of the latrines had a cover means that the villagers (and perhaps even latrine designers) have not yet adequately understood the role of feces and flies in

the spread of disease.

It is difficult to know whether or not these signs of progress are due to the intervention of the IHWs or the CHWs. One thing is clear, however, most CHWs do not seem particularly confident in their role as animators and it is difficult to imagine them organizing and giving a health lesson. Their one month training hardly prepares them for that. Their role seems to be limited to setting a good example, being a potential source of information, and providing some curative services.

7.8 Village Health Cells

Although the statistics show that a significant number of VHCs have been formed under the project, the overall sense of the evaluation is that most VHCs are not very effective in supporting the CHWs or overseeing health matters in the villages. While it is true that in most villages a CHW, a traditional birth attendant, and, in some cases, even a well supervisor, have been chosen and trained, it is not at all certain that the VHCs took responsibility for the choice. Furthermore, it is apparent that most VHCs have not organized a means of renumerating the CHWs since 63 percent continue to work on a voluntary basis. The cell's ability to maintain cleanliness around the well is also in question since 71 percent of the water points visited were considered dirty or poorly maintained. These findings, which are disappointing, are not particularly surprising given the lack of training in health matters of the VHCs and the sporadic supervision and support the IHWs are able to give them. It is, therefore, perhaps more realistic to recognize and accept the limitations of the VHC members, and adjust our expectations of them accordingly.

7.9 The Pilot Zone

The pilot zone was created as an experiment to see if certain lessons about how to implement a village water and health project could be learned by comparing villages in the zone with those outside. Unfortunately, mechanical problems prevented the timely installation of the wells and pumps, and the experiment remains incomplete. Nevertheless, some comparisons can be made and conclusions drawn.

First of all, in spite of the fact that improved wells and pumps have not yet been installed in most of the pilot zone villages, awareness of the role of water in the transmission and control of disease is somewhat clearer to people within the zone than without. Furthermore, people in the pilot zone are more disposed to going to the VHWs for curative services (70 percent) than those from other villages (48 percent). These two facts together lead to the conclusion that the CHWs in the pilot zone are perhaps better established and supported by the IHWs and VHCs than VHWs in other villages. This conclusion is verified by the fact that 50 percent of the responding villagers in the pilot zone know that village animation is one of the tasks of the VHC as compared to only 39 percent outside the zone. Furthermore, 75 percent of the VHCs interviewed indicated that during the IHW's last visit a health meeting was held. These health meetings appear to have had an impact. One hundred percent of the VHC members from the pilot zone knew that to avoid diarrhea one must

drink clean water, whereas only 55 percent of the VHC members from outside the zone gave the same response.

In other areas of comparison the difference between the pilot zone and the other villages is less significant or, in some cases, clearly reflects the fact that there is no improved water point yet. From the aforementioned data, however, it can be concluded that the impact on the village level, at least in terms of health awareness, depends greatly on the kind of support and supervision the IHWs give to the VHWs, the VHCs, and the village at large.

The pilot zone activities represented a very significant change in strategy, and the change had to be made almost overnight, since the French translation of the WASH evaluation report did not reach the project staff until early 1985. With only one year remaining in the project, then, the staff set about implementing the activities in an atmosphere of near frenzy. The animation activities, if that is an accurate term in this case, were conducted at such an accelerated pace that within a period of six weeks all 50 villages had named members for their VHC, selected people for training, and collected 70,000 CFA. Ironically, at this point when the villages had supposedly earned their wells, mechanical problems with the drilling rig delayed well construciton. To date, only 6 of the 50 pumps have been installed.

Chapter 8

IMPACT

This chapter considers the impact that the project has had on the beneficiaries' health, social and economic status, institutions, and environment. Also, the project's effect on women is examined.

8.1 Health

Health professionals generally agree that long-term measurable impacts on health are hard to achieve within the extremely limited time span of one project. It is also recognized that unless a project is multifaceted (integrated) and has unlimited time and resources, it is nearly impossible to address all the causes of ill health in a particular target group. The RWSP is no exception. In fact the designers of this project did not expect to have any significant impact on water-borne or water-related diseases such as schistosomiasis or malaria. However, they did anticipate a reduction in mortality and morbidity by controlling such diarrheal diseases as shigellosis, amebiasis, guinea worm, ascaris, and many other intestinal worms prevalent in the area.

Unfortunately, evaluation of even these objectives is impossible because no epidemiological survey was undertaken at the beginning of the project to serve as base-line data. Even if such a survey had been carried out, however, one would probably find that the project's impact on health was not as great as anticipated in certain villages where traditional wells are located within a few yards of most people's homes or where people live several kilometers from the new well. In those villages people continue to use their traditional sources of water until the sources dry up.

Ideally objectively gathered and scientifically evaluated data should be used to measure project impact, but in this circumstance, the evaluators were obliged to use more subjective indicators. When the villagers themselves were asked if they thought that their health had improved since potable water was made available, 72 percent said yes and 65 percent of the IHWs agreed.

A reduction in morbidity and mortality by controlling or eradicating disease is the final goal of any health project. Progress in achieving this long-term goal can be measured also. Progress in the control of disease is apparent in the RWSP in two areas: awareness-raising and latrine construction.

Through the combined efforts of the IHWs and the CHWs many villagers are now aware of the role of polluted water in causing disease. While this awareness may not be followed by concrete actions to prevent water pollution, the fact that a degree of understanding has been reached is a signpost on the way toward achieving the goal. Latrine construction has also increased during the project. This is a real achievement given the difficulty of changing defecation habits. Although such factors as quality of construction and degree of use must be considered.

Now that the wells have been installed, the potential for improving the health

of the villagers depends primarily on the continued efforts of the IHWs. If the IHWs can maintain the momentum of support and supervision to the village as a whole and the health workers in particular, then improvements in health are almost inevitable. The project has seen an increase in water use and an unexpected surge in latrine construction. If these two activities continue it is likely that skin diseases and fecal-borne diseases will be reduced. The potential for reducing the morbidity and mortality due to diarrheal disease is improved now, given the presence in the village of a health worker who can show mothers how to make the oral rehydration solution and can sound the alarm when an epidemic looms.

8.2 Social Status

Social benefits from water/health projects fall into three basic categories. First, the community participation that is required for planning, organizing, and constructing a water point sometimes provides an enhanced ability within the community to undertake other projects. Success in overcoming the problem of water supply tends to stimulate the community into taking actions such as constructing a grinder for grains, purchasing oxen and plow for animal traction, planting wood lots, irrigating gardens, making bricks for housing, increasing small animal production (chickens, pigs, etc.), and getting involved in artisan activities (weaving and dyes).

Second, the creation of an assured water supply tends to attract outside resources which are placed in the village to benefit the community. These include commercial stores of various types, schools, health clinics, and roads.

Third, an assured water supply tends to enhance the overall village environment, thus slowing the exodus of rural inhabitants -- particularly the young -- to the cities and improving the general condition of women and children.

Real evidence of social impacts within the project zone is limited. Community participation in the process of establishing a water point has varied. For large-diameter wells community participation was, of course, required but there was minimal community involvement in drilled wells. During the extension phase of the project, community involvement was required. Participating villages had to establish health cells and create a well-maintenance account. It must be stated that CDRs (political action committees) have doubtlessly played a role in community participation during the past two years, and, in the future, will probably provide a leadership role.

Apart from agricultural and other normal activities within the village, the water point and latrines have probably been paramount in marshalling village participation. Many villagers considered latrine construction to be an ongoing project. Others stated that additional wells were needed in their village. Thus, it appears that villagers are preoccupied with water points and latrines and have not yet considered other problems facing them. The evaluation team concluded that the RWSP has not enhanced community problem-solving skills significantly, but there is a potential for it to do so.

The village of Leguema did benefit socioeconomically from the project. This

unusual village, located 15 km east of Bobo, received a drilled well which had an unusually high yield. After the well was installed Leguema became involved in a French twin-village program. The "twin" French village financed the installation of a complete water distribution system including electric pump, water tower, and a piped system with several fountains. The village is now collecting revenues for the water by charging water recipients. Leguema also has a productive vegetable gardening business which supplied vegetables to Bobo.

Concrete examples of specific activities resulting from the establishment of village water points included water troughs for village animals, a few instances of small garden plots, and the possibly increased production of millet beer. It appeared that a few new houses had been constructed in many villages.

Several factors may have negatively influenced the project's social impacts. In several areas housing concessions are rather widely scattered and benefits from the water point are reduced. In other villages the water point supplements an existing supply, usually traditional wells, and so the impact is somewhat dampened. Finally it may simply be too soon for visible impacts to have developed in many villages.

8.3 Economic Status

The impact that the project has had on the economy of the area is closely related to the social impacts described in the previous section. The well itself and the use made of the well water can have an impact on the economy. In this project economic impacts were more potential than actual to date.

However, it deserves to be noted that the project itself has already had a large beneficial impact on the economy of the region. It is a major employer of 342 people whose incomes support or help support their families. The project has purchased a significant amount of goods and services within the region. This has doubtlessly had a ripple effect on local businesses. The purchase of fuel and miscellaneous supplies, for example, has been an ongoing activity throughout the six-year life of the project.

When the project is completed these beneficial impacts on the economy will be largely eliminated. However, Faso Yaar and the artisan repairmen will continue to provide what is required for operating and maintaining the wells. Faso Yaar will provide sales service for all of the Moyno pumps within the project and may potentially serve the needs of northern Ghana where 1,300 Moyno pumps are in use.

8.4 Women

Any village water supply project implemented in a country where women are the principal transporters of water will inevitably have an impact on women. This project has been no exception. Project designers identified women in the project area as special beneficiaries, accurately recognizing their role not only as porters but as key participants in decisions regarding water use and new well construction.

The project paper explains that, by having water in closer proximity to their homes, women will be spared the arduous and very time-consuming task of walking great distances to fetch water for their compounds. They will, therefore, have considerable additional time potentially available for other socially and economically beneficial activities. In villages where hydrogeological conditions permitted, the improved well was installed closer to the village than the traditional water source, thus ensuring the benefits to women as described. Although it was not specifically evaluated, the time saved in water transport is undoubtedly used for other purposes of intrinsic value to the women concerned and probably to the family as well.

The project has increased employment opportunities for women in the villages as well. As of June 1985, 191 traditional birth attendants had been trained in the four provinces with assistance from the project. Some of the women trained were in fact practicing birth attendants before they were selected for training. Training provided them with the opportunity to improve their skills and reinforce their standing in the village. Other women who had no previous experience as birth attendants were also trained and thus given the means to provide a much needed service to the village and to learn a profitable trade at the same time.

As part of the project, also on the village level, more than 380 village health cells have been established. While it is not explicitly stated that women must be members of the cell, it was found that most cells do have some women members in addition to the traditional birth attendant, who is automatically a member. Participation in the village health cells by women gives them a say in the selection of health workers and the function of the primary health post and in general assures that the views of women in the village will be represented.

Under the project 25 women were trained as itinerant health workers, 32 percent of the total number trained. Their supervisors, the sanitarians, explained that while women IHWs are sometimes less mobile than their male colleagues, their visits to the village are more productive. It seems that women IHWs can empathize with villagers more easily than men.

8.5 Institution Building

A serious question for evaluators is to what extent the systems, structures, and personnel put in place by the project will continue after the support of the project is withdrawn. In the best of cases the means of continuation will have been taken into consideration before the system structure and/or personnel are installed and will have been an important part of the project.

In the RWSP several outputs were created which require a means of continuation, in order for them to become functioning "institutions" after the project. One of the project outputs is the itinerant health worker. Although the project facilitated the creation of this new health worker and made IHW training possible, the IHWs were always meant to be part of the government's National Primary Health Care Program. Hence, before the project began training IHWs, their integration into the Burkinabe Civil Service had already been agreed upon. However, at the time of this writing none of the 78 IHWs trained have begun to be paid by the Ministry of Health, although the necessary

arrangements are in process.

For the IHWs to function effectively however, they need to have more than their monthly salaries. For one thing they need a means of transportation, fuel, and repair facilities. The Ministry's plans for assuring transportation seem shaky. In fact, during the evaluation some IHWs asked if USAID could not continue to cover mobylette repairs.

Whether or not the IHWs continue to work in the future as they have under the project will determine to a great extent the effectiveness of the community health workers and the village health cells. While the CHWs and the VHCs will surely continue to exist on paper, they both depend heavily on the IHWs for support and guidance. If the IHWs visit the villages less frequently due to lack of transportation, for example, it is certain that the effectiveness of the CHWs and VHCs will be compromised.

One of the most important institutions that should have been established during the project is an operation, maintenance, and repair system for the pumps. Without such a clearly defined and tested system, the continued function of the pumps cannot be assured. If the pumps do not work well most potential impacts of the project are jeopardized. Although certain parts of the maintenance system have been put into place, as described in Section 7.4, the final steps have yet to be taken, and the system remains unfinished. Even when the system is in place, however, it will still need to be monitored and a back up system will need to be maintained. Thus, until the system is finalized and tested over a significant period of time, it cannot be said that continued operation of the wells is assured after the project is completed.

Under the project several buildings were constructed or renovated. These include the ONPF office building, a garage, and a warehouse. These buildings will continue to be used and maintained by the Ministry of Water. The future of the Water Analysis Laboratory, which was renovated and partially equipped under the project, is not clear. The Ministry of Health is currently seeking assistance to complete the supplies, and a laboratory technician still needs to be trained. The project also renovated a classroom, office, and storeroom at the National School for Public Health. These are being used and maintained by the school.

8.6 Environment

Rural water development projects have several potentially detrimental environmental impacts. These include the following:

- pumping at rates above the sustainable yield of the aquifer,
- pollution of the aquifer from surface sources, and
- concentrations of people and animals which cause deforestation or overgrazing above the regenerative capacities of the natural vegetation.

Annual recharge values for the project area are quite high compared to other areas of Burkina Faso. Rainfall averages above 1000 mm per year, and the

estimated infiltration rate is 5 percent. Therefore, wells would have to be placed extremely close together before the threshold of sustainable yield would be reached. For example, if 10 m^3 per day were pumped from project wells over the period of a year, then a density of 7 hectares/well would be required before reaching the threshold value of sustained yield. Even considering extremely dry years and pumping from other wells in the area, the project is far from reaching a density where withdrawals exceed recharge.

Pollution of aquifers from surface sources is a problem in some wells (see Section 7.2). This has occurred in wells which have had inadequate drainage around them. Mud holes created by poor drainage attract animals which in turn apparently have caused increases in nitrite (NO_3) and possibly bacteriological contamination. Where proper protection and drainage measures have been provided around the well, contamination has not occurred. In the cases where the pollution already exists, proper drainage can be expected to improve the situation. Proper drainage measures have been addressed in the Practical Guide to Community Health. The manual also specifies that latrines should be constructed no closer than 30 meters to the well. This limit is being respected.

A new well normally provides a focus for villagers and their animals, since both may utilize the well at least once a day. Villages may also increase in population since a well provides a basic requirement for their existence. Often stores, schools, and dispensaries are constructed in villages with a permanent water supply. This further attracts concentrations of people. Elsewhere in Burkina Faso many examples of overcutting for firewood and overgrazing have occurred around concentrations of populations. However, no particular evidence of overgrazing or overcutting around project wells was found during the village survey. Southwestern Burkina Faso is an area dominated by agriculture. Stock-raising is a secondary pursuit. Some nomadic herders do use the area during the dry season, but overgrazing was not evident. Because of the relatively abundant woody vegetation, overcutting for firewood did not appear to be a problem. In fact, in many areas,particularly the Poni and Bougouriba provinces, the population is so dispersed that permanent concentrations around wells are minimal.

In sum, the effects of well and latrine construction under project activities have had an overall positive effect on the environment. The negative effects that have occurred are relatively minor and remedial measures have been recommended.

Chapter 9

CONCLUSIONS AND RECOMMENDATIONS

The major findings or conclusions of the RWSP evaluation, followed by the recommendations, are summarized in this chapter under the following categories: general, water component, health component, and administration.

9.1 General

The construction of wells was successfully undertaken by the project which attests to the efforts and experience of the ONPF/Bobo. In spite of this success the water needs of the local populations have not yet been satisfied, particularly in the province of Poni. There is a considerable investment in equipment and materials remaining in the garage and warehouse which has not yet been amortized. The community health system which is in place and being run by the community health workers should be continued and encouraged.

In consequence of the above it is recommended that the GBF and USAID strive for a means to continue the project in a second phase.

9.2 Water Component

1. The project has succeeded in constructing the numbers of wells expected. This has probably been the most successful part of the project.

2. The quality of wells construction has been acceptable in both the drilled wells and the hand-dug wells.

   It is recommended that attention be given to the need for deeper wells in some cases, particularly dug wells, and for emphasizing well development to maximize the yields of wells.

3. Without a doubt the quantity of water consumed in project villages has been increased. This major objective of the project has been reached. Based on the observations of the evaluation team it is reasonably clear that the objective of 10 liters/person/day has been obtained for populations residing near the well.

4. The success ratio for achieving productive wells has increased with experience. The use of aerial photos has improved the success ratio of locating wells to above 90 percent.

   It is recommended that geophysical instruments may be useful in locating well sites where aerial photos have proven ineffective. Geophysical instruments may prove particularly effective in determining desirable depths of drilling.

5. The selection of villages destined for wells needs to be reviewed. It appears that some villages have wells which are underutilized, while others are greatly overburdened.

It is recommended that the site selection process be reviewed to assure that both the technical and social aspects of site selection are given ample weight without undue political influence. Based on a village survey, including both water and health components, a list of proposed villages should be submitted by the project administrative authorities for their concurrence. Thus, through the combined consideration of technical, social and health factors, a definitive list can be approved by the Provincial Coordinative Committee.

6. Data collection was not explicitly a goal of the project and therefore was not emphasized. However, a significant amount of important data has been collected but not sufficiently analyzed.

   It is recommended that more emphasis be placed on standardizing data collection and analyzing the data collected. The project has only one qualified hydrogeologist. One or two more are needed specifically to concentrate on the interpretation of pumping tests; the production of hydrogeologic maps, such as depths of weathering (alteration); and the location of springs and the formulation of plans for their development.

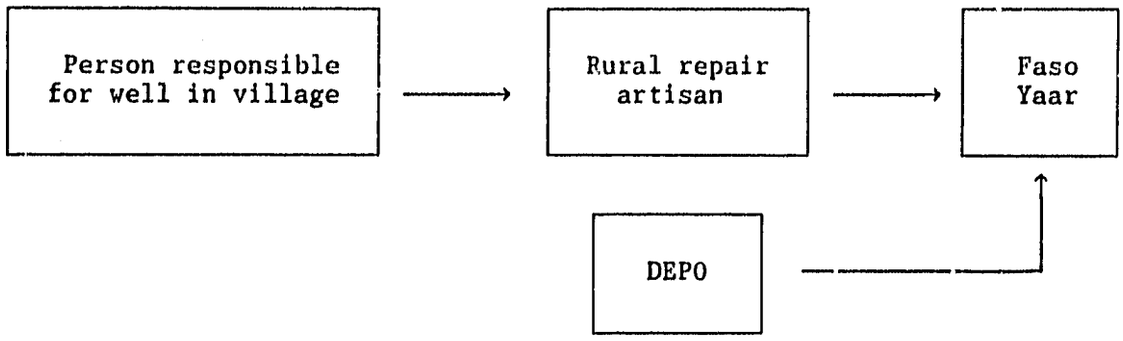
7. It appears that the Moyno pump has a breakdown rate which is too high to meet acceptable standards for pump performance.

   It is recommended that studies be undertaken to determine if pump standardization within Burkina Faso is acceptable and if local manufacture of pumps is possible. If outside assistance is desired, USAID should consider utilizing the WASH Project to undertake the studies.

8. Pump maintenance is probably the single most important factor in determining project success. Unfortunately, an effective maintenance system is not yet functioning. Since the beginning of the project the maintenance system has been a source of concern. The new maintenance system now being proposed, which depends on Faso Yaar and a group of rural repair artisans, has not been tested.

   It is recommended that the ONPF maintain a back-up maintenance system and evaluate the efficiency of the new maintenance system for a period of time until it is assured that the new system is working properly.

   Further, it is recommended that for the new system a member of the Village Health Committee be named as the person responsible for the well. This person should be able to arrange payments required for pump repairs and to account for all work and payments to the village health cell. The organizational chart of this arrangement is as follows.



9. The lack of coordination between the two components of the project, water and health, has resulted in out-of-phase work progress. The pilot zone was established in order to test an approach which provides for the required coordination between water and health. It appears to be working.

   It is recommended that emphasis be placed on a coordinated approach between water and health, and that the approach established in the pilot zone be utilized in the future. The pilot zone approach should continue to be surveyed, evaluated, and modified where necessary. The wells construction component should not proceed until after the health component, including the extension program (animation), has taken place. Thus the villagers will fully understand their role and responsibilities in pump maintenance and the relation between water and health before well construction begins.

10. The choice of the most efficient method (between government or private sector) of wells construction is in question.

    By definition private entreprises are registered, pay duties and taxes according to the statutes, and establish employee salaries free of government regulation. Any other form of operation is considered a government operation (en regie).

    It is recommended, in general, that drilled wells be undertaken by the private sector because of the advantages in cost, speed, and quality of construction. However, there are reasons to maintain a government role in constructing drilled wells including the following: to assure that the market will not be monopolized by a small number of private enterprises, foreign or national, to allow the government to develop a capacity to undertake special programs such as drilling piezometric wells for research purposes; and to assure that equipment left over from specific projects financed by donors is utilized to the maximum of its usefulness.

9.3 Health Component

1. The impact of the RWSP, both actual and potential, was enhanced by the health education component.

   It is recommended that future water supply projects include a health education component.

2. Due to the financial, human, material, and logistical resources of the project, the National Primary Health Care System in the four provinces of the project was put into place very quickly.

   It is recommended that the activities undertaken during the project be continued with the same vigor so that the villagers do not become discouraged.

3. During the past year of the project, the project objectives were mixed with the objectives of the Ministry of Health which made it difficult to establish final statistics for the health component of the project.

   It is recommended that the project keep its data and statistics separate from those of the Ministry of Health to facilitate evaluation of project progress.

4. During the training of the itinerant health workers, not enough time is reserved for practical sanitation, e.g. latrine construction and well drainage system construction.

   It is recommended that more time be reserved for this subject during the IHW training. Also the one week reserved for the subject, training-of-trainers, during the itinerant health worker training is not enough. The training of village health workers varies too much from one CSPS to another. Too much emphasis is placed on curative skills at the expense of preventive medicine and animation. The possibility of forming mobile training teams should be investigated.

6. All of the nurses in the project area have not received in-service training. This makes it difficult for them to supervise the work of the itinerant health workers properly.

   It is recommended that a way be found to continue in-service training of nurses. It is also necessary to include a course on primary health care in the training of new nurses so they will be better able to supervise the itinerant health workers.

7. The problems that were supposed to be resolved by training two people from Burkina Faso in the United States were not defined in the project paper. Thus, it is not certain that the training will actually correspond to the needs of the country.

   It is recommended that the problems that need to be solved be well defined before taking any action.

8. The visual aids made by the project were not appropriate for the itinerant health workers or the village health workers.

   It is recommended that visual aids be made which are appropriate for use by health workers in the field.

9. The Practical Guide to Community Health is a major contribution of the health component of the project.

It is recommended that copies of the guide be distributed immediately to the itinerant health workers and that workshops at the provincial level be held to discuss the use of the guide. Copies should also be given to the National School for Public Health so that it can be incorporated into the next training course.

10. Some of the technical annexes of the Practical Guide to Community Health are not correct.

    It is recommended that these annexes be revised before reprinting the guide, especially those concerning well drainage and latrine construction.

11. Not enough attention was paid to the details of latrine design. Consequently it does not correspond to the needs of the people.

    It is recommended that the sanitarians or the other people responsible for the design take advantage of the available literature regarding latrine design and make the necessary changes.

12. The sanitary conditions around the project wells are below acceptable standards. Adequate drainage systems have not been constructed.

    It is recommended that a standard well drainage system including a drainage canal, a water trough, a soak pit, and an enclosure be devised for all of the project wells.

13. It is very difficult to evaluate accurately the impact of the project because no base-line data concerning incidence and cause of morbidity and use of water was made.

    It is recommended that such studies be made at the beginning of all such projects.

14. The quality of water was improved in both drilled wells and large-diameter wells. However, it is clear (but not surprising) that the distance to the water remains the most important factor in determining the quality of water consumed. The closest water sources (traditional wells, seasonal streams, and small lakes) are often used even when the project well is just a few yards further away.

    It is recommended that whenever there is a choice, a traditional water source close to the village should be improved rather than constructing a new well farther away. In the choice of villages, priority should be given first to those that have no traditional water point, and then to those having only one or two sources.

    It is also recommended that the itinerant health workers and the community health workers increase their efforts to convince the villagers of the need to use the improved water points if they want to improve their health.

15. Even though the project has provided potable water to the village, at

present the villagers are not sufficiently aware of the relationship between polluted water and disease. Also, water often becomes polluted between the time it is collected and the time it is consumed.

It is recommended that during their health education lessons the itinerant health workers focus upon the role of polluted water in the spread of disease. Furthermore the village health workers should give the villagers concrete advice about how to avoid polluting the water after it has been collected.

16. During the entire project the health component has suffered from too frequent changes in its directorate. In addition, all of the directors have had to divide their time between the project and their other official responsibilities.

    It is recommended that the person assigned to the health technical directorate stay in that position at least two years and work full time.

17. Because of the insufficient numbers of physicians in the country, the project technical directors for the health component have always been required to practice medicine while at the same time being director. This has had a negative impact on the project.

    It is recommended that rather than employ a physician for the job, a health agent (not a medical doctor) with special training in administration should be hired.

18. During the implementation of the project, the non-integration of the itinerant health workers into the Burkinabe civil service has caused some problems both in the CSPS (Dispensary) and at the provincial levels.

    All project personnel who are expected to become civil servants at the end of the project should be integrated into the civil service immediately following their training.

19. The itinerant health workers have too much work, and as a result they cannot visit each village as frequently as necessary.

    It is recommended that a means be found to continue training IHWs and to organize in-service training courses for the previously termed "pill distributors" so they can do the work of the IHWs trained under the project.

20. Through the combined efforts of the itinerant health workers and the village health workers, a heightened awareness among villagers of cleanliness and hygiene has been achieved. Unfortunately, this awareness has not always been followed by corresponding actions, except in the case of latrine construction which has seen an acceleration of activity.

    It is recommended that the GBF find a means to assure that the IHWs can continue to supervise the VHWs. (i.e., means of transportation, fuel, repairs).

21. The village health workers are not very capable in their role as health

educators.

It is recommended that health education lessons with visual aids be prepared and that these lessons be integrated into the CHW training.

22. The village health cell members are not effective.

It is recommended that VHC members receive training in management as recommended by the synthesis workshop members.

9.4 Administration

1. A project that requires the collaboration of two ministries and an international donor has inherent difficulties from the start. The lack of coordination between the interested parties has been the source of several problems. In addition, changes in leadership in the GBF, USAID, and the technical assistance contractor have negatively affected the project. However, coordination has improved during the past two years with the creation of a management unit, the introduction of new financial reporting and stock management systems, and the collaborative efforts of the two technical directors of the project.

   Considering the past difficulties, it is recommended that particular emphasis be placed on the importance of collaboration and coordination in future projects. It is difficult to recommend solutions to the problems of interministerial coordination other than to note that individual personalities are important factors. The administrative organization in itself is probably less important than choosing leaders who are dedicated to common objectives. It is recommended that, in order to improve coordination, a national director be named. This person would be responsible for both water and health components and would be assisted by a technical advisor who would represent the donor organization.

2. During the life of the RWSP the total cost will have reached 4,924,000,000 CFA. Regrettably the financial management of the project by the government has been relatively inadequate.

   It is recommended that in the future financial management of all projects be under the Ministry of Planning and Development, which has already developed initiatives in this direction.

3. The use of American-made vehicles and equipment has caused problems. Servicing this equipment is not assured by the manufacturer. Spare parts are very expensive and take a long time to be delivered once they are ordered. Also these vehicles use a great deal of fuel, and are not practical for a country like Burkina Faso which must import fuel.

   It is recommended that in the future consideration be given in the terms of the bilateral agreements for the need to purchase equipment appropriate for local conditions.

4. Economic and financial calculations completed for this evaluation show investment returns through unit price values. Such values were not

previously known for this project. It is imperative that the GBF, as well as private enterprises, be aware of the unit costs in order to set quantifiable objectives, to keep track of their current financial position, and to fine tune management decisions.

In consideration of the difficulties involved in determining precise economic costs but also of the importance of the unit cost values, it is recommended that an economic analysis be used in evaluating future investment decisions or in undertaking corrective economic measures.

5. It has been shown for projects similar to the RWSP that the output by field technicians is positively influenced by wage incentives.

   It is recommended that work bonuses be introduced in the project for field technician staff in order to make the project more competitive.

Photo 1. Traditional well with rope and bucket.

Photo 2. Moyno pump and commonly used containers for transporting water.

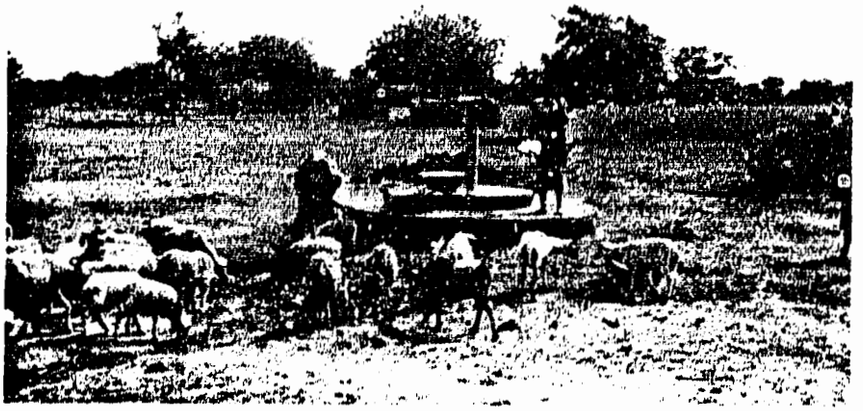


Photo 3. Project well without drainage system. Puddles around well are a potential source of disease.

Photo 4. Children often work in pairs to pump water.

Photo 5. A locally made ceramic container for storing one family's water.

Photo 6. Large-diameter well with drainage system and fence. Pump has been removed.

Photo 7. Project well with proper drainage system and fence.

Photo 8. Large-diameter well where people have opened the cover in order to use rope and buckets rather than a pump.

Photo 9. Latrine with plastered walls and door screen. Round hole and drainage are improperly designed.

Photo 10. Latrine built with laterite blocks.

References

1. Ilboudo, Joseph. "Hydraulique Villageoise, possibilité de création de production autour des ouvrages du Projet." Ecole Supérieure de Science Econ (ESSEC). DPFH USAID No 686-0228. 1986.2.

2. Sandwidi, D. Serge Alain. ESSEC - Dept. of Administration. Le problème des charges récurrentes des projets de Développement financés par l'Aide Extérieure dans les pays du Sahel. 1986.

3. Sandwidi, Serge. Rapport de Stage effectué au Projet Hydraulique Villageoise No. 686-0228. Approche de financement des charges récurrentes - ESSEC 1985.

4. Inputs to Project Paper WASH Supplement - 1984.

5. Analysis of Mid-term Evaluation Rural Water Supply Project - Upper Volta No. 686-0228 - USAID - Burkina, April 22, 83 USAID - Burkina.

6. Bambara. 1986. Contributions : USAID Gouvernement du Burkina.

7. Youssof, H. - Mai 198. Implantation des Forages dans les Départements de Hounde, Koumbia, Bereba et Nakuy.

8. Turner, William. Evaluation of the well construction component of the Burkina Faso Rural Water Development Project. AGW Consultants.

9. Comments of Dr. Sondo Blaise on the Mid-term Evaluation Report.

10. Wash Field Report No. 105. Malawi Self-Help Rural Water Supply Program: A Mid-Term Evaluation of the USAID-Financed Project. December 1983.

12. Wash Field Report No. 162. CARE/Bolivia - Water Supply and Small Scale Irrigation Program: A Final Evaluation of the USAID-Financed Project. April 1986.

13. Mini-Santé - Projet USAID No. 686-0228. Semestriel - 1er Semestre 81.

14. WASH Technical Report No. 32. Facilitator Guide for Conducting a Team Planning Meeting. November 1985.

15. Proj. Ag. July 79 (Project Agreement).

16. Proj. Ag. Amendment 1 - 2 - 3 - 4 - 5.

17. Mini-Santé - Projet USAID No. 686-0228 - Rapport Semestriel, 2e Semestre 81.

18. Mini-Santé - Projet USAID No. 686-0228. Rapport Annuel 1982.

19. Proj. Rapport Final - Dimpe Inc./MCD. Vol. 2 Annexes - March 86.

20. Projet Hydraulique Villageoise dans la Région Centrale du Burkina Faso. Compte rendu des travaux 1ère phase CEAO - BRGM.

21. Bruno Bambara. Project presentation - USAID No. 686-0228 - June 86.

22. Hema, A. Alexandre - Mai 85. Présentation du Volet Santé du Projet Hydraulique Villageoise.

23. Youssof, H. - Mai 84. Notes sur la géomorphologie et l'hydrogéologie de la région de Bobo suivant l'itinéraire Borodougou-Sourou-Koudinga.

24. Mid-term Evaluation of Rural Water Supply Project, USAID No. 686-0228 - Vol. 11.

25. Rural Water Supply Proj. No. 686-0228 USAID - Official Files list.

26. Hema, Allassane Alexandre - Bobo - 20 Mai 85. Rapport de Mission au Togo effectué du 8 au 12 mai 85 dans le cadre de l'Hydraulique Villageoise.

27. Bambara, Bruno. Field trip remarks - USAID - May 21, 1985.

28. Ashelman, Peter - M.C.D. Inc. Rapport final - juillet 83 - juillet 84.

29. Plopper, Suzane - end of service report. M C D - May 1983.

30. Rapport d'activites - avril, mai, juin 85. Volet santé.

31. Youssof,H. - Juillet 84. Conditions hydrogéologiques dans le bassin greseus dans les provinces du Kenedougou - Houet. Compte rendu d'implantation des forages.

32. Youssof, H. - Mai 85. Implantation des forages dans les départements de Houndé, Koumbia, Bereba et Bekuy - Interprétation des photos aérienne dans le choix des sites de forages.

33. Situation actuelle des activités du Volet Santé du Projet Hydraulique Villageoise No. 686-0228. 9 avril, 84.

34. Projet de programme de formation des AIS Mini-Santé-Direction de la formation professionnelle et des Stages - Ecole Nationale de Santé. Février 1983.

35. Dao, Adama. Rapport de Fin de Stage 3e année Hydraulique Villageoise Exemple de programme.

36. Rapport d'activités 83-84-Volet Hydraulique. Projet Hydraulique Villageoise, Septembre 84.

37. Liste des villages dotés de puits et forages éxecutés dans le cadre du Projet Hydraulique Villageoise USAID No. 686-0228 DPFH - 25 Septembre 84.

38. Dishman, D. - Dimpex Inc/MCD - March 86. Proj. Rapport Final - Vol. 3 Health Ed.

39. Ouedraogo, Mamadou DPFH 1984. Rapport de synthèse - Projet Hydraulique Villageoise. USAID Bobo - Campagnes 1980-84.

40. Rapport Final 1ere phase du Burkina Faso. Projet Hydraulique Villageoise de conseil de l'Entente Annexes.

41. Audit of Rural Water Supply Project, Burkina Faso, Projet No. 686-0228 - Reg. Insp. Gen. for Audit Dakar - April 18, 1986.

42. Robertson, R. - Dimpex Inc - March 1986. Proj. Rapport Final - Vol. 4 - Garage Warehouse.

43. Prog. Hydraulique Villageoise Conseil de l'Entente Rapport Final de la 1ere phase du Burkina Faso - BRGM.

44. Rapport Préliminaire de Recensement des villages bénéficiants des puits du projet USAID Octobre - Nov. 83. Province du Houet - Kenedougou - Poni Bougouriba. Enquête menée par DSP - HER dans le cadre du projet USAID No. 686-0228 par Peter Ashelman et Deborah Dishman MCD - 23 Decembre 83.

45. Mini-Santé - Projet USAID 686-0228. Rapport Semestriel 84 - 1er Semestre.

46. Mini-Santé - Projet USAID 686-0228. Rapport 2me Semestre 84.

47. Mini-Santé - Projet USAID 686-0228. Rapport de janvier-février-mars 85.

48. RWSP - Proj. Imp. Letters List.

49. Guide Pratique de la Santé Communautaire USAID 6/1986.50.

50. Projet de Rapport Final - Dimpex/MCD Vol 1 - Mars 85.

51. WSP - 686-0228 U.V. Proj. Paper AID - June 79.

52. Dishman, Deborah - December 19, 1985. USAID Rural Water Supply Project No. 686-0228. Health Educator Mission Report - June 85 - Dec. 85.

53. Bourgoin, Richard P. - 19 Décembre 85. Rapport Mission Forage Bobo.

APPENDIX A

List of Persons Contacted During Evaluation

Michel KOUDA	Directeur, Direction des Etudes, de la Planification et du Contrôle du Ministère de l'Eau, assumant l'intérim du Secrétaire Générale du Ministère de l'Eau à Ouagadougou
Alain Dominique ZOUGBA	Secrétaire Général du Ministère de la Santé à Ouagadougou
Dr. Thomas SANOU	Haut-Commissaire du Houet - Bobo-Dioulasso
Dr. HEMA ALEXANDRES	Médecin-Chef de la Santé Urbaine de Bobo-Dioulasso et Directeur Technique du Volet Santé du Projet USAID/Burkina d'Hydraulique Villageoise à Bobo-Dioulasso
Mamadou DIALLO	Directeur Technique du Volet Hydraulique du Projet USAID/Burkina d'Hydraulique Villageoise et Directeur de l'Office National des Puits et Forages à Bobo-Dioulasso
Dr. Blaise SONDO	Directeur Provincial de la Santé du Houet et ancien Directeur du Volet Santé du Projet USAID/Burkina d'Hydraulique Villageoise à Bobo-Dioulasso
Dr. Roger HIEN	Directeur Provincial de la Santé du Poni à Gaoua
Mme Ramata KOUTOU	Assistante de Santé à la Direction Provinciale de la Santé du Poni à Gaoua
Joseph KY	Assistant de Santé, Chef de la Division des Agents de Première Ligne à l'Ecole Nationale de Santé à Bobo-Dioulasso
Mme Djeneba GUEYE	Monitrice à l'Ecole Nationale de la Santé à Bobo-Dioulasso
Mamadou OUEDRAOGO	Ingénieur Hydrogéologue, ONPF-Bobo-Dioulasso
Boukary OUEDRAOGO	Technicien d'Assainissement au Projet USAID/Burkina d'Hydraulique Villageoise, Volet Santé à Bobo-Dioulasso
Simon TINGUERI	Assistant d'Assainissement au Projet USAID/Burkina d'Hydraulique Villageoise, Volet Santé à Orodara, province du Kénédougou
Etienne HIEN	Assistant d'Assainissement au Projet USAID/Burkina d'Hydraulique Villageoise, Volet Santé à Diebougou, Province de la Bougouriba
Salifou Theodore OUEDRAOGO	Préfet de Nako, Province de la Bougouriba
Dieudonné BATIONON	Haut-Commissaire du Kénédougou à Orodara

Boubacar DICKO	Secrétaire Général du Kénédougou à Orodara
André OUEDRAOGO	Préfet de Orodara
Adama Hassane TAMBOURA	Préfet de Koloko, Province du Kénédougou
Bureau CDR de ONPF	L'Office National des Puits et Forages, Bobo-Dioulasso
Guy YODA	Ingénieur Sanitaire à la Direction d'Education pour la Santé et Assainissement, Ouagadougou, ancien Ingénieur Sanitaire Burkinabé du Projet
Mme Pauline TIENDREBEOGO	Gestionnaire du Projet USAID d'Hydraulique Villageoise à l'office National des Puits et Forages, Bobo-Dioulasso
Pascal LEOSSOGO	Service Administratif à l'Office National des Puits et Forages, Bobo-Dioulasso
Faustin OUEDRAOGO	Aide-Comptable Volet Hydraulique, Office National des Puits et Forages, Bobo-Dioulasso
Paul-Marie SAWADOGO	Chef du garage, l'Office National des Puits et Forages, Bobo-Dioulasso
Idrissa THIOMBIANO	Chef magasinier, l'Office National des Puits et Forages, Bobo-Dioulasso
P.Hamidou KOUSSOUBE	Contrôleur du travail, Bobo-Dioulasso
Hamidou SANA	Délégué, Comité de Défense de la Révolution, l'Office National des Puits et Forages, Bobo-Dioulasso
Antoine ZONGO	Office of Financial Management, USAID/Burkina à Ouagadougou
Bruno BAMBARA	Adjoint au Chef de Projet USAID d'Hydraulique Villageoise à l'USAID/Ouagadougou
George THOMPSON	Chef de Projet USAID d'Hydraulique Villageoise à l'USAID/Ouagadougou
Juliette GNOUMOU	Secrétaire du Volet Santé au Projet d'Hydraulique Villageoise, Bobo-Dioulasso
Joanny KABORE	Conseiller de Santé à la Direction de la Formation Professionnelle du Ministère de la Santé
Amado OUEDRAOGO	Conseiller de Santé à la Direction de la Formation Professionnelle du Minstère de la Santé

APPENDIX B

Questionnaire

WATER SUPPLY - INTERVIEWS WITH VILLAGERS.

1.	Before the Construction of the new well, where did you collect water? During the rainy season:	Pilot Zone	Outside P.Z.	Total
a.	river/stream	90%	54%	65%
b.	well	50%	63%	59%
c.	lake	-	-	-
d.	rainwater catchment	-	-	-
	During the dry season			
a.	river/stream	80%	54%	62%
b.	well	50%	75%	68%
c.	lake	-	-	-
d.	other	-	4%	3%
2.	Before the Construction of the new well, how much time did you require to collect water needed for one day?			
a.	less than one hour	40%	54%	50%
b.	from one to two hours	20%	29%	26%
c.	more than two hours	40%	17%	24%
3.	How much water did you use per person per day?			
a.	less than 10 liter	50%	61%	58%
b.	10 - 20 liter	50%	30%	36%
c.	more than 20 liters	-	9%	6%
4.	After the Construction of the new well/pump Where do you collect water?			
a.	from the new well/pump only	29%	60%	53%
b.	well and river/stream	71%	36%	44%
c.	well and lake	-	-	-
d.	river/stream only	-	-	-
e.	other	-	4%	3%

		Pilot Zone	Outside P.Z.	Total
5.	How much water can you bring from the new well daily for your family?			
a.	quantity	NOT ANALYZED		
b.	number of trips daily	"	"	
c.	description of recipient	"	"	
6.	After the Construction of the new well/pump, how much water do you use per person per day?			
a.	less than 10 liter	14%	30%	27%
b.	10 - 20 liter	86%	39%	27%
c.	more than 20 liter	-	30%	23%
7.	Can you show one the quantity you collected to day from the new well/pump (Estimate)?			
a.	less than 10 liter	20%	6%	9%
b.	more than 10 liter	80%	94%	91%
8.	Does the new well provide sufficient water for your needs in all seasons?			
a.	Yes.....	17%	43%	38%
b.	No.....	83%	57%	62%
9.	Does the water taste good?	Not Analyzed		

	Pilot Zone	Outside P.Z.	Total
10. According to you, why does the well not cover your needs?			
a. there are too few wells	80%	63%	67%
b. the flow of the well is insufficient	20%	19%	19%
c. neighboring villages also collect their water here	20%	25%	24%
d. the animals also need to be watered	-	25%	19%
11. If the well does not provide sufficient water for your needs, how many additional wells are required?	NOT ANALYZED		
12. What contributions could the viliage make in that case?			
a. financial support	33%	8%	16%
b. in kind (labor, local materials)	67%	92%	94%
13. According to you who is responsible for repairing the pump when it breaks down?			
a. the pump caretaker	44%	6%	19%
b. the Village Health Call	22%	6%	11%
c. the GOBF	11%	61%	44%
d. the artisan	11%	-	4%
e. the Village Health Worker	-	-	-
f. I don't know	-	6%	4%
g. the CDR representative	11%	16%	15%
h. the villagers (in general)	-	6%	4%

	Pilot Zone	Outside P.Z.	Total
14. Since the installation of the pump has it broken down?			
a. Yes.....	0	71%	58%
b. No.....	100%	29%	42%
15. If yes, how many times?			
a. 1	-	67%	67%
b. 2	-	27%	27%
c. 3	-	6%	6%
d. 4 or more	-	-	-
16. Who should repair the pump?			
a. the pump caretaker	-	-	17%
b. the Village Health All	-	-	8%
c. the village Chief	-	-	42%
d. CDR	-	-	17%
e. Other	-	-	75%
17. Who has repaired the pump the last time?			
a. GOBF (someone from the project)	-	80%	80%
b. I don't know	-	10%	10%
c. Other	-	10%	10%
18. How long did it take to repair it?			
a. less than one week	-	10%	10%
b. less than one month	-	40%	40%
c. more than one month	-	50%	50%

WATER SUPPLY: INTERVIEW WITH THE CARETAKER

		Pilot Zone	Outside P.Z.	Total
1.	As well/pump caretaker, what are your responsibilities?			
a.	daily checking of the well/pump	80%	52%	60%
b.	get/buy spare parts	14%	-	3%
c.	sanitary protection measures	14%	26%	23%
d.	advise the artisan in case of breakdown	19%	13%	17%
e.	advise the VHC in case of breakdown	29%	4%	7%
f.	periodic preasing	-	4%	3%
g.	Other	14%	4%	7%
2.	Have you received any kind of training become a caretaker?			
a.	Yes.....	14%	4%	7%
b.	No.....	86%	96%	93%
3.	Did you receive any tools or supplies?			
a.	Yes.....	-	-	-
b.	No.....	100%	100%	100%
4.	Can I see your tools and supplies?	NOT ANALYZED		
5.	What means of transportation do you have to get spare parts and/or call the artisan?			
a.	on foot	-	13%	10%
b.	bicycle	71%	65%	67%
c.	mobylette	14%	35%	30%
d.	Other	14%	4%	7%

11.6 QUESTIONNAIRE

11.6.1 HEALTH - OBSERVATIONS RE SANITARY WATER USE

Name of the Village:

		Percentage of Respondents		
		Pilot Zone	Outside P.Z.82	Total
1.	Observation (all wells)			
	The receptides in which the women collect water clean at the time of collection? (Do the women rinse them at before filling)?			
a.	All of the Receptides are clean	17%	11%	13%
b.	Most of the "	66%	56%	58%
c.	None of the " are "	17%	33%	29%
2.	Observation (large diameter open well only) Is there a place near the well where the drawing receptide can be kept clean?		No large dia wells	
a.	Yes.....		0%	0%
b.	No.....		100%	100%
3.	Observation (all wells) Is the area around the well clean and well maintained (proper drainage, no stagnant water, etc.).			
a.	Yes.....	0%	29%	23%
b.	No.....	100%	71%	77%

	Pilot Zone	Outside P.Z.	Total
4. Observations (in private yards/houses) Ask several villagers to show you where they store their water. Inspect the storage arrangement and determine it's cleanness			
a. Clean.....	13%	30%	26%
b. Dirty, prone to contamination	87%	70%	74%
5. Observations (Private yard/house) Ask for a drink of water. Determine if the way people draw water from the storage container could contaminate it.			
Yes (prone to contamination).....	87%	85%	85%
No	13%	15%	15%

HEALTH - QUESTIONS ASKED FROM VILLAGERS

	Pilot Zone	Outside P.Z.	Total
1. Can you tell me how people get sick?			
a. dirty (or contaminated) water	90%	65%	72%
b. dirty hands	NA	NA	NA
c. spoiled food	NA	NA	NA
d. insects	NA	NA	NA
e. don't know	NA	NA	NA
2. Can you tell me of ways to prevent diarrhea?			
a. b, by drinking clean well or pumpwater	70%	48%	55%
c. by drinking filtered water	NA	NA	NA
d. by drinking river or lake water	NA	NA	NA
e. don.t know	NA	NA	NA
f. Other	NA	NA	NA
3. If you are sick, to whom in the village do you go?			
a. traditional treater	0%	26%	18%
b. the Village Health Worker (VHW)	70%	48%	55%
c. the Village Midwife	0%	4%	3%
d. the Nurse	50%	70%	64%
4. What is the name of the VHW?			
a..... correct	89%	77%	81%
5. What kind of work does the VHW do?			
a. provides curative services	70%	74%	74%
b. health education	30%	26%	27%
c. sanitation	30%	17%	21%
d. latrine construction	0%	17%	12%
e. don't know	-	-	-

6. Has the VHW built a latrine?	Pilot Zone	Outside P.Z.	Total
a. Yes.....	70%	39%	48%
b. No.....	10%	39%	30%
c. I don't know	-	4%	3%
d. Not stated	20%	18%	19%
7. <u>If yes</u>, how was it constructed?			
a. with the help of the villages	43%	67%	56%
b. with outside technicians	-	-	-
c. don't know	-	-	-
d. by himself	43%	11%	25%
e. not stated	14%	22%	19%
8. Have you constructed a latrine at your home ?			
a. Yes.....	30%	26%	27%
b. No	70%	74%	73%
9. <u>If not,</u> why not?			
a. too expensive	-	6%	4%
b. don't need it	14%	-	4%
c. don't know how to make it	-	29%	21%
d. Other reasons:	80%	71%	75%
10. Have you participated in the construction of the new well?			
a. Yes.....	70%	91%	85%
b. No.....	20%	4%	9%
c. not stated	10%	5%	6%

	Pilot Zone	Outside P.Z.	Total
11. Is there a Village Health Cell in the Village?			
a. Yes.....	70%	65%	66%
b. No.....	30%	13%	18%
c. not stated	-	22%	16%
12. <u>If yes</u>, what are its tasks?			
a. pump maintenance	14%	13%	14%
b. "animation", community organization	71%	60%	64%
c. manage the health fund	57%	33%	41%
d. supervise the VHW and VM	43%	33%	36%
e. choose the well-caretaker	14%	-	5%
f. buy spare parts	14%	-	5%
g. don't know	-	13%	9%
13. Since the installation of the new well in the village, resulting in an increase in water availability, do you think your health has improved ?			
a. Yes.....	40%	74%	64%
b. No.....	0%	13%	9%
c. Don't know	10%	4%	6%
d. not stated	50%	9%	21%

*In Zone pilot, In only 5 villages had the pump been installed.

11.6.7. INTERVIEWS WITH VILLAGE HEALTH WORKERS (PILOT ZONE: 7: OUTSIDE PILOT ZONE 20)

		Pilot Zone	Outside P.Z.	Total
1.	Are you regularly renumerated by the villagers?			
a.	Yes.....	43%	30%	33%
b.	No.....	57%	65%	63%
2.	According to you, what are your most important tasks?			
a.	"Animation"	57%	30%	37%
b.	curatibe services	43%	50%	48%
c.	Health education	43%	45%	44%
d.	pump maintenance	0%	5%	3%
e.	other	14%	15%	15%
f.	don't know	14%	-	3%
g.	providing chloroquine	-	15%	11%
3.	What do you think the villagers appreciate the most about your work?			
a.	"Animation"	14%	25%	22%
b.	curative services	57%	70%	60%
c.	providing chloroquine	-	15%	11%
d.	don't know	14%	15%	15%
e.	health education	14%	25%	22%

		Pilot	Outside	Total
4.	Could you tell me of ways that diseases are transmitted?			
a.	dirty (contaminated) water	86%	80%	81%
b.	germs/bacteria	NA		NA
c.	dust			
d.	insects			
e.	don't know	NA		NA
5.	Could you tell me of ways to prevent diarrhea?			
a.	by drinking clean water from the well/pump	86%	75%	77%
6.	Please explain how you can make oral rehydration solution.			
a.	correct	71%	60%	63%
b.	wrong	14%	30%	26%
c.	don't know	14%	10%	11%
7.	Do you have visual aids to facilitate health education in the village?			
a.	Yes.....	14%	0%	3%
b.	No.....	86%	100%	97%
8.	Observation: Ask the VHW to convince you not to throw garbage everywhere in the village (not quantified).			

	Pilot Zone	Outside P.Z.	Total
9. Observations:			
Demonstration latrine constructed cleanlines	71%	30%	41%
a. very clean	80%	67%	73%
b. clean	-	-	-
c. more or less clean	-	33%	18%
d. dirty	20%	-	9%
Use			
a. used a lot	50%	50%	50%
b. used a fan amount	50%	25%	36%
c. litle used	-	25%	14%
Construction (as per design)			
a. modern (concrete slab)	80%	86%	83%
b. traditional	20%	14%	17%
c. well constructed	100%	57%	78%
d. poorly constructed	-	43%	22%

	Zone	P.Z.

11.6.8. HEALTH: INTERVIEW WITH THE VILLAGE BIRTH ATTENDANTS

1. Do the women in the village call you for deliveries?	Pilot	Outside	Total
a. Yes	83%	82%	82%

2. If not, why not?			
a. they refuse my services	-	-	-
b. they prefer to deliver at home with an old women	100%	33%	50%
c. they go to the nearest maternity	-	-	-
d. other	-	67%	50%

3. If yes, how many women did you help to deliver last month?			
a. none	40%	10%	16%
b. 1 - 5	40%	70%	64%
c. 6 - 10	20%	15%	16%
d. 6 - 10 or more	-	5%	4%

4. What other activities do you carry out?			
a. health education	67%	27%	36%
b. prenatal consultations	50%	27%	32%
c. home visits	-	14%	11%
d. other	17%	-	3%

		Pilot Zone	Outside P.Z.	Total
5.	Where do you collect water for your work?			
a.	river or stream	33%	5%	11%
b.	pump	50%	50%	50%
c.	traditional well	33%	23%	25%
d.	other	–	18%	14%
6.	What should you do to prevent neo natal tetams?			
a.	sterilize the instrument with which to cut the umbilical cord	83%	63%	71%
b.	keep the stump of the umbilical cord clean	33%	27%	29%
c.	other	–	14%	10%
7.	Since you were established as a village birth attendant have you participated in a refreester course?			
a.	Yes.....	50%	9%	18%
b.	No.....	50%	77%	71%
c.	not stated	–	14%	11%

11.6.6. HEALTH - INTERVIEW WITH THE AIS

	Pilot Zone	Outside P.Z.	Total
1. How many Vilage Health Workers (VHW) are based in the zone you supervise?			
a. 0 - 10	14%	30%	30%
b. 11 - 20	43%	24%	30%
c. more than 20	43%	38%	40%
How many Village Birth Attendants (VBA) are based in the zone you supervise?			
a. 0 - 10	14%	54%	40%
b. 11 - 20	43%	15%	25%
c. more than 20	43%	31%	35%
2. How frequently are you supposed to visit the VHWs and VBAs?			
a. every week	-	-	-
b. twice a month	-	23%	15%
c. once a month	100%	62%	75%
d. less than once a month	-	15%	10%
3. In reality how often do you manage to visit them?			
a. every week	-	-	-
b. twice a month	14%	31%	25%
c. once a month	57%	15%	30%
d. less than once a month	29%	54%	45%

		Pilot Zone	Outside P.Z.	Total
4.	Do you have a means of transportation (mobylette)?			
a.	Yes.....	100%	100%	100%
b.	No.....	-	-	-
5.	Does it allow you to visit all VHW and VBAs when you want to?			
a.	Yes.....	29%	46%	40%
b.	No.....	71%	54%	60%
6.	If not, why not?			
a.	lack of fuel	40%	14%	26%
b.	frequent breakdown	100%	100%	100%
c.	poor state of the roads	20%	43%	33%
d.	other	-	-	-
7.	When you visit the VHWs on which aspects of work do you place emphasis?			
a.	number and state of latrines	43%	46%	45%
b.	contents of the pharmaceutical bon	43%	54%	50%
c.	number of health education lessons	71%	54%	60%
d.	chloroquine provision	14%	-	5%
e.	cleanlines of village	43%	62%	56%
f.	observe the VHW when at work	29%	15%	20%
g.	other	29%	46%	40%

	Pilot Zone	Outside P.Z.	Total
Id. for the VBAs?			
a. contents of the birth attendant for	43%	48%	40%
b. number of deliveries	43%	31%	35%
c. number of prenatal visits	57%	23%	34%
d. other	29%	31%	31%
e. nothing	-	15%	10%
8. How do you see your relationship with the VHC?			
a. supervision then	57%	77%	70%
b. provide then with advise	100%	69%	80%
c. check the VHC health fund(s)	-	15%	10%
d. other	43%	15%	25%
9. Did you participate in training the VHW + VBA?			
a. Yes.....	100%	85%	90%
b. No.....	-	15%	10%
10. If yes, how?			
a. conducted training in "Animation"	57%	NA	NA
b. " " "	57%	NA	NA
c. " " "	29%	NA	NA
d. " " "	29%	NA	NA
11. Have you noticed any changes in the villages since you're begun health education or water and sanitation?			
a. Yes.....	43%	77%	65%
b. No.....	57%	23%	35%

5. HEALTH - QUESTIONNAIRE FOR VILLAGE HEALTH CELL	Pilot Zone	Outside P.Z	Total
1.a. - What are the tasks of the village Health Worker (VHW)?			
a. "animation"	57%	47%	50%
b. health education	14%	53%	42%
c. demonstrations	14%	0%	4%
d. curative services	71%	100%	92%
e. sanitation	57%	47%	50%
f. don't know	0%	6%	4%
1.b. - What are the tasks of the village Midwife (MW)?			
a. deliveries	71%	78%	76%
b. health education	29%	28%	28%
c. demonstrations	-	17%	12%
d. don't know	-	-	-
e. prenatal consultations	-	28%	20%
f. other	29%	0%	8%
2.a. - During the past year, how have the VHC members helped the VHW in his.her work?			
a. "animation"	14%	29%	25%
b. community organization.participation	43%	35%	38%
c. maintenance of well/latrines	-	17%	13%
d. health education	-	12%	8%
e. management of the health fund	14%	12%	13%
f. supervision of VHW	29%	35%	33%

2.b. - During the past year how have the VHC members helped the VM in her work?	Pilot Zone	Outside P.Z.	Total
a. construction of a delivery room	14%	26%	24%
b. supervision of VM	14%	22%	20%
c. organization of the women	43%	33%	36%
d. management of the healthfund	-	6%	4%
e. nothing	-	22%	16%
f. other	14%	-	4%

3. Do you know how people get side?			
a. dirty (contamined) water	86%	72%	76%
b. dirty hands	NA	-	NA
c. spoiled food			
d. insects			
e. don't know			
f. dirty environment	NA	-	NA

4. Can you tell me some ways to prevent diarrhea?			
a. by drinking clean well or pumpwater	100%	55%	68%
b. by drinking boiled or filtered water	NA		NA
c. by drinking river or lake water			
d. good sanitation			
e. personal hygiene			
f. don't know			
g. other	NA		NA

5. How did the villagers contribute to well construction?	Pilot Zone	Outside P.Z.	Total
a. labor	38%	83%	69%
b. local materials	25%	44%	38%
c. cash	13%	11%	12%
d. housing and food	38%	61%	54%
e. in no way	38%*	0%	12%

* in three villages in P.Z. no work had started yet on the (borehole) well.

6. What is the name of the well caretaker?			
.....Correct	75%*	80%	78%

*in the remaining 25% of villages no one drosen yet.

7. What are his responsibilities?			
a. daily checking of well/pump use	75%	53%	61%
b. geasing	-	13%	9%
c. sanitary protection and maintenance	38%	53%	48%
d. inform the VHC in case of breakdown	13%	-	4%
e. All the artisan in case of breakdown	13%	7%	9%
f. buy/get spare parts	13%	-	4%

8. How many latrines have been built in the village since the creation of the VHC?			
a. none	13%	17%	15%
b. 1 - 5	63%	55%	58%
c. 6 - 10	-	-	-
d. more than 10	25%	28%	27%

9. Why haven't more villagers constructed a latrine?	Pilot Zone	Outside P.Z.	Total
a. lack of technical know how	-	5%	4%
b. lack of interest	-	22%	15%
c. insufficient willingness to spend money on it	12%	-	4%
d. high cost	-	11%	8%
e. don't know	12%	-	4%
f. other	50%	39%	42%
g. lack of materials	-	11%	8%

10. How frequently does the HW visit your village?			
a. at least twice a month	12%	24%	20%
b. once or twice a month	38%	20%	26%
c. less than once a month	50%	56%	54%

11. What does he/she do with the VHC during visits?			
a. training	-	12%	8%
b. educational meeting	75%	44%	54%
c. supervision	50%	50%	50%
d. inspects the well/pump	12%	44%	33%
e. inspects latrines	50%	25%	33%
f. checks the health fund	12%	6%	8%

12. Observation" Ask a VHC member to convince you to build a latrine (not quantified)

11.6.9. WATER SUPPLY - MANAGEMENT QUESTIONS FOR V.H.C.

		Pilot Zone	Outside P.Z	Total
1.	How have you financed your spare parts when your pump has broken down?			
a.	with money from our O+M fund	-	-	-
b.	equal contributions by villagers	-	-	-
c.	other	-	20%	17%
d.	no spare parts financed as yet	100%	80%	83%
2.	Do you have a special fund for the O+M of your pump, well?			
a.	Yes.....	100%	13%	39%
b.	No.....	-	87%	61%
	If yes, was the fund created before or after the installation of the pump/well?			
a.	before	100%	0%	-
b.	after	0%	100%	-
3.	How have you financed this O+M fund?			
a.	equal contributions by villagers	100%	100%	100%
b.	profit of collectively owned fields	10%	67%	23%
c.	other	-	33%	8%
4.	For which purpose have you used the money from the fund?			
a.	buy spare parts	NOT ANALYZED		
b.	pay labor	"	"	"
c.	pay the artisan	"	"	"
d.	no expenses incurred yet	"	"	"

		Pilot Zone	Outside P.Z.	Total
5.	Do you have a ledger/notebook for recording expenses?			
a.	Yes.....	70%	100%	77%
b.	No.....	30%	0%	23%
6.	Who decides what the fund is used for?			
a.	the VHC members	10%	100%	31%
b.	the VHC chairman	20%	-	15%
c.	the Village Health Worker	-	-	-
d.	the VHC treasurer	50%	-	38%
e.	the Itenerant Health Worker	-	-	-
f.	other	40%	67%	46%
7.	How much money do you presently in your O+M fund?			
a.	nothing	-	33%	8%
b.	less than 1000 F CFA	-	-	-
c.	1000 F CFA - 4999 F CFA	-	-	-
d.	5000 F CFA - 9999 F CFA	-	33%	8%
e.	more than 1000 F CFA	100%	33%	85%

FIELD SURVEY SCHEDULE

DATES	: TEAM 1 Village	TEAM 2 Village	TEAM 3 Village
JUNE			
21	BAKARIBOUGOU SAYAGA	NATINDOUGOU LIDERA	FAMBERLA DIONKELA
22	FANAGA KOUROUMA	KOROSSOKOURA LANFERAKORA	LEGUEMA DIMIKUI
24	TONOGOSSO DANKARI KOTI	ZINTIO POULBA	YO KANKANE
~~Fe~~ 25	BANKANDI TENOULE DJANVOR	BABORA DJIPOLOGO	TANSABLA BELEBALE
26	BROUM-BROUM KOUEKOUERA	KPELE KOUTENADOUO	SANGOLO MINAO
27		TANPE	SOUHOUERA DANKANA