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62

ANNEX B

UPPER VOLTA WATER SUPPLY PROJECT  
FINANCED BY THE GOVERNMENT OF UPPER VOLTA AND  
THE UNITED STATES AGENCY  
FOR INTERNATIONAL DEVELOPMENT (USAID)

PRELIMINARY ACTION PLAN  
WATER SUPPLY AND SANITATION PROGRAM

85

## INTRODUCTION

This action plan is the result of a workshop on rural water quality control held at the School of Health in Bobo Dioulasso, December 6-9, 1982, organized by the Project Direction (health component) and Medical Care Development (MCD).

This plan was prepared by those participating in the workshop; with the technical support of the Lecturer, Mr. Pierre R. Léger, Director of MCD, International Office.

The methodology applied in the plan preparation was the following:

- 1 - Identification, in plenary session, of the importance of a water supply and sanitation program to the villages targeted by the project. Formulation of goals and objectives for such a program.
- 2 - Distribution of participants in three working groups and assignment of a specific objective to each for the development of an action plan to accomplish that objective (see Appendix for each group composition and objective).
- 3 - Preparation of each specific action plan has included:
  - a) identification of problems and advantages regarding the objective to be addressed;
  - b) analysis of problems in order to dissipate any constraints which could be resolved during the life of the project, as well as those which will not be solved during that timeframe;
  - c) development of a strategy oriented specifically towards the resolution of each problem, indicating what can be done, by whom, with what means, and when would it be feasible;

d) preparation of a work summary by each group to be presented in plenary session.

4 - Presentation and discussion in plenary session of the work of each group. The presentation was made by a representative of each of the three groups.

5 - Discussion in plenary session of the format and content of the final document and of the recommendations to be made concerning program development within the project framework.

6 - Finally, winning the group's agreement which would lead to the synthesis and preparation of the final document by the Lecturer.

It should be noted that this plan of action is merely a preliminary plan, to be submitted to the Directors for the two project components who would approve a definitive action plan for village water supply and sanitation.

I - Overview

The purpose of the village water supply development project in cooperation between the Government of Upper Volta and the United States of America is to improve the quality of health and the socioeconomic status of populations distributed among 550 in Upper Volta by developing water supply systems capable of providing a significant amount of water, of easy access, and of acceptable sanitary quality. Project objectives are:

- 1) To motivate, organize, train and bring the villagers to an uniform level, enabling them to participate in all the phases of system development entrusted to them, namely: choice of source (groundwater or surface water), collection method (cisterns or large diameter wells) and their location, drawing method (type of pump), construction of the supply system and its physical and sanitary maintenance.
- 2) To build 620 sanitary water points (320 cisterns and 300 large diameter wells) in the 500 targeted villages.
- 3) To supervise and maintain the physical and sanitary level of water supply.
- 4) To develop actions for the promotion of health and prevention of diseases in order to achieve the benefits expected from the availability of a sanitary supply system, as well as its protection from eventual contamination by unsanitary practices.
- 5) To develop the auxiliary personnel needed to assist at the village level, and to improve the technical and administrative skills of intermediate groups called, in particular, to plan and supervise the surveillance and maintenance of the physical and sanitary levels of water supply systems after construction.

Although project activities during the last three years have efficiently addressed the majority of the objectives mentioned above, the principal project activity was developed in the field of water safety control.

Thus, at the end of the 1981/1982 campaign, 775 villages have been inventoried, 24 cisterns have been designed, 60 large-diameter wells have been built, and 98 pumps installed. Additionally, 204 village health workers have been trained for 164 villages of which 114 are targeted by the project. It should be noticed that only 94 VHWs in 80 villages (77 villages within the project) have received specific health training. Moreover, 22 travelling Agents who will be responsible for the supervision of VHWs are presently being trained. A continuing education program for nurses is underway at the project sanitary level. However, in the field of water safety control, monitoring the sanitary conditions of water supplies, and epidemiological surveillance (particularly of diseases of hydric origin or those bearing relation to the water) few activities have been carried out by the project until the present time.

In order to remedy this situation and accomplish the results expected from the different plans executed by the project, a component relevant to the sanitary control of the project water supply systems will be included among the activities of the project's two folds. The description of the action plan proposed for this component, as well as the specific resources necessary to its implementation are formulated henceforth.

II. Action Plan for Water Supply and Sanitation Within the Project Framework

A. Goals and Objectives

This component has the objective of assuring that the water to be distributed from the supply systems built within the scope of the project will be maintained at a level of quality acceptable for drinking. In other words, the risks of developing unsanitary systems or water of undesirable quality, as well as the risk of potential contamination of such systems after their initial utilization will be reduced to a minimum.

To accomplish this, the specific objectives of this component for project activities in this field are as follows:

1. To obtain sanitary water sources, free of risk of contamination from existing or potential pollutants.
2. To obtain sanitary water storage or collection.
3. To maintain the sanitary level of water supply systems once their utilization has begun.

B. Action Plan Strategy or Approach

In order to attain the goals and objectives of this component the preferred strategy or approach for this action plan will include:

1. Hydrogeological Survey and Choice of a Groundwater Source

The hydrogeological survey of groundwater levels must include an in-depth sanitary inquiry, together with a complete inspection of the sites, in order to determine the existing or potential sources polluting the water intended to supply the targeted villages; physico-chemical and/or bacteriological analyses will have to be made when the safety level of a

targeted source is unknown, as well as the geological site analysis in order to collect information on the ground's capacity to absorb treatment.

a) For deep ground sources (more than 30 meters), it is sufficient to collect a sample for physico-chemical analysis during the pump tests, in order to determine its odor, color, turbidity, pH, temperature, alkalinity, acidity, total life of the source, calcium, magnesium, iron, manganese, sodium, potassium, nitrates, nitrites, chlorides, sulphates, fluor, silicates, carbonates and bicarbonate percentages.

Whenever the sources are suspected of being polluted by a nearby industrial plant, a much more thorough analysis will have to be made.

b) For superficial sources (less than 30 meters) a sample will have to be taken for bacteriological analysis in order to determine its percentage of fecal coli-bacilli, in addition to a sample for physico-chemical analysis to establish the parameters indicated above.

These samples could be taken while conducting pump tests. In the absence of pump tests, a sample for physico-chemical analysis would simply be taken.

Site inspections and surveys will be conducted by HEC agents, in charge of the hydrogeological inventories. The analyses will be executed at the water sanitation laboratory of the health component, and the results obtained will be submitted to the approval of the Sanitation Agents, leading to the choice of waters to be drawn.

## 2. Site Selection and Construction of Water Supply Systems

Having chosen the water source, it would be wise to select the site and proceed to constructing the water supply system.

Site selection should take into consideration the recommended sanitary guidelines, i.e. the distances between the water point and the several pollution focuses (latrines, cow pastures, cultivated terrain, etc...). On the other hand, the site selection will favor elevated locations. This will not only help maintain water quality levels, but will also facilitate the transportation of water.

Regarding water systems construction, this will be based on standard plans for cisterns and large-diameter wells. These plans will be studied and approved a priori by Sanitation Agents in order to insure that the sanitary requirements for the construction of wells are met, i.e. volume capacity, drainage of construction waste waters, and the assignment of a worksite protection zone.

In case of improvement or reconstruction of a water system, a thorough sanitary inquiry is required, as well as an in-depth inspection complete with collection of samples for physico-chemical and bacteriological analyses. If contamination from a pollution point is suspected, this should be verified by means of a fluoresceine test which will prove whether or not any connection exists between the system and the suspected pollution point.

After construction or reconstruction, the water systems will be treated with a surplus of chlore for at least 12 hours (preferably at night), the excess chlore being eliminated either by steady pumping until the residual chlorine has reached a concentration lower than 2 mg/l, or by its neutralization with sodium thiosulphate.

Site selection will be made by the HER Agent, who will be responsible for determining the worksites with the approval of the Sanitation Agent for that region, who will also conduct sanitation inquiries before and after

construction; disinfection of the supply systems will be carried out by the HER construction team under the supervision of a Sanitary Agent, who will recommend the chlorine concentrations to be utilized, and who will also be responsible for maintaining the right chlorine concentrations after disinfection. These analyses will be conducted at the project's health component laboratory.

### 3. Sanitary Maintenance of Water Supplies

Once a water system goes into service, it becomes necessary to monitor its sanitary level and to adopt preventive and corrective measures when applicable.

Specific aspects to be monitored are:

- the state of the work, particularly its water bearing capacity;
- the condition of the pump and its utilization;
- the system's draining capabilities; and
- the observance of the protection zone.

Concerning the preventive measures, it would be advisable to draw samples for bacteriological analysis (as well as physico-chemical analyses when industrial pollution is in question) at the end of each raining season, and to disinfect the collected water by means of overchlorination.

This measures apply primarily for large-diameter wells. The chlorine base disinfectant can be obtained from the Sanitary Agents' chlorine-base disinfectant manufacturing facility.

As for the corrective measures, it would be wise to identify the safety risks presented by each problem, and to adopt emergency measures until safety has been restored.

Considering that the pump is the system's most vulnerable component, it is advisable, in case of breakdown, to identify the water point, the water drawing method, and the safety risks, and proceed to disinfecting the water in the supply system, either by overchlorination if another unsanitary water point were to be chosen, or by a chlorination strong enough to cover water chlorine needs whenever the project systems (large-diameter wells) preclude pump utilization.

A residual chlore concentration of 0,5 - 1,5 mf/l will be maintained in the used supply by the periodical disinfection of wells or by means of a steady disinfection procedure (clay pot or other).

Thus, whenever there is reason to suspect accidental contamination of a water point, it would be wise to proceed to disinfecting the waters, and to identify the problem in order to take the necessary corrective measures.

The most common operations to be carried out are shown on FIGURE 1.

FIGURE 1: Operations Most Commonly Conducted in a Rural Water Supply and Sanitation Program

Operations	Sanitary Inspection	Analysis		Disinfection		Sanitary Training
		Bacteriological	Physico-chemical	Preventive (5-10 mg/l)	Corrective (100-200 mg/l)	
Choice of a Water Source	XXX	XX	XXX	-	-	XXX
Construction of a Supply System	XXX	-	X	-	XXX	XXX
After the raining season	XXX	X	X	-	XXX	XXX
During epidemics	XXX	XXX	X	-	XXX	X
Periodical Maintenance (sanitary wells)	XXX	-	-	-	-	XXX
Periodical Maintenance (unsanitary wells)	XXX	-	-	XXX	-	XXX

XXX - Recommended action

XX - Suggested action

X - Recommended in certain cases

- - Unnecessary

Chlorine percentage experiments leading to a recommended chlorine concentration for the different works of the project will be the responsibility of the Sanitary Agents. Continuous monitoring of the works' safety level will be entrusted to VHWs. At least once a month, the Travelling Agent in charge of supervising the VHWs will make a routine inspection of the project in order to assess the sanitary level of the works. With the assistance of the VHWs, the Travelling Agent will also conduct all necessary routine disinfections. At least once every other year, the Sanitary Agent himself will be responsible for achieving a complete sanitary inquiry of the water points. Moreover, at least at the start, the S.A. will be responsible for supervising all disinfection by overchlorination. After that, this same task could be undertaken by the Travelling Agent. The Sanitary Agent will also have to grant his permission for reutilization of a water supply after maintenance procedures, in order to insure all safety measures have been taken.

All water supply works regarding the improvement of safety will be initiated and carried out under the supervision of a Sanitary Agent. Finally, the supervision and maintenance program for each water supply system will be designed by the Sanitary Agent who, in turn, will be in charge of its supervision.

4. Villagers Participation in  
Water Supply and Sanitation Activities

The principal beneficiaries of this control program are the villagers who, naturally, must be considered as the works' patrons. For that reason, all the activities of this component should benefit from villagers' participation, one of the first safeguards to be sought prior to the beginning of activities in a targeted village.

To obtain the meaningful and steady participation of villagers, it would be advisable to conduct a motivation campaign, based on their understanding of the purpose and need for such activities as part of any water supply project. For example, environment sanitation, particularly the construction of latrines, should be regarded as a means of assuring water safety not only at the level of supply systems, but also at the home storage level. Hopefully, this understanding will be realized at the beginning of the studies concerning selection of villages targeted for installment of water supply systems. This villagers motivation phase must embrace all program phases, as well as a clear definition of their role, their contributions, and their responsibilities toward this program. Villagers participation sought for this program is the following:

- choice of drawing method or type of pump (when several are available).

This choice will be made after all the details have been explained to them with regard to operation, cost, durability, maintenance facility, dependability, and the limitations of pumps.

- Choice to build a watering and/or washing tank, which would be constructed with the village's own resources and the technical support of the working party.
- construction of a safe draining system under the supervision of a health agent (Sanitary Agent or Travelling Agent), and with his technical support.
- responsibility for monitoring the supply system operation, and for the preventive maintenance of the system, the pump, and the protection zone and, particularly, the drawing system.
- contribution for the purchase of Javel water in emergency cases.

At the terminus of the motivation campaign and when the villagers are ready to assume responsibility in the installation of a water supply system, the village should be organized by one or more representatives designated by the community. At that time, their tasks will be determined. On the other hand, it will be necessary to exemplify their function in order to enable them to bring their tasks to fruition. Periodic contact will have to be maintained between technicians of the two components and those charged with these responsibilities, in order to establish cross-information. Data on water supply conditions and the difficulties encountered will be provided by those in charge, whereas data on the needs for corrective and/or preventive measures will be furnished by technicians.

The sensibilization campaign and training activities will be conducted in a joint effort by HER and Health Agents (entrusted with inventory, site selection, construction of supply systems and their supervision and maintenance).

The VHWs and the T.A. will coordinate villagers participation under the supervision of Sanitary Agents. Finally, the entire staff of the two working parties will participate in the continuing training of villagers with emphasis on sanitary maintenance of water supply systems.

##### 5. Development of the Working Parties Technical Skills

In order to execute the above-referenced program activities, it will be necessary to develop the technical skills of the personnel involved in the program. This will be accomplished first, through technical and/or practical courses as part of the training program and of VHWs and T.A.'s training. Such courses could be prepared and taught by the Project's

Sanitary Agents, according to the tasks entrusted to them. Thus, in a practical way, the courses will address the following topics:

- Sanitary level of a water supply system
- Inspection of a water supply system
- Drawing of samples for bacteriological analysis
- Disinfection of a water supply by utilization of Javel water.
- Villagers participation (motivation, organization, training and information).
- Sanitary measures to be taken for the protection of water supplies.

A two week workshop should be conducted in the interest of the two working parties (HER and the Health component). The workshop would be attended by technicians from the project and surrounding regions, and will feature a complete program on Rural Water Supply and Sanitation. Subjects treated in the workshop will be:

- Appropriate technology for the development of rural water supply and sanitation systems. Topics are:
  - . hydrogeological survey
  - . groundwater drawing and sanitary construction of drawing systems
  - . preventive and corrective disinfection of water supplies
  - . water distribution (pumping or drawing methods)
  - . supervision of the water's physical and sanitary conditions
  - . preventive and corrective maintenance of water supplies with regard to construction and sanitation
  - . disposal of human excreta and wastes in the villages
  - . villagers participation in water supply and sanitation projects.

Sub-topics are:

- . Motivation of villagers
  - . Organization of villages to participate
  - . Training of participating villagers
  - . Information and sanitary training.
- Planning Rural Water Supply and Sanitation Programs. Topics are:
- . Planning and programming WS&S projects
  - . Management of projects (administration, planning and supervision)
  - . Management of information
  - . Project evaluation.
- Financing rural WS&S projects. Topics are:
- . Financial analysis of projects
  - . Village-level financing
  - . National and foreign sources of financing.
- Epidemiological surveillance of hydric and drinking water-related diseases in a WS&S project.

This workshop will include conferences, practical demonstrations, group work and practical on-site experiments.

Thus, the project technicians will have the opportunity to participate in seminars, workshops and/or international symposiums with the purpose of broadening their knowledge through other peoples' experiences.

6. Management of Information Within the Program Framework

It will be necessary to collect, interpret, disseminate and store data generated by the water supply and sanitation program. Such data

will not only equip participants for decision-making as needed, but also for evaluating work progress. To accomplish this, the following information is needed:

- General profile of Each Targeted Village

- . Demography
- . Sociology
- . Economic status
- . Other

- Profile of Each Village's WS&S

- . Type of WS&S
- . Population serviced
- . WS&S's level of safety
- . Description of actual and potential contamination
- . Population participation and input
- . Presence of VHVs in the village and information on their training and their experience in the position they occupy.

- Record of Activities:

- . Construction and improvement
- . Sanitary inspections
- . Surveys
- . Problems and obstacles encountered
- . Analyses results and their interpretation
- . Actions taken concerning the WS&S.
- . Other

## 7. Schedule of Program Activities

After the proposed Action Plan has been approved by the project incumbents, it will be profitable for the personnel of both components to agree on ways of cooperation to carry out project implementation.

Although it would be advisable to launch all the above mentioned activities, the present lack of necessary resources for some represents an obstacle which will only be removed slowly. However, a good number of activities will be scheduled to start immediately. These are:

- . Incorporation of sanitary inquiries to water resources assessment activities.
- . Water Supply inquiries in villages already serviced.
- . Physico-chemical and bacteriological analyses of supposedly contaminated waters.
- . Boosting village participation.
- . Training of personnel working in the program (VHWs and T.A.s)

A chronogram or schedule of activities is shown below:

- Dissemination of Data

- . All urgent information regarding the WS&Ss will be disseminated immediately. For example, the technicians of both working parties will be responsible for informing one another immediately about every emergency situation which may arise.

With regard to routine situations, the Sanitary Agents will be required to present a monthly report to the Director of the Health component, with copy to the Director of HER, and an annual report on the sanitary condition of the water points and the interventions carried out during the year. This annual report will be distributed to the Directors of both components.

Drinking Water Supplies Sanitation

Activity	Personnel in charge	Period of Implementation		
		1983	1984	1985
1. Approval and finalization of the Action Plan	Directors of the two components	●-----●		
2. Sanitary assessment of the WS&S built	Sanitary Agents	●-----●	●-----●	-----
3. Sanitary assessment of the WS&S to be built	HER Agents Sanitary Agents	●-----●	●-----●	-----
4. Motivation, organization, training and program information of villagers	VHws, T.A.s, Sanitary Agents and HER Agents	●-----●	●-----●	-----
5. Surveillance and maintenance of the WS&S sanitary conditions	VHws, T.A.s, Sanitary Agents HER Agents		●-----●	
6. Training of VHws and T.A.s in WS&S sanitation	Sanitary Agents	●-----●		
7. Preparation and presentation of the WS&S workshop	National and international lecturers	●-----●		
8. Development of a reference laboratory for the physico-chemical and bacteriological control of project water supplies	Consultant(s), Laboratory technicians and Sanitary Agents		●-----●	
9. Management of Information	Technicians from both components	●-----●		
10. Epidemiological surveillance	Physician Director of the Health component, Nurses, Sanitary Agents, T.A.s and VHws		●-----●	

11

## APPLICABLE RESOURCES

### Human Resources

#### 1. HEALTH COMPONENT

- . 4 Sanitary Agents
- . 1 Laboratory technician
- . 110 Travelling Agents
- . 550 Village Health Workers
- . Drivers

#### 2. HYDRAULIC COMPONENT (HER)

- . Hydrogeological inventory incumbents
- . WS&S site selection incumbents
- . WS&S construction incumbents
- . WS&S maintenance incumbents

#### 3. TECHNICAL ASSISTANCE

- . 2 Sanitary education specialists
- . 1 Hydrogeology specialist
- . 1 Electromechanics engineer
- . 1 Financial analyst
- . National/international lecturers, Sanitary engineer(s), Epidemiologist, Administrator, financial analyst, sociologist, other...

### Material Resources

- 3 portable laboratories for the exclusive analyses of recommended tests (1 laboratory per department, and 1 for the HER hydrogeology section).
- 4 Millipore portable laboratories for bacteriological analyses (fecal coli-bacilli only). Laboratories are to be utilized for routine analyses by Sanitary Agents.

- 4 kits for the production of sodium hypochlorite from granulated salt and water-base disinfection. These kits will be placed at the health centers or dispensaries at the Sanitary Agents' operations headquarters, and will be capable of producing chlorine-base disinfectant in sufficient quantities to cover not only the program needs, but also those of the health center or dispensary.
  
- Agents' Working Tools
  - . 250 ml. flasks
  - . 5 to 10 liters plastic drums
  - . 100 meters scale chain
  - . Weight
  - . String and rope
  - . Thermometer
  - . Residual chlorine/pH indicator (preferably Hydrocure), 1 per Sanitary Agent
  - . Hach residual chlore indicator (1 per S.A.).
  
- Complete reference laboratory for physico-chemical and bacteriological analyses of drinking water. This laboratory will be located in Bobo-Dioulasso, within the health component facilities.
  
- 4 four-wheel-drive vehicles, one per sub-district for use by Sanitary Agents for program supervision activities.

NOTE: A complete and thorough study would be necessary for equipping the reference laboratory. Such study would require the expertise of a consultant specializing in water quality control experiments.

APPENDIX

List of Participants in the Workshop  
and Composition of the Working Group

A - List of Participants

<u>Name</u>	<u>Title</u>	<u>Position</u>
TRAORE, SEYDOU	Senior Technician, HER	Water Resources Inventory Brigade
BOUDA, OMER	Sanitation Assistant	Rural Water Project Health Component
SORGHO, G. PROSPER	Sanitation Assistant	Banfora Sanitation Service
YONLI, AMYE	Sanitation Assistant	Rural Water Project Health Component
HIEN, DIKONTE ETIENNE	Sanitation Assistant	Rural Water Project Health Component
OUEDEKAGO, BOUDACAR	Sanitation Assistant	R.W.P. - H.C., Bobo
TIENGUEBI, SIMON	Sanitation Assistant	R.W.P. - H.C., Bobo

APPENDIX

B - Composition des Groupes

<u>GROUP</u>	<u>Subject (assigned objective)</u>	<u>Participant</u>
I	To obtain a sanitary water supply source	Traoré, S.* Bouda, O. Hien, D.E.
II	To obtain a sanitary water collection and distribution system	Tienguéri, S.* Sorgho, G.P.
III	To supervise and maintain water supply systems in good sanitary condition	Yonli, Amyé* Ouédraogo, B.

\* Presenter of the group's works in plenary session.