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UPPER VOLTA RURAL WATER SUPPLY PROJECT

PROJECT NO. 686-0228

CONTRACT NO. AID/ AFR-C-1709

DIMPEX ASSOCIATES INC.

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1. INTRODUCTION

1.1 Project Goal

The over-all goal to which this project contributes is to "improve the quality of life of rural people in Southwestern Upper Volta."
-USAID Project Paper, June, 1979.

1.2 Project Purpose

The purpose of this project is "to provide rural people of Southwestern Upper Volta with a) potable water supply systems which will meet their minimum daily requirements and b) an effective community health education program."
-USAID Project Paper, June, 1979.

1.3 Scope of Work

The scope of work for which DIMPEX is responsible includes the provision of long-term specialists in administration, equipment, health education and hydrogeology, as well as selected short-term specialists, to perform technical assistance directed to:
1) the digging, deepening or drilling of 620 wells and
2) the creation of a viable and self-sustaining preventive health system in the villages associated with the wells program.
-Contract No. AID/afr-c-1709, October, 1980.

1.4 Contract Funding and Modifications

Initial funding up to a limit of $240,000 and effective for 6 months was authorized in a letter contract between AID, SBA and DIMPEX in October, 1980, pending negotiation of costs and execution of the final contract (C-1709).

On February 20, 1981, Amendment No. 1 to the Contract:

1) increased obligated funding by $240,000 to a total of $480,000

2) modified the statement of work to reflect 42 months of service for the hydrogeologist and health educator, reduced from 48 months; and also amended the short-term technical assistance;

3) identified the period of the contract as starting on October 3, 1980 with an estimated completion date of December 31, 1984;

4) provided a line item budget and identified the total estimated cost of the contract as $1,924,271;

5) defined the basis for overhead rate and payment of fixed fee.

On November 9, 1981, Amendment No. 2 to the Contract:

1) increased obligated funding by $750,000 to a total of $1,230,000;

2) revised the description of services for the hydrogeologist and added a new contract position and scope of work for 36 months of services by an Administrative Manager;

3) revised the schedule and duration of long and short-term technicians' services;

4) increased the budget to $2,314,084, reflecting the additional costs of the new Administrative Manager position and adding the wife of one of the contract technicians;

5) provided for changes in logistic support and for the inclusion of updated AID General Provisions and Additional General Provisions.

On April 26, 1982 Amendment No. 3 to the Contract:

1) revised the budget to $2,241,213 to reflect savings based on the first year's actual costs.

On September 3, 1982 Amendment No. 4 to the Contract:

1) A new overhead rate was negotiated and approved.

On May 17, 1983, Amendment No. 5 to the Contract:

1) Increase the obligated funding to $2,241,213 to correspond to contract cost of the same amount approved in Modification 3.

2) Revised the statement of work to reflect the 5 months' extension for the health education specialist.

2. CONTRACTOR CONTRIBUTION TO PROJECT OBJECTIVES

Summary

At the end of this reporting period (December, 1983) the wells component of the Rural Water Supply (RWS) project had successfully completed 215 drilled and 205 hand dug wells, of which 85 had not yet been sealed and 133 were awaiting installation of the Moyno pump. Another 21 wells were in process.

At the present rate of production, and assuming that the FORACO drill rig remains on loan to the project through July, 1984, it seems likely that the target number of positive water points (620 in 550 villages) will be approached on or before the PACD. It may be assumed, however, that the masonery and pump installation work will not be completed by this date, and that considerable pump repairs, village animation, deepenings and re-drillings will remain for the proposed extension campaign.

This reporting period encompasses the close-down of the 1982-3 campaign, the "off-season" and the start-up of the 1983-84 program. A particularly intense effort was made during these six months to ensure that the final year of the project (as originally conceived) would be as productive as possible. As emphasized in Semi-Annual Report No. 5, priority was accorded to parts orders, equipment maintenance, logistics and supply considerations.

On the health side, the replacement for the second health advisor position arrived at Post and assumed his duties. The project, however, was handicapped by prolonged periods without an active, full-time technical director. The revolving-door nature of this post (3 incumbents this period) has contributed to a serious lack of administrative and managerial support. On a more positive note, the health component sponsored and organized a very successful seminar program in July and a comprehensive village survey effort in Sept. - December. Training of Itinerant Health Workers continued apace with 21 having completed their training and 30 more currently in training. To date 260 Village Health Workers have been trained. And 103 demonstration latrines have been constructed.

A comprehensive proposal for improvements to, and extension of, the project was jointly prepared by DIMPEX and Medical Care Development (See Annex A).

WATER SUPPLY COMPONENT

2.1 - Hydrogeologist

The contract hydrogeologist concentrated his efforts on drilled-well site selections, the compilation of hydrogeological data available and the training of a

local-hire assistant. He and his assistant have begun logging of well cuttings from drilled wells for lithological determination and transferring the well logs into the "fiches de village" systematically. During this period the hydrogeologist also carried out and interpreted several pumping tests to determine the characteristics of aquifers: transmissivity and permeabilities (see Annex B).

2.2 - Equipment Specialist

During the 1982-83 close-down and the off-season, the equipment specialist focused on Jeep and Mack parts orders, modification and maintenance of the project fleet, and warehouse controls. As the new campaign began and garage activities diminished somewhat, he was able to concentrate on organizing and directing the Ingersoll-Rand technician TDY(Oct. 20-Nov. 15, See Annex C) exploring training possibilities for project mechanics; and preparing for an eventual relocation to new garage facilities.

2.3 - Administrative Specialist

The administrative specialist worked with the local hire accountant closing out the 1982-83 books - with particular attention paid to non-liquidated encumbrances carried over to the 1983-84 campaign. He assisted the technical director in the preparation of the 1983-84 budget, and the brigade chiefs in the procurement of necessary supplies and spare parts for a successful November mobilization. He participated in an evaluation of funds available for a proposed extension year, and in discussions with USAID personnel regarding extension year parameters. He also received numerous inspection and evaluation team visits during the six months under review, including a full-scale audit of local currency expenditures carried out by the Ouagadougou-based USAID financial analyst. At the end of the period, the administrative specialist worked with USAID and two brigade chiefs chosen for US-technical training, to ensure that necessary administrative arrangements for their proposed March '84 departure were concluded. He continued to supervise on-going wells component administrative and logistics routine.

HEALTH COMPONENT

2.4 - National Rural Water Supply and Sanitation Seminar (See Annex D)

A national rural water supply and sanitation seminar was organized by the Project with the assistance of Medical Care Development (MCD). The seminar took place between August 22 and September 2, 1983, and was attended by HER well technicians and Ministry of Health (MOH) sanitarians working within and without the Project area. The health educators played a major role in the preparation and implementation of the seminar. The participants viewed the seminar as practical and valuable. It was considered an effective means for introducing nationally Mr. Ashelman and Ms. Dishman, the new MCD health specialists, to Voltaic health and HER personnel. The seminar also provided an opportunity to expose the two specialists to problems and proposed

solutions for rural water supply, sanitation, and primary health care issues in Upper Volta. The participants and Project officials made a recommendation that an international rural water supply and sanitation seminar be organized in the Project area.

2.5 - Proposed Health Component Technical Assistance Work Plan

During his field visit to Upper Volta, Pierre R. Leger, MCD's Project Officer, proposed a Work Plan which was developed and presented to the Project Directors, U.S. AID/Ouagadougou and the MOH Secretary General. The Work Plan was effective in providing guidance to the health educators and to Project activities in the remaining months of the Project. Six areas were considered priorities for Project intervention. These were:

- Development of a Project information system.
- Development of a sanitary control program for Project water supplies.
- Development of a demonstration latrine program for Project villages.
- Development of training programs for Village Health Workers (VHWs) and Itinerant Agents (IAs), and nurses.
- Development of health education intervention capabilities in the project area.
- Reinforcement of Project management by developing a Project operations plan and an epidemiological surveillance plan.

Specific roles and responsibilities for the MCD health specialists and short-term consultants intervention plan were proposed in the Work Plan.

2.6 - Survey of Project Villages (See Annex E)

A comprehensive survey of 374 Project villages which had received a Project water supply system was organized and implemented between September and December 1983. The purpose of the survey was (1) to provide thorough orientation to the new MCD specialists and (2) to develop an adequate data base to program future Project activities. The survey was realized with the participation of personnel from both Project components and field personnel from the Ministries of Health and Rural Development who were working in the four Project provinces. Data which as been collected is currently being analyzed for Project use primarily during the remaining seven months of the Project.

2.7 - Water Quality Testing

The senior MCD specialist, Mr. Ashelman, made an inventory of all existing project water quality testing equipment, supplies and facilities. The existing Millipore kits were found to be in disrepair and not appropriate for the tests required for the Project. While the faulty filter parts were returned to the manufacturer for adjustment, a list of more appropriate equipment and supplies was made and submitted to Project officials for approval and procurement. Cost estimates for all equipment were obtained by MCD/Washington and sent to Upper Volta for approval by Project officials. Additionally, the HACH kit manual was returned in MCD/Washington for translation into French. Translation is being done and French copies should be ready by the time all equipment is received in the field.

2.8 - Well Site Improvement

A technical plan to improve existing well sites was developed and proposed by MCD to project officials. The plan proposes to extend concrete well aprons to two meters, build a lip at the perimeter to retain run-off water, and connect the apron to a soakage pit for final disposal. The proposed construction methods were demonstrated to HER and health personnel during the August-September seminar where a drilled well site was improved with the collaboration of seminar participants and villagers. The proposed technical plan is to be reviewed by HER for final approval; a copy is appended to this report (See Annex F).

2.9 - Training of Itinerant Health Workers and Sanitarians

Ten Itinerant Health Workers (IHWs) in the Hauts-Bassins area, and as many in the Sud-Ouest Department, participated in field survey training sessions led by the health educators in order to prepare the IHWs to conduct the survey interviews in target villages. Almost all IHWs took part in the field interviews, either in collaboration with ORD personnel (who were also instructed in how to conduct the survey) or under the supervision of Project sanitarians. One sanitarian from the Hauts-Bassins was trained to help instruct ORD interviewers; two Sub-Ouest sanitarians assisted in training their IHWs and in tabulating survey results from their area.

2.10 - Project Management Assistance

The health specialists have contributed in the analysis of the evaluation report. Their role was primarily one of being catalysts in the interpretation and utilization of evaluation results. The specialists also assisted in pre-campaign coordination meetings with HER and local government administrators.

In collaboration with the wells component, the health specialists arranged for the development of joint operations in the preparation and implementation of the survey and in the siting of new wells. Finally, the health specialists assisted the project sanitarians with the development of the work program for this year's campaign.

The two previous health specialists, Suzanne Plopper and Steve Lucas, who departed in 1983 at the expiration of their contracts provided recommendations for future project direction (See Annexes G and H).

3. PROBLEMS EXPERIENCED

WATER SUPPLY COMPONENT

3.1 - Hydrogeologist

A) Hydrogeology field missions were impeded by the poor mechanical condition of the jeep Cherokees. This problem was resolved in December with the receipt of a Toyota Diesel Land Cruiser.

B) Lack of documentation: The project has not yet been able to obtain documents referred to in Semi-Annual Report No. 5 which would be of benefit to future hydrogeological studies. Further attempts will be made during the following period.

3.2 - Equipment Specialist

A) Moyno Pumps: Perhaps the most disquieting element of the recently completed village survey were the responses concerning the Moyno pump performance. After tabulating and analyzing pump test results from 267 project villages, the health specialists concluded that 10% of all pumps installed up to that time were no longer functioning, and an additional 23% were yielding less than the minimum established criterium of 6 liters/minute (at 50 rotations/minute). Although project technicians have been aware of the existence of Moyno pump mechanical problems for some time (see past semi-annual reports for details), the number of installations effected had never before been systematically evaluated and the scope of the problem perhaps not fully appreciated.

In any event, the wells component direction has responded by dispatching pump repair teams to villages cited in the survey Preliminary Report (Annex E) and, in meetings with Robbins-Myer field representatives, by stressing the importance of their concluding a workable representation agreement with an established local firm. USAID has been asked to reinforce this request as forcefully as possible in a cable to Robbins-Myer management. It is hoped that through such an agreement spare parts for the Moyno pump would be more accessible, hence less of an administrative and financial burden for the project, and that personnel trained in Moyno pump installation and repair could be made available to service project-purchased pumps.

With regard to future installations, the project has recently received 285 new Moyno pumps which have been significantly modified to correct perceived defects. Although the project experience with the new pump components has been limited and cannot be considered conclusive, the equipment specialists believes that the chromium rotors are a great improvement over the nickle-plated ones and that it is possible that the most serious of the past mechanical problems has been solved. That may also be the case with the new heavy-duty clutches. A Robbins-Myer reprsentative visiting in December informed the equipment specialist that the project should experience many fewer breakdowns of clutch components based on the record of new-model pumps installed elsewhere. The equipment specialist estimates that a reasonable evaluation of the modified pump performance will be possible after the 1983-4 campaign.

B) Jeeps: A thorough reexamination of the jeep policy is being undertaken, the results of which are not yet totally defined. At issue is the compatibility of the jeep vehicles with HER activities following completion of the project, given the following considerations: 1) HER's capacity to operate and maintain the fleet on the limited resources that will be available to it, 2) the availability of spare parts locally; 3) the technical problems experienced with jeep vehicles and their performance to date under local conditions, see Semi-Annual Report No. 5, Section 3.3, and 4) time delays in delivery.

HER feels strongly that given the budget with which it will have to operate after the project, it will not be able to use the jeeps, particularly the 6-cylinder vehicles, because of high fuel consumption and the high cost of spare parts. It is felt that HER would not be able to special-order any parts (due to administrative and budgetary constraints), which would lead eventually to a deadlined fleet of useless vehicles. In addition, the jeeps have not demonstrated that they can stand up to the road conditions in the area. Particularly troublesome is the "shaking apart" of the front crossmember of the chassis. Jeep has sent additional crossmembers to be installed on all J-20 and Cherokee chassis and they have installed the additional crossmembers on subsequent models. But the results of this modification are not known at this time, and it is difficult to justify potentially burdening HER with this problem. There is no indication that the rear axle breakage problem has been resolved, or even addressed.

For these reasons HER will request aid to allow it to renew at least a portion of the jeep fleet with locally-purchased vehicles (Peugeots and Toyotas). These vehicles have an acceptable record in this country of reliable parts distribution and vehicle performance. AID's response to the request to purchase locally is not yet known. The effect of the policy review is to put a hold on ordering vehicles and parts. Without knowing what the fleet will consist of it is impossible to know what spares to plan for.

With reference to Semi-Annual Report No. 5, section 4.2.1 the order of a replacement fleet was never completed, this due to a similar jeep-purchase policy review at AID/ Ouagadougou, rather than to the project policy review described above. At the time Semi-Annual Report No. 5 was being prepared, the project was planning to order the jeeps mentioned in the report and the necessary requests to AID were made. Later when AID began to reconsider its jeep purchasing policy, the order was put on hold. Because of this delay, the project was compelled to request an authorization from the mission to order a minimum of four vehicles locally in order to start the 1983-84 campaign. This was done, and the vehicles (three 504 pick-ups and one Toyota Land Cruiser) are now in use. The local purchase of these vehicles does not preclude the necessity to review the remaining jeep fleet. It is this renewal that is being considered in the reexamination of jeep policy at the project level.

In addition to the uncertainty concerning which vehicles are to be ordered, there is the further problem of assuring that jeeps, if they are eventually chosen, will arrive in time for them to be used during the extension period. AID is awaiting a waiver from AID/W which will authorize the purchase of jeeps. Even if the waiver is received soon, it is not clear that the project will be able to order the vehicles in time for them to be delivered on or before the beginning of the extension campaign. Past orders have demonstrated that a minimum of nine months and sometimes more than a year is required for jeep deliveries. This in spite of shorter delivery times quoted by the suppliers. This is still another argument for the local purchase of vehicles, which can be delivered in one to seven months, depending on availability.

C) Mack trucks: The spring problem referred to in past reports (Semi-Annual Report No. 5, section 4.2.2 for example) has not yet been solved. A Mack representative visitd the project in November and suggested that helper-springs be added to the dump trucks. These parts will be ordered.

3.3 - Administrative Specialist

A) Gasoline and Vehicle Controls: During the course of a number of inspection/evaluation visits sponsored by USAID, the question of gasoline and vehicle controls was repeatedly raised. It is generally acknowledged that the present system of issuing gasoline coupons without a mileage control is insufficient and that there has not been close monitoring of vehicle use. USAID/OFM has promised to provide written guidelines to help rectify this situation.

B) Accounting for third-party receipts, gasoline encombrances: The first issue cited concerns accounting procedures to rectify specific line items when the project is reimbursed for wells drilled for outside organizations. The problem of gasoline encumbrances was discussed in Semi-Annual Report No. 4. In both instances the project has requested guidance from USAID/OFM and a memorandum clarifying these questions should be forthcoming during the next reporting period.

C) Micro-computer: Project administration would be greatly facilitated by the installation of an appropriate micro-computer and software. The inventory system presently maintained by hand could be handled at far greater efficiency with a small and relatively inexpensive micro. The payroll system for 250 project employees would be even easier to computerize, relieving the local-hire accountant of many days of drudge work/month and virtually eliminating errors. Many other applications, including project financial analyses, cost details by field brigade, even routine correspondence and report writing are within the realm of a mid-range system and minimum of software. This issue has been discussed at a number of levels, meeting virtually no resistance on any front. It remains for HER/Ouagadougou, in consultation with CENATRIN (a data-processing liaison office in Ouaga) to specify the model and accessories to be ordered.

D) Monthly reporting system changes: Following an October field visit by Arthur Anderson and Co. consultants, during which new reporting requirements were discussed, the project will adapt present monthly financial reports to conform to cumulative rather than yearly parameters. A number of other changes which have been proposed will be reviewed in detail during a three-day seminar January 10-13 at USAID/Ouaga. The project accountant will participate in this training and begin the new format upon his return. Insofar as less than seven months remain before the PACD, it is hoped that the new reports can be adopted without disrupting present accounting routine and that the extra time involved in processing the new forms will not compromise the accountant's present activities.

E) Cement: The project overstocked cement last campaign because provisions sufficient for the Oct.-July program did not arrive until late April (see Semi-Annual Report No. 5), at which point the bulk of the 1982-3 requirements had already been purchased locally. Rather than risk losses due to prolonged storage/humidity, the project is transferring 228 tons to a Dutch-funded hydraulique project at cost.

HEALTH COMPONENT

3.4 - Management Weakness

During the first six months of the Project, it became apparent to the MCD health specialists that the health

component had major management weaknesses. This was highlighted by the departure of the first health component director, which left a vacuum in Project administration which had not been totally filled by the end of this reporting period. Among the problems experienced by the director's departure were the following:

- Lack of supervision and direction of Project personnel, particularly IAs who were newly recruited and needed to settle administrative problems and be oriented toward their new position.

- Absence of a decisionmaker at the health component level to insure that the Project field personnel were being properly supported.

- Delays in scheduling Project vehicles, obtaining gas coupons, and obtaining needed equipment and supplies.

- No replacement of a Project sanitarian who departed for training abroad without giving notice.

- Breakdown in communication between Project personnel working in the Southwest Department and Project headquarters.

Moreoever, roles and responsibilities of various personnel, to include those of the health specialists, were undefined and, therefore, did not allow any Project staff to fill at least some of the void which was left by the former director.

3.5 - Work Plan Implementation

The Work Plan proposed by MCD to USAID and Project officials in Bobo-Dioulasso and Ouagadougou made several recommendations which would require short-term technical assistance in the following areas:

- Operation plan development for the health component.

- Water quality control and surveillance program planning.

- Epidemiological surveillance program planning.

- Health education program development.

To date, no decision has been made in addressing these specific recommendations. However, it is hoped that with the assistance of the REDSO and WASH teams, final decisions on these key project areas will be made by the Ministry of Health and USAID.

3.6 - Survey Processing

It was anticipated that the survey would have been processed by November 1983 and a final report written before January 1984. However, it was felt that the data collected during the survey would serve as a basis for setting up the proposed information system, which is to serve each Project component. Therefore, the decision was made by Project personnel to develop a computer program to help analyze the survey results and to draw a Project profile. In turn, the computer program could easily update information regarding the Project. Both REDSO and SHDS were contacted for assistance; however, final arrangements are yet to be made for this intervention.

4. GENERAL OBSERVATIONS

WATER SUPPLY COMPONENT

4.1 - Hydrogeologist

Considering the success rate obtained from the wells drilled this campaign (nearly 100%) in the sedimentary area of the project zone (former Department des Hauts-Bassin) and given the value of transmissivities and permeabilities obtained from the pumping tests in the wells in the area (see Annex B) it appears that in the Precambrian sandstone zone we have encountered an unique geological unit. Thus, at least two faces of these sandstones ("a' Gris a Galet de Ouartz and Gris Rose") are the foundation for a significant reservoir of water and drillings will meet the current needs.

In event that the project is extended, this zone should be the object of special attention for the ground water reservoir development of the area.

4.2 - Equipment Specialist

A) Ingersoll-Rand: The training sessions conducted under the supervision of the Ingersol-Rand (I-R) specialist in October and November were extremely useful. With the assistance of this technician, the project will be placing orders for I-R, International Harvester (I-H) and Detroit Deisel motor spare parts. A premaintenance inspection of the TH60 led the specialist to conclude that the rig had been properly operated and maintained to date (see attached field report, Annex C). He was able to give a thorough explanation of the function of each component including instruction on the disassembly and repair of various elements. Unfortunately hands-on major repair instruction was impractical due to time and equipment constraints, but he was able to recommend a potential training site at an I-R facility in Asia. The equipment specialist is currently following up on this possibility. On his return to the U.S., the I-R specialist contacted suppliers for the drill rig manufacturers

in order to obtain documentation required to order parts. This is necessary since there are no representatives for these suppliers in Upper Volta and the documentation supplied with the drill rig was incomplete.

B) Jeeps: This is clearly a critical problem area. Up to now the garage has been able to keep field activities going. However, with the aging of the jeeps, provisions must be made for their eventual replacement in order to avoid seriously handicapping field activity due to breakdowns. If it is decided that the Project must purchase jeeps, the waiver from AID/W will have to arrive soon. The equipment specialist and the project director feel strongly that HER should be allowed to purchase vehicles locally for the reasons cited in section 3.2.B, above.

C) Moyno pumps: The equipment specialist believes that the problems of rotor and clutch breakdowns may have been resolved. He will continue to monitor the modified pump performance during the course of this campaign. The other problems noted in Semi-Annual Report No. 5, section 4.2.4 are relatively minor.

D) Mack/I-R training: Inquiries are being made into possibilities for comprehensive training for Mack and I-R equipment. Th most difficult obstacle is finding instruction in French. Solutions to this problem, including hiring local translators or bilingual technicians or sending the equipment specialist along, are all being considered. The equipment specialist feels that hands-on training is very important at this juncture, particularly for the TH60 mechanic.

E) Warehouse controls: Because the project is nearing completion, and the equipment specialist will not be present for the extension period, greater attention is being given to the eventuality that counterparts will be taking over the equipment specialist's functions. To this end, recruitment was initiated for a warehouse clerk capable of effectively controlling material use and maintaining stocks. The persons selected would be paid from HER funds, since a large stock of spares and material will remain.

4.3 - Administrative Specialist

From an administrative/financial standpoint, the wells component is in very good shape. The present campaign is well underway with no logistical impediments in sight. It is clear that sufficient funds remain to see the project through to the PACD and beyond, and that barring unforeseen problems, target objectives should be achieved during the course of a proposed extension year. The issues that remain to be resolved next reporting period concern primarily post-PACD considerations. Notably:

A) Training: The project has a considerable investment in American-origin equipment and parts, hence an obligation to provide for their maintenance when American assistance in phased out. Training possibilities for Jeep, Mack and I-R mechanics are being explored and positive results should be reported next period.

U.S.-based training of two project brigade chiefs, in geology and water wells technology is programmed for March 1984 to August 1986. Though certain administrative obstacles remain to be overcome, it seems likely at this writing that they will be able to begin. Their English language training in Dayton, Ohio, is on schedule.

A related issue concerns the recruitment and training of a warehouse clerk and administrative assistant to back up the expatriate technicians presently in place. Since a considerable overlap period will be necessary if these new staff members are to be integrated into their respective posts before the PACD, this issue will become increasingly important during the next six months.

B) Extension parameters: Early next reporting period the GOUV and USAID will have to discuss objectives and parameters for the proposed project extension. Questions of continued technical assistance, short-term expertise, ration ale(s), level of funding will all have to be addressed. In addition, the possibility of a U.S.-funded "Phase II' wells program may also be broached.

C) Moyno Pump: The Moyno pump failures threaten the viability of project achievements. Thus the designation of a local representative capable of actively supporting project pump installations is critical. Equally important will be the field test results of the modified Moyno pumps being installed. The extent to which the project has successfully responded to target population needs will hinge, to a large degree, on the outcome of this issue.

D) Recurrent costs: The recurrent cost proposal depends upon village participation; hence the efforts of the combined wells/health animation team will become increasingly important as the Project approaches the PACD. A number of strategies for village-level maintenance of project water points have been discussed, and should be better defined during the following reporting period.

HEALTH COMPONENT

4.4 - Administrative Changes

During this reporting period, the Health Component has changed directors twice. The changes of Directors have resulted in some disturbances in Administration which, in turn have affected Project operations. However, a permanent

replacement was named in December and has assumed general administrative responsibilities.

4.5 - Increased Collaboration Between the Health and Wells Components

A hallmark of the last six months has been the development of a fruitful collaboration between the staff of the two Project components. This is a direct result of the August-September seminar where the participants made recommendations on several issues which required close collaboration between all agencies. However, the survey was the major tool which brought personnel from both components and local governments together. Personnel from within and without the Project from the Ministries of Health and Rural Development fully participated in the planning, organization, management, and implementation of the survey. This proved that with effective planning of activities in a coordinated manner, the Project components can work together.

5. CONTRACTOR GOALS AND OBJECTIVES

WATER SUPPLY COMPONENT

5.1 - Hydrogeologist:

A) Continue with site selections.

B) Brief assistant on methods used to date.

C) Establish a program of isopiezometric mapping

D) Establish a program to determine the specific yield of aquifers. With this value one can calculate the maximum expected drawdown for a given pumping rate or the yield to be expected for a given drawdown. Such data can be used to predict if a well will yield continually during the dry season. Also such data gives a better estimate of how deep to set the pump intake.

5.2 - Equipment Specialist:

A) Continue supervising garage and warehouse activities. Responsibilities and day to day controls will be systematically transferred to counterparts during the coming months.

B) Prepare move to new garage facilities.

C) Arrange training for I.R. and Mack equipment.

D) Prepare parts orders for existing equipment with a view to long-term use.

5.3 - Administrative Specialist

A) Follow up on technical training for brigade chiefs.

B) Install and program micro-computer.

C) Train an administrative assistant.

D) Participate in project extension discussions.

HEALTH COMPONENT

5.4 - Short-Term Technical Assistance

The original Technical Assistance Plan adopted in September called for three short-term consultants to assist in a) water quality laboratory development, b) operational plan development, and c) epidemiological surveillance program development. Since Contractor staff in Bobo was not able to receive assurance from AID that these consultancies will be discussed until after a decision is made regarding Project extension, these three areas remain vague and undefined.

Nonetheless, the health component staff submitted to the health technical director a six-month program schedule to be refined and adopted at the beginning of the new year. These are outlined below.

5.5 - Survey of Project Villages

Arrangements will be made to translate the Preliminary Report of the survey in French and distribute it to interested parties. Completion of the survey is proposed by interviewing 18 more target villages and submitting survey results to a more rigorous analysis, taking advantage of computer capabilities from the SHDS Project in Abidjan, if necessary.

5.6 - Collaboration with HER in Well and Borehole Sitings

While 31 sitings have been made in Houet Province, 40 yet remain. In Poni Province, 34 sitings have been made; Bougouriba Province awaits 50 sitings.

5.7 - Disinfection of Large-Diameter Wells

Project sanitarians plan to disinfect hand-dug wells upon completion of concrete work to assure bacteriological purity of well water. Details of coordination with HER are being worked out in January, the actual disinfection beginning in February.

5.8 - In-Service Training of Nurses, IHWs and VHWs

Starting in January, six nurses in Houet Province and three each in Poni and Bougouriba Provinces are to be trained in conjunction with 30 IHWs in training (still in school) and 21 IHWs in the field (from last year), emphasizing collaboration with 152 existing VHWs in the areas of latrine construction and motivation, construction of soak-away pits, protective measures around the well site, and rehydration therapy.

5.9 - Recruitment, Training, and Supervision of Latrine and Well Protection Teams to Work with ASVs

This proposed idea is still in the development stage but has the support of all sanitarians and the health educators. Given the fact that the "animation" does not sufficiently motivate ASVs and fellow villagers, the mobile demonstration teams will have a greater impact, working by two's with the ASV under supervision of the IHW. It is proposed that the teams (three of two each) be engaged by HER and jointly trained.

5.10 - Water Quality Analysis and Control

Bacteriological analysis of selected large-diameter wells and limited chemical analysis of boreholes primarily constitute the basis for recommending corrective actions. This activity awaits material and training support from a consultant such as was proposed in the September Technical Assistance Work Plan.

5.11 - Production of Health Education Materials

The Centre National d'Education Sanitaire in Ouagadougou has agreed to provide a graphics specialist to develop appropriate visual aid materials of IHW and VHW activity. The materials are to be reproduced by a local photo-offset printer.

5.12 - Participation in Training HER Well Animation Team

The Animation Team proposed by HER is to be engaged in well education; particularly pump maintenance and well sanitation. Health personnel will be involved in training for the latter.

5.13 - Recommendations

Management Improvement

It is highly recommended that the organizational structure for the Health Component be thoroughly studied and strengthened in the future, particularly if the Project is to be extended. While it is understood that the health

component Project director cannot devote full-time attention to Project management, assistance must be provided to him in order to ensure smooth operation. Thus, the position of an Assistant or Deputy Project Director would have to be created. The primary function of this position would entail activity planning and management. The position would require a full-time person with adequate expertise and experience in public health administration. A person for this position could either be provided by the GOUV, thereby becoming the counterpart to the health specialists, or if necessary, by USAID as a member of the technical assistance team.

Data Processing Capability

The information system, which will entail processing of all required project data, could use an appropriate computer system effectively. This would not only be beneficial for Project management, but also it could serve as a model for other projects, including the Rural Health Planning Project. Therefore, the Project will need technical assistance to make a feasibility study for such a proposal, develop a specific computer program, and train four project personnel to use the hard- and soft-ware for the proposed computer system.

ANNEX A

DIMPEX ASSOCIATES INC.

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UPPER VOLTA RURAL WATER SUPPLY PROJECT

PROPOSAL
FOR IMPROVEMENT AND EXTENSION
OF THE PROJECT

October 1983

Opportunities to Improve Implementation in the Rural Water Supply Project in Upper Volta

During the summer of 1978, a Dimpex Consulting team contracted by USAID and working with the Ministry of Rural Development/HER proposed a set of recommendations for the Rural Water Supply Project in Upper Volta. Based on the recommendations of the Dimpex report, the Project Paper (PP) was prepared by the USAID/Ouagadougou staff.

Subsequent to this Dimpex was contracted by AID to implement the technical assistance portion of the project. Dimpex has now been assisting the Government of Upper Volta/Direction de l'Hydraulique et Equipement Rural (HER) in this implementation activity for about three years. In 1982, a mid-term evaluation of the project was conducted and a report submitted. This report has now been reviewed and discussed by the GOUV, USAID, AID/W and the Dimpex field and home office staffs. It is therefore in consultation with all these involved parties and, specifically, at the request of Ministere de Development Rural/Direction de l'Hydraulique, the Ministere de la Sante' Publique and the USAID Mission that we offer a set of proposals which, if adopted, can contribute to improvement in project performance and assurance of greater project success.

The mid-term evaluation report, noted above, prepared by International Science and Technology Institute, Inc. (ISTI); the Dimpex semiannual reports; the USAID mid-term evaluation report analysis and the Project Evaluation Summary (PES) have made available a great deal of documented information about the project. With this in mind and because there appears to be considerable understanding and agreement by all involved as to the critical project issues, we have chosen to make our presentation simple and direct.

In recommending actions to be taken we have been particularly conscious of the need to institutionalize in Upper Volta the

positive experience and systems developed by this Project. In monitoring progress we have been asking questions such as -- How can the technologies required for the success of this type of activity be effectively transferred? How can this and other water projects be made more cost-effective and affordable in the Voltaic context? How can the target population be motivated to more strongly identify with, provide significant support to, and successfully continue the project over the long run after outside support is completed? These questions naturally lead into areas of concern for manageable recurrent costs, community involvement, opportunities for private sector support facilities, all with the objective of reducing the GOUV financial and human resource burden and thereby expanding its capacity to further satisfy the water needs of its people.

We have structured our recommended actions to conform with the GOUV strategy for water resource development and the AID Mission's priorities in water and health, as we understand them. Since the Rural Water Supply Project is the pilot project for both the National Water Decade and the National Primary Health Care Programs, we have attempted to adjust our recommendations to be in consonance with the policies and programmed actions already enunciated for these activities.

The following constitutes our recommendations for improving the project:

1. Coordination and Operational Planning.

Lack of a project long-range operational plan to provide guidelines for coordinating and integrating the wells and health components continues to hamper the project. A main function of such a plan would be to outline necessary actions in preparing villagers for early and full participation in, and support to, project activities. A well defined plan would provide for closer and continuing integration between the wells and health components in conducting a coordinated animation and sensitization program among the villagers. Such an integration would also provide a

similar stimulus in the timing, scope and coordination of the three critical village mobilization efforts: well construction, sanitation and pump maintenance.

A detailed plan should also focus on specific measures to induce a much more responsible and proprietary attitude than apparently now exists among the villagers with respect to assumption of recurrent maintenance costs. Significant local contribution in cost-sharing is mandatory if the project is to be cost-effective and budgetary recurrent costs kept at a reasonable level to encourage replication in other areas of Upper Volta. To achieve sufficient motivation among the villagers, it will be necessary to conduct an extensive media campaign and this is outlined in a separate recommendation below.

To provide the needed long-range operational plan, Dimpex proposes to provide the short-term services of a program planner and a social anthropologist for periods of 12 weeks. It is anticipated the consultants would work closely with the two GOUV project co-directors and, if agreeable, be provided support from CESAO. Dimpex has well qualified consultants who have expressed interest and availability and we are drafting preliminary scopes of work and job qualifications for these, as well as for the other consultancies detailed below.

2. Media Campaign

As noted above, a detailed operational plan should outline procedures for integrating the sensitization, animation and mobilization efforts of the two project components. An integral part of such a plan should be provision of a soundly-conceived media campaign to inform the target villagers of the project objectives, facilities and benefits and to promote increased acceptance of their responsibilities in supporting the program and maintaining the facilities.

A significant impetus for quickly developing such a media campaign in the project area with HER support exists in the January, 1984 seminar directed to the National Year of the Village Water, which emphasizes the media potential.

To accelerate this proposed campaign on behalf of the RWS Project, Dimpex proposes to provide a short-term audio-video/ communications specialist for a period of 10-12 weeks. The start of the consultancy would be in January, 1984, to coincide with the period of the HER seminar. Additional information on this recommendation is contained in Attachment A.

3. Recurrent/Unit Costs

Aligned with the need for a detailed operational plan is the requirement to install a cost accounting system which, among other data developed, quickly and correctly identifies project O&M expenditures. If the project is to be economically viable for replication, recurrent costs must be collected, analyzed and reduced where found to be excessive. A start has been made in the project with the cost accounting training provided by USAID and with the basic cost accounting procedures installed for the wells component by the Dimpex administrative/financial manager. These efforts need to be accelerated and expanded if reliable and complete cost data is to be provided to the project.

What is needed at this point is a financial analysis of the total project which separates capital investment from O&M expenditures and provides a set of guidelines in the operational plan for installing mechanisms and outlining procedures for a continuing program of cost accounting, expenditure evaluation and budget control. With regard to the latter, ISTI reports that HER budget projections show an annual pump maintenance cost of FCFA 31 million, with 72% of this expected as a village contribution. Given this degree of budgetary dependence on local funding, it is anticipated the financial analysis should investigate and identify alternatives in cost-sharing and sources of supplemental funds.

To provide this type of comprehensive financial analysis, Dimpex proposes to provide the short-term services of a financial analyst for 10 weeks. This specialist would also work closely with the above program planner and social anthropologist in outlining the fiscal data parameters and procedures for inclusion in the

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operational plan. Additional information on this recommendation is contained in Attachment B.

4. Pump Maintenance and Spare Parts

Up to the present time no program has been designed to recruit, train and supervise village mechanics for preventive maintenance or repair for the Moyno pump. Similarly, no indigenous capability has yet been established to locally stock spare parts and supply the servicing of the Moyno pump. Further, there has been no apparent effort to assist in the development of local manufacture, fabrication and distribution of the simpler components of the Moyno pump system, as was recommended in the PP.

Given the anticipated pump R&M costs noted above (factored to the equivalent of U.S.$150/pump-village/year) it appears imperative that remedial measures be taken immediately to reduce this projected exorbitant burden on village finance and RED recurrent budget. Disregard of this crucial issue, impacting directly on villager motivation to assume the major portion of pump R&M costs, risks failure of the program over the long-term, as is already evident in a number of similar programs in other LDC's.

With regard to indigenous development of spare parts supply, servicing and domestic manufacture of pump components, there apparently has been some accord between Robbins and Myers, USAID and CFAO/SOVALCI to establish an in-country source of supply for spare parts and training of pump mechanics. If this is done, it is assumed the problems which have been present with other local spare parts suppliers will be avoided and satisfactory support provided in the Moyno program.

Robbins and Myers has recently indicated the possibility of assisting in the development of local manufacture and fabrication of the simpler components in the pump system. This might include the casting, forging, machining and assembly of components such as rod, drop pipe, hardware and fittings. Although establishment of such a domestic industry could be by parastal and government funding, private sector enterprise might be preferred. Obvious

benefits of relying less on total imports would include less FX drain, increased employment and ultimately a lowering of R&M pump costs to the project.

To address and help resolve these urgent issues of pump maintenance, supply of spare parts, mechanic training and pump component manufacture, Dimpex proposes to provide the short-term services for 6-8 weeks of a maintenance/industrial engineer, augmented by the services of a Robbins and Myers pump engineer as well as the part-time services of the financial analyst, above, to provide a financial feasibility of the public/private enterprise suggested. Ideally, the team would include experienced specialists from REDSO/WA, such as Glenn Anders.

5. Commodity Procurement

Procurement to date on this project has been a responsibility of the USAID project officer. The time spent on this function has reduced the time available for close monitoring of project activities and attention to, and resolution of, urgent matters affecting the project. Also, as noted throughout the project documentation, deliveries of critical equipment and supplies have seriously retarded some activities in the project and reduced the effectiveness of project personnel in discharging their duties. Procurement to date has been through standard AID supply channels using PIO/C, GAO and the Commodity Procurement Office. It is known that in using this system, purchase orders have sometimes had to be reissued several times and that deliveries have thus taken up to two years or more after the initial order was placed.

To reduce the problems of excessive demands on the project officer's time and delayed deliveries which have worked to the detriment of the project, it is suggested that USAID consider use of Dimpex in all future procurement for the project. Dimpex is registered with AID/W as a Procurement Services Agent (PSA) and has the experience and qualified staff to expedite commodity and equipment purchases. We are prepared to start such services immediately.

6. Health Component

Although the original objective of the project's health component was to install a village health education program with a strong focus on sanitation measures, this objective was expanded to align this activity with the newly-established National Primary Health Care Program. The project operational plan, as proposed above, would therefore identify this amended responsibility in the guideline developed for the project's health component.

The following is a summary of the major recommended improvements contained in Appendix D. Dimpex proposes to provide through MCD the short term consultants identified below:

A. Water Quality Control

A new facility for the health directorate is to be constructed in Bobo-Dioulasso and provision of an equipped water quality laboratory discussed by USAID and the GOUV. If approved, it is proposed to provide a short-term consultant for ten weeks. This consultancy will be scheduled in two trips: six weeks to plan the laboratory and, after the laboratory has been constructed and equipped, four weeks more to assist in start-up and provide in-service training to the staff.

B. Epidemiological Surveillance

This is a Project activity originally included to monitor and evaluate project impact on elimination or reduction of water-borne diseases, as well as recording the absence of new water-related diseases. The activity will require the services of an epidemiologist and provision of equipment and supplies to carry out a baseline survey among a representative sample of project villages. The epidemiologist will also design an information management system to monitor the impact of the project on water-borne diseases.

It is proposed that, if available, the epidemiologist at the Center Muraz (OCCGE) in Bobo-Dioulasso conduct this

activity. Alternatively, it is proposed to provide through MCD a three-month consultancy by a qualified epidemiologist to plan and conduct the survey.

C. Health Education Support

With the construction of the health directorate's facility there will be a need for a full-time health educator, presumably from CNES. A health education program will have to be developed by the health educator, with the help of project staff and appropriate materials produced to support the programs.

MCD can provide short-term consultants to assist where needed.

7. Extension

Due to an accelerated construction schedule for digging and drilling wells and installing pumps during the last two campaign periods, it is possible that by July, 1984 almost all of the targetted 620 wells will have been constructed. A considerable number of Moyno pumps will still remain to be installed, however, since this activity must await completion of the well drilling and testing operations.

There are caveats, however, as the ISTI report correctly points out, in projecting that the wells program will be essentially complete and thus assistance to this activity can be terminated with construction of the 620 wells. Firstly, in making up for lost time in the last two campaigns the well drilling and development brigades apparently did not maintain as high a standard in construction and installation as is normally expected. The ISTI report identifies a number of deficiencies, such as poor packing around the drop pipe in the water-bearing zone which, over time, could significantly reduce well output. Also, a much reduced work schedule in draw-down and capability testing during well development was determined to be unsatisfactory and not in accord with prescribed standards. This and other deficiencies in the drilling and development stages raise questions as to

whether some wells, particularly those at the borderline in output capability, will start declining in the near future.

There appears to be enough risk identified with accelerated well construction procedures that more satisfactory practices and standards should be observed. Although a more deliberate construction discipline would somewhat lessen the rate of well production, such practices would be warranted over the long run. It would also be advisable for the well drilling and development brigades to return to previous drilling sites which are in question and determine whether there might be need for further testing and improvement.

Given these and other deficiencies as identified in the ISTI report, indicating it would be prudent to extend the three positions* of the wells component, we recommend an extension of the project for 18 months. Similarly, the health component will require about 18 months extension of the two health positions to achieve the goals originally established.

*See Attachment C

Attachment A

Media Campaign

Media support to those responsible for animation and sensitization can make a significant and positive difference in their level of effectiveness and acceptance by the target population of their assistance. To this end, the information and awareness campaign among the rural populations of Upper Volta concerning the problems of village water, which is planned for the National Year of Village Water in 1984, should materially benefit the project.

The RWS Project is located in the Departments of Hauts Bassin and Sud Ouest. Since there have been considerable financial and human resources already expended in the project area, there is an urgent need to involve those populations in sharing responsibility for the success of the already established water points. Therefore, accelerated media support should be applied to the project area. Although provided on an accelerated and targetted basis, it should nevertheless be an integral part of the National Campaign, particularly as it relates to "Maintenance of Water Points" and "Water and Health."

The project itself would benefit while contributing to the objectives of the National Year of Village Water through provision of the services of an audio-video/communications specialist to devise, test and implement a media campaign in the project area. The objectives of this consultancy would be:

1. Assist the group, or groups (DESAH, CNGSP, GRAAP, CIEH and MOH) designated by HER to implement the public awareness campaign in the project area to:

    a) devise, develop and manage public health education programs utilizing posters, slides and, where possible, films;

    b) devise, develop and manage a public health education program utilizing radio transmission; and

    c) strengthen the information dissemination capability of the designated groups and the communities they serve.

The functions of the consultant will be to:

1. Determine what audio-visual materials are available.
2. Inform HER about the quality of the materials, their content and their immediate value to the target area.
3. Advise on what materials to select to achieve goals.
4. Determine how to obtain materials.
5. Design a logistical system which processes materials, maintains adequate records, and informs when materials are available.
6. Identify technical support for the media that is to be used.
7. Advise on the appropriate materials produced locally.
8. Arrange a short training seminar or short course with animateurs and selected individuals to assist the local staff prepare objectives and plans for radio and other media.
9. Advise on the efficacy of the program methodology.

Attachment B

Financial Analysis of the Project

If the project is to be replicable and improved, it is important to know the operational costs of critical activities or work packages--hence a financial analysis which differentiates between investment expenditures (now part of infrastructure/ overhead) and unit and variable costs of operations. This would provide the project and HER with critical operational cost co-efficients, the basic building blocks of a management and planning information system. Beyond current project management and planning, it would provide HER with the basis for a standard cost system. This would be particularly useful if HER considers contracting out specific activities or to communities expressing an interest in developing wells.

Financial analysis of operational costs might include:

1. Unit cost per drilled or dug well by variables such as: topography, ground conditions and location, given present conditions.
2. Allocation of overhead, depreciation and maintenance expenses to specific activities.
3. Unit cost for training, supervising and equipping village health workers, itinerant agents and dispensary nurses.

Considerable data could be extracted from project financial records and observation of operational methods in the field in order to tailor financial analysis to prevailing operational practices.

UPPER VOLTA RURAL WATER SUPPLY PROJECT

Proposal for Improvement and Extension of the Project

Justification for extension of the three current Dimpex positions:

I. HYDROGEOLOGIST

1. Common consensus indicates extreme dissatisfaction regarding water availability in some areas where drilled wells are already constructed. To retain village participation in, and support to, this program and to preserve integrity of project it may be necessary to:

A. Add or modify wells and pumps for larger villages. In a number of the more populous villages with drilled wells the single well and pump supplied by this project may not be adequate for the demand. Where this is due to inhabitant dispersal necessitating excessive travel distance a second drilled well would be desirable. On the other hand, if the well is centrally located and has adequate yield but the Moyno pump with one user at a time is the limiting factor it may be possible to powwer the pump and discharge continuously to a simple overhead storage container fitted with multiple drawoff spigots. The Moyno is adaptable to simpler powering, preferably and most economically animal power as has been done in Niger.

B. Provide additional yield and drawdown tests to drilled wells which are borderline in capability, or show early reduced water yield. This may be due to substandard gravel packing or other deficient construction practices and thus require resetting or redrilling. Failure of a number of wells for such reasons could have serious adverse impact on the program.

2. Establish the 20 observation wells throughout the project area, as already recommended, as part of the well network for national water resource planning and development purposes.

3. Strengthen current hydrogeologic data collection and analysis. If there is to be soundly-based replication, particularly for site selection, there is urgent need to accelerate, expand and systematize the hydrogeologic information now being only randomly collected and partially utilized. All the above activities, if undertaken, would require an extension of at least 18 months for the hydrogeologist position.

II. EQUIPMENT SPECIALIST

After July 1984 there may still need to be an extended period of assistance provided in the training of village pump mechanics, provision of pump, vehicle and equipment spare parts, and the drafting of simple O&M manuals as guidelines for intelligent and informed replication of the mechnical aspects of the project. There may also be extensive help needed to ensure that a low-cost village pump maintenance program is established so that the project remains viable. In this regard, ISTI reports HER annual pump R&M budget projections from the equivalent of US $150 to US $500 per pump-village, levels which would impact adversely on village motivation in cost-sharing.

III. ADMINISTRATIVE/FINANCIAL MANAGER (CHIEF OF PARTY)

With project extension this position will remain central to developing a coordination and integration of the health and wells component, and to ensuring a successful turnover to the counterpart organization. It is anticipated that assistance and training will need be provided to the GOUV counterparts to improve capability in program management, fiscal evaluation and cost control. For this, as well as the other positions above, the current scopes of work will need amending to reflect the changes proposed to the project.

Attachment D

Medical Care Development

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M
C
D

UPPER VOLTA RURAL WATER SUPPLY

U.S.A.I.D. # 686-0228

PROPOSAL

FOR THE EXTENSION OF THE

PROJECT'S HEALTH COMPONENT

October 1983

Administrative Offices
11 Parkwood Drive
Augusta, Maine 04330 207/622-7566

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I. PROJECT BACKGROUND

A. The Initial Project Plan

The Upper Volta Rural Water Supply Project was designed to provide the rural people of southwestern Upper Volta with (1) a potable water supply system which would meet their minimal requirements of 10 liters per capita per day, and (2) an effective village health education program to optimize the potential health benefits inherent in an improved water supply system (USAID Project Paper - June 1979).

The tangible project objectives were as follows:

1. Water Supply Systems Development

a) Construction of 620 village water supply systems for 550 villages (300 new and improved dug wells and 320 drilled wells) during the life of the project.

b) Develop appropriate management support systems for the construction and maintenance of the water supply systems to include a pump installation and maintenance program, administrative management program, and a vehicle and equipment maintenance program.

2. Health Education Program Development

a) Organize the 550 villages to receive water supply systems by creating village and health education committees, recruiting village health workers (VHWs), and sensitizing villagers to ensure their participation in the project.

b) Train 550 village health educators (VHEs) and 110 social animatrices (one per five VHE) to supervise village health programs.

c) Develop and implement through VHEs and animatrices the health education program.

d) Develop water quality and epidemiological surveillance programs for project villages.

e) Construct 550 demonstration latrines (one per project village) in the project area.

The approach and methodology adopted to achieve the project objectives were as follow:

1. APPROACH

a) Creation of two project directorates; one responsible for the construction and maintenance of village water supplies placed under the Ministry of Rural Development; the other responsible for the development and implementation of the health education program under the Ministry of Public Health. These directorates were to operate from the regional offices of both ministries in Bobo-Dioulasso.

b) Provide equipment, vehicles, and supplies for all project activities.

c) Provide technical assistance in the following areas:

- Hydrogeology
- Equipment/vehicle maintenance
- Administration (financial management)
- Health education
- Short-term consultancies as needed.

2. METHODOLOGY

a) Create project coordination committees at departmental levels which would be responsible for tracing project directives (e.g. choice of villages), and periodically evaluating project progress.

b) Create wells brigades to undertake construction campaigns and pumps installation.

c) Construct and equip equipment/vehicle maintenance workshop(s) to support project activities.

d) Construct/renovate and equip administrative offices for project management units.

e) Create health implementation teams (health educators, sanitarians, and Peace Corps volunteers) to develop village health education programs, one team per department.

f) Provide equipment/vehicle/material to the National Center for Health Education (CNES) to assist project health education activities.

B. Modified Project Plan

Project implememtation started in 1979 with the wells construction program, while the health education program was being mobilized. Project start-up coincided with the adoption by the Government of Upper Volta of a National Primary Health Care Program which included the development of a village health infrastructure similar to that proposed by the project, to complement the National Program. Thus the GOUV and USAID amended the project agreement to make it a model for developing the new program.

The changes that took place in the initial project plan were as follows:

- Recruitment and training of village health workers (VHWs) to provide primary health care services (simple diagnosis and treatment, and health education);

- Development of village health committees to manage local primary health care program;
- Development of village pharmacy program;
- Recruitment and training of itinerant agents (IAs)(first line Ministry of Health workers) to supervise VHWs.
- Training of dispensary nurses to train VHWs and supervise IAs.

C. New Water Supply Policy Development

In 1982, Upper Volta became the first country in Africa to have developed a national water supply and sanitation decade program plan. The adopted policy and strategies for the decade are closely reflected in the Rural Water Supply Project, and the GOUV has officially selected the project as a model for developing the national decade program. Therefore, new project initiative should take into consideration the program which Upper Volta is trying to put into place to serve as a pilot project.

D. Project Achievements (1979-1983)

From July 1979 to July 1983 the following activities were achieved by the Project:

1. Organizational Development

a) Creation and staffing of both project directorates

b) Construction/renovation and equipment of Project offices

c) Development of wells construction brigades, pump installation brigade, and departmental health education teams.

d) Development of wells construction, equipment and staffing of vehicle maintenance facilities

e) Creation of departmental coordinating committees.

f) Fielding of technical assistance team.

2. Program Development

a) Implementation of wells construction and pump installation programs

b) Implementation of vehicle/equipment maintenance program

c) Implementation of financial management program

d) Development of hydrogeological support program

e) Implementation of primary health care/health education program

3. Specific Project Achievements

a) Water Supply Systems Construction

- Construction/renovation of 420 wells
- Installation of pumps on most water supply systems

b) Health Education Program

- Recruitment and training of 242 village health workers for 181 villages and 22 Itinerant Agents.
- Development of 141 village health committees
- Construction of 103 latrines
- Creation of 138 village pharmacies
- Implementation of 352 health education sessions
- Re-orientation of 22 dispensary nurses.

II. ANALYSIS OF PROJECT RESULTS

A. Project Objectives Achievement

1. Village Water Supply Systems Construction

It is expected that all 620 village water supply systems will be constructed and equipped with a pump by July 1984. With presently available resources and activity plans, less than 50 percent of village wells will have

sanitary surroundings. An effective pump maintenance program covering the 550 targeted villages will not have been put in place.

2. Health Education Program

It is expected that about 330 village health workers (VHWs) - 60% of target --, and 52 Itinerant Agents (47% of target) will have been trained by July 1984. This will represent a coverage of about 260 villages in the project area. However, not all 260 villages will have a project well.

It is also expected that about 260 villages will have one or more demonstration latrines, a village pharmacy, and a health committee. About 300 village water supplies will have been tested bacteriologically, and about 50 water supplies will have been chemically tested by the end of the project.

C. Existing Constraints to Full Achievement of Project Objectives

1. Insufficient Coordination and Cooperation Between the Two Programs

Since the start of this Project, there has been no specific operational plan to integrate project component activities and better cooperation among the components. Thus far, both components have operated more or less on the National operational plans designed by their respective ministries. For example, HER has not involved the project health personnel in siting, constructing, and finishing the water supply, or in sensitizing project villages.

The health component has not included the wells construction personnel in the programming of the component's activities. These deficiencies have resulted in both components having unrelated activities, reducing the effectiveness and efficiency of operations.

2. Non-existence of a Project Component Design

Some of the problems that have made it difficult to achieve the project's goals and objectives are:

a) Lack of project health component design which would have given a clear understanding of the activities that had to be addressed by the project in the health area.

b) Lack of activity chronograms

c) Lack of resources needed to accomplish activities

d) Lack of a management plan delineating the roles and responsibilities of staff at all levels in the project

e) Lack of appropriate management systems and/or programs, to include:

- manpower development and training
- supervision
- information system
- logistics and drug distribution

The formulation of objectives, analysis of constraints, development of appropriate strategies, and development of an operational plan describing the activities, resources needed, and management scheme are necessary in order to have a more realistic implementation of this project, which is to be the pilot project for both the National Primary Health Care and the National Water Decade Programs in Upper Volta.

3. Insufficient Health Manpower

The project is being implemented by a physician (who is working on a part-time basis), four sanitarians (one third of the country's corps of sanitarians) and two health specialists (technical assistance).

The dispensary nurses are presently being oriented and trained to take responsibility for training VHWs, and supervising both the AIs and the VHWs in the project area. Considering the number and location of villages

to be covered by the project, the infrastructure required to carry out project activities, and the activities to be implemented by the project, it is clear that the existing project manpower is not sufficient to meet project needs. In addition, without the clear definition of roles and responsibilities for each category of project personnel, the full utilization of existing personnel has not been permitted in project implementation.

4. Lack of Appropriate Infrastructure to Support Health Education Interventions, Water Quality Control, and Epidemiological Surveillance in the Project Area

The CNES, which has been identified as the national service to provide assistance in the planning of health education interventions and the production of appropriate health education program, is located at about 360 km from project headquarters making participation obsolete. Creating an antenna of the CNES at project headquarters is considered a pre-requisite to having an effective health education program for project villages.

The project possesses two Millipore testing kits for bacteriological analys of water. The Ministry of Rural Development has an embryonic laboratory for chemical analysis of water in Ouagadougou (360 km from project site). However, the laboratory performs relatively few tests of relevance to a water quality control program as proposed by the Plan for the Project. The Centre Muraz in Bobo-Dioulasso also has the capability to perform bacteriological analysis of water samples. However, their capability is limited to a relatively few water samples per month due to lack of equipment, supplies and personnel.

One of the project activities was to have set up an epidemiological surveillance system in the project area. It could have monitored and evaluated the project's impact on the elimination or reduction of water-borne diseases, as well as recording the non-introduction of new water-related diseases as a direct result of the project. To date, there is no surveillance program

operation plan and no steps have been taken in assessing the situation prior to project interventions. There are no public health services in Upper Volta which could provide the services necessary for implementing such a program. The Centre Muraz in Bobo-Dioulasso has the personnel and infrastructure to assist in implementing a program; however, such arrangements as the provision of equipment, supplies and logistical support would have to be made. It should be noted that the Muraz Center is a regional (international) organization for West Africa. It may not be interested or its participation may be restricted in such local activities.

III. CONCLUSION AND RECOMMENDATIONS

Since the project's health component started its activities much has been accomplished with the limited available resources. A primary health care program has been started on a relatively large scale, and manpower has been trained to carry out most of the anticipated rural water supply activities designated for the health component.

However, a realistic assessment of the needs to enable the project to develop, as well as the necessity for an effective operational plan need to take place as soon as possible if the project is to meet the stated rural water supply systems development objectives in addition to serving as a pilot for the national Primary Health Care and Water Decade programs. It is possible for the project to accomplish all these objectives if properly designed.

Finally, this project has a unique capability to provide potable water supplies to large numbers of the rural population living in the 550 villages in southwestern Upper Volta, as well as to serve as the model for

expanding GOUV activities in primary health care and water supply and sanitation services coverage in other parts of the country.

Below are recommendations for the steps which will need to be taken for successful achievement of this project:

A. Project Extension

Because the health component was retarded by 18 months after the start of the project and most of the required project activities are in the developmental phase, it is recommended that there be at least an 18-month extension period given to the project. At the end of this extention, it is anticipated the programs will be in place and the project's goals and objectives achieved.

B. Health Component Design/Project Operational Plan

As soon as the project extension has been decided, and the scope of the project agreed upon by U.S.A.I.D., it will be necessary to conduct a feasibility assessment of the proposed scope to design an effective plan for the health component in conjunction with the preparation of an operational plan which will integrate the activities of both project components.

Because technical expertise to carry out this task is limited in Upper Volta, and the project staff will be implementing on-going activities, short-term technical assistance will require a team of three professionals who have expertise in program planning, sanitary/public health engineering, and social sciences. They will assist the public health staff in formulating an appropriate operational plan and would require five to six weeks in Upper Volta to complete this activity.

C. Water Quality Control

At the outset, the Rural Water Supply project was designed to insure that the water quality of newly constructed supplies were both bacteriological

and chemically acceptable for human consumption and posed no threat to health. While the necessity for such an activity may be questionable it is nevertheless an important one which must take place if the project is to have an epidemiological surveillance program and if it is to conform to National Policy and Strategies of Upper Volta as stipulated in the policy and strategy released by the GOUV.

While the health component design will enunciate an effective water quality control program for the project, it will be necessary to provide an equipped water quality laboratory which will be able to carry out all required analyses. This laboratory could be proposed as an arm to the Central Laboratory, and these are recommended as necessary structures to serve the Water Decade program.

Once the provision of the proposed laboratory is approved by the GOUV and USAID, and a short-term consultant with expertise in development of similar facilities should be provided to do the following:

- Develop a floor plan for the laboratory (to serve as a program to the architect).
- Make a list of laboratory equipment and supplies and prepare all specification and cost documents.
- Develop appropriate (standard) methods to be used within the context of the project.
- Propose staffing for laboratory.
- Develop and implement an in-service training program for Voltaic laboratory technician(s).
- Prepare operational guidelines to include sampling, transporting, analyzing and interpreting analysis.

This person will be needed for a period of ten weeks; six weeks to plan the laboratory in a first trip, and four weeks after the laboratory has been constructed and equipped, to assist in starting operations and provide in-service trainign to its staff.

It should be noted that the construction of a new facility for the health directorate has been approved, and that the laboratory could be placed in that facility.

D. Epidemiological Surveillance

This activity will require the services of an epidemiologist and the provision of adequate equipment and supplies to carry-out a base line survey of a representative sample of the project villages. The epidemiologist will also need to design an information management system in order to monitor the impact of the project on water-borne diseases. While a qualified Voltaic epidemiologist is presently working at the Centre Muraz and could undertake the responsibility for this program, MCD's Research Division, which has expertize and experience in epidemiological survey design and implementation, could assist the epidemiologist with the development of the program plan.

It is anticipated that the survey could be conducted and the program designed within a four to six month period.

E. Health Education Support

A health education office will be built as part of the new facility approved for the health component of the project. However, there will be a need for a full-time health educator from the CNES to operate that office.

A health education program will have to be developed by the health educator with the project field staff, and appropriate material produced to support the program.

MCD is prepared to provide short-term technical assistance wherever required in the development of the program.

E. Long-Term Technical Assistance

Presently MCD has two long-term technical assistance team members in the field: a Community Development/Health Education Specialist and an Environmental Health Specialist. The team is presently involved in assisting the directors of both components and the field staff in the programming and implementation of project activities. Their role in project implementation is a crucial one. Therefore, it is recommended that these two positions be kept throughout the duration of the extension program. An effective work plan for the team has been developped and negotiated with both the project directors and USAID officials in Upper Volta.

ANNEX B

REPORT ON THE INTERPRETATION OF PUMPING TESTS IN THE H.E.R. PROJECT ZONE

H. YOUSSOF

DECEMBER 1983

NOTE ON THE INTERPRETATION OF PUMPING TESTS IN THE H.E.R. PROJECT ZONE

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Annex I, II, III, IV

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Four pumping tests were conducted in the wells in the Project zone. We attempted a number of interpretations based on the records of drawdown and occasionally of recovery in the well, pumped in a single, steady flow.

In spite of all the imperfections, the results obtained (permeability and transmissivity) are consistent. All the drillings were executed in the sedimentary zone of the Hauts-Bassins. It appears from the evidence that in the precambrian sandstone zone we have encountered a geological unit and that at least two facies of these sandstones ("gris à galet de quartz" and "gris rose") are the foundation for a significant reservoir of water and drillings will meet the current needs. (see map).

1. Test Conditions

It is to be noted that for all tests of the equilibrium method (Dupuit Formula) as well as of the non-equilibrium method (Jacob and Theis Formulas), the application of equations is valid for a nappe whose characteristics have been simplistically hypothesised as follows:

- the terrain is homogeneous and isotropic
- the nappe is horizontal, of constant thickness and infinite extension
- the nappe is stationary (non-flowing), and therefore on a horizontal substrate
- the entire thickness of the nappe has been traversed (complete drilling)

In the case of the wells under study, however, the aquifers did not correspond exactly to the conditions mentioned.

In addition, these tests were not conducted to determine the real potential for exploitation of the well.

Furthermore, due to the test methods and the time period in which they were conducted, these tests were largely unrepresentative of the yield which would be obtained through exploitation during periods of low water. To be truly meaningful, the tests should be conducted during the last months of the dry season (March to July). The tests, which were conducted without precautions, generally overestimate the real output of the wells.

The test procedures, it must be reiterated, do not satisfy the needs of the objective at hand: to determine the well yield (the maximum pumping rate that can be supplied by a well without lowering the water level in the well below the pump intake).

2. How the tests were conducted

The procedure utilized during the drilling campaign may be summarized as follows. The wells are developed by air-lift with the aid of a compressor and a portable generator until clear water is obtained. It is at this point that an estimate of the yield of the well is made by the development team. Full scale pumping tests are conducted only in the wells where a yield of approximately 5 m^3/hr or more was obtained. A submersible pump of 3-1/2 inches would be then used with the portable generator to conduct the long term test.

The drawdown was measured for 24 hours, with steady yield, and the recovery, following the termination of pumping, was measured for 4 to 6 hours, and in one case for 24 hours.

3. Test procedure - Review of certain principles of pumping test

The method used is as simple to complete as it is practical. It is necessary to begin with as low a discharge as possible, increasing it gradually. The test thus proceeds through a series of successive steps. Each discharge corresponds to a dynamic water level; both are noted.

Next an attempt is made to dry the apparatus, if this is possible, in order to learn the maximum discharge and the pump is then unprimed. This is followed by a return to the desired rate and the long term test is conducted.

It should be pointed out that the tests involve measurements and must therefore be executed with the same rigor as any physics experiment.

Time, levels (drawdown and recovery), and discharge must be measured.

Experimental studies on a well are generally conducted by application of the equilibrium method (Dupuit formula).

$$Q = \pi \quad K \quad \frac{H^2 - h^2}{\text{Log } R/r}$$

The results obtained cannot be interpreted unless the experiment is conducted in steady flow, that is with discharge and water level constant (When Q is constant, h remains constant).

The test consists of four (4) operations:

- overall test allowing the construction of discharge-time and water level-time graphs
- determination of the characteristics of the well
- construction of the recovery curve
- determination of the specific yield

4. Application of the Dupuit equation

Once all the necessary elements have been gathered, the Dupuit formula allows the following curves to be plotted:

a) Curves showing water level and discharge in relation to time (Fig. 1)

The overall test is designed to arrive at a stabilized pumping level corresponding to a form of equilibrium of the depression cone. It provides an image of the way in which the test was conducted. It results in the construction of a graph showing the variation of discharge and water levels in relation to time. The principle is based on the execution of pumping at constant discharge and water levels. The different steps, which normally

number 3 or 4, correspond to the operation of the pump during periods when the water levels are stabilized, for a determined discharge. The last part of the curve represents the recovery in the well.

b) Curve of water levels in relation to discharge, or characteristic curve (Fig. 2)

The essential aim of the test by step-drawdown is the experimental construcion of the well's characteristics.

The pumping test thus allows the establishment through experiment of the curve representing the relationship between discharge and draw down. This curve is the graphic expression of the Dupuit formula. It is constructed by points.

$$Q = \frac{1.366\ K\ (H^2 - h^2)}{\log R/r}$$
$$= Cte\ (H - h)\ (H + h)$$
$$= Cte\ \Delta\ (H + H - \Delta)$$
$$= Cte\ \Delta\ (2H - \Delta)$$
$$Q = Cte\ 2H\Delta - \Delta^2$$

Discharge is therefore a function of drawdown. It is parabolic function.

This curve consists of two parts. For the less significant drawdowns, the Δ appearing before H can be disregarded; the first part of the curve can thus be assimilated to a right: $Q = Cte\ 2H.\Delta$.

Beyond the critical point, the second part of the curve corresponds to significant drawdowns, and in this zone a considerably greater drawdown brings about an increasingly smaller growth in output.

In practice, the drawdown corresponding to the critical point should not be passed. The well yield should be less than or equal to this maximum utilisable discharge.

It should be emphasized that the test curve down not permit the conclusion that the apparatus could provide this yield at all times during the year.

c) Recovery curve (Fig. 3)

When pumping is stopped, the nappe regains its initial equilibrium. The dynamic level climbs in the borehole, more or less rapidly, attaining the initial piezometric level.

By plotting the water levels or drawdown on the y axis of a graph from bottom to top, and time on the x axis, the recovery curve can be plotted.

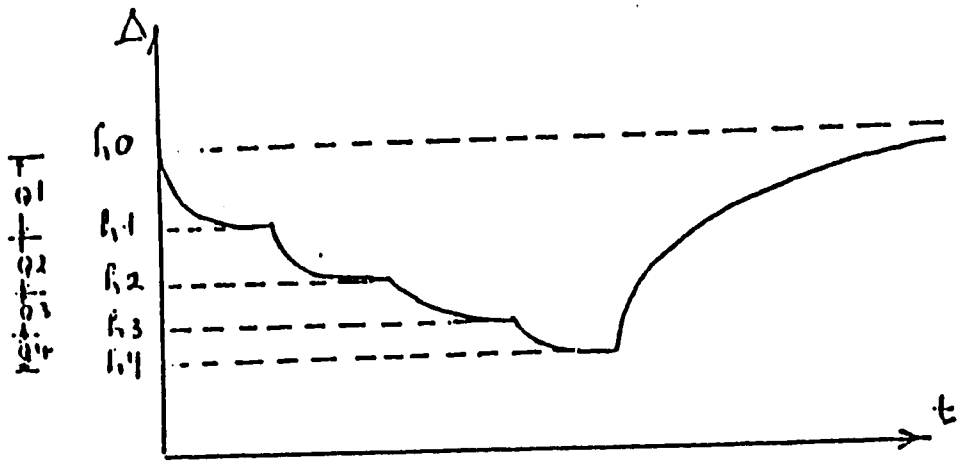


FIG. 1 PUMPING STEPS

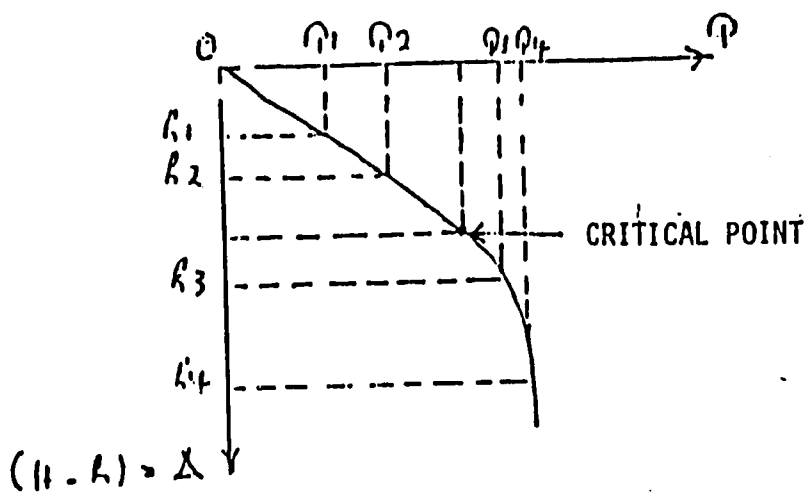


FIG. 2 CHARACTERISTIC CURVE

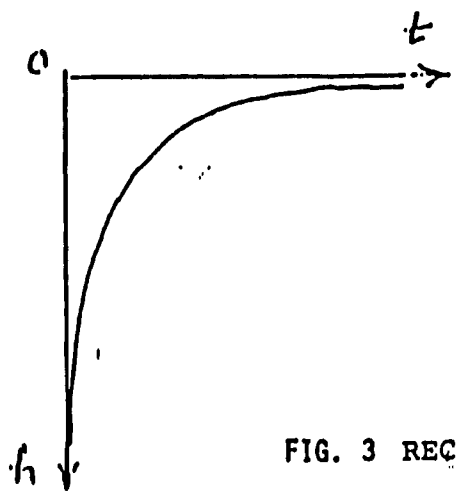


FIG. 3 RECOVERY CURVE

d) Determination of the specific yield

The specific yield or specific capacity of a well being pumped at a constant rate of discharge is the ratio of discharge to the drawdown ($\frac{Q}{\Delta}$) when the pumping time has become long enough so that - as far as can be precisely measured - the drawdown appears to be stabilized. This is the hourly discharge for one meter of drawdown.

As a general rule, the aim is to obtain maximum discharge from a well for as little drawdown as possible, in other words, "optimum yield", and knowledge of the value of $\frac{Q}{\Delta}$ for a nappe in a given region allows the determination of either the local conditions for well installation, or an improved yield.

5. Interpretation of the tests

In our interpretation, we allowed that the discharges correspond to a drawdown which is stabilized or nearly stabilized, and we calculated the transmissivity using the Dupuit and Jacob formulas.

a) Dupuit Formula

We allowed that the discharges correspond to a stabilized drawdown and we used the simplified Dupuit formula for unconfined groundwater to obtain a value for the coefficient of mean permeability: K

$$Q = I\ 336\ K\ \frac{H^2 - h^2}{\log R/r}$$

$$Q = c\ K\ (2H - \Delta)\Delta$$

$c = \frac{1.366}{\log R/r}$ (in which r is the radius of the well and R is the radius of influence) was chosen equal to 0.5 considering that for a borehole with a 10 cm radius, c varies from 0.45 to 0.68 when R passes from 10 to 100 meters. Thus we have the following formula.

$$Q = 0.5\ K\ (2H - \Delta)\Delta$$

For unconfined groundwater, Q representing discharge, Δ representing drawdown, in a borehole traversing water table height H.

The value of K thus obtained, multiplied by the height of water in the well, provides the approximate degree of transmissibity T, at the time of the test.

In the case of the confined nappe the Dupuit formula is:

$$Q = 2.73\ K\ e\ \frac{H - h}{\log R/r}$$

$$Q = 2.73\ K\ e\ \frac{\Delta}{\log R/r}$$

Using the same reasoning as for the unconfined nappe

$c = \frac{2.73}{\log R/r}$ was chosen equal to 1.

We will, therefore, have the following formula:

$$Q = K\ e\ \Delta$$

with e representing the thickness in meters of the confined aquifer.

We can thus calculate permeability as follows:

$$K = \frac{Q}{e\Delta}$$

or the transmissivity directly

$$T = \frac{Q}{\Delta}$$

Koumi - Seminary (see Appendix 1)

Drilling depth: 53 meters

N.S. 33.67 meters

Rough sandstone aquifer, generally reddish with quartz pebbles

Aquifer hieght 19.33 meters

$Q = 4 \times 10^{-3}\ m^3/s$

Pumping time = 24 hours

$\Delta = 1.28$ meters

$$K = \frac{Q}{0.5\ (2H - \Delta)\ \Delta}$$

$$= \frac{4 \times 10^{-3}}{0.5\ (38.66 - I.28)\ I.28} = \frac{4 \times 10^{-3}}{23.9}$$

$$= I.6 \times 10^{-4}\ m/s$$

$$T = K\ e = I.6 \times 10^{-4} \times 28 = 4.5 \times 10^{-3}\ m^2/s$$

Dinderesso (Appendix II)

Drilling depth: 143.36 meters

N.S. 40.70 meters

Fine sandstone aquifer with quartz pebbles

Thickness of the confined aquifer: 67 meters

$Q = 3.7 \times 10^{-3}\ m^3/s$

Pumping time = 48 hours

$\Delta = 8.20$ m

We will apply the formula for the confined nappe:

$$K = \frac{Q}{e\Delta} = \frac{3.7 \times 10^{-3}}{67 \times 8.20} = \frac{3.7 \times 10^{-3}}{549.4}$$

$$= 6.7 \times 10^{-6}\ m/s$$

$$T = \frac{Q}{\Delta} = 4.5 \times 10^{-4}\ m^2/s$$

Matourkou I (Appendix III)

Results from the Matourkou I well, with a depth of 43 meters and a static water level of 8.70 meters, are as follows:

The aquifer is medium fine sandstone with a height of 28.50 meters.

$Q = 0.416 \times 10^{-3} m^3/s$

Pumping time: 24 hours

$\Delta = 13$ m

$$K = \frac{Q}{0.5\,(2H - \Delta)\Delta}$$

$$= \frac{0.416 \times 10^{-3}}{722.8} = 5 \times 10^{-7} \text{ m/s}$$

$$T = K.\ e = 5 \times 10^{-7} \times 28.5$$

$$= 1.4 \times 10^{-5} m^2/s$$

Lequema (Appendix IV)

Because the nappe is confined, we will apply the corresponding formula

Depth: 153 meters

N.S. 36.83 meters

Aquifer: medium to coarse siliceous sandstone

Aquifer height: 13 meters

$Q = 3.7 \times 10^{-3} m^3/s$

Pumping time: 24 hours

$\Delta = 24.87$ m

$$T = \frac{Q}{\Delta} = \frac{3.7 \times 10^{-3}}{24.87} = 1.5 \times 10^{-4} \text{ m}^2/\text{s}$$

$$K = \frac{T}{e} = \frac{1.5 \times 10^{-4}}{13} = 1 \times 10^{-5} \text{ m/s}$$

b) Jacob Formula

We calculated the extent of transmissivity using the Jacob Formula in the transitory regime, using measurements made during the course of the tests. (see appendices I, II, III, and IV)

$$T = \frac{0.183\ Q}{c}$$

with c representing the incrase in drawdowns, in a logarithmic cycle. (see the results in the table in the following chapter).

6. Conclusion

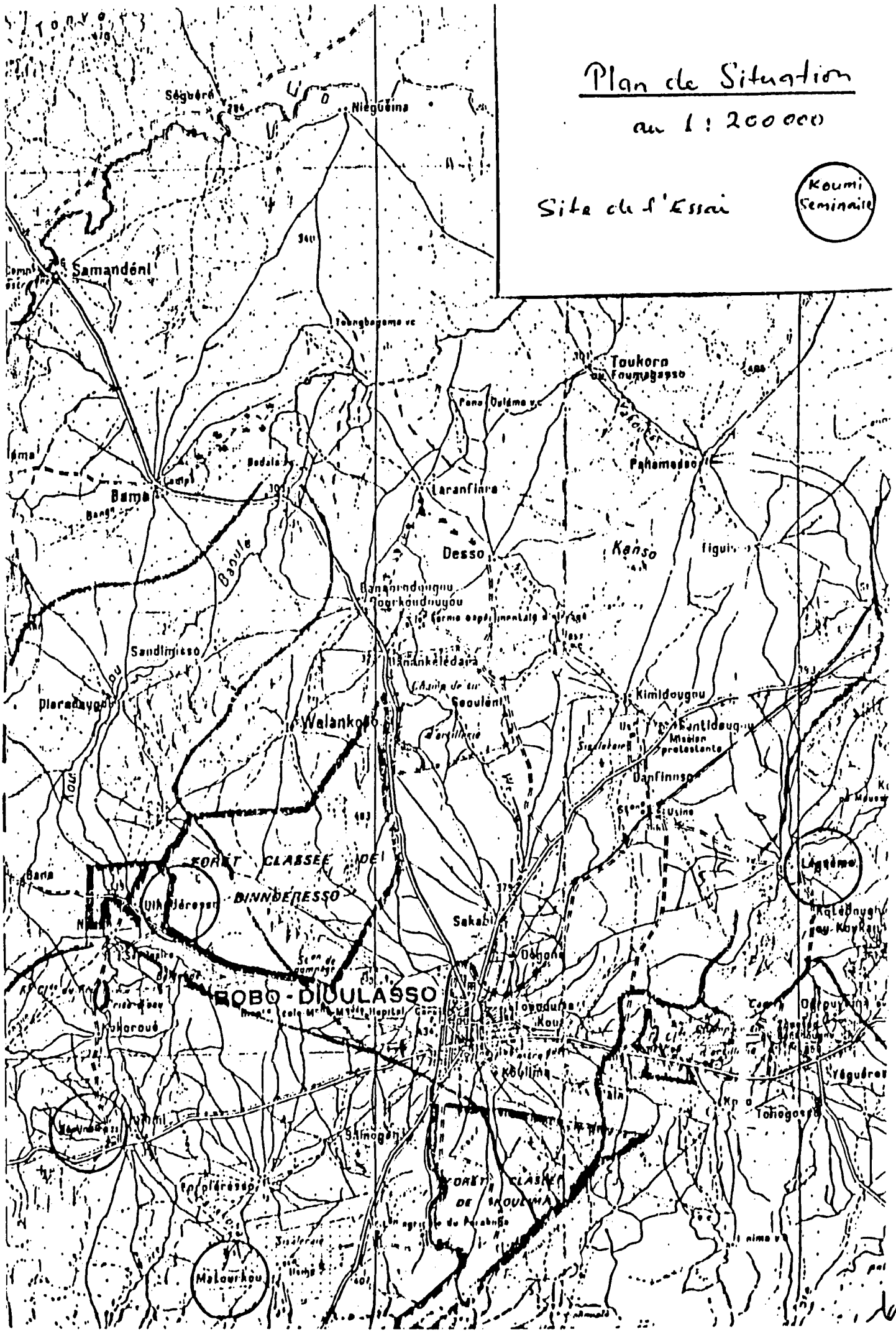
The results of our interpretations are summarized in the following table:

	Dupuit Formula		Jacob Formula	
			T m^2/s.	
	K m/s	T m^2/s	Drawdown	Recovery
Koumi	1.6×10^{-4}	0.45×10^{-2}	1×10^{-2}	0.6×10^{-2}
Dinderesso	0.8×10^{-5}	4.5×10^{-4}	1×10^{-4}	0.8×10^{-3}
Matourkou	0.5×10^{-6}	1.4×10^{-5}	1.7×10^{-4}	---
Lequema	1×10^{-5}	1.5×10^{-4}	5×10^{-4}	---

The range for the permeability coefficent is from $0/5 \times 10^{-6}$ to 1.6×10^{-4} m/s with an average of 1×10^{-5} m/s.

According to G. Castany, since the "border" between permeable terrains and impermeable terrains is situated at about 10^{-7}m/s, the approximate value of permeability obtained is that of the slightly to moderately permeable terrains.

Excluding Koumi which has high transmissivity (7×10^{-2} m^2/s) the transmissivity of the other aquifer terrains is generally about 10^{-4} with an average of 3×10^{-4} m^2/s which is a reasonable amount.


Plan de Situation
au 1 : 200 000
Site de l'Essai
Koumi Seminaire
Samandéni
Bama
Toukoro
Fourmagasso
Pahamedaso
Laranfiara
Desso
Kanso
Figui
Sandinjesso
Walankoro
Kimidougou
Kantidougou
Mission protestante
Danfinnso
Usine
FORET CLASSEE DE DINNDERESSO
Sakabi
Dégoni
BOBO-DIOULASSO
Kollina
Tonogosso
Sinogéni
FORET CLASSEE DE SOUKNA
Malourkou
Lagasso

Annexe I

REPUBLIQUE DE HAUTE-VOLTA
DIRECTION DE L'HYDRAULIQUE
ET DE L'AMENAGEMENT DE
L'ESPACE RURAL

INVENTAIRE DES
RESSOURCES HYDRAULIQUES

FICHE DE FORAGE

N° I.R.H.

N° Provisoire :
Sous-Préfecture
Canton :
Village :
Lieu dit :
Photo aérienne n°

Longitude : x =
Latitude : y =
Cote sol : z =
Carte 1/200 000e
Mission

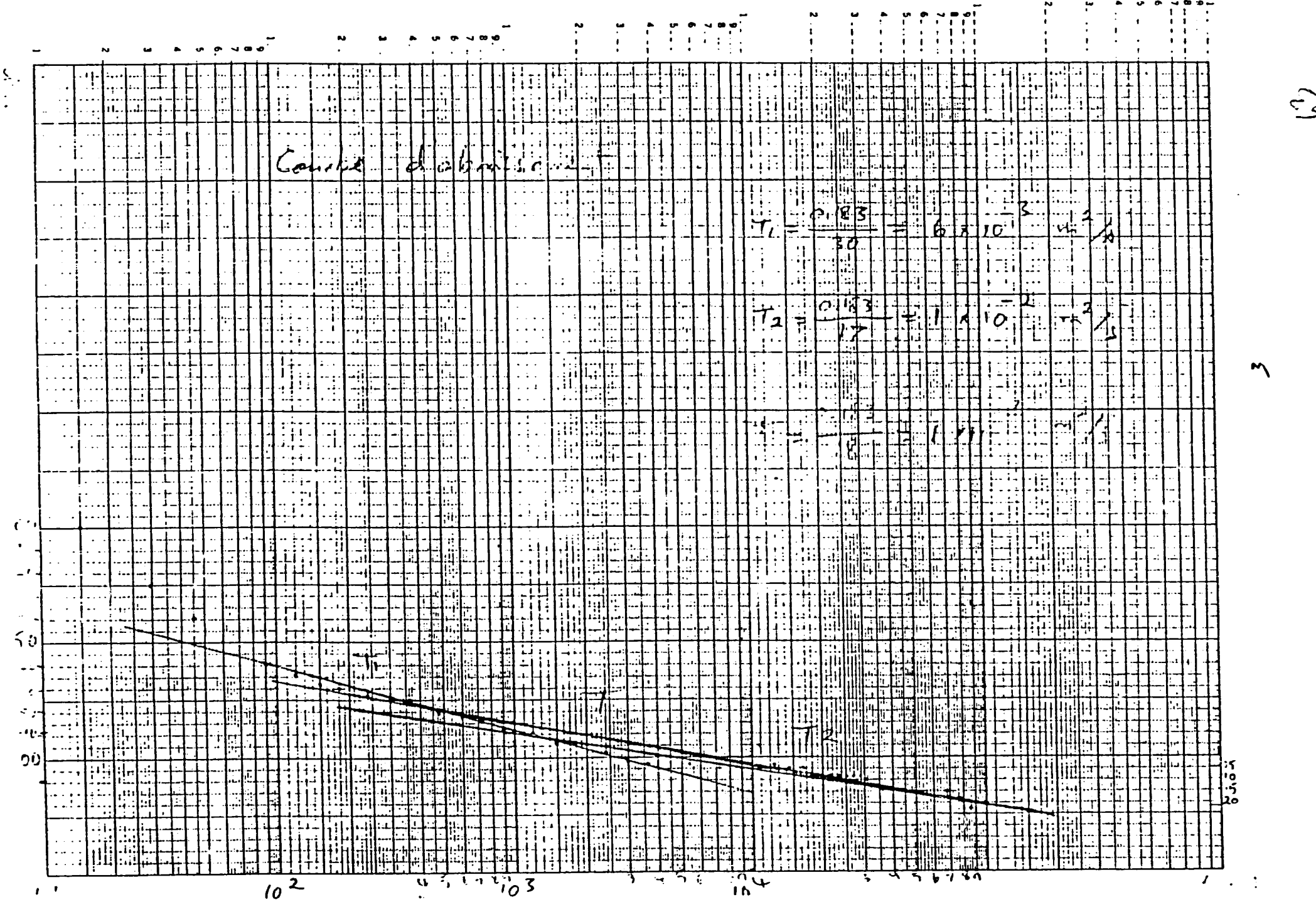
Propriétaire :
Maître d'œuvre :
Entreprise :
Type de machine :
Sondeur :

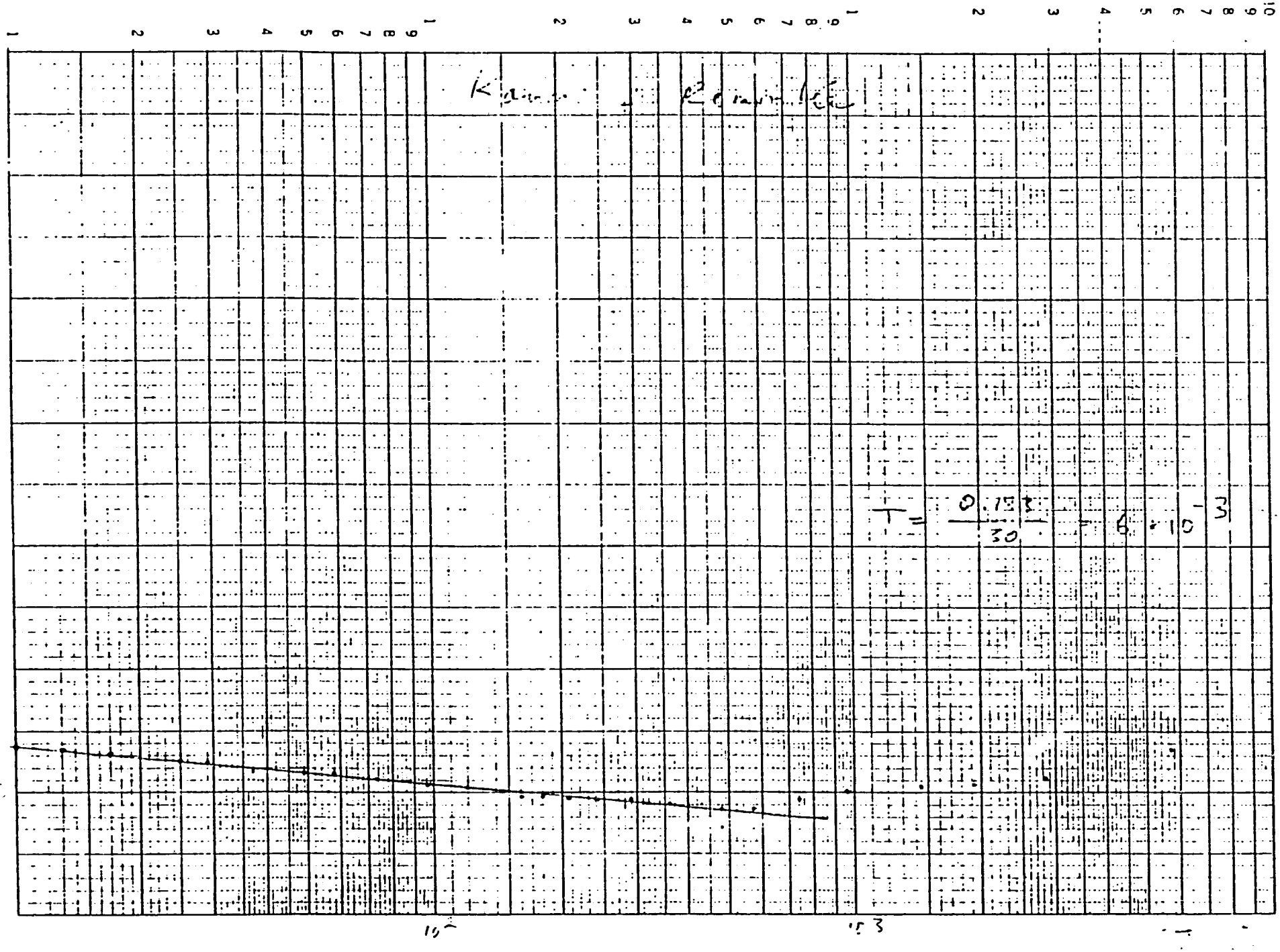
Date du début des travaux :
Date de la fin des travaux :
Massif filtrant { nature :
granulométrie :
Equipement :

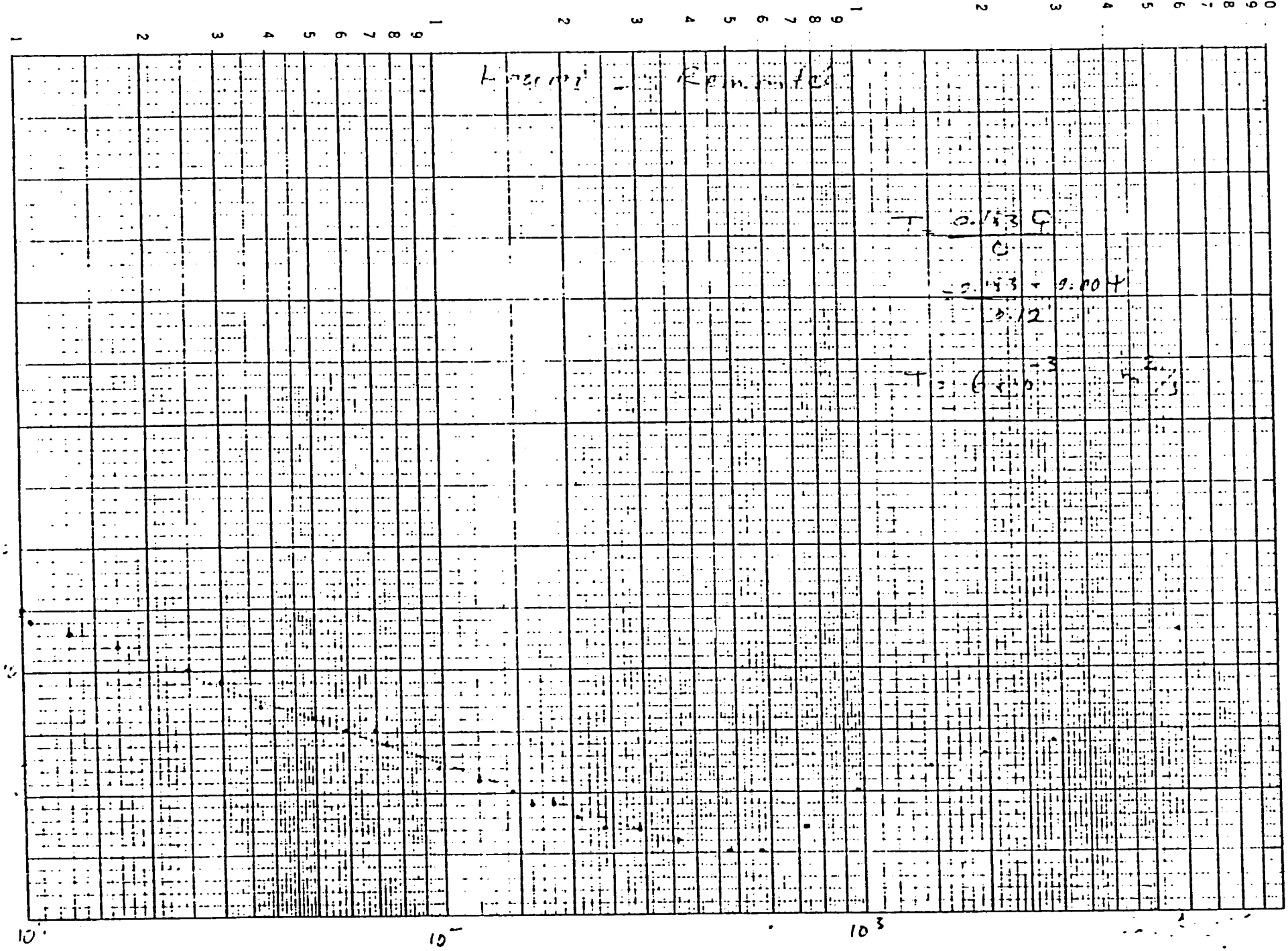
Profondeur (m)	ø Forage	ø Tubage	Coupe	DESCRIPTION GEOLOGIQUE	N.S. (1)	Observations
5				Latérite brune friable		
10						
15				Latérite brune indurée très dure		
20						
25						
30				Grès grossier à moyen rougeâtre, à galets de quartz (échantillon meuble), très peu cimenté		
35	33,67	NS				
40						
45				Grès moyen très peu cimenté jaunâtre à galets de quartz blanc, (échantillon meuble)		
50	53					
55						

2

62


Courbe d'étalonnage
$T_1 = \frac{0,183}{30} = 6 \times 10^{-3}$ s/m
$T_2 = \frac{0,183}{17} = 1 \times 10^{-2}$ s/m
T_1
T_2
10^2
10^3
10^4
15
10
5
20


$T = \frac{0.15}{30} = 5 \cdot 10^{-3}$


Linear - Expected
T = 0.183 G
0
= 0.183 + 0.004
0.12
T = 6.4 10^-3 G^2/3
10^1
10^-
10^3

ESSAI [illegible]

ARMEMENT mesuré sur : [illegible] à [illegible] m. de [illegible] Feuille n° 1

Date	Heure	Temps de remplissage	Enfoncement s	Débit Q	σ/S	Observations
[illegible]	?	0	0	0	0	[illegible]
		$5 \cdot 10^{1}$	[illegible]	4×10^{-3}	$[illegible] \cdot 10^{2}$	
		3.[illegible]	[illegible]		2.25	
		[illegible]	[illegible]		2.40	
		[illegible]	[illegible]		2.50	
		[illegible]	[illegible]		[illegible]	
		$1.20 \cdot 10^{2}$	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	1.12		[illegible]	
		[illegible]	1.11		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		$1.20 \cdot 10^{3}$	1.16		[illegible]	
		1.5[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		3.05 ✓	
		[illegible]	[illegible]		[illegible]	
		5.[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
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		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		3.05	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	

ESSAI [illegible]

AMMONIAC mesuré sur : à m. de Feuille n° [illegible]

Date	Heure	Temps de mesure	[illegible]	[illegible]	c/c	Observations
		$2.52 \cdot 10^{6}$	[illegible]		[illegible]	
		2.76	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		3.24	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		4.62	1.26			
		5.04	[illegible]			
		5.40	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		[illegible]	[illegible]		[illegible]	
		8.64	[illegible]		[illegible]	

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J . . . I . . . . C . . . L . . . E . . . de :

DEBITMETRE mesurée sur : [illegible] à [illegible] de [illegible] Marille n°

Temps total de pompage t° = [illegible] secondes
Débit moyen de pompage Qm = [illegible] m³/s

Date	Heure	Temps depuis arrêt pompage : t'	$\frac{t°}{t'} + 1$	Rabattement s	s/Qm	Observations
		0	[illegible]	[illegible]	$3.23 \cdot 10^{-2}$	
		$1.5 \cdot 10^{1}$	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	3.05	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	1.15	[illegible]	[illegible]	
		[illegible]	1.21	[illegible]	[illegible]	
		[illegible]	[illegible]	[illegible]	[illegible]	
		$1.20 \cdot 10^{3}$	[illegible].3		[illegible]	
		1.5[illegible]	5.8	[illegible]	[illegible]	
		1.5[illegible]	4.9	[illegible]	[illegible].65	
		[illegible]	[illegible]	[illegible]	[illegible]	
		[illegible]	[illegible].7	[illegible]	[illegible]	
		[illegible]	2.5	[illegible]	[illegible]	
		5.40	1.7	[illegible]	[illegible]	
		[illegible]	1.3	[illegible]		
		[illegible]	1.0		[illegible].05	
		9.15	[illegible]		[illegible]	

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REPUBLIQUE DE HAUTE-VOLTA
DIRECTION DE L'HYDRAULIQUE
ET DE L'AMENAGEMENT
DE L'ESPACE RURAL

INVENTAIRE
DES RESSOURCES HYDRAULIQUES

FICHE DE FORAGE :

Annexe II

N° provisoire :
Sous-Préfecture :
Canton :
Village : DIN DORESSO
Lieu dit :
Photo aérienne n°

Longitude : X =
Latitude : Y =
Cote sol : Z =
Carte 1/200.000e
Mission

Date du début des travaux : 18/11/81
Date de la fin des travaux : 19/11/81

Matériel utilisé : {nature : grandeur :

Equipement :

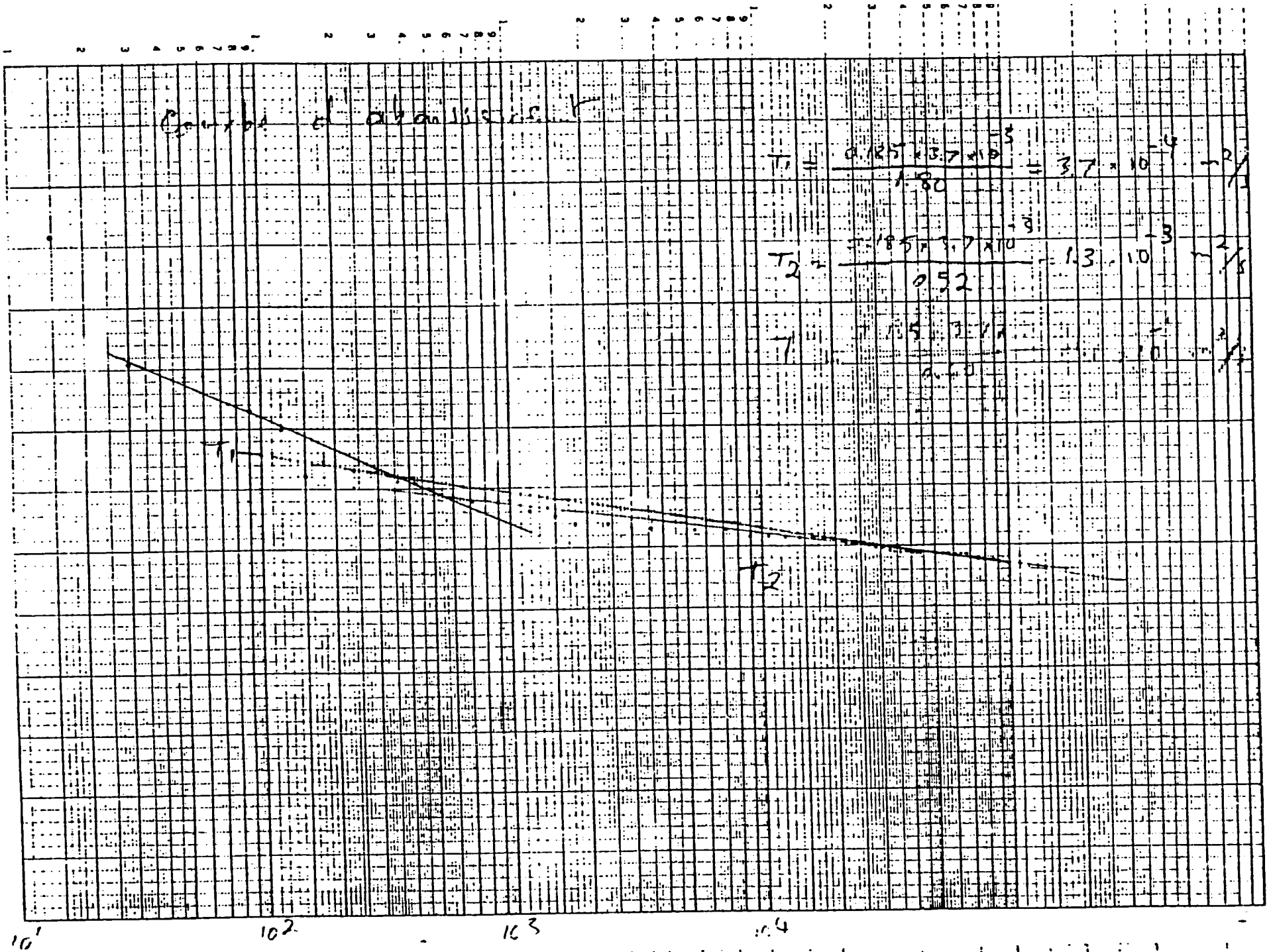
Profondeur (m)	Coupe technique	Coupe géologique	DESCRIPTION GEOLOGIQUE	N. S. (1)	Observations
10			Argile latéritique ocre		
			Argile rouge, kaolinique friable.		
20			Grès plus ou moins altéré fin violacé, se débitant en plaquettes. ciment siliceux.		
	27 m		schiste gris à gris-verdâtre dolomitique.		
30					
40					
50	1,70 m NS		schiste gris-noirâtre, dur dolomitique.		
60					
	67 m		schiste gréseux violacé		
70					
80			Grès fin violet à rose-clair siliceux se débitant le plus souvent en plaquettes. Passées de schiste gréseux.		
90					
100			Présence de galets de quartz limpide.		
110			Grès moyen friable, blanc avec niveaux ferrugineux rougeâtres très friables		
	56				

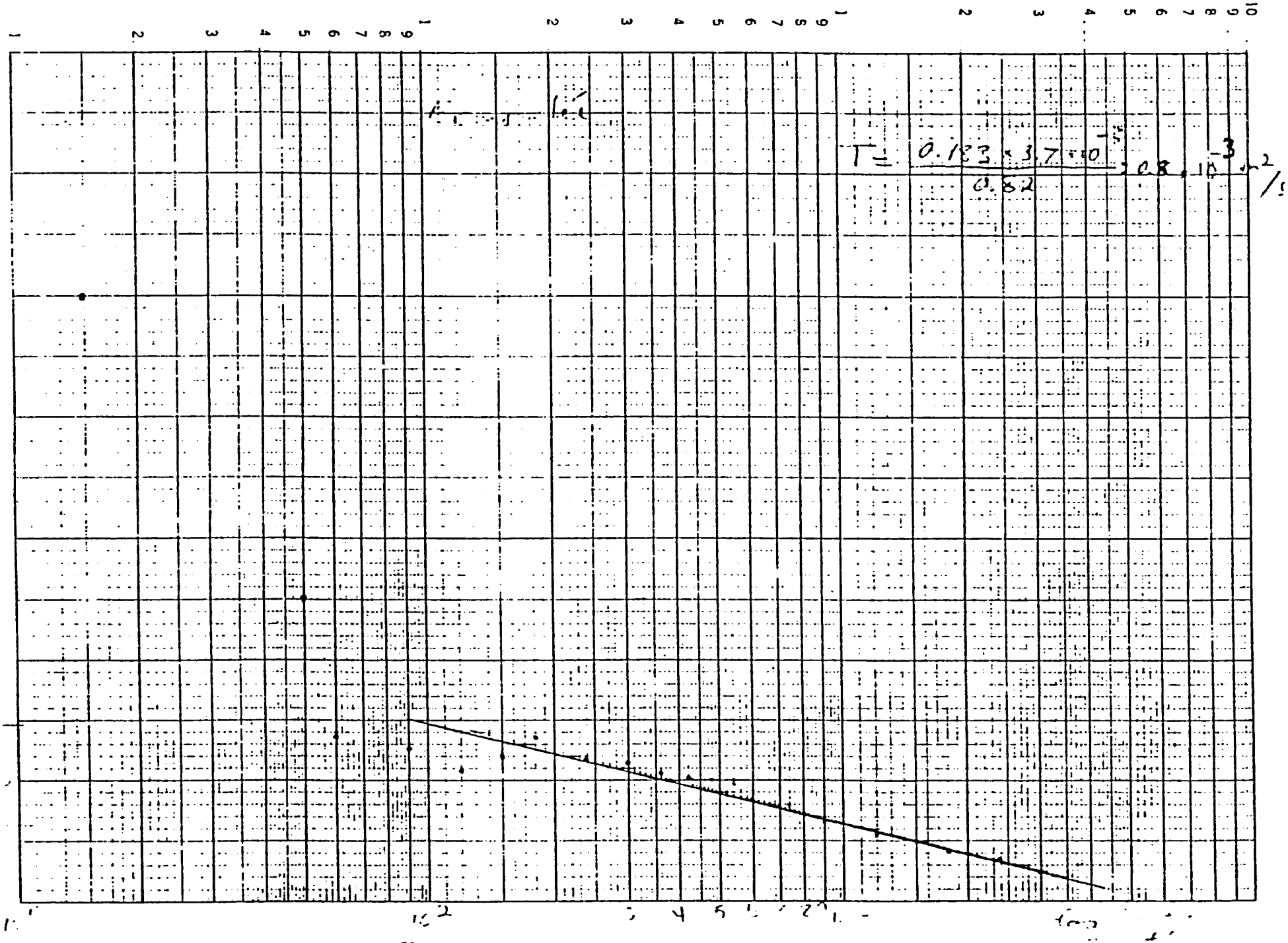
Courbe d'étalonnage

$T_1 = \frac{0.125 \times 3.7 \times 10^{-5}}{1.80} = 3.7 \times 10^{-4}\ m^2/s$

$T_2 = \frac{1.85 \times 3.7 \times 10^{-5}}{0.52} = 1.3 \times 10^{-3}\ m^2/s$

$T_1 = \frac{1.5 \times 3.7 \times 10^{-5}}{0.10} = 5.5 \times 10^{-4}\ m^2/s$





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ESSAI [illegible]

ASSIGNEMENT mesuré sur : à m. le Feuille n° 1

Date	Heure	Temps de remanence	Déplacement D (cm)	Points D - 3 3.7 [illegible]	o/o	Observations
4/3/52	9h45	0	0			[illegible]
		$1.5 \cdot 10^{1}$	2.55			
		3.0	4.45			
		6.0	5.15			
		$9.0 \cdot 10^{1}$	5.70			
		$1.20 \cdot 10^{2}$	[illegible]			
		1.50	6.80			
		1.80	6.55			
		2.40	6.70			
		3.00	6.70			
		3.60	6.57			
		4.20	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		[illegible]	[illegible]			
		$1.20 \cdot 10^{3}$	[illegible]			
		1.50	[illegible]			
		1.80	[illegible]			
		2.10	[illegible]			
		[illegible]	[illegible]			
		3.60	[illegible]			
		5.40	7.74			
		7.20	[illegible]			
		[illegible]	[illegible]			
		[illegible]	7.55			
		1.26	7.56		13	

12

[illegible] J U S A I [illegible] D E [illegible] D E

ALIMENTEMENT mesuré sur : à m. de Feuille n° :

Date	Heure	Temps de remplissage	Débit m	Débit l	o/c	Observations
		1.44.15"	7.17			
		1.62	7.17			
		1.50	7.17			
		1.78	7.12			
		2.14	7.95			
		2.34	7.97			
		2.52	[illegible]			
		2.76	8.00			
		2.88	8.03			
		3.06	8.06			
		3.24	8.09			
		3.42	8.10			
		3.66	8.13			
		3.78	8.14			
		3.96	8.15			
		4.14	8.15			
		4.32	8.15			
		4.68	8.16			
		5.04	8.17			
		5.40	8.18			
		5.76	8.18			
		6.12	8.18			
		6.48	8.18			
		6.84	8.19			
		7.20	8.19			
		[illegible]	[illegible]			
		[illegible]	8.25			
		[illegible]	8.25			
		[illegible]	8.26			

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[illegible]

[illegible]

Temps total de mise en pompage t° = [illegible] secondes
Débit moyen de mise en pompage Qu = [illegible] m³/s

Date	Heure	Temps depuis arrêt pompage s. t'	$\frac{t°}{t'}$ + 1	[illegible] s	s/[illegible]	Observations
5/3/[illegible]	[illegible]h 50	[illegible]		[illegible]		[illegible]
		1.5 × 10[illegible]	[illegible]	[illegible]		
		[illegible]	[illegible]	–		
		4.5	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		7.0	[illegible]	[illegible]		
		1.2[illegible]	[illegible]	[illegible]		
		1.50	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		2.60	[illegible]	[illegible]		
		3.20	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		5.40	[illegible]	[illegible]		
		6.00	[illegible]	[illegible]		
		7.20	[illegible]	[illegible]		
		9.00 × 10[illegible]	[illegible]	[illegible]		
		1.20 × 10[illegible]	[illegible]	[illegible]		
		1.50	[illegible]	[illegible]		
		1.80	[illegible]	[illegible]		
		2.40	[illegible]	[illegible]		
		[illegible]	[illegible]	[illegible]		
		[illegible]	[illegible]			

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Annexe III

REPUBLIQUE DE HAUTE-VOLTA
DIRECTION DE L'HYDRAULIQUE
ET DE L'AMENAGEMENT
DE L'ESPACE RURAL

INVENTAIRE
DES RESSOURCES HYDRAULIQUES

N° provisoire :
Sous-Préfecture :
Canton :
Village : Matroukou
Lieu dit :
Photo aérienne n°

Longitude : x =
Latitude : y =
Cote sol : z =
Carte 1/200.000
Mission

Aménagement :
Propriétaire :
Entreprise d'oeuvre :
Entreprise :
Type de machine :
Sondeur :

Date du début des travaux : 4/11/81
Date de la fin des travaux : 4/11/81

Massif filtrant { nature :
granulométrie :

Equipement :

Profondeur (m)	Coupe technique	Coupe géologique	DESCRIPTION GEOLOGIQUE	N. S. (1)	Observations
			Argile latéritique rouge.		
5					
10	NS ≈ 7,8 m		Argile sableuse ocre-jaune friable.		
15	14,5 m				
20	Hauteur de l'aquifère dans Matroukou I				
25					
30			Grès fin à moyen blanc-rosâtre, micacé, un peu feldspathique. peu friable.		
35					
40					
43 m	Profondeur de Matroukou I				
45					
50					
55			Schiste gréseux violacé, fin à passées de gris verdâtres		
60					
65					
70					
75					
80					
85					
90					
95					

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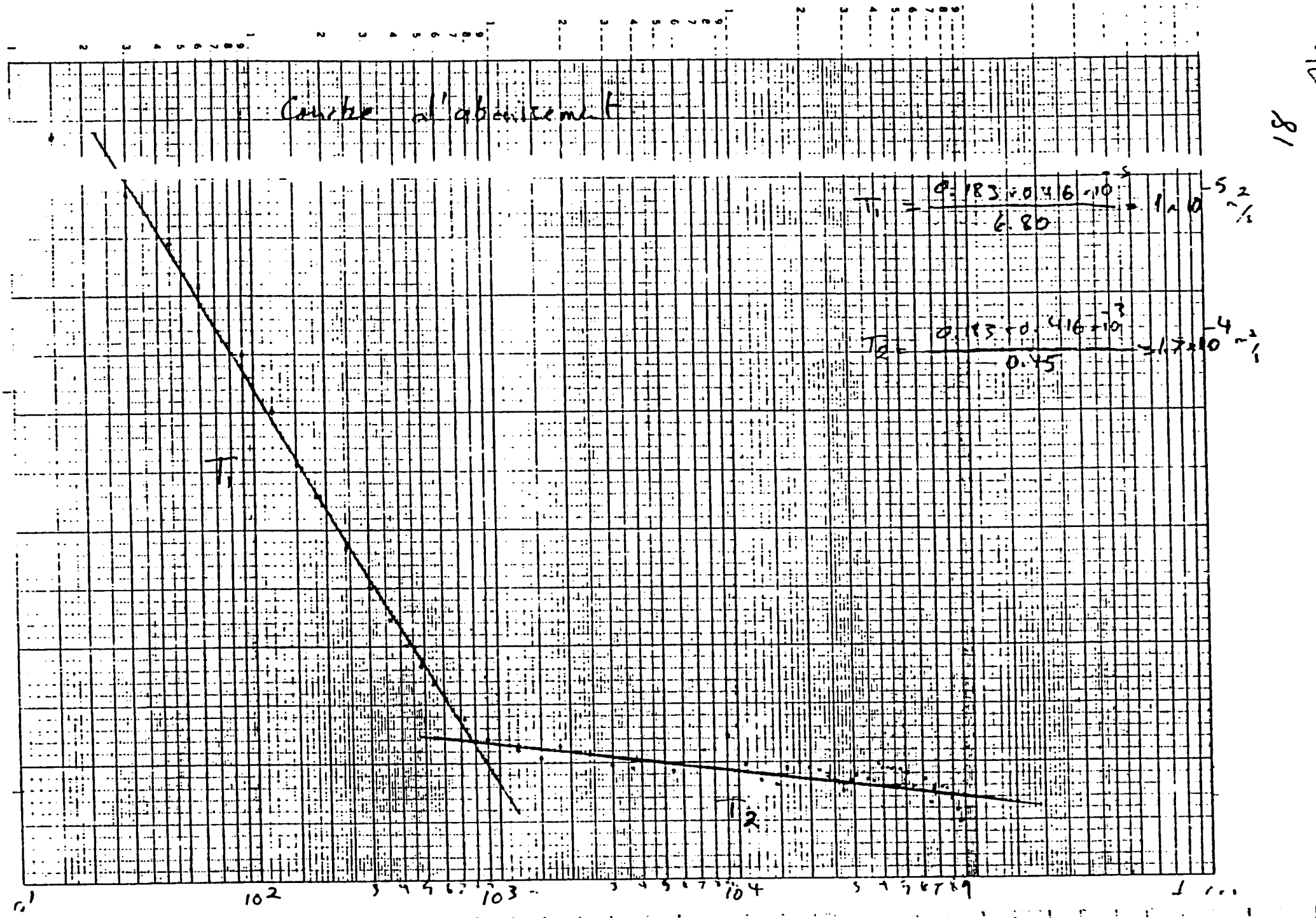
Courbe d'abaissement



JOURNAL [illegible] Maternelle

AMPLIFICATEUR mesuré sur : à m. de Feuille n°

Date	Heure	Temps de remplissage	Déplacement a	Débit $0.416 \cdot 10^{-3}$ m³/s	c/c	Observations
3/6/81	8h30	0	0	1.5 m³/s		[illegible]
		$1.5 \cdot 10^1$	1.30			
		3.0	2.24			
		4.5	3.09			
		6.0	3.83			
		$9.0 \cdot 10^1$	5.05			
		$1.2 \cdot 10^2$	6.00			
		1.5	6.54			
		1.5	7.42			
		2.4	8.36			
		3.0	9.03			
		3.6	9.57			
		4.2	10.00			
		4.5	10.35			
		5.4	10.65			
		6.0	10.57			
		7.2	11.26			
		$9.0 \cdot 10^2$	11.59			
		$1.2 \cdot 10^3$	11.80			
		1.5	11.90			
		1.8	11.67			
		2.4	11.73			
		3.0	12.07			
		3.6	12.10			
		5.4	12.18			
		7.2	11.80			
		$9.0 \cdot 10^3$	11.56			
		$1.08 \cdot 10^4$	12.03			
		1.26	12.28			19
		1.44	12.3[illegible]			

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ESSAI [illegible]

ENREGISTREMENT mesuré sur : à m. le Feuille n°

Date	Heure	Temps de parcours	Déplacement	Vitesse	o/o	Corrections
		1.62×10^4	12.08			
		1.80	12.01			
		1.98	12.09			
		2.16	12.16			
		2.34	12.25			
		2.52	12.30			
		2.70	12.47			
		2.88	12.32			
		3.06	12.23			
		3.24	12.20			
		3.42	12.32			
		3.60	12.35			
		3.78	12.04			
		3.96	12.11			
		4.14	12.09			
		4.32	12.13			
		4.68	12.16			
		5.04	12.14			
		5.40	12.43			
		5.76	12.54			
		6.12	12.38			
		6.48	12.69			
		6.54	12.43			
		7.20	12.42			
		7.56	12.47			
		7.92	12.64			
		8.28	[illegible]			
		8.64×10^4	13.16			

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B

REPUBLIQUE DE HAUTE-VOLTA
DIRECTION DE L'HYDRAULIQUE
ET DE L'AMENAGEMENT
DE L'ESPACE RURAL

INVENTAIRE
DES RESSOURCES HYDRAULIQUES

FICHE DE FORAGE

Annexe IV

N° provisoire :
Sous-Préfecture :
Canton :
Village : Léguéma
Lieu dit :
Photo aérienne n°

Longitude : x =
Latitude : y =
Cote sol : z =
Carte 1/200.000°
Mission

Financement :
Propriétaire :
Maître d'œuvre :
Entreprise :
Type de machine :
Sondeur :

Date du début des travaux : 6/82
Date de la fin des travaux : 6/82

Massif filtrant { nature : granulométrie .

Equipement :

Profondeur (m)	Coupe technique	Coupe géologique	DESCRIPTION GEOLOGIQUE	N. S. (1) (m)	Observations
10			Fine poussière rose de silice niveau probable de grès très fin friable.		
15					
20			Grès fin rose, homogène micacé (mica blanc) à ciment siliceux. Souvent avec placage de fines couches de minéraux verts	[illegible]	vers niveau de la nappe superficielle.
40				[illegible]	niv. de la nappe aquifère probable
50					
60					
70			schiste gréseux gris violacé micacé, fin avec fines pellicules de minéraux verts sur les plans de schistosités.		
80					
90					
100			schiste gréseux gris verdâtre très peu micacé, siliceux		
110					
120					
130					
140			Grès moyen peu micacé, siliceux homogène. rose. Grès plus ou moins grossier blanc. Grès grossier à moyen blanc siliceux.	[illegible]	vers niveau de la nappe proche

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HYDRAULIQUE et EQUIPEMENT RURAL Service Puits et Forages	PROJET	PUITS / FORAGE	venues d'eau:
	N° Prov. Quartier Ville Sous-préf.	DEVELOPPEMENT PALIERS LONGUE DUREE DESCENTE REMONTEE	cuvelage Ø de tubes Ø de pleins Ø de captage Ø de crépines Ø de Ø de trou nu Ø de Ø de bouchon de pied : OUI NON

N.S.:	Q=	T=	Δ=
P. avant:	Q=	T=	Δ=
	Q=	T=	Δ=
P. après:	Q=	T=	Δ=
	Q=	T=	Δ=

échelle T/essais H/mn/s	Heure H mn	mesure niveau m	mes. Temps lec. cptr.	cotes air-lift Ø prof.	Ø prof.	N. D. m	Δ m	Q. 3.7×10 m³/h	OBSERVATIONS (distance de rejet, type de pompe, ...)
00 00 00	h : h :					56.83		[illegible]	NS = 36.8[illegible]
00 00 15	h : h :	15	1.5 × 10¹			46.63	9.80		
00 00 30	h : h :	30	3.0			47.53	[illegible]		
00 00 45	h : h :	45	[illegible]						
00 01 00	h : h :	60	6.0			[illegible]	[illegible]		
00 01 30	h : h :	90	9.0			[illegible]	[illegible]		
00 02 00	h : h :	120	1.20 × 10²			52.31	15.48		
00 02 30	h : h :	150	1.50			54.06	17.17		
00 03 00	h : h :	180	1.80			55.25	[illegible]		
00 04 00	h : h :	240	[illegible]			56.87	20.04		
00 05 00	h : h :	300	3.00			57.87	21.04		
00 06 00	h : h :	360	[illegible]			58.45	21.62		
00 07 00	h : h :	420	[illegible]			58.82	21.99		
00 08 00	h : h :	480	[illegible]			58.96	22.13		
00 09 00	h : h :	540	5.40			59.11	22.28		
00 10 00	h : h :	600	6.00			[illegible]	22.37		
00 12 00	h : h :	720	7.20			[illegible]	22.53		
00 15 00	h : h :	900	9.00			[illegible]	22.60		
00 20 00	h : h :	1200	1.20 × 10³			59.54	22.71		
00 25 00	h : h :	1500	1.50			[illegible]	22.74		
00 30 00	h : h :	1800	1.80			[illegible]	22.84		
00 40 00	h : h :	[illegible]	[illegible]			[illegible]	22.96		
00 50 00	h : h :	[illegible]	3.00			[illegible]	22.98		
01 00 00	h : h :	3600	3.60			59.94	23.11		

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[illegible]	H mn	[illegible] m	[illegible] v.u.	profondeur	profondeur	m	m	m³/h	pannes, turbidité, etc
01 30 00	h h :	5400	[illegible]			[illegible]	[illegible]		
02 00 00	h h :	7200	[illegible]			60.21	[illegible]		
02 30 00	h h :	9000	9.00			60.32	[illegible]		
03 00 00	h h :	10800	1.08 [illegible]			60.37	[illegible]		
03 30 00	h h :	12600	1.26			[illegible]	[illegible]		
04 00 00	h h :	14400	1.44			[illegible]	23.62		
04 30 00	h h :	16200	1.62			[illegible]	[illegible]		
05 00 00	h h :	18000	1.80			60.51	[illegible]		
05 30 00	h h :	19800	1.98			60.51	23.68		
06 00 00	h h :	21600	2.16			60.50	[illegible]		
06 30 00	h h :	23400	2.34			60.65	23.82		
07 00 00	h h :	25200	2.52			[illegible]	[illegible]		
07 30 00	h h :	27000	2.70			[illegible]	[illegible]		
08 00 00	h h :	28800	2.88			[illegible]	[illegible]		
08 30 00	h h :	[illegible]	3.06			61.00	[illegible]		
09 00 00	h h :	32400	3.24			[illegible]	[illegible]		
09 30 00	h h :	34200	3.42			61.04	24.21		
10 00 00	h h :	36000	3.60			61.13	[illegible]		
10 30 00	h h :	37800	3.78			61.63	[illegible]		
11 00 00	h h :	39600	3.96			61.15	24.32		
11 30 00	h h :	41400	4.14			61.05	[illegible]		
12 00 00	h h :	43200	4.32			61.44	24.61		
13 00 00	h h :	46800	4.68			61.27	24.44		
14 00 00	h h :	50400	5.04			61.28	24.45		
15 00 00	h h :	54000	5.40			61.32	24.49		
16 00 00	h h :	57600	5.76			61.40	24.57		
17 00 00	h h :	61200	6.12			61.47	24.64		
18 00 00	h h :	64800	6.48			61.48	[illegible]		
19 00 00	h h :	68400	6.84			[illegible]	[illegible]		
20 00 00	h h :	72000	7.20			[illegible]	[illegible]		
21 00 00	h h :	75600	7.56			[illegible]	[illegible]		
22 00 00	h h :	79200	7.92			[illegible]	[illegible]		
23 00 00	h h :	[illegible]	8.28			1.62	[illegible]		
24 00 00	h h :	81400	8.64			1.76	[illegible]		

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ANNEX C

INGERSOL-RAND TRIP REPORT

Paul Schmid

November 1983

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November 17, 1983

Summary and comments on Dimpex - Upper Volta Trip

The TH-60 in Bobo Diolasso Upper Volta is in very good condition for a drill machine over two years old. The machine shows that the operator does not abuse the equipment and is willing to use suggestions that I have brought up. With the exception of the procedure for engaging the compressor clutch at 2100 RPM, his instruction in the operation of the drill shows a very high quality.

The spare parts supplied for this machine seem to have been adequate up to this time, however luck has been with them. I find that there are no repair parts for the Cat water injection pump, and that the parts they have for the King swivel are for a 15-KM unit but there is a 20-PXV swivel on this machine. The list goes on and on.

The spare parts list that we are putting together at this time will cover the machine much better than the original, and will include items that are updated or revised since the original purchase of the machine and the parts manuals.

I will forward from the states, some updated material and corrections to the rig manual. Scott and I are compiling a specific list at this time.

Although there has been no problem putting together a spare parts list for the TH-60 drill, the manuals for the chassis and the Detroit engine are difficult to read. The manuals are older than the truck and rig, so not all of the combinations are reflected in the books.

Scott has requested a 5 day extension upon my return to the states so that I may gather updated information and forward it to him. For the additional information it will be necessary for me to visit both a Detroit dealer (Great Lakes Energy in Akron Oh.), and an International Dealer (in Akron Oh.). Keifer in Garland has agreed to this request via telex.

The correct compressor oil for the TH-60 is SHC-626 oil. Currently they are using SHC-629 oil that they got from the rig in Ouaga. The SHC-629 oil is the correct oil for the XHP-1150 compressor where it came from, but NOT for the TH-60, and it should NOT be used in it. I recommended that the SHC-626 oil be installed as soon as possible. Until then, extreme caution must be used to warm the oil up completely before putting the compressor under load.

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Summary and comments on Dimpex - Upper Volta Trip

In general the maintenance schedule has been good in sofar as the greasing is concerned. However, the filter changing and the gearbox oil changes have been overlooked. I recommend that the hydraulic oil filters and the compressor oil filter be changed two (2) times each year. The Cotta box transfer case oil should be changed with each engine oil change.

The engine oil change and the engine oil filter should be changed each 6,000 miles. (the miles on the speedometer DO increase while the drill is running)

The engine oil bypass filter should be replaced every 12,000 miles or every other oil change.

The tri-drive, top head, carrousel gearbox oils should be changed at least one (1) time per year.

The regular lubrication seems adequate and should remain the same. There are lubrication charts are in the manuals for any items that may be in question and they are very clearly written.

Some of the Rotary screw air compressor oil filters that are now in stock, of which there are many, that are not reinforced with the fine steel screen must NOT be used in the TH-60. These filters should be destroyed. The correct filter element part number is 35330133 and there is a limited supply of these now on hand in the shop.

I recommend that ALL filters in stock be protected from dust and dirt. This would mean sealing each filter in a separate plastic wrap. As it is now these filters are put on the shelf without regard to keeping them clean. It is of no value to remove a dirty filter from a machine and install a new dirty one in its place.

I point out this fact: The loss of one engine or one compressor or one hydraulic oil pump could amount to more than a mans wages for one year.

An oil or air filter cleans in one direction only. As the oil or air passes into the filter the dirt is stopped in the filter. If this filter gets dust and dirt on the clean side while on the shelf, it will flush this dirt into the system as soon as the flow starts through the filter. Thus the new filter could destroy rather than protect the system.

There are two (2) types of hydraulic oil filter elements in stock at this time. Part number 58110560 is the correct element for the TH-60. This element has no outside wrapper and can be used in any of the five hydraulic filters.

Summary and comments on Dimpex - Upper Volta Trip

Part number 50930106 HAS an outside wrapper and may be used in the 2 can filters mounted on the hydraulic tank. They must NOT be used in the single can Sundstrand suction filter.

I recommend that the 50930106 elements be used as stated until the stock is depleted. These filters should not be reordered.

Ordering the 58110560 elements in the future will eliminate one type of filter and will also ease the confusion.

A telex has been put together inquiring about a training class in Maylasia. Since they have the best facilities I have seen for the type of training Volta requires, I have suggested that they contact Tan Eng Seng at IR Subang Jaya. Scott has requested a price quote for a multi week school in hydraulics and air compressor inspection and repair.

I also visited the RO-300 drill in Upper Volta and some comments follow.

The personnel from Ouagadougou say that the IR people here in Ouaga., a company by the name of CICA-ELECTRO-HALL is of very little help to them. They say that they do not have parts nor personnel to help solve their problems. They also say that if the IR people cannot help them, that in the future they must buy another brand of equipment that can be serviced by local people.

The RO-300 is about three years old and has not been maintained as well as it should have been. They have no spare parts in stock and they did not seem concerned about keeping it in good repair in the past. Possibly the biggest problem is the fact that there are no spare parts to work with. They told me that the hydraulic filters had not been changed since the machine was new.

The drill itself seems to be in better shape than the International chassis. They have had more trouble with the truck, brakes, transmission shifter air leaks, fan clutch air leaks, tachometer, speedometer etc. than any thing else.

FIELD SERVICE REPORT FOR DIMPEX AND UPPER VOLTA USAID CONTRACT

Date: Oct. 20 - Nov. 15 1983 Report No: 83-11-1

Model: TH-60 Serial No: 563 Hours: 1709

Mileage: 61955 Engine Hrs: 1613 New: __ Used: __

Customer: USAID - Upper Volta Project Location: Bobo Diolasso

Persons Contacted: Dimpex Assoc., Leyland Hazlewood, Vernon Hazlewood, Brad Wallach, Scott Welch - USAID, Elroy Carlson

= =

Equipment: 38 ft double retract derrick, 4.5" Drill rod, 2 7/8 joints, 20 PXV swivel, 23 series top head pump, 3 section pump, 600 CFM comp, UL-88, Front cooler, 3 Jacks, Sand line W/clutch (never used), 25 GPM Cat, Pig oiler, 5 X 6 Mud Pump.

25 Oct 83

A Replace all Greesen hydraulic oil filters. They are very dirty and have a black slime on them. This dirt is not system generated and must have been poured in through the filler neck when oil was added to the tank. It could have been contaminated oil or a dirty container.

B Remove, clean and repair all foot control valves. It was necessary to install one repair kit, the other valves only needed cleaning and lubrication.

C Remove all val es from the Mud pump, clean and grease them. The pump is very rusty inside but should operate OK. Replace all discharge valve cover gaskets and show how to properly assemble the valves and covers.

D The 20 PXV King swivel needs the seals replaced, but there are none in stock. (The wrong seals were shipped in the spare parts order.)

26 Oct 83

A The battery and starting system has been altered, and no longer seems to work properly. (Will telex for proper wiring diagram)

B Remove and overhaul the Low speed Wabco air control valve. The housing and bushings are worn badly and the valve should be replaced. (No valve in stock)

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C Start up and run the rig compressor. check the air regulation system. The compressor seems to run OK. I find that they are using SHC-629 oil in this compressor. The proper oil is SHC-626 and I recommended that this oil be changed AS SOON AS POSSIBLE. In the meantime, the compressor MUST be COMPLETELY WARMED up before putting in under load.

D Start up and run the IR vane portable compressors used with another drill located here at this Bobo shop. This compressor has an oil leak in the main discharge area, and also rolls the engine backwards on shutdown.

27 Oct 83

A Remove the portable compressor discharge check valve. The valve is worn badly letting the air in the separator tank back into the compressor turning it into an air motor thus rolling the engine backwards. They will reassemble the unit and continue operating it this way until a new check valve can be ordered and installed.

B On the TH-60, We replaced the Pulldown regulator. The adjustment stem was tight and attempts to free it up have resulted in breaking it.

C Free up the Hammer Holdback regulator valve and the Water Injection regulator valve.

D Discuss the operation of the Pulldown and Holdback regulation and the proper method of using them.

E Discuss the Water Injection pump construction and repair procedures. Also the foam injection pump operation and what to expect from it.

F Change the oil in the Tri-drive gearbox.

G Replace the Rig compressor oil filter. This filter has broken up very badly. Pictures show the filter when it was removed. There is a large stock of this Old style filter in stock, also there are a few of the New style elements. We installed one of the New style elements at this time.

H Disassemble the King swivel and inspect the seals. Discuss how to further disassemble the swivel for major repairs. Reassemble the swivel. (The seals are bad, but there are none in stock.)

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FIELD SERVICE REPORT FOR DIMPEX AND UPPER VOLTA USAID CONTRACT

I Adjust the engine fan belts. (Needs belts, none in stock)

J Check the engine fan clutch. (Needs overhauled, slips slightly)

K Disconnect the engine fan clutch air supply from the firewall and plug the manifold. This has also stopped the air leak at the fan clutch thermostat.

28 Oct 83

A Go over and discuss the air compressor operation and oiling system in detail.

B Work with Scott on spare parts that should be kept in stock.

29 & 30 Oct 83 (weekend)

31 Oct 83

A Discuss the control air piping from its source to final shifting of the hydraulic valves and cylinders.

B Discuss the Hydraulic system in detail, on the rig. Go over each component as we follow the hydraulic power flow.

C Discuss in depth the construction, operation and repair of the valve banks and pumps.

D Cover the test gauge points and the operating pressures at each point in the system.

1 Nov 83

A National Holiday here in Volta. Work on parts lists with Scott in the morning.

2 Nov 83

A Scott was tied up somewhat with the factory rep. from MACK truck. The Rep came in today to help Scott with some problems with the MACK trucks used with the Drill Rig.

B Finish our parts list for the IR rig and continue with the IHC and Detroit engine diesel parts identification.

FIELD SERVICE REPORT FOR DIMPEX AND UPPER VOLTA USAID CONTRACT

3 Nov 83

A Remove the orifices from the Cotta box oil supply lines.

B Several of the trucks that are being started up for the drill season have dead or low batteries. A lot of the day was used up switching batteries and getting the engines started.

C Go through the Hyd valves and systems on both the 300 CFM screw compressor and the 175 CFM portable compressors. Again dead batteries slowed down operations.

D Discuss the operation, fuel system etc. compared to the Mack and Cummins engines.

4 Nov 83

A Work on the IHC and Detroit spare parts lists.

B There are many places in the manuals which are not clear or where the parts do not seem to be defined for this truck or engine. The manuals are older than the truck so some combinations are not shown. Only help from a dealer or distributor possibly state side will help.

C Work with Scott on a list of specific areas and parts that we need numbers for.

D This PM we started showing the slide training films for the TH-60 hydraulics. Ran out of time, will finish Monday.

5 - 6 Nov 83 (weekend)

7 Nov 83

A Finish the TH-60 hydraulics slide films and presented the TH-60 operation and maintenance film. We have spent about 9 hours on these two films discussing in detail each component, its function and its relation to the operation of the machine.

B Work with Scott compiling a list of questions about the engine manual. Also discussing which parts are supplied by International and which are supplied by Detroit Diesel.

FIELD SERVICE REPORT FOR DIMPEX AND UPPER VOLTA USAID CONTRACT

8 Nov 83

A Work with Scott compiling a listing of tasks he wants me to complete in the States.

B Check the alternator on the rig. 12 Volt Neg Ground (I have never seen an 8V92 with a 12 volt system before.)

C Check the Tach drive. (It is as shown in the Detroit manual.)

D Copy all the papers so Scott and I have identical notes and lists.

9 Nov 83

A Check over my copies, list questions and discuss them with Scott.

B Machine gone to the field, Scott cannot find a reliable vehicle that he trusts to go out to see it in operation.

C Scott says "take the afternoon off"

D Scott called about 12:45. Says the Rig compressor won't build pressure, and wants to know if I want to go to the rig, about 70km. (Yes, I wanted to get out to see the country and the rig rather than stay at the hotel anyway.)

E Compressor is shutting off at about 125 psi. Remove and clean the UL-88. Adjust the butterfly linkage. Runs OK now.

10 Nov 83

A Fly from Bobo to Ouaga.

B Go to various offices and talk about the drill.

C Go to the garage where the RO-300 drill is located.

RO-300 Serial No.: 445 Hours: 232 (don't work)
Miles: 63426 (not working) Front tach gone. (has broken tang at the 90° angle drive at the blower) 8V71T engine, 20 PXV Mod swivel, 7½ X 8 Mud pump, NO air compressor, Young oil cooler, Pig oiler in standpipe for Aux. air compressor, 25 GPM Cat, Sandline W/clutch (never used), 2 part line, 23 SS table drive pump, 22 SS Mud pump motor, 5 Greesen hydraulic oil filters.

FIELD SERVICE REPORT FOR DIMPEX AND UPPER VOLTA USAID CONTRACT

D Transfer case Jaw clutch won't shift. (Has a bad Wabco control valve. Need parts)

E The right front drive axle brake rod is wearing on the case. It has been broken at some time and when they rewelded it it was not aligned just right. They will adjust it.

F Drive line pillow block squeaks. (Need Part)

G Engine fan thermostat leaks air. (Disconnect the line at the firewall and plug the manifold.

H Engine fan clutch slipping. (Need Parts)

11 Nov 83

A Complete the job of plugging the Air clutch supply line.

B Adjust the engine fan belts. (needs belts)

C Remove and check the main transmission shift control knob. (has an air leak when the range shifter is in high range.) The shifter condition is questionable, it has been worked on before with little success.

D Check the drive lines. Two of the driveshafts are out of phase. Explain how they should be aligned.

E Check out one of their 750 CFM - 250 PSI portable compressors. The regulator is set too high, 280 psi and is blowing off at the separator safety relief valve.

F Remove the pressure regulator, clean and reassemble it. Adjust it to 250 psi and reload at 220 psi.

G Check out their 1150 CFM - 350-400 PSI skid mount compressor. Serial No. 111883 U79 343 Model XHP-1150. They tell me that since the fuel filters were replaced, the engine does not run properly. Since they have NO spare parts, they replaced the filters with whatever was available, that looked like they may fit. To demonstrate, they put batteries in the unit and got it started. After a normal warm up period the compressor was brought up to speed very slowly with the hand throttle. At between 1800 and 2000 rpm they pointed out a surging in the engine, and a noise in the area of the transmission-air end connection. When I

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ran the throttle to full open, it ran OK. It seems that the transmission is shifting up-down-up-down etc. During further questioning it was brought out that the fuel filters and the transmission oil were, as they say Just changed. (Last January) I checked the transmission oil and it did not smell burnt but it did not look like Dexron II. They showed me the container that the oil came in and it does say Dexron, but the oil in the transmission is not Red.

H There is an oil leak at the bottom oil outlet at the separator tank. (No spare part)

I There is also an oil leak on the oil bypass valve. (again no parts)

J The fuel primer pump has been broken and rewelded, now it don't work properly. (no parts)

12 Nov 83

A Remove and partiality repair the Wabco control valve for the Jaw clutch in the transfer case. (One kit was sent up from the Bobo project spare parts. They will finish the valve when the other kit arrives.)

B Work with the Ouaga RO-300 group on a list of spare parts that they should have for the RO-300.

C Again I brought up the subject of the drive line alignment on the RO-300.

Time to Fly out.

Additional notes are contained in the summary sheets that accompany this report.

Paul Schmid Field Service Supervisor - IR Product Support Group
Garland, Tx.

November 17, 1983

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ANNEX D

UPPER VOLTA RURAL WATER SUPPLY PROJECT

Project No. 686-0228

TRIP REPORT

August 17 - September 7, 1983

Pierre R. Léger, Director
International Division
Medical Care Development, Inc.

November, 1983

I. INTRODUCTION

Between August 17 and September 7, 1983, Pierre R. Léger, Director of the MCD International Office and Project Administrator for the health component of the Upper Volta Rural Water Supply Project (No. 686-0228), made a field trip to Ouagadougou and Bobo-Dioulasso in Upper Volta.

The purpose of the trip was two-fold:

1) To assist in the implementation of the National Seminar on Rural Water Supply and Sanitation which was organized by the Project, and
2) To assist the two new health specialists in developing a work plan agreeable to the project directions and USAID, as well as to address all technical and administrative problems of the health component and/or with the project itself.

These two objectives were successfully addressed. The National Seminar was implemented between August 22 and September 2, 1983, and was attended by 30 participants:

- Project Technicians from both components
- Project Directors
- USAID representatives
- WHO representative
- Representatives from CNES
- Sanitarians from all regions of the country
- HER technicians from other regions of the country (YATENGA and COMOE)
- MCD's technical assistance personnel (environmental health specialist and health education specialist), and the Director of the International Division
- The President of Dimpex Associates.

After meetings with the Project Directors and Project Staff in Bobo Dioulasso, and the Secretary General of Health, USAID Officials in Ouagadougou, and the Health technical assistance team; a proposed health component work plan for the remaining life of the Project was formulated and negotiated with all relevant Project parties.

The outcome of both the National Seminar and health component work plan are described hereafter, followed by comments and recommendations by Mr. P. Léger.

II. DETAILED DESCRIPTION OF ACTIVITIES

A. National Seminar (see Annex I - A, B, C)

The National Seminar on Rural Water Supply and Sanitation in Upper Volta was an outcome of recommendations made by Voltaic project personnel and officials at the Ministry of Health at the end of the Water Quality Control workshop which was implemented by MCD in December 1982.

The purpose of the Seminar was to improve the knowledge and skills of field technicians from HER and the health component working in different parts of the country, and to improve project implementation with suggestions and recommendations which could be made by participants.

As the USAID-financed project is considered by the GOUV to be a model for the National Water Decade Program and the National Primary Health Care Program The approach of the National Seminar was to utilize this on-going project to transfer technological, as well as planning and management information to the participants, and to have participants assist in identifying new methods or techniques for addressing the weak parts of the Project.

It is for this reason that the Seminar was planned in a way where a number of key subjects were presented, followed by group discussions, field visits, and practical field work.

The key subjects presented were:

- Global, national, and regional water supply and sanitation policies and strategies development
- The Upper Volta Rural Water Supply Project design, implementation and achieved results
- Appropriate technologies for rural water supply and sanitation for Upper Volta
- Sanitary control of water systems
- Community participation: necessity for devleopment projects - approach and methodology for development, and experience in U.V.
- Health education interventions: national and planning for rural water and sanitation projects
- Epidemiological surveillance: program necessity, approach and methodology for rural water and sanitation projects
- Vector and nuisance problems, which must be considered in the planning and implementation of a rural water supply and sanitation project.

The above-mentioned subjects were presented by representatives from:

- The two project components
- USAID
- The World Health Organization
- Centre Muraz
- The CNES
- Medical Care Development

Practical field work and demonstrations were done in the following areas:

- Sanitary improvement of surrounding water supply system's site
- Bacteriological sampling and analysis of drinking water
- Community water supply and sanitation surveys
- Pump maintenance demonstration
- Operation and maintenance of drilling equipment (TH 60)

At the end of the National Seminar, three board recommendations were formulated by the participants. These were broadcasted on radio and were the following:

1. That all future water projects should also include a sanitation component
2. That more sanitary technicians be trained to carry out the the water supply and sanitation projects which will be developped during the Water Decade
3. That equipment and facility maintenance programs be developped with each project and that special consideration be given to local production of hand pumps and pump parts.

An official seminar report was to be prepared by the Directors of the Project for the GOUV.

B. Technical Assistance Work Plan for the Health Component (see Annex II)

With the replacement of the health component technical assistance team, and the change in health component project management, MCD felt it was an opportune time to discuss the health component weaknesses vis-à-vis the recommendations of the mid-term evaluation, as well as to develop and negotiate a proposed work for the technical assistance team.

During the field trip, several meetings were held with USAID officials the Project Directors and staff, and the Secretary General for Health. These

meetings primarily covered Project issues raised by the evaluation, and the proposed technical assistance work plan prepared by MCD.

The proposed work plan included the following:

1. That the MCD technical assistance personnel would have specific responsibility for development of project sub-components versus geographical project areas. Ms. Dishman, the community development and health education specialist, would be responsible for assisting the Project with the development of manpower training, health education, and village organisation. Mr. Ashelman, the environmental health planning specialist, would be responsible for sanitary control of water supply systems, construction of demonstration latrines, and development of a project information system. Both specialists would work with the Project directors in the development and monitoring of these and other key activities.

2. That the health team would undertake a complete survey of the project area which would orient them toward the realities of the project area, and would allow them to collect all the necessary information on project status in order to design specific intervention programs for the remaining lifespan of the Project.

3. That the following activities must be addressed:

- Operational plan for the health program integrating activities of the National Primary Health Program with that of the Water Supply and Sanitation Project,
- Water quality control program development to include facility and resources development,
- Epidemiological surveillance program development,
- Health education program development to include facility and resources development,

and that short-term assistance from MCD would be required in these areas.

While the work plan was approved in principle by all parties, it was agreed that the MCD technical assistance team prepare and negotiate the details for each of the proposed tasks with the Project directors and subsequently with USAI

III. COMMENTS

A. National Seminar

The National Seminar has successfully achieved its objectives. The majority of participants felt that they had learned a great deal, and were better prepared to participate in the planning and implementation of rural water supply and sanitation projects. As for the project staff itself, it had a better understanding of the Project rationale, as well as the actions which must be taken to improve water supply and sanitation systems.

It was unanimously agreed that the organization for the seminar was weak, and recommendations were made to improve such seminars in the future. However, the participants recommended that a third seminar be organized within the next year, and include other francophone countries as well.

The problems which will need to be addressed for future seminars include:

- Participants' reception
- Policies on per diem allocation to participants
- Recruitment and orientation of speakers
- Seminar logistics and administrative support
- Technical preparation for field work
- Selection of national coordinator

The benefits for the Project were the following:

- Construction of a model apron and stockage pit which would eliminate unsanitary conditions at project water supply sites. It should be noted that villagers provided some material and the labor force for the construction.

- Identification of local resources for water quality testing and epidemiological surveys.

- A model program for community participation and education in the implementation and operation of water sypply and sanitation systems.

- Information exchange on construction and maintenance of facilities.

- Exposure to other technologies to include spring capping and rainwater harvesting as sources of supplies for project villages where groudwater is not ready available.

B. Technical Assistance Work Plan

At the start of the Project, MCD recommended that a project plan be develcped for the health component and that a work plan for technical assistance be derived from it. Such a plan was never developed. The technical assistance team were used primarily as supervisory staff, giving both technical and administrative liaison between the project sanitarians and the project director. While the technical assistance staff played a major role in establishing activities, orienting field staff, and supervising field activities, their contributions were greatly limited in light of project activities which had to take place in each one of the "sous-préfectures".

Presently, it is felt that the sanitarians can implement and manage all the project activities which need to take place in their geographical locations. Therefore, the role of the technical assistance team had to be redefined in such a way that their project input can be optimized. By using two professional who have complementary specialties, it becomes more effective to assign areas of responsibilities to each of them.

They are able to concentrate their efforts to specific development areas, including activity programming and problem-solving. Moreover, they are able to provide effective assistance with development planning and management to project directors.

As for the work plan, it becomes an effective tool for highlighting the responsibilities of both parties and for evaluating the efficiency and effectiveness of technical assistance in the project.

With the necessity to have a) a more coordinated effort between the two project components, b) an operational plan integrating the various activities called for by the GOUV and c) to address the issues raised in the evaluation (including water quality testing, epidemiological surveillance, and health education support), the work plan becomes an effective tool for strengthening the health component and becomes the basis for planning any extension of the project beyond its lifespan.

IV. RECOMMENDATIONS

A. National Seminar

This national seminar was the second one organized within the framework of the project. It not only provided an opportunity for project technicians to improve their knowledge and skills in the different areas of project interventions, but it also provided an opportunity for other water supply and sanitation technicians from different regions of the country to benefit from the experience and expertise acquired thus far by project technicians. Indeed, the USAID project has become the model for the development of effective water and sanitation decade projects in Upper Volta.

A third seminar on Rural Water Supply and Sanitation in the framework of the Water Decade program has been requested by the participants of the national seminar.

The request is a justifiable one because their seminars provide a continuing education program for national technicians. Therefore, it is recommended that another seminar be held within a year from the August 1983 National Seminar, and that it be organized as an international event with participants and speakers from different francophone African countries.

However, preparation for this seminar will need at least six months start-up time. To plan the proposed international seminar, the following will need to be addressed as soon as possible:

1. Obtain agreement from the Government of Upper Volta and request that a planning Committee be created. The members of the Committee should preferably be selected among the members of the National Water and Sanitation Committee and should be presided over by both the Health and Rural development representatives.

2. Nomination of a national seminar coordinator whose responsibility will be to carry out the planning committee's recommendations.

3. To select a sub-committee among members of the planning committee who will have specific responsibilities under the direction of the National Coordinator for organizing the seminar.

4. To approve technical assistance from MCD to provide a seminar planning and management specialist and a Sanitary Engineer to serve as a resource specialist. The seminar planning and management specialist would assist the planning committee and the

National Coordinator with all planning and management activities for the Seminar, while the technical resource person would assist in preparation and implementation of the technical aspect of the seminar.

The seminar planning and management specialist would be needed for 10 weeks while the technical resource specialist would be needed for five weeks.

MCD will prepare, once approved, a proposal for short-term technical assistance which will provide in detail, the scope of work, the proposed candidates, and a schedule of activities.

B. Proposed Technical Assistance Work Plan

The proposed technical assistance work plan is a document written primarily to re-direct technical assistance inputs in such a way that the mid-term evaluation recommendations are addressed and project expected results are achieved.

While the role and responsibilities of the long-term technical assistance specialists have been approved and established, the other recommendations concerning short-term technical assistance activities will need to be addressed as soon as possible. The recommendations are as follows:

1. Health Operation Plan

If the project is to be extended beyond July 1984, serious consideration must be given, particularly to the development of an operational health component plan. A specialist with primary health care/water supply and sanitation program planning background is needed to assist the health component staff with cooperation with the wells construction component staff to develop such an operational plan. The plan would have to address the following actions in detail:

- Manpower planning and training for health workers in this project
- Village organization for the implementation, operation, and management of village systems (health post and water supply system)
- Health education intervention in the water supply/ primary health care program.

- Environmental health activities related to the water supply project and the primary health care program

- Information management

- Logistics/supplies management to support village health workers, itinerant agents, nurses, and project sanitarians

- Integration of wells construction activities within the health component activities

Once these actions are carefully analysed in conjunction with required and available resources, decisions at both the project and governmental levels would have to be made in order to identify the scope of the project's interventions. Then an operational plan delineating specific goals, objectives, activities, activity schedules, roles and responsibilities of villages and project staff during the extension period will have to be prepared and approved by both the GOUV and USAID.

2. Support Programs

The crucial support programs to be addressed are:

- The Water Quality Control Program
- The Epidemiological Surveillance Program
- The Health Education Intervention Program

Recommendations have been made in the work plan to address these programs if specific project objectives are to be met on a long-term basis. Therefore, it is recommended that actions be taken to approve proposed short-term technical assistance for these programs as soon as possible, so that they can be integrated in the operational plan.

ANNEX I, A

Seminar Schedule

SEMINAR ON WATER SUPPLY AND SANITATION

USAID PROJECT - AUGUST 22 TO SEPTEMBER 2, 1983

PROGRAM

BOBO-DIOULASSO (UPPER VOLTA)

TUESDAY 23rd, FIRST DAY

8 am to 9 am	Registration of participants
9 am to 9:15 am	Official opening by the representatives of - the Ministry of Rural Development - the Ministry of Health - USAID and the representative of the Prefect
9:30 am to 9:45 am	Introduction of the participants
9:45 am to 10:30 am	Break
10:30 am to 12:30 am	Presentation of the agenda
12:30 pm to 3 pm	Lunch
3 pm to 4 pm	Presentation of the preparation of the policy and the national strategies for water supply and sanitation by Mr. Pierre LEGER of MCD.
4:15 pm to 6 pm	Group preparation by participants of the outlines of a water supply and sanitation policy adequate for Upper Volta.

WEDNESDAY 24TH, SECOND DAY

8 am to 8:30 am	Presentation of the USAID project on village water supply by Mr. Bruno Bambara, USAID representative
8:30 am to 10:30 am	Presentation of the project achievements - Health component by Mr. OUEDRAOGO Boukary - Water supply component by Mr. DIALLO Mamadou
10:30 am to 11 am	Break
11 am to 12:30 pm	Discussion of the presentations
12:30 pm to 3 pm	Lunch
3 pm to 3:45 pm	Adequate technologies for rural water supply in Upper Volta (technical, economic and social aspects)
3:45 pm to 4 pm	Break
4 pm to 6 pm	Group preparation of the technical and socio-economic surveys to be carried out for programming a rural A.E.P. project.

THURSDAY 25TH, THIRD DAY

8 am to 9:15 am	Design, implementation and maintenance of the HER wells by Mr. KAMBOU Claude.
9:15 am to 10:30 am	Design, implementation and maintenance of drillings by Mr. BORO Amidou / SANON.
10:30 am to 10:45 am	Break
10:45 am to 11:30 am	Presentation of design, implementation and maintenance of the rainwater collection systems by Mr. Pierre LEGER.
11:30 am to 12:30 pm	Quality control of rural water (sanitation surveys, physical, chemical and bacteriological analyses, detection of polluting sources) by Mr. Pierre LEGER.
12:30 pm to 3 pm	Lunch
3 pm to 6 pm	Practical work : Surveys on water supply and preparation of an outlet development plan in BODIALEDAGA.

FRIDAY 26th, FOURTH DAY

8 am to 9:30 am	Presentation and discussion of the development plans by the groups
9:30 am to 10:45 am	Community participation in water supply and sanitation projects in Upper Volta. (Experiences, realities and recommendations.)
10:45 am to 11 am	Break
11 am to 12:30 pm	Health education and community participation in rural water supply and sanitation projects by Dr. Gue Beli.
12:30 pm to 3 pm	Lunch
3 pm to 6 pm	Goals and objectives of the International Potable Water Supply and Sanitation Decade by Dr. Gue Beli or the WHO representative.

SATURDAY 27th, FIFTH DAY

8 am to 12 pm	Physical, chemical and bacteriological analyses of water at the Muraz Center laboratory. Participation of the laboratory technicians

MONDAY AUGUST 29th, SIXTH DAY

8 am to 9:30 am	Epidemiological control for the rural water supply and sanitation projects (needs and feasibility) Dr. Guiguemde of the Muraz Center Discussion on this subject
9:30 am to 11 am	Staff training in services related to rural water supply and sanitation (Planification and implementation of the programs) Mr. Pierre LEGER Dr. Gue Beli followed by a discussion
11 am to 12:30 pm	Pump repair and maintenance by HER technicians
12:30 pm to 3 pm	Lunch
3 pm to 6 pm	Development work on a water source in BODIALEDAGA

TUESDAY 30th, SEVENTH DAY

8 am to 10 am	- Human waste and waste water disposal in rural areas Mr. Leger, Mr. P. Ashelman, D. DISHMAN - Planning for a latrine project Mr. Ouedraogo Boukary
10 am to 10:30 am	Break
10:30 am to 12:30 pm	Goals and objectives of the IPWSSD (Overall presentation) Mr. Gue Beli or the WHO representative
12:30 pm to 3 pm	Lunch
3 pm to 6 pm	Trip to BAMA Solid and liquid waste Disposal problem

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WEDNESDAY 31st, EIGHTH DAY

8 am to 10:30 am	Discussion on the Tuesday trip
10:30 am to 12:30 pm	Vector control Entomologist of the Muraz Center
12:30 pm to 3 pm	Lunch
3 pm to 6 pm	Film presentation about water supply and sanitation at the Health School.

ANNEX I, B

RURAL WATER PROJECT

USAID N°686-0228

SEMINAR EVALUATION

NAME OF PARTICIPANT :

ADDRESS :

OCCUPATION :

ASSIGNMENT PLACE :

POSITION :

YEARS OF EXPERIENCE :

1. WHAT WAS THE SUBJECT OF THE SEMINAR?

2. WHAT WAS THE MAIN PURPOSE OF THE SEMINAR?

3. HAS THE SEMINAR ADDRESSED THE SUBJECT?

YES NO

IF YES: Was the subject entirely covered?

covered in part:

or not covered:

WHY?

4. In your opinion, has the purpose of the seminar been reached?

YES NO

WHY?

5. Has the seminar brought to you knowledge and/or skills in the following areas:

	YES	NO
b. Inventory of water ressources		
c. Inventory of environment		
a. Policy and strategy of water decade		
d. Design and development of wells		
e. Design and development of drillings		
f. Design and development of other types of water points		
g. Design and development of latrines		

h. Design and development of an extension and education program in the health sector

i. Other items: List them.

6. Were the presentations:

GOOD AVERAGE POOR

Elaborate and make comments that will help to improve the types of seminars:

7. Were the field visits satisfactory?

YES NO

Explain why:

8. Were the practical works carried out during the Seminar adequate?

YES NO

If NO, explain:

9. Were the audiovisual aids adequate?

YES NO

If NO, explain:

10. Should there be another seminar on water and sanitation under this project?

YES NO

If YES, give details on the date, duration, framework, objectives, etc.

11. What are your general comments on the Seminar?

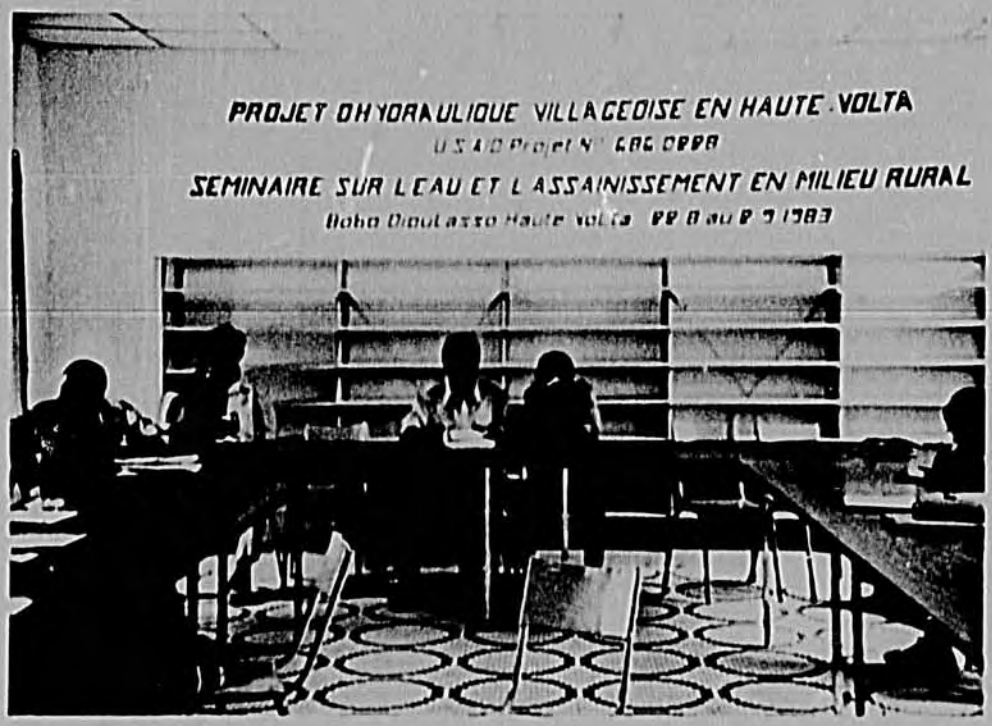
12. What are your recommendations to improve such seminars under this project?

ANNEX IC

VISUAL PRESENTATION

ON

SOME SEMINAR FIELD ACTIVITIES



1) GOUV and USAID representatives attending group work session at Seminar

2) Project directors working on group activity

3) Participant groups developing water supply and sanitation strategies for country regions

4) Dr. I. R. Guiguenmdé of the Centre Muraz in Bobo-Dioulasso makes a presentation on Epidemiological Surveillance Program Concept and Planning

5) Participant takes water sample from Marigot
for bacteriological testing
during Seminar's field work
(Sample proved water was highly contamined:
E. Coli were too numerous to count)

6) Participant takes water sample from traditional well
for water testing during Seminar's field work
(Sample proved to be
highly contamined with fecal coliforms)

7) Project sanitarian informs participants on village organization and customs during field work

8) Participant groups undertake Health Education session with villagers during field work

9) Participants inspect two types of non-project well-water supplies

A modern well (top), and a traditional water hole (bottom).

10) Participants survey project area to view different types of water systems used.

A spring built by HCR is seen above, and a non-capped spring is seen below.

11) Participants inspect Marigot used in project area as drinking water source by villagers.

12) Participants visit construction method for new traditional well being built by villagers.

13) Participants inform village health committee on work to take place in improving water supply surroundings and level of participation expected from villagers.

14) Villagers work under the supervision of participants in constructing a platform around a drilled well-water supply to eliminate standing pools of water

15) Villagers work as volunteers to collect building material.

16) Seminar participant is being instructed by MCD Engineer on construction details for well's apron.

17) Villagers perform all construction work for well's apron.

18) Villagers provide animation for village workers

19) Village women collect water (top)
from existing well

for mixing concrete (bottom)

20) An unsanitary condition around a newly constructed Project Water Supply (top)

was converted to a sanitary situation (concrete apron and soakage pit) by participants and villagers within a three-hour work period involving over 20 participants and 50 villagers (bottom)

ANNEX E

PRELIMINARY REPORT

SURVEY OF VILLAGES USING
USAID PROJECT WELLS
OCTOBER - NOVEMBER, 1983

HOUET, KENEDOUGOU, PONI,
AND BOUGOURIBA PROVINCES,
UPPER VOLTA

JOINTLY RESEARCHED BY
DIRECTION DE LA SANTE PUBLIQUE (DSP)
AND
HYDRAULIQUE ET EQUIPEMENT RURAL (HER)
UNDER
USAID PROJECT No. 686-0228
BOBO DIOULASSO, UPPER VOLTA
BY DEBORAH DISHMAN AND PETER ASHELMAN
OF
MEDICAL CARE DEVELOPMENT, INC., AND
THE DIRECTION DE LA SANTE PUBLIQUE,
BOBO DIOULASSO

DECEMBER 23, 1983

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ACKNOWLEDGEMENTS

The authors of this survey effort, a project of three-and-a-half months duration, recognize its timely accomplishment is due to the extraordinary collaboration of many well-wishers. First of all, gratitude is expressed for the warm and appreciative reception offered by the villagers themselves, who are benefiting from Project wells and health training.

Among USAID Project personnel who made this survey possible, thanks go to the two Technical Directors, Dr. Irénée OUEDRAOGO, Volet Santé (Health Component), and Mamadou DIALLO, Hydraulique et Equipement Rural (H.E.R.), who approved the initial concept of the survey; H.E.R. Brigade Chiefs Claude KAMBOU, Mamadou Victor ZIGANE, Benjamin SANOU, and Amidou BORRO, who provided essential field information; Volet Santé Sanitarians Omer BOUDA and Etienne HIEN, who supervised research teams and tabulated responses; Sanitarian Boukary OUEDRAOGO, who helped train interviewers of the Organisme Regional de Developpement (O.R.D.); Zouri DRAMANE, Gaoussou KI, and Paul SANOU, detached from H.E.R. pump installation during November to collaborate full-time; Miss Joanne SPALDING, Peace Corps Volunteer who interrupted her itinerant health work to provide field and office support in Bobo Dioulasso; Madame Juliette GNOUMOU and Madame Fatimata KONATE, Volet Santé and H.E.R. secretaries, respectively.

The O.R.D. at Bobo Dioulasso generously extended collaborative support from the beginning. Bobo O.R.D. Director Ibrahim MEBIE promptly agreed to Volet Santé's request for O.R.D. participation; the Chiefs of Secteurs Bobo Nord and Bobo Sud, Germain ZONGO and Roger BONKO, then arranged for the survey authors to develop the questionnaire content and form in working sessions with O.R.D. Sous-Secteur Chiefs.

Field work in Houet and Kenedougou Provinces was accomplished almost exclusively by O.R.D.'s knowledgeable local extension workers (Encadreurs). Gratitude is due to O.R.D. Secteur Chiefs Germain ZONGO, Bobo Nord; Roger BONKO, Bobo Sud; Daouda KAMBIRI, Orodara; Sié PALM, N'dorola; and Noufou ZANGO, Houndé; and all the Sous-Secteur Chiefs who supervised and assisted the field interviews. No fewer than seventy O.R.D. personnel were involved; their expertise and cooperation greatly facilitated the research.

Most of the Project-trained Itinerant Health Workers, newly placed in the field, assisted in the village field survey. Those in Houet and Kénédougou Provinces collaborated under the supervision of the O.R.D. Sous-Secteur Chiefs, whose O.R.D. extension workers did most of the interviewing. In Poni and Bougouriba Provinces to the east, where the O.R.D. was unable to program a joint field effort under the time frame of the survey, Project personnel from Bobo Dioulasso did the field interviews in collaboration with the two Project Sanitarians responsible for the region, along with local Itinerant Health Workers and Ministry of Health personnel.

Best Available Document

RATIONALE AND CONDUCT OF SURVEY

After nearly four years of activity in well construction and health training in southwestern Upper Volta, the USAID Village Water/Health Project, through its Technical Directors, launched a collaborative field survey of results and needs. Conducted under the aegis of the Project health component of the Direction de la Sante Publique, Secteur 7 (DSP/7) in Bobo Dioulasso, the survey entailed the joint effort of DSP/7 itself, the well-digging Bobo regional office of Hydraulique et Equipement Rural (H.E.R.), and the Bobo regional office of the Organisme Regional de Developpement (O.R.D.).

The rationale for the survey was to specify the conditions and needs in the environment of each usable Project well bearing upon attainment of key Project objectives, notably 620 hand-pumped well points and a village health worker presence in 550 Project villages. In highlighting important problems, the survey serves as a guide for programming future activities, as suggested in this Report.

In collaboration with H.E.R. and O.R.D., Bobo Dioulasso, the survey was conceived, developed, and organized in September, 1983 by the authors of this Report, consultants with Medical Care Development/Dimpex Associates assigned to the Project health component. During October and November the field survey work was conducted in almost 380 villages out of a possible 392.

The task of coding, tabulating, analyzing and reporting survey data from 374 accepted surveys took place mostly in the offices of H.E.R., Bobo Dioulasso, where adequate space was available. The H.E.R. staff was always ready to advise and assist, and three H.E.R. field men were detached for the month of November to help in data collection and tabulation. The health component, under the Project Technical Director at DSP/7, provided administrative support and transportation means for key field survey workers.

This Report takes an overview of Project villages grouped by four recently-created Provinces (see map and Table 1). The 374 village well sites described below were selected as being usable water points impacting on village life. These encompass both large-diameter wells hand-dug to a large extent by the villagers, whether equipped with pumps or not, as well as finished boreholes with pumps.

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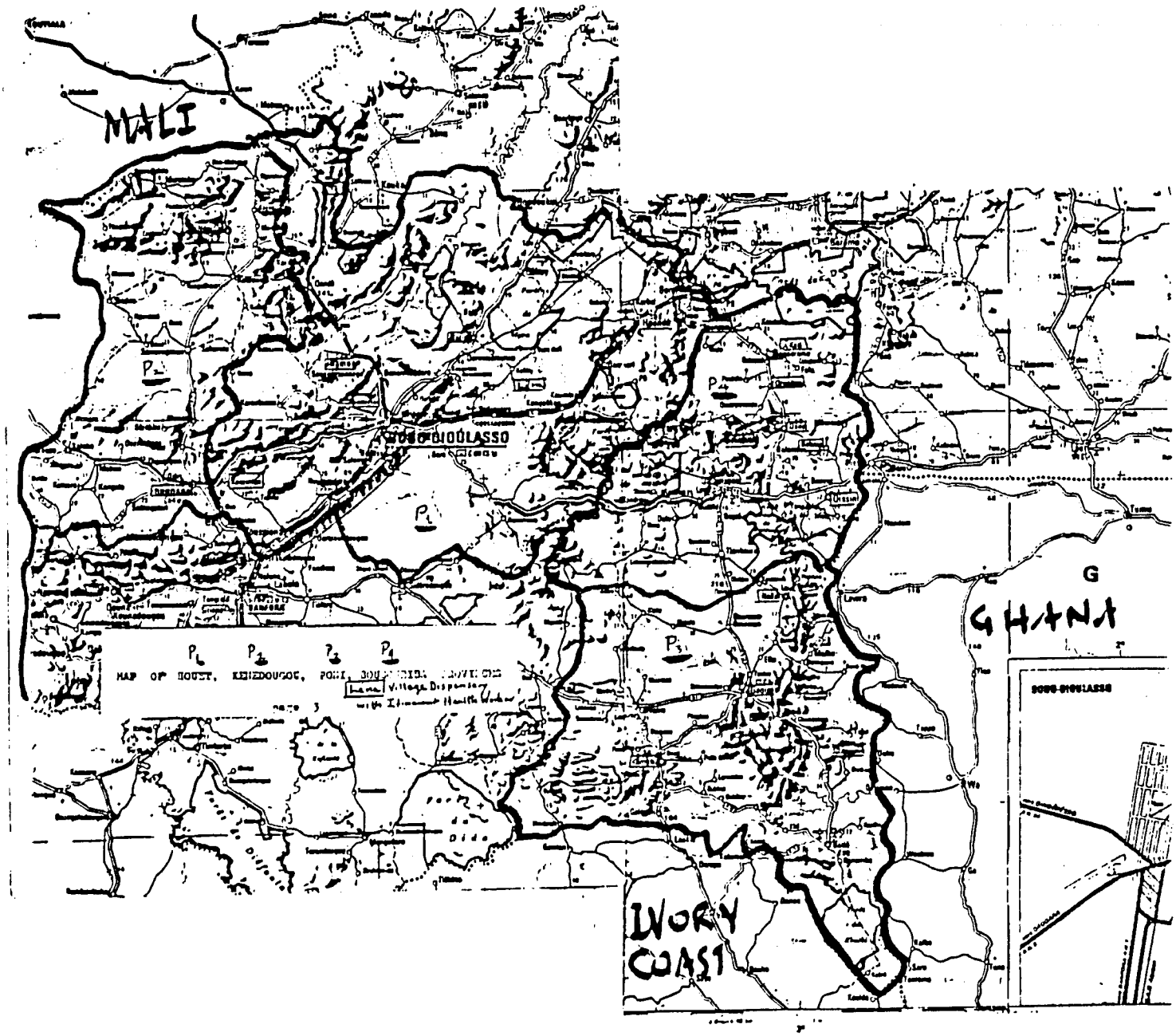

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TABLE 1

NUMBER OF VILLAGE/WELL SURVEYS BY PROVINCE AND WELL TYPES

PROVINCE	TOTAL NUMBER	WELL TYPES		
		Boreholes with pump (Drilled)	Hand-dug wells w/pump (Large Diam.)	Hand-dug wells without pump (Large Diam.)
HOUET (seat: Bobo Dioulasso)	129 (all 5 Depts.)	62	59	8
KENEDOUGOU (seat: Orodara)	45 (3 of 4 Depts., mostly N'dorola	1	0	44
PONI (seat: Gaoua)	122 (all 5 Depts.)	84	0	38
BOUGOURIBA (seat: Diebougou)	78 (all 4 Depts.)	17	44	17
TOTALS	374	164	103	107

OVERVIEW OF KEY VARIABLES

Referring to the Appendices, particularly Appendix V, one may discern further the scope of the survey and the format whereby it was manually coded, tabulated and analyzed.

Whereas the survey questionnaire sought to reveal each well point and the surrounding habitat in its physical and socio-cultural context, only selected data were tabulated and analyzed, as variables immediately of interest to H.E.R. and Volet Sante program objectives. These selected variables are summarized as follows.

KEY VARIABLES

Geographic location of Project well sites -

Houet and Poni Provinces, with 251 sites, contain two thirds of Project wells surveyed (see Appendix V - 7).

Well type -

Hand-dug wells constitute 56% of presently usable Project water points; but more than half are still open without pumps, and several need redeepening.

State of pumps -

For mechanical reasons, presumably, 10% of the 267 well points initially equipped with pumps don't work at all (4½% in Bougouriba Province alone).

Pump output -

Another 23% function below an output norm of 6 liters (but not zero liters) at 50 rotations per minute. Bougouriba Province again has problems, with 28 out of 61 equipped wells producing below the norm or at zero.

Sanitary conditions around well site -

About 44% of wells surveyed exhibited noticeable drainage problems, while about 12% had drainage furrows. 34% had nearby H.E.R.-built concrete watering basins. Evidence of human and animal wastes near the well is universal, no enclosures having been erected.

Frequency of well utilization -

Wells equipped with pumps generally exhibit peak use in early morning and late afternoon, with slackening off around noon hour. By contrast, the open wells of N'Dorola Departement show no marked peak use, yet late afternoon consumption dwindles considerably.

Reaction to water quantity and water quality -

While only 18% of the villages were thought to have sufficient water, about 33% were satisfied with the quantity produced by the Project well and 87% were convinced the well had some positive impact on village health. 88% were at least partially satisfied with the convenience of the well location, and in excess of 90% found the water taste, odor, and color at least acceptable, except for Houet Province (about 10% dissatisfied with water quality).

Best Available Document

Village population, size, and neighborhoods -

A total population of about 350,000 villagers was covered of which 46% is in Houet Province. Poni, whose villagers make up only 18% of the total, received a third of presently usable wells, its average village size, 625 persons, being the lowest--half that of Houet and Bougouriba villages (around 1300). The Lobi peoples in Poni generally live in dispersed family groupings, averaging three neighborhoods ("quartiers") per village compared to about four in Houet and Kenedougou.

Seasonal consumption of Project well water -

During the summer rainy season, as a general average only about 26% of the 350,000 surveyed villagers draw on Project wells; whereas during the hot, dry season the figure rises to 50%.

Provinces are ranked in Project water consumption, rainy and dry seasons, as

(1) Houet	31%,	67% of survey population (161,509)
(2) Kenedougou	27%,	40% of survey population (36,123)
(3) Bougouriba	22%,	37% of survey population (62,123)
(4) Poni	20½%,	33% of survey population (89,698)

Interest in private latrine construction -

Men responded more than women: of the male respondents, on the average 41% were aware of demonstration latrines built by the Project-trained Village Health Workers; in all Provinces but Poni, about 43% were willing to pay for latrine construction.

Severity of malaria, diarrhea, intestinal and Guinea worms -

Only 20 dispensaries were included in the survey, where nurses indicated malaria and diarrhea as more severe than worms; but Guinea worm afflicted the populations of Poni and Bougouriba more severely than the others.

Support for Project Itinerant Health Workers -

Only half of the Project Itinerant Health Workers responded to the questionnaire, and predominantly to voice little support for their efforts. (See Appendix III for Itinerant Health Worker Dispensary villages.)

Support for Local Village Health Workers -

The 112 VHW's who responded generally indicated mediocre support, except that half in Houet Province noticed a positive support. (See Appendix IV for Village Health Worker villages)

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SOME HYPOTHESES SUGGESTED BY WATER SUPPLY VARIABLES

Functioning of Project well pumps

While generally, the rotating Robbins-Myers pumps are producing at an output of over 6 liters at 50 rotations per minute, about one-third appear to operate below this norm.

Hypothesis 1: Mechanical shortcomings of the Project pumps occur with enough frequency to seriously undermine attainment of water supply objectives.

Rationale: The 6 liter per minute norm is adapted from ongoing pump efficiency studies by the United Nations (see reference on page 1 of Questionnaire).

Survey Question: The measured volume of pump output during one minute at up to 50 regular rotations is how many liters?

Findings: Normalized to 50 rotations per minute, mean output in Bougouriba Province (N=59) is 6.7 liters per minute; and 6.4 liters in Bobo Dioulasso Departement (N=45) of Houet Province. In the three Provinces equipped with pumps, the percentage of pumps producing below the norm ranges from 21% (Poni) to 45% (Bougouriba).

Population serviced by Project wells

The populations surveyed do not include villages with unequipped drilled wells, nor villages programmed for the present campaign. Yet the 350,000 figure accurately reflects present potential users of Project wells.

Hypothesis 2: The benefit-cost value of well construction can be tied directly to village population size and density.

Rationale: Costs incurred per operational well can be measured against per capita consumption and well-site convenience. Large, compact villages maximize well utility.

Findings: Provinces were ranked on a previous page for seasonal consumption (approximated as number of users) of Project well water. This ranking is correlated to number of neighborhoods and, less clearly to total village population. (See following Table)

TABLE 2

CORRELATION OF WATER CONSUMPTION

WITH NUMBER OF NEIGHBORHOODS AND VILLAGE POPULATION

Province	Consumption Rank	Mean Nbr. Neighbor-hoods	Mean Village Population	N Village
HOUET	1	3.8	1368	118
KENEDOUGOU	2	4.0	921	43
BOUGOURIBA	3	3.3	1290	75
PONI	4	3.0	625	101
GENERALIZED		3.5	1037	337

Reaction to water quality

Clearly the sealed Project wells are a technological improvement over traditional wells in terms of water quality. While the problem of possible pump breakdown remains, the step up in technology has brought a purer and (if the well is sufficiently deep), more reliable water supply.

Hypothesis 3: Properly-functioning pumped wells--though widely accepted and appreciated for their convenience and water quality value--are underutilized by the potentially serviced population.

Rationale: Dependence on traditional wells and, where available, on surface water, persists, even in the dry season, in spite of the presence of well water.

Findings: Very wide-spread praise for water quality and its impact on health does not alter the fact that pump use definitely drops from mid-morning to mid-afternoon, and that 74% of the total surveyed village population does not use Project well water during the rainy season.

SOME HYPOTHESES SUGGESTED BY PREVENTIVE HEALTH VARIABLES

Villager support for the Village Health Worker

Project-trained VHWs receive no benefits from the government, so are dependent on their own occupation and village support for their livelihood.

Hypothesis 4: VHWs can expect to receive satisfactory support in about one-third of their villages, but this may vary by Province.

Rationale: The VHWs themselves were asked to rank degree of village support as good, mediocre, or not at all.

Survey Question: "What is the level of support given to you, the VHW, by your village?"

Findings: Generally, only 38% (42 out of 112 respondents) stated they were well-supported, but the data was insufficient in Kenedougou Province (2 respondents). Support is ranked by Province thus: Houet (50%), Poni (38%), and Bougouriba (22%).

Village Health Worker effectiveness with latrine construction

The VHW is responsible for building a demonstration latrine, and in so doing, soliciting support and assistance from the village population.

Hypothesis 5: VHWs are effective in fewer than half of their villages.

Rationale: The population's awareness of latrine construction by the VHW is an indicator of how well the VHW functions in fostering preventive health activities.

Survey Question: "Has a cement-finished latrine been constructed by the VHW of the village?"

Findings: In 41% of (49 out of 120) villages with VHWs, male respondents were aware of cement latrine construction by the VHW.

Villager motivation for latrine construction

Latrines are built for personal motives with family resources.

Hypothesis 6: Generally, no more than one-third of the villagers are motivated to build a latrine.

Rationale: An adult's willingness to pay an individually-stated amount for a latrine indicates motivation for latrine construction.

Survey Question: "How much can you pay for a latrine?"

Findings: In 35% of (97 out of 279) villages male respondents volunteered a specific amount they would pay, ranging from 100 to 20,000 FCFA. Whereas response to the previous question, "Is a latrine important to you?" yielded a 98% positive response, the present question, "How much can you pay?" more truly reveals motivation to act.

Extent of water-related diseases

Among diseases surveyed in the Village Dispensaries where nurses responded, the severity of four water-related disease situations was noted for comment, namely: malaria, diarrhea, intestinal worms and Guinea worm (Dracunculosis).

Hypothesis 7: In all Provinces, malaria and diarrhea are rated most severe, followed by intestinal worms, while Guinea worm is less of a problem.

Rationale: Asked to rank common illnesses by severity on a zero to four scale, dispensary nurses responded with reliable indicators of the incidence and severity of the illness among the population served.

Findings: Houet, Poni, and Bougouriba Provinces yielded 20, 16, and 10 respondents concerning the four diseases, whereas only three responded in Kenedougou. Besides the universal severity of malaria and diarrhea in all Provinces, one notes that intestinal worms are still a concern in all four Provinces, while Guinea worm is limited to Poni, and to a lesser extent, Bougouriba.

RECOMMENDED FURTHER RESEARCH

The following tasks associated with this survey await further research action:

1) Translate the text (not Appendices) of this Preliminary Report into French for distribution to H.E.R., Health, and O.R.D. personnel interested in furthering Project goals

2) Conduct field interviews in the 18 remaining villages scheduled for this survey (see Appendix VI), a good number of them in remote Poni Province. Estimated are three man-weeks for collecting, tabulating, and incorporating the dat

3) Formulate and analyze hypotheses more precisely through applying computerized statistical procedures to the encoded data. This should include the analysis of new topics useful for program strategies, for instance:

   - o geographic coding of villages by language and ethnic grouping so as to facilitate training strategies;
   - o classification of villages by ease of access to health dispensary units and to O.R.D. village centers;
   - o identification and priorization of village sanitation and preventive health problems.

4) Continuously work with Itinerant Health workers and through them, with Village Health Workers, to measure and improve their field effectiveness, and to generate hypotheses useful for attaining Project objectives.

5) Mount a composite map at 1: 200,000 scale showing both surveyed villages using Project wells as well as program activity involving Itinerant and Village Health Workers.

6) Create an information storage and retrieval system building on survey coding and findings, which is jointly accessible to H.E.R. and the Project component of the Direction de la Santé Publique.

7) Make the information system operational through continuous inputs by H.E.R., Health, and O.R.D. personnel in all four Provinces.

8) Test and reformulate hypotheses generated from the operational information system by means of an end-of-Project evaluation.

PROGRAM PRIORITIES FOR THE NEXT SIX MONTHS

The previous discussion suggests certain priority activities for the Health and Wells components of the Project, to be programmed for the coming six-month period, January - June 30, 1984. These activities are outlined in tabular form and commented on below.

TABLE 3

H.E.R./D.S.P. PROGRAM PRIORITIES, JAN. - JUNE 1984

	COMPONENT	ACTIVITY	TIME FRAME
1	HEALTH (D.S.P.) WELLS (H.E.R.) S.H.D.S.	Prelim. Report Translation Completion and Detailed Analysis of Survey	Jan. 10-30 Jan. 10-30
2	HEALTH	Continuing Education: 152 VHWs 21 IHWs 12 Nurses	Jan.-May February March
3	HEALTH	Training: 30 IHW students	Before Apr. 30
4	WELLS/HEALTH	Latrine Teams: Recruitment & Training Field Work	Jan.-Feb. Mar.-June
5	WELLS/HEALTH	H.E.R. Animation Team: Well Sanitation & Educ.	Feb.-May
6	C.N.E.S./HEALTH	C.N.E.S.- Graphics Specialist Production of Health Educ. Visual Aids	Feb.-March
7	HEALTH	Water Quality Control/ Well Disinfection	Feb.-May

Commentary on program priorities

1. For detailed computer analysis of survey, discussed above, a consulting arrangement with Strengthening Health Delivery Systems (S.H.D.S.) in Abidjan is presently under discussion.

2. Continuing education places major emphasis on oral rehydration for treatment in connection with diarrhea, and on Guinea worm prevention, since an impact can be shown on both illnesses in a short time.

3. Training of Itinerant Health workers presently at the Nursing School in Bobo Dioulasso by Project sanitarians and technicians through practical field work prior to graduation in April.

4. Given the difficulties encountered thus far with VHW demonstration latrine construction, where "animation et sensibilisation" have not sufficiently motivated the desired action, the formation and training of mobile latrine-demonstrating teams is recommended. These will be six workers who split into groups of two to work under the supervision of the local IHW. The workers are to be engaged by H.E.R. and jointly trained. The teams will also assist in well sanitation activities.

5. The H.E.R. Animation Team proposed by H.E.R. is to be engaged in well education, particularly pump maintenance and well sanitation. Health component will be involved in training.

6. The Centre National d'Education Sanitaire (C.N.E.S.) will provide graphics specialist to develop appropriate visual aid materials. The materials will be reproduced by a local photo-offset printer paid for by the health component.

7. Water quality control and well disinfection will be undertaken by Project sanitarians with IHW assistance as an ongoing activity. Simple colorimetric test kits are proposed by the sanitarians; the HACH and Millipore equipment requested earlier are expected for February use.

Annex F

TECHNICAL SPECIFICATIONS FOR THE DEVELOPMENT OF DUG AND DRILLED WELLS

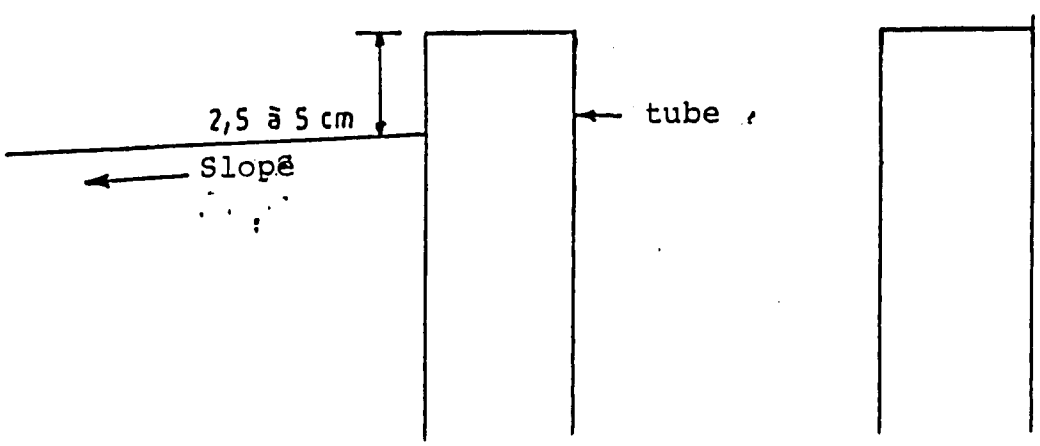
P. Leger
August 1983

I. THE DUG WELL

A. Construction of the Platform

Construction of the platform will be accomplished before the curb is constructed. Once the tube is raised to approximately 30 to 50 cm below ground level, the 1 m circular form (mold) should be put into place. Then, the following activities will be undertaken (see figure 1).

1 - Clearing and delimitation of a circular surface 2 m from the exterior wall of the curb. This surface of the platform, should be dammed. The surface should be 2.5 to 5 cm below the top of the tube. Furthermore, the surface should have a slight slope toward the perimeter of the surface, as follows:



2 - Prepare 2.6 m reinforcement sections (8 mm) and bend them at a right angle so that 0.6 m is positioned horizontally. Attach the radial reinforcement protruding from the tube. Place the wood spacing blocks under the radial reinforcements to maintain them in place. The number of sections will equal the number of reinforcements protruding from the tube. The distance between sections will be calculated as follows:

$$\frac{6.28 \times \text{Radius } (2\text{ m} + \text{exterior Radius of the well})}{\text{Number of vertical reinforcements protruding from the tube}}$$

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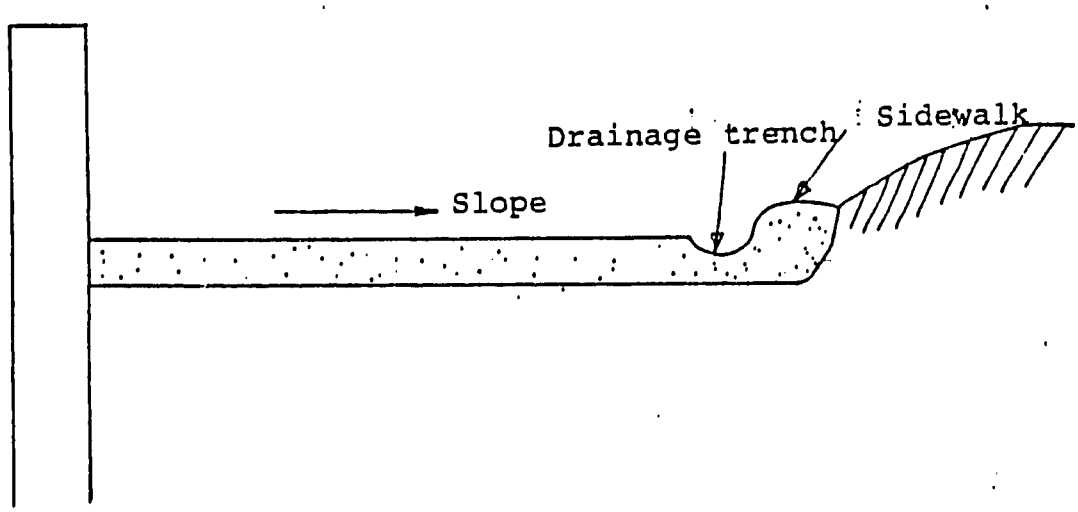
3 - Prepare 3 circular reinforcements of 6 or 7 mm. The diameter of each of the 4 circles will equal that of the vertical reinforcements of the radial sections. Attach the 3 circles to the radial sections 25 cm apart to form the horizontal reinforcement for the curb.

4 - Prepare 8 circular 6 or 8 mm reinforcements in the following manner: the smallest circle will be placed 20 cm from the exterior surface of the tube. Prepare each consecutive circle so that its radius is 25 cm longer than the preceding circle. The last circle should be almost at the end of the radial sections. Attach the circles above the radials. Build a hummock of earth all around the exterior reinforcement which will be used as a mold into which concrete will be poured.

5 - Prepare concrete with the following consistency: 1 part cement; 2 parts sand; 5 parts gravel and sufficient water to make the concrete acceptable. Pour the concrete for the platform so as to obtain a slab 10 cm thick. Smooth the surface of the concrete so that it slopes slightly toward the exterior of the platform, and from a high point toward a low point on the platform.

Build a concrete sidewalk at the perimeter of the platform and make a depression which will serve as a drainage trench just before the sidewalk.

The drainage trench must also slope from the high point to a low point of the platform. The height of the sidewalk will be between 5 and 10 cm from the platform, as follows:



6 - Cover the concrete with straw or other appropriate material to keep it moist for 7 days. Before the concrete is completely dry, pour water on the platform to make certain that it flows in the desired fashion. That is from a high point to a low point at the foot of the sidewalk and from the curb to the sidewalk. At the low point, make a groove in the sidewalk to permit water to drain from the platform (see figure 2).

7 - Make a drainage trench running from the well to a 1.3 m sump filled with rocks and situated more than 3 meters from the sidewalk of the well. Cover the trench with mortar. Make certain that the drainage trench slopes from the platform toward the sump.

B. Construction of the Curb and the Cover Slab

1 - When the concrete of the platform is completely dry, remove the covering material. Put the form for the curb into place. This form will be placed at a distance of 15 cm surrounding the mold. Thus, the curb will be 15 cm thick. Pour the concrete and allow it to dry for 7 days.

2 - While the curb is drying, the slab which will cover the well can be made. The slab should be circular and of one piece. It should be 7.5 to 10 cm thick and reinforced with criss-cross reinformcements (see Figure 3). It should also have a circular man-hole, made using a tin form, and a hole for the pump, also made using a wood or tin form. A ridge 1 to 2 cm high could be made surrounding the manhole to prevent water from entering, inserting 4 bolts into the concrete of the ridge before it completely hardens. Bolts would also be inserted to hold the pump. Construction would proceed as follows:

a) - Make a form 7.5 to 10 cm high and with the same exterior diamater as the curb. Place the form on a flat surface.

b) - Build two tin forms. One form, for the man hole, will have a diameter of 60 cm and a height of 15 to 20 cm. The other form will have a diameter large enough to allow the pump handle to be pulled out. Place the two forms inside the form for the slab. The form for the man-hole should be at least 30 cm from the perimeter of the slab form, and the form of the pump should also be at least 30 cm from the side opposite from the man-hole.

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Figure 1 - DETAILED VIEW OF THE FLATFORM PROPOSED FOR THE WELLS

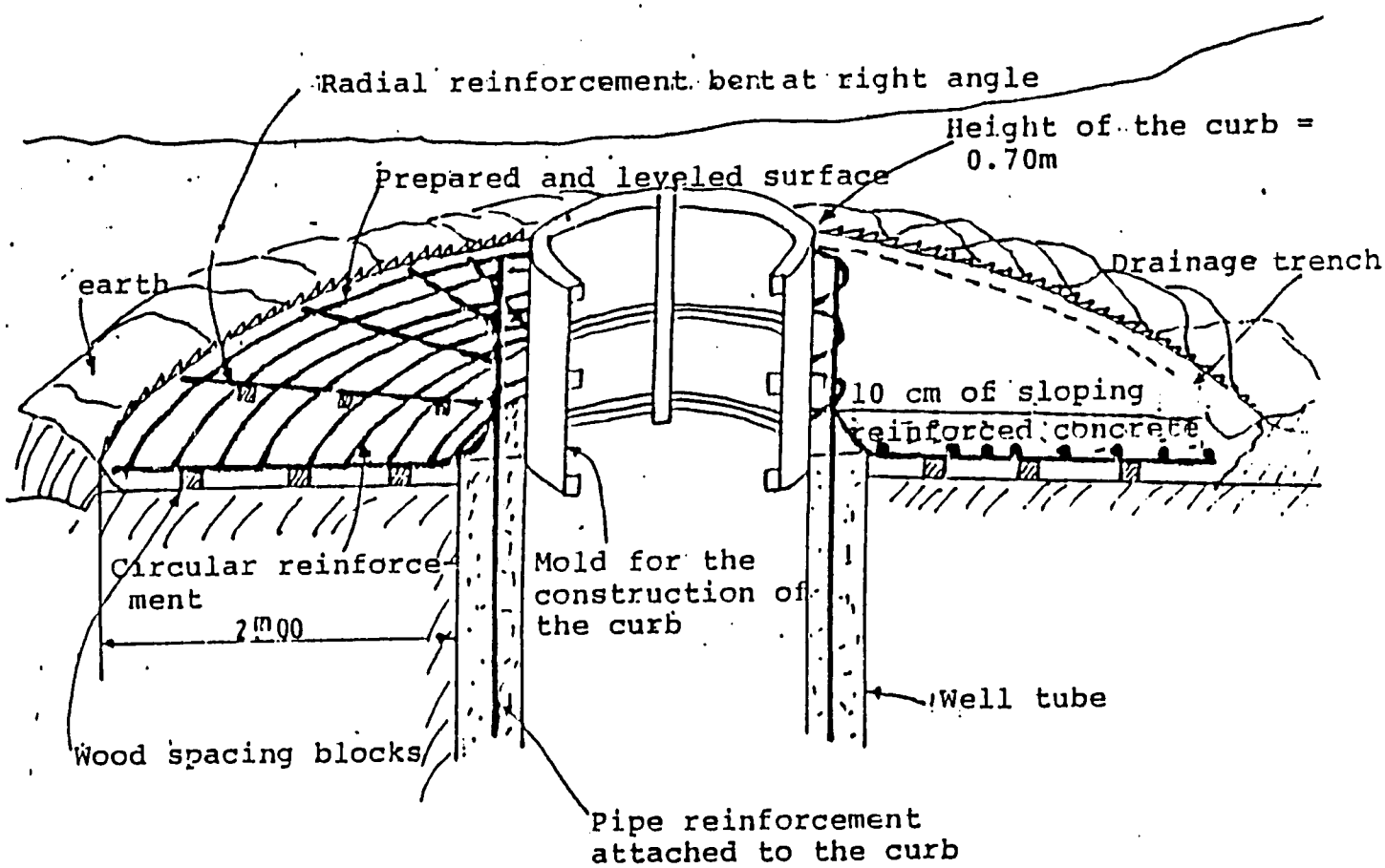
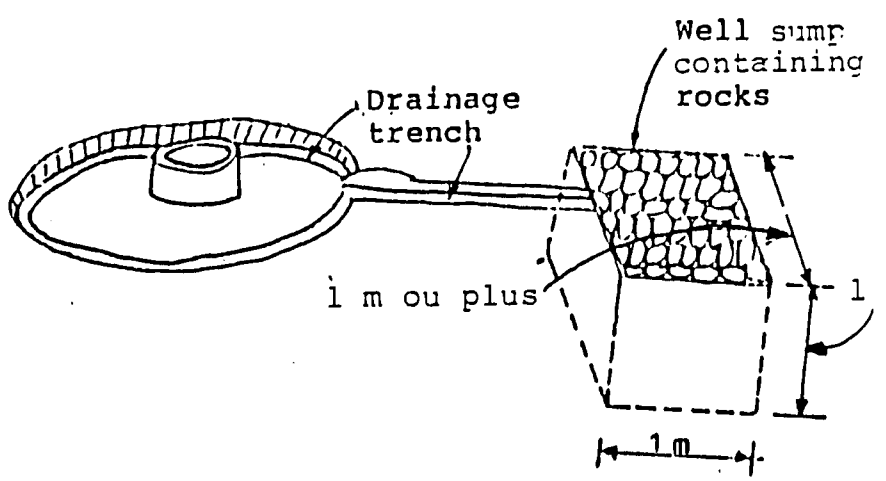


Figure 2 - DETAILED VIEW OF THE DUG WELL AND SUMP



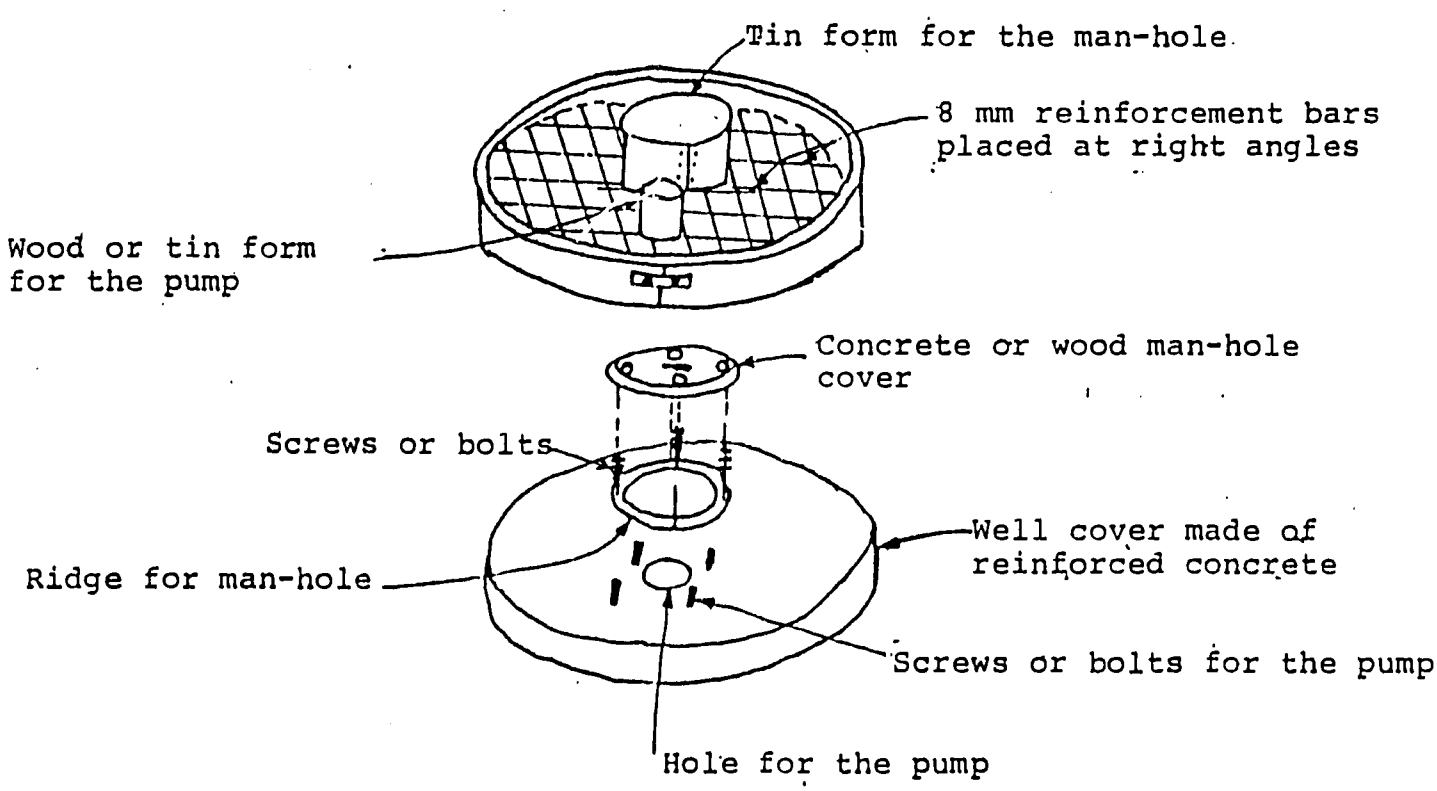
c) - Prepare concrete with the same consistency as that used for the curb, then fill the form one-third full, that is 2.5 to 3 cm full. Then, place the reinforcement grid made with 8 mm bars placed at right angles. Once the reinforcement is in place, fill the form with concrete, make the man-hole ridge and insert the bolts in the ridge and in the spot for the pump. Allow the concrete to dry for 7 days, covered and moist.

During this time, the man-hole cover can be made, either of wood or concrete, with holes for the 4 bolts. This cover will be 65 cm in diameter and 4 to 5 cm thick.

d) - The cover slab will be placed on the curb using mortar which will be smoothed.

3 - Finally, if the well is to be equipped with a hand pump, a two-step stairway should be built.

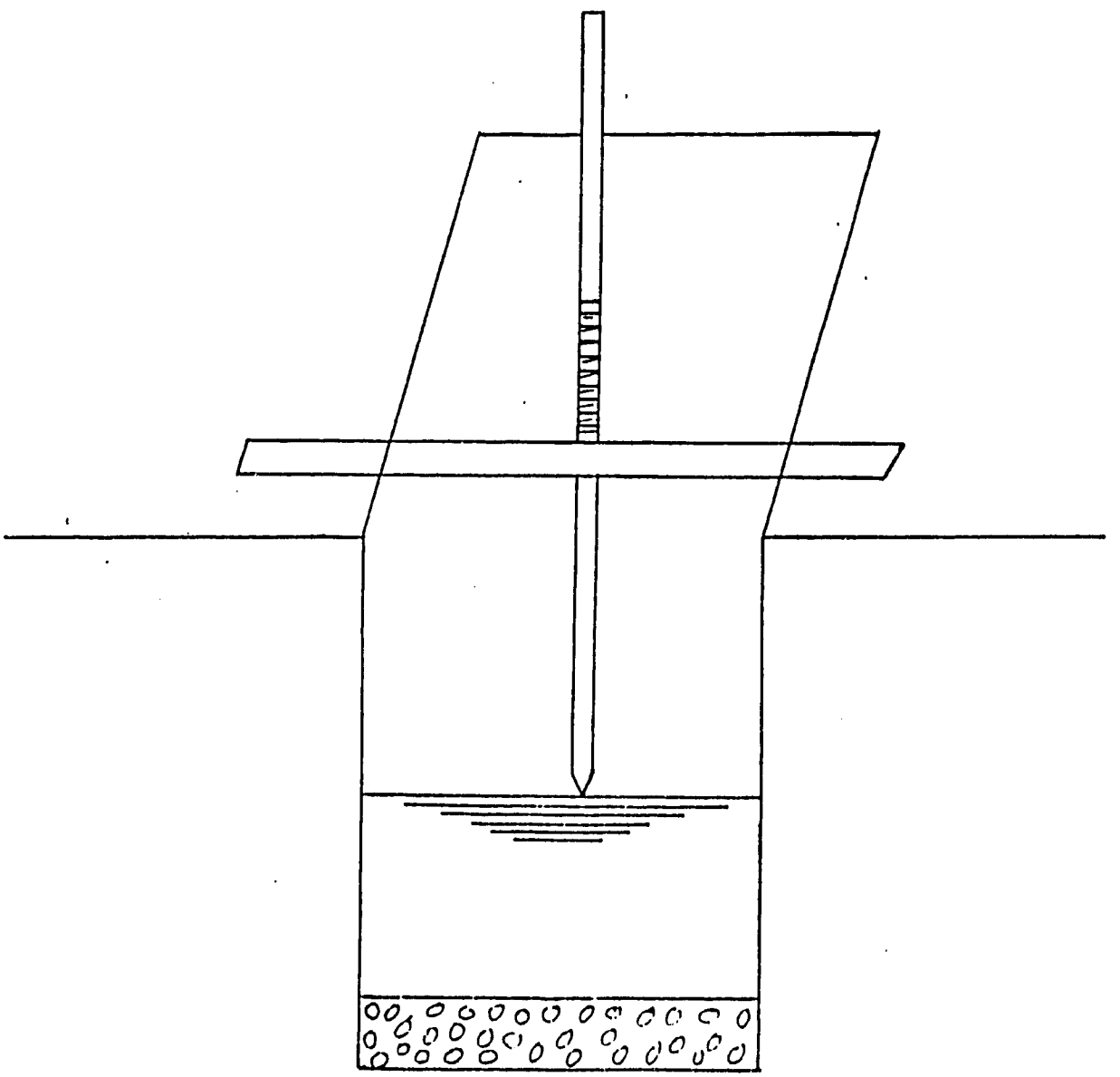
Figure 3 - VIEW OF THE COVER SLAB



C. Improvement of the Area Surrounding the Well Plat rm

Once work on the well has been completed, the area surrounding the well within a radius of 15 m should be improved. Thus, the surface surrounding the platform will be banked so that rainwater can be drained toward the downhill side of the well. In the case of low ground, well water should be directed through a filtration trench filled with rocks which will receive not only rainwater, but also water from the well platform.

A test can be made to check the absorption capacity of the soil. The test consists of digging a hole 30 cm x 30 cm, 1 m to 1.5 m deep. Clean the bottom and pour a layer of gravel 4 cm deep. Fill the hole with clean water and let the water percolate overnight. The next day, fill the hole with 20 cm of water. Through use of a plank placed across the hole and a measuring rod, the time required for the water to lower one centimeter can be determined, as follows:



The absorption rate (TA) can then be calculated in litre/m^2/day using the chart provided in the back. Thus if the drainage surface area (a), measured rainfall for the rainiest month (July or August) (P), the number of rainy days during that month (N.J) and the soil type (packed soil, cement, etc...) are known, the volume of percolated water can be calculated using the following formula: $V + C \times A \times \frac{P \times I}{NJ \quad 1000}$

The necessary surface area for absorption can thus be determined:

$$V + TA \text{ in } m^2$$

The length of the trench will be:

$$L = SA - 2 \times \text{width} \times \text{height} + 2 \times \text{height}$$

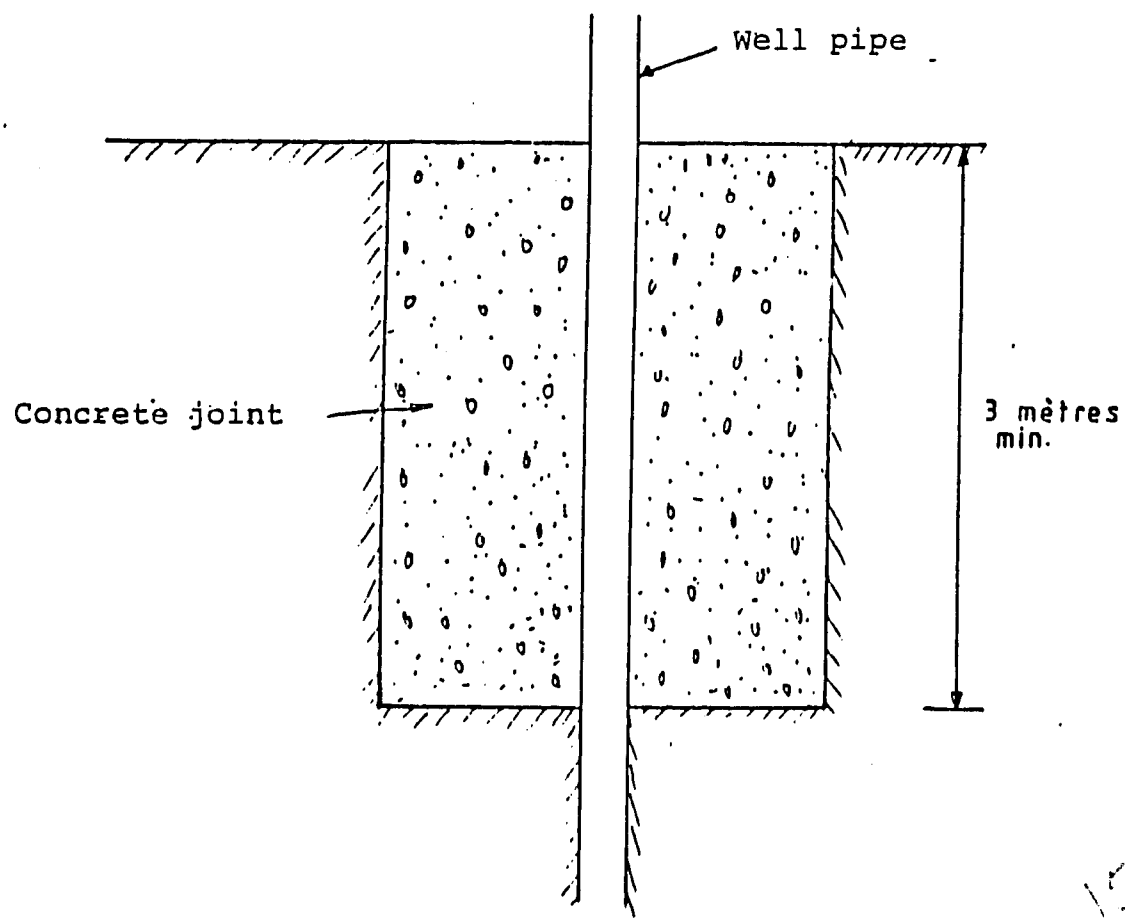
For a trench 1 m deep and 1 m wide the length will be equal to:

$$SA - 2 + 2$$

II. THE DRILLED WELL

A. Construction of the Joint

For the development of a drilled well, the bore hole should be banked with concrete to a depth of 3 meters to seal the PVC tube and prevent the seepage of surface water, as follows:



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B. Construction of the Drilled Well Platform (See Figure 4)

1 - Bank and clean a surface 2 m square with the well pipe situated in the middle of this surface. The surface should be well dammed and sloping from the pipe toward the perimeter of the surface. Build a small hummock of packed earth around the perimeter of the surface.

2 - Place 8 mm reinformcement bars 1.9 m in length to form a grid on the surface. Place the bars 25 cm apart and attach the lower bars to those placed perpendicularly on top. Raise the grid 2.5 cm above the ground by placing it on wood blocks (24 blocks 2.5 cm x 5 cm x 10 cm).

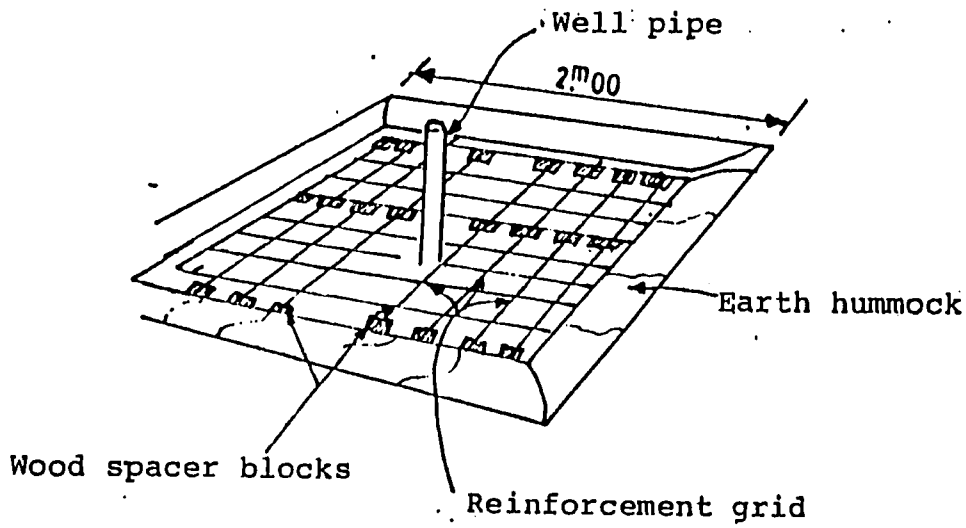
3 - Prepare concrete with the following consistency: for one part of cement add 2.5 parts sand, 5 parts gravel, and a sufficient quantity of water. Pour the concrete to a thickness of 10 cm near the tube and shape it in a slope toward the perimeter of the surface. Insert the bolts for the pump before the concrete hardens and smoothe the surfacr of the platform. Build a concrete sidewalk 5 to 10 cm thick around the perimeter of the platform and make a depression or trench to allow water to run from a high point to the lowest point of the platform from the depression.

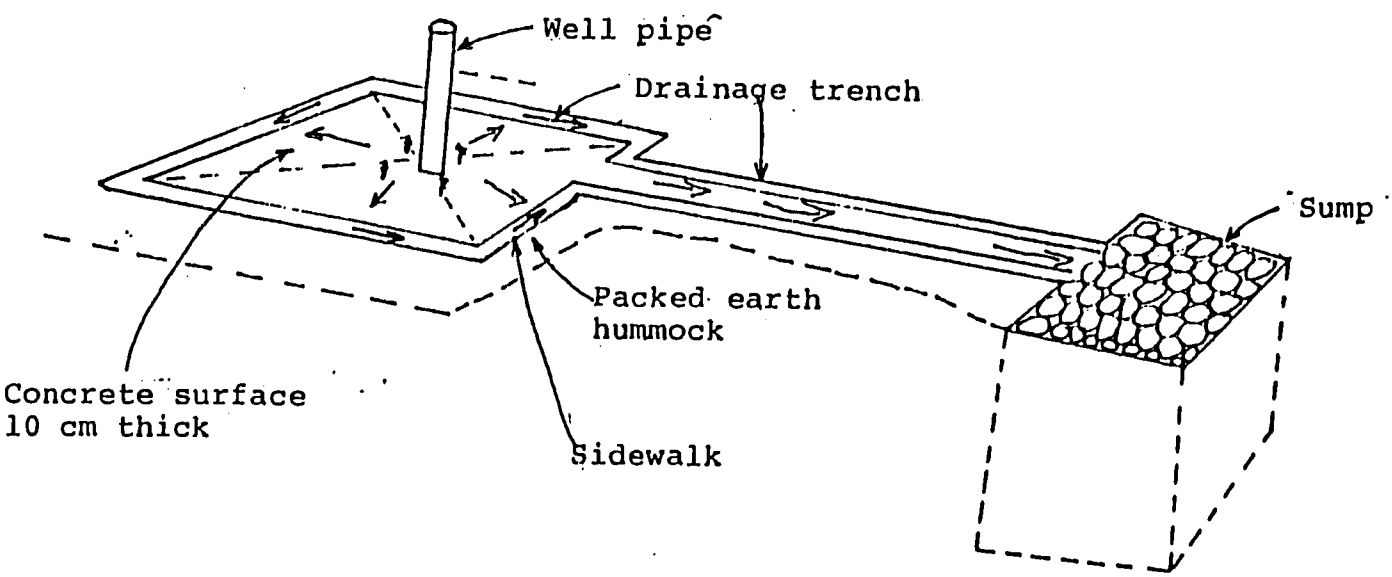
4 - Allow the concrete to harden for 7 days. Before the concrete is completely hardened, make notch at the lowest point to allow water to drain from the surface.

5 - Make a sump and a drainage trench as described for the dug well.

6 - Finally, improve the surrounding area as described for the dug well.

Figure 4. VIEW OF THE GRID AND THE PLATFORM CONSTRUCTED FOR A DRILLED WELL





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ANNEX G

Medical Care Development

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M
C
D

RECOMMENDATIONS FOR FUTURE PROJECT DIRECTION

USAID/GOUV RURAL WATER SUPPLY PROJECT

By: Suzanne Plopper
Senior Health Specialist

July 25, 1983

Administrative Offices
11 Parkwood Drive
Augusta Maine 04330 207/622-7566

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RECOMMENDATIONS FOR FUTURE PROJECT DIRECTION

The purpose of the purpose of the following report, as a supplement to my End of Service Report (May '83) is to briefly outline major problems and contraints involved in the implementation of the health component of the USAID/GOUV Rural Water Supply Project and to recommend changes to improve the outcomes of this project.

The health component of this project has progressed relatively well in the past 2½ years in the implementation of some of the activities set forth in the Project Agreement. However, the appropriateness of certain activities to project goals and the potential for effectively implementing all aspects of the project must be re-examined in the light of realities existing in the field and constraints within the project in order that efforts undertaken thus far and to be undertaken for the remainder of the project, result in maximum impact on village health.

I. PROBLEMS

The following are problems 1) with the effective implementation of project activities (as described in the Project Agreement), or 2) with the contribution of these activities to project goals. (For further details, refer to End of Service Report.)

A. Village Health Workers (VHWs)

The recruitment and training of 550 village health workers from villages with a project well during the life of the project is unattainable given 1) the amount of time and resources required for effective recruitment, training, and supervision of VHWs; 2) the limited number of staff to carry out this task; 3) the 18-month delay between the signing of the Project Agreement and the beginning of project activity; and 4) the fact that the health component is necessarily allied with and dependent upon resources and other activities of the Ministry of Health in the project zone. (Of the approximately 400 VHWs currently in the project zone, approximately 1/3 have been recruited and at least partially trained by other individuals and organizations in the region, beginning as early as 1977. There does not yet exist in the project zone a functional and effective system of supervision for VHWs.

B. Itinerant Health Workers (IHWs)

The recruitment and training of 110 itinerant health workers during the life of the project is unattainable due to delays in project start-up and the organization of this new program. A maximum of 52 IHWs will have completed the one year training program by July '84.

The first class of IHWs received minimal practical training in the construction of latrines and waste water soak holes and in well maintenance and improvement.

C. Analysis of Well Water

The periodic analysis of water quality in project wells called for in the Project Agreement has not occurred as planned for reasons given in the End of Service Report. However, this activity is not an immediate priority in terms of village health (except in isolated cases of obvious well contamination), given that 1) with few exceptions, properly covered project wells provide clear water in contrast to most unprotected traditional wells; 2) project wells often do not meet the needs of the majority of the village population, the remainder being forced to continue to use other sources of water, generally ponds and unprotected and polluted traditional wells; and 3) most project wells have significant waste water problems which project staff have not had the time to address. (Other wells projects in Upper Volta do not periodically test their wells.)

D. Demonstration Latrines

Demonstration latrines built with cement slabs and foundations (as proposed in the Project Agreement by the fact that "materials are to be provided by the project") are probably not appropriate technology nor useful models in the project zone, given 1) the unavailability of cement and iron outside of major towns; 2) that latrines are virtually nonexistent in rural areas of the project zone; and 3) that cement is a luxury by the standards of most villagers in the project zone.

E. National Center for Health Education (CNES)

The anticipated audio-visual support from the National Center for Health Education (CNES) is impractical, given 1) the distance between

the CNES office (Ouagadougou) and the project base in Bobo Dioulasso; 2) the repair problems encountered with the Jeep cinebus based at CNES and additional problems likely to be encountered with film projectors were they to be transported frequently over rural roads; 3) the lack of appropriate films; and 4) the small CNES staff which is responsible for health education requests throughout the country.

The lack of technical support by CNES has not been crucial to the implementation of project activities. Films, which were to be used as part of the health education effort in villages, are not necessarily the most appropriate technology in this situation. Suitable visual aides (i.e. flanelographs) are available in Bobo Dioulasso. Project staff have begun negotiating with CNES concerning the development of certain visual aides for use in the primary health care program.

The fact that more collaboration between the project and CNES was not possible does not mean, however, that project support of CNES was not productive. The continuing development of CNES is important to Upper Volta's public health program. The project cinebus has been more appropriately used for in-service training for health personnel (for whom there are appropriate films) than it might have been for project purposes.

F. Other

1. A continuing problem has to do with the design of the health component, that is with the fact that it was originally designed to complement the wells of the project and later modified to serve as a model primary health care program. The health component has attempted rather unsuccessfully to fulfill both these roles.

There are advantages and disadvantages to either focus. A close link with the wells component theoretically could maximize the benefits to be gained from a clean water supply. However, the value to be gained from this linkage is somewhat reduced by problems encountered with project wells (see End of Service Report, pp. 6-7 and 9). Secondly, the pace of activity of the two components of the project is such that it would be difficult to collaborate effectively on all aspects of water supply. Such a linkage would necessitate limiting the health component's broader

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focus on primary health care since, as can be seen by activities to date, the health component does not have the staff to respond effectively to both foci.

An orientation of the health component toward primary health care allows the MOH to try out its primary health care program on a fairly large scale and to thereby use it as a model for primary health care planning throughout the country. The health component has essentially taken this approach with an emphasis on choice of villages with project wells. (For valid reasons, this emphasis has not always been maintained by other health department personnel in the project zone.) In taking this approach, staff have not had time to adequately address water supply problems.

2. In general, health component activities have been hampered by transportation problems both in terms of 1) the initial miscalculation of the transportation needs of project sanitarians, and 2) repair problems of Jeep vehicles (despite a very responsive project garage).

Some of the above problems are complicated by a lack of critical on-going planning and evaluation of effort by project staff and by a general reluctance to question project activities set forth in the Project Agreement in the light of realities encountered in the field.

II. RECOMMENDATIONS

The options available for improving and maximizing the impact of the project are few. Staff cannot be increased before the summer of '84 when the second class of IHWs will have completed their training. The project (variously described in project documents as improving the health of rural villagers in the project zone and providing an effective health education program to maximize the potential health benefits inherent in an improved water supply) will require 1) an extension of the health component for one to two more years, 2) a modification of some project activities, and 3) a re-ordering of some priorities.

An extension of the health component for one year would allow an assessment of progress and problems (as proposed later in this report) and some project modifications. It would also allow the recruitment and training of an additional 50-75 VHWs and 30 IHWs. A two-year extension,

or phase two, is necessary for the recruitment and training of the full 550 VHWs and 110 IWHs called for in the Project Agreement. It would further allow the MOH and USAID to do a more valid evaluation of this model program following two to three years of 1) concentrated effort with the same VHWs and villages, and 2) practical water supply and sanitation interventions in the same villages.

I can only recommend such an extension, however, if the following immediate priorities outlined below are adopted. Their adoption will require the temporary postponement of new VHW recruitment and training (perhaps for the entire '83-84 campaign). To continue the past pace of recruitment and training of VHWs during the next campaign is to continue to neglect the existing problems of VHW supervision and of attention to village water and sanitation problems. And it does not allow time for an overall assessment of the outcomes of past recruitment practices and quality of training and supervision.

A. Village Health Workers (VHW)

1. Assessment of the skills and productivity of existing VHWs, especially as concernes their role in preventive health.

Guidelines for this assessment should be developed by central project staff (technical director, health educators and sanitarians) in collaboration with central MOH staff responsible for primary health care. Today the staff of this project(aside from the technical director) have had minimal to no contact with central MOH staff responsible for primary health care. VHW recruitment criteria and training strategies (including the development of a guide for the training of VHWs in curative treatment and disease prevention) have been developed by project staff. Staff of this project and of another project in the region have proposed different reporting systems for VHWs activities. Based on their experience, project staff can go one step further and develop guidelines for the assessment of these activities. However, without collaboration with MOH staff, such guidelines (and subsequent program development) may be incongruent with MOH goals and resources.

2. Determination and implementation of ways to improve the effectiveness of VHWs.

Probably the most important contribution to improve effectiveness of VHWs will be the establishment of a system of regular and supportive supervision. VHWs should be visited at least twice monthly until they are capable of conducting causeries in their villages, have the confidence fo the villagers and until the villagers begin to take an active role in identifying and carrying out preventive health measures. This supervision will entail a) the supervisor's participation in village health committee meetings as necessary to help them define their role and begin to organize selected activities; b) assisting the VHW with causeries until he becomes confident and capable of doing them alone; c) advising VHWs and villagers on disease transmission and on practical means of prevention in the village; and d) reviewing the records of the VHW. As this form of supervision has not been widely practiced to date by supervisors of VHWs in the project zone, it may initially require assistance by project staff.

3. Establishment of a long term structure, independent of project personnel, for the renewal of VHW pharmacy supplies in the Bobo Dioulasso department.

4. Development of uniform procedures for the reporting of activities of VHWs and supervisors of VHWs.

B. Itinerant Health Workers (IHWs)

1. Organize the practical sanitation training for IHW trainees so that each individual participates directly, at least once, in each of the following tasks: latrine slab and foundation construction, using mud and wood and using cement; waste water soak hole construction; and well maintenance and improvement (including the construction of protective walls, slabs and trenches for wells). If IHWs are to be commited to and effective at promoting preventive health measures in the villages, they need more practical training in the above tasks than the first class received.)

C. Well Water Analysis

1. Assessment of existing water supplies in villages with a VHW and project well to determine: a) the general quality of the water at the source and obvious causes of pollution; b) the extent to which each source is used for domestic purposes (especially drinking); and 3) the

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importance and feasibility of improving the source (especially in the case of modern or traditional wells). Such assessment would be done by project sanitarians in collaboration with IHWs and nurses. This task could be extended to villages with a VHW but no project well and to villages with a project well but no VHW. However, given staff and time constraints, villages in these latter two categories would need to be screened perhaps more carefully in terms of the potential for improvement of water supply as each is missing an important component: either a modern well or a VHW.

2. Where it is feasible to improve a water source, work to encourage the responsible individuals to take the indicated action and assist them as necessary.

D. Latrine construction

1. Assess the effect of demonstration latrines 1) with cement slabs, and 2) with mud and wood slabs in terms of use, maintenance, and number of villagers having subsequently built either model. If the cement slab model has seldom been adopted, the project should seriously consider eliminating this model.

E. Other

1. Collaboration between the two components of the project (in choice of project villages, site selection in villages and village animation/ sensitization, etc.) has not been as productive as originally planned for reasons noted earlier in this report and in the cousultant's End of Service Report. The idea of this close collaboration, essential to achieve project objectives, must be redefined and more appropriate strategies developed to reflect project realities.

Most important in developing appropriate strategies for collaboration between the two components would be the creation of a working technical committee composed of project officials and staff as well as a USAID representative which would have the responsibility to plan joint actions, and address problems common to the progress of both components.

The development of strategies for the achievement of a collaborative effort among the two components should be addressed as soon as possible, so that, if the project is extended to preferably a two-year period, there would be ample time to have well-defined strategies and actions which would be implemented in that period, evaluated at the end of the two-year extension, and serve as a basis, if need be, in the design of a potential phase II.

III. CONCLUSION

In conclusion, the health component has worked hard to accomplish the activities outlined in the Project Agreement. However, it is time these activities be seriously examined in terms of their long-term effect on rural health; and that subsequent project activity be modified accordingly. If this project is to serve as a model, every effort must be made to develop it in ways that are relevant to the needs of Upper Volta and particularly to the needs of its rural target population.

Feasibility and Potential Value of Possible Strategies for Health Component Direction:

1. Complete all project activities as outlined in the Project Agreement by the project termination date, July '84, and terminate the project.

It is physically impossible to complete all project activities within the next year.

2. Terminate the project in July '84 and use this final year of the project to evaluate activities undertaken to date.

While this option is feasible, it does not promote application of lessons learned from previous experience in subsequent project modification. Nor does it allow for completion of all project activity.

3. Extend the project for one year and:

a) Attempt to complete all project activities during this two-year period.

While this option might be feasible, it does not allow for assessment of project effectiveness and subsequent modification which is crucial to project success at this point.

b) Evaluate project activities and make necessary modifications during the first year and continue with this modified program during the second year.

This option is feasible. However, it is not likely that all project activities would be successfully completed during this time and a terminal project evaluation would be based on rather minimal experience with the chosen program modifications.

4. Extend the project for two years, or establish a phase two, and:

a) Complete all project activities during this three-year period. This option is feasible; however, it does not allow for assessment of project effectiveness and subsequent modification which is crucial to project success.

b) Evaluate project activities and make the necessary modifications during the first year, and continue with this modified program during the two following years.

This is the option recommended earlier in the report. It is necessary for the recruitment and training of the full 550 VHWs and 110 IHWs called for in the Project Agreement. It would further allow the MOH and USAID to do a reasonable evaluation of this model program following two to three years of 1) concentrated effort with the same VHWs and villages, and 2) practical water supply and sanitation interventions in the smae villages.

ANNEX H

USAID RURAL WATER SUPPLY PROJECT

Project No. 686-0228

RECOMMENDATIONS FOR

FUTURE PROJECT DIRECTION

By: Steve J. LUCAS
Health Specialist

November 1 1983

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RECOMMENDATIONS FOR FUTURE PROJECT DIRECTION

This report outlines several key problem areas and constraints in the implementation of the health component of the USAID/GOUV Rural Water Supply Project No. 686-0228, as well as water supply activities and the impact on the attainment of health objectives.

It should be stated at the outset that a report on project problems seems by its vary nature, negative or downbeat. This is not the intention of this report. The project has made considerable strides towards attaining objectives and has been given exemplary support by the GOUV.

I. PROBLEMS

A. Planning and Design

The design of the health component of the project was specific in stating the overall quantitative goals of the project: training 500 village health workers (VHWs) from villages receiving a project well and construction demonstration latrines in those villages. However, the lack of a clear plan or a framework for intervention strategies and a Terms of Reference for project has hampered project progress and created a vaccuum.

As a result of this vaccuum, the health component of the project evolved from a strictly health promotion adjunct to the water supply effort to a more general implementation of the MOH primary health care program. While the essential health promotion objectives of the project were retained, the scope of activities was broadened. In principle, this was not a bad transformation as it gave the ministry a vehicle to implement their program on a large pilot scale, and yet retaining essential project objectives. However, there was no concomittant augmentation of personnel and resources. As a result qualitative objectives suffered even though quantitative ones were being met.

B. Village Health Workers (VHWs)

The project, after a slow start in the initial year, greatly increased the number of VHWs trained in the second year. This was partly a result of better organization of the training program and improved utilization of existing health personnel in the project area for training purposes. Nurses in the area were given in-service training in sanitation, health education and teaching methodology. They were able to do the bulk of the training of VHWs leaving the sanitarians and health educators free to supervise training that was in progress at various training sites. The large increase in VHWs has brought with it the problem of supervision and support given the lack of supervisory personnel The cadre of intermediate level personnel envisaged for supervision of the VHWs, the Itinerant Health Agents, started training over a year late and, therefore, there were no supervisory personnel equipped to handle the increased number of newly trained VHWs. Thus a functional system of supervision does not yet exist in the project zone.

The substantial drop-out rate for VHWs is also cause for concern. Supervision is partially responsible for this problem but lack of support by the villagers contributes also. In principle, the VHW is recognized for his contribution to village improvement and consequently rewarded by the villagers in kind. In the majority of villages this has not been the case. The villagers, in the absence of perceived benefits (i.e. injections), do not seem to sense the importance of the preventive work that is being done by the VHW. The VHW, in the absence of appreciation for his work, stops or decreases his/her involvement with preventive health interventions and concentrates on curative care or drops out completely. This curative care is seen as the vehicle for increasing prestige and remuneration by villagers.

C. Itinerant Health Workers (IAs)

For various reasons, the start-up of training of this category of health worker began late. This has created a supervisory vaccuum and a trainer shortage in the project areas. .

The training of IAs was carried out with little coordination between the project staff and the National School for Nursing. The curriculum was shown to project staff well after the school had started. Since it was developed by school personnel, it was essentially curative in content. That, combined with the fact that the instructors were almost exclusively medical personnel and curative case oriented, appears to have given the IAs a similar bias. Only after project staff expressed reservations was a project sanitarian asked to give a one or two-week session on sanitation to the IAs.

While not requested by the school to help in training, project staff were asked to post the IAs on short notice without their background qualifications. They were posted and told to supervise by seeing the VHWs twice a month.

The practical training of the IAs given by one of the sanitarians but due to the short notice given and the insufficient time allotted was inadequately prepared and did not allow enough time for all the students to participate fully. This is a crucial part of the training that did not get the emphasis that was necessary.

D. CNES

The concept of coordination and interaction between the National Center for Health Education and the project to develop training and educational approaches, methodologies and materials, in principle, appears to be a logical one. However, to date nothing has materialized despite general attempts to collaborate due to: 1) the physical distance between the two offices; 2) transportation problems; 3) differing priorities, education and orientation of CNES staff; 4) lack of project staff, time and resources to spend the necessary time in Ouaga to bring ideas to fruition.

E. Latrines

The public health benefits of latrines that are used and maintained properly are well known. In the first year of the project (1-82), there was remarkably little success in meeting the goals of constructing one demonstration latrine in each of the project villages despite the fact that the materials were provided free of charge and labor was the only requirement that villagers had to meet. Furthermore, to the best of my knowledge, there was not a single replication that year of a demonstration latrine. In the second year, the vast majority of the villages recruited built a demonstration latrine and there was a replication rate on the order of approximately 75%. Partially, this was the result of a scheduling change made by project staff to reduce their work load and free up time for other activities. In the first year, staff would make three trips to the village immediately after the VHW completed training: the first to deliver the medical kit; the second to organize the villagers to dig the pit for the latrine and construct the slab; and the third to place the slab in place and discuss proper usage of the latrine. After the scheduling change, the VHW, upon completion of training, was asked to return to his/her village and organize the village to dig the pit. When this was accomplished, he was to contact the nurse responsible for him who would, in turn contact project staff. We would then deliver the kit and construct the slab at the same time and give guidance on the emplacement of the slab, proper usage and maintenance tips. While this could be construed as negative motivation it does not explain the higher replication rate. It is my personal opinion that the second year personnel staff worked more closely with the established "groupement villageois" in the development of health committees. Their prestige and influence contributed to the improved acceptance of the usage of latrines (both cement slab and local materials).

There is some debate about the appropriateness of cement slab latrines and this is probably true in areas where cement is unavailable or beyond the means of the villagers. In certain cotton growing regions, it is certainly within their means and the issue is how to convince people that it is in their interest to use them.

F. Analysis of Well Water

To date, project well testing has not occurred on a regular basis and inspection has taken place only where known problems exist. This can be attributed to 1) personnel time constraints and priorities; 2) equipment breakdown/lack of spare parts; 3) lack of maintenance personnel or facilities; and 4) lack of knowledge of testing procedures and methodologies. This has been remedied somewhat by long overdue Technical Assistance Seminars conducted by M. Pierre Léger.

There has been some discussion over the necessity to test wells when, at this stage, quantity is the crucial issue versus quality which can be provided by drilled or dug capped wells and, by their nature, give better water than existing unprotected sources. In the short run this may be the case, although project staff often encoutered project dug wells with the caps

removed to have access to water when levels were too low for the pump to reach. This poses an immediate danger to consummers. Of much more importance is giving the Voltans the capabilities and tools (infrastructure) to maintain the quality of their water supplies over the long run as other donors and the government to expand the quality water supply to the population.

G. Impact of Wells Activities on the Health Component

There have been some actions taken by the wells component that have adversely affected health activities as a result of 1) lack of coordination, and 2) factors beyond control.

At the outset of each campaign year, a list of villages destined to get a well was published. The health team would then train a VHW in these villages during the same year. Quite a few villages did not receive a well as promised making efforts in health education and sanitation counterproductive as it appeared that we had not kept our word. The causes for this are manifold 1) planning wells in a certain number of villages but no finishing in the campaign year due to rain, equipment breakdown, etc.; 2) hydrogeologic constraints; 3) political considerations (which are not within the purview of this report, but which play an undeniably important role).

In the dry season, health staff often found dug project wells (and a few drilled) that had gone dry or had so little water that the pump had no or negligible yield. Villagers would then remove the protective covering to get what they could on the floor of the well. Thus in both the case of dry wells or of low yield and drying wells the health education message was difficult to transfer.

The policy of putting in one well per village often militates against an effective health education and sanitation program at the village level. In dispersed villages and in villages with more than one quarter, less than one half the population is served. Furthermore, the nature of the pump allows only one person at a time to use it. Therefore, many villagers, rather than waiting in line will seek their water elsewhere, at unprotected sources.

H. Long-Term Education

One of the most important constributions that can be made in development assistance is the training of host country nationals to ensure the long-term success of the project and to increasingly play a longuer role in their country's development. The project calls for health people to receive long-term training. To date, however, none has started.

I. Evaluations

Evaluations, when done in a timely manner and utilized, are a useful planning tool that can improve the chances for the success of an undertaking. The mid-term evaluation of this project was done late July 82, due to the inability to field a team. Despite numerous requests by team and Voltan

personnel, we did not receive the final translated report until 10-12 months later. Within the original time frame of the project, it is virtually impossible to take corrective action.

J. Technical Assistance

There has been an underutilization of the Technical Assistance called for in the PP and the Pro Ag. This is due in part to: 1) misperception on the part of GOUV personnel as to the role and value of technical assistance, 2) a fear that short-term personnel will take up a disproportionate amount of time and resources acquainting themselves with the situation, 3) the often observed inability of technical assistance personnel to communicate adequately once in the field necessitating the use of additional resources.

II. RECOMMENDATIONS

Despite continuing problems, the project has made considerable progress towards attaining project objectives. Much remains to be done, however, a reassessment of the priorities and premises which have governed the activities so far is needed. Based on this, the project should be extended only if a long-term plan is developed. Following are suggestions and recommendations for such an assessment and plan as well as for various areas of priority redirection.

A. Planning and Design

There is an urgent need for a precise long-term plan which would take into account qualitative aspects as well as quantitative. This would require an assessment of VHWs skills, acceptance, effectiveness, the level of supervision and support needed, etc. A reordering of priorities based on reality in the field is necessary. I would recommend technical assistance of 2 1/2 months for this task of which at least two weeks to a month should be spend in Washington preparing background material amd becoming familiar with the project.

B. Village Health Workers (VHW)

Before continuing to train other VHWs, the existing ones should have adequate support and supervision. For the immediate future, no more than 20 or 30 new VHWs should be recruited per campaign. The record and reporting systems need to be organized, standardized and implemented in conjunction with MOH personnel so that it will be uniform and applicable to the whole country,

Though it may be somewhat difficult to do so, it is imperative that a system of pharmaceutical resupply for the VHWs be established. One possibility is to set one up in conjunction with other donors and encourage

the MOH to involve itself. The other is to somehow involve the Government at the outset in devising a system. (The MOH has had a plan in effect for some time but has not moved any nearer to implementation).

Technical assistance would be helpful both for formulating a record and reporting system and for assisting the MOH in the design and implementation of a pharmaceutical resupply system.

C. Itinerant Health Workers (IA)

There is an urgent need to refocus the emphasis of the IA training away from curative towards a more preventive emphasis in both pedagogy and especially practical applications. This will require an assessment of the curriculum and joint efforts with the MOH. Another area of the curriculum drastically lacking is supervision. The IA needs to have an idea of his major function before he is placed in the field. A knowledge of community organization, and weanling nutrition is also very important.

Technical assistance in curriculum development is required, as well as for actual in-service training of the trainers and assistance in training the current student body.

D. CNES

Technical assistance would be helpful to assess the current needs of CNES, both in terms of personnel and equipment to ensure their effectivenes with their present work and to assist in their development of materials for the project. The lack of appropriate films and slide series for example could be rectified with the assistance of persons versed in these areas of expertise.

E. Latrines

Technical assistance should be considered for determining the most effective sort of latrine and perhaps designing others that would meet the needs of the various regions of the project and country. The means and methodologies for persuading villagers to accept latrine usage may require the efforts of a sociologist.

F. Analysis of Well Water

Either the long-term plan or another document prepared by an expert in this field should spell out a plan for an increasing role of project personnel in the analysis and surveillance of project wells. While this may not be critical in the short run to the success of the project, I feel it is important that the GOUV be given an infrastructural basis to enhance their capability for testing water sources over the long term.

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G. Impact of Wells Component

If it is decided to extend the project, I would highly recommend an expansion of the water supply system in villages already having a project but still not being adequately served. Improving access for the whole village would greatly improve the atmosphere for the acceptance of sanitary interventions on Health Education efforts.

Wells which have been known to go dry seasonally or have a very low production rate should be deepened, developed more fully and/or replaced.

There is a need for an effective mechanism to ensure that villages having a trained VHW also receive a well. With the proposed moratorium on VHW training, perhaps a year's lead time between the drilling of the well and the commencement of training would cut down on the incidence of villages being promised a well but not getting it due to the reasons cited in Section I.

H. Long-Term Education

Expedite the long-term training already programmed in the ProAg. If there are sufficient funds, develop a long-term training program for one of the project sanitarians in well and waste water management, planning and administration of water testing programs, development and maintenance records system.

I. Evaluation

Conduct an evaluation, or more appropriately an assessment, of the plan, the activities, the interventions and the methodologies of the project to date in collaboration with project staff. The final report should be completed and used as a guide for the second phase or extention of the project.

J. Technical Assistance

Technical assistance can be an important tool in the attainment of project goals. This is true, however, only if the technician is familiar with the project, the area, and the language, as experience has shown. I recommend that with the provision of any technical assistance that the person be thouroughly acquainted with the project and the constraints of the geographical area as well as having a high level of communication skill in French.

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III. CONCLUSIONS

This project has done remarkably well in improving the water supply of the population and training village level health workers as a model program to be expanded to the rest of the country. This has been due in large part to the high level of support that has been proferred by the GOUV. The termination of the project by the original date (July '84) would be a mistake given the rare degree of cooperation and support the MOH h exhibited. Based on the lessons learned during the initial years of the project, modifications and adjustments should be made to reflect the realitie existant in Upper Volta, and to meet the water and health needs of the population.

For these reasons, I feel that the project should be extended by a minimum of 18 months in order to initiate the recommendations. Ideally, a Phase II would be added to provide an adequate timeframe for the institutionalization of the modifications made during the extension period.