

PD-AAN-484

ISN: 32143

686-0228

/53

SEMI-ANNUAL REPORT NO. 5

JANUARY - JUNE 1983

UPPER VOLTA RURAL  
WATER SUPPLY PROJECT



PROJECT NO. 686-0228

CONTRACT NO. AID/ AFR-C-1709

DIMPEX ASSOCIATES INC.

NEW YORK, NEW YORK

WASHINGTON, D.C.

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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 CONTRIBUTIONS TOWARDS OBJECTIVES

### WATER SUPPLY COMPONENT

#### Summary

The months of January - May, 1983, cover the major portion of the third wells and health campaign. It was a period in which considerable progress was made towards achieving project goals, in spite of a number of logistical problems. In sum, approximately 60 wells were drilled, 54 dug, 4 deepened during these five months. The development and pump installation teams managed to equip about 45 water points, while the inventory brigade surveyed and recorded data for an additional 30 villages in the Sous-Prefecture of Batie.

In terms of technical assistance, these five months saw the departure of one contract hydrogeologist and the arrival of his replacement; the departure of one of the two health educators, and the absence on leave (R and R) of the equipment specialist and administrative manager. Individual contractor contributions are discussed in detail below, the health component activities in a separate section which follows.

#### 2.1 Hydrologist

The former contract Hydrogeologist, Mr. Robert Vorhis, finished his tour of duty and left post on January 7, 1983. His final report and a number of programs for the HP41 computers were left for his successor, along with a comprehensive catalog of village inventory data. Mr. Vorhis was replaced in March by Dr. Youssof Houshang, who joined the project on TDY in preparation for a long-term assignment.

Since his arrival, Dr. Youssof has concentrated his efforts primarily on drilled-well site selections in the Canton of Koloko (Dept. of Hauts-Bassins). In April and May he spent 14 days in the field selecting 41 sites for the Foraco (French) drill rig. Since then, many of these sites have been exploited, with a 100% success rate to date.

The hydrogeologist has also done preliminary work preparing hydrogeological cross-section maps from Bobo Dioulasso to Orodara. As part of this effort and to aid in the siting, the hydrogeologist contacted C.I.E.H. (Centre-Inter-Africaine des Etudes Hydraulique) where he was able to obtain a number of the TAMS maps referred to in previous semi-annual reports. He also made contact with the Institut Geographique National and the USAID documentation center.

As of this writing (July 1983) the hydrogeologist is completing the drilled-well site-selections in the Canton of Orodara, and will have all drilled-well siting for the 1982-3 campaign finished before his return to the U.S. at 3 months TDY is attached as Annex A.

## 2.2 Equipment Specialist

The principal activities of the equipment specialist during this reporting period were: 1) supervising vehicle repairs, 2) monitoring warehouse controls, 3) preparing parts orders for Jeeps, Macks and pumps, 4) working with manufacturers' representatives to resolve chronic equipment-failure problems, and 5) planning for the 1983-4 campaign (including off-season training sessions for I.R. and Jeep equipment)

Because the vehicles are now in their third field campaign and based in a region with particularly bad roads, breakdowns were more frequent January - May than in the past, notably with regard to project Jeeps. The equipment specialist thus spent a relatively greater proportion of his time supervising garage and field repair work during these months than had been the case in past reporting periods. In order to insure that the 1983-4 campaign will not be hindered by transportation problems as the existing fleet ages, the equipment specialist worked with the technical director and the USAID project officer preparing a new-vehicle order and a parts supply system, described in greater detail in section 3.

## 2.3 Administrative Specialist

The administrative specialist continued to supervise the financial aspects of the project. He also worked with the equipment specialist and local-hire warehouse clerk on the maintenance of a comprehensive inventory system for project materials, and with the project director and brigade chiefs in preparing for the 1983-4 campaign.

In a more immediate vein, the administrative specialist has developed a means of financial analysis which enables him to provide the technical director, on a monthly basis, with a line-item by line-item summary of project encumbrances and a percentage of allocated funds remaining by rubrique. This enables potential shortfalls to be spotted and remedied in a timely manner. By way of example, in the 1982-3 local currency budget, no provisions were made for the purchase of vehicle tires, insofar as an order had been placed in July 1982 (via Firestone) for the supply of all necessary tires and tubes. When delays were encountered in the delivery

of these materials, the equipment specialist was forced to search out alternative sources of supplies, at highly inflated prices, causing a line item overrun of over 15,000,000 francs (more than half the funds allocated for all vehicle maintenance costs). A similar situation arose when a contract for cement supplies was delayed and the project was forced to purchase a considerable amount of cement locally and pay a heavy premium. Both of these line-item overruns were discovered in May and provisions made, in collaboration with the USAID project manager, to transfer supplemental funds to these two rubriques.

The administrative specialist and the local-hire accountant redesigned the monthly reporting format to better reflect the actual amount of non-liquidated encumbrances and remaining provisions by line item. The administrative specialist also maintained a detailed cost journal by brigade (see Annex B outline for of journal details) to provide data for future cost projections and analyses. This will be of particular interest with regard to allocating provisions for the proposed pump-repair teams (which figure heavily in the GOUV recurrent-cost proposal.)

In March, the administrative specialist was asked to participate in an audit of the health-component finances. After discovering a shortfall in excess of 500,000 CFA, he was asked to recruit and supervise a new accountant, and participate in a much more rigorous oversight of the health component financial affairs.

The administrative specialist was further occupied this reporting period, with briefing the new technical director (replacing Mr. Ibrahima Pare, recently transferred to the National Water Service (O.N.E.) in Ouagadougou) and with general supervision of day to day project administration.

## HEALTH EDUCATION COMPONENT

### 2.4 In-service Training for Nurses

Sixteen nurses from the Departmnet de Sud-Ouest and twelve from the Hauts Bassins participated in a one-week, in-service training session on primary health care. Conducted by project personnel, the session emphasized sanitation (including waste water disposal, latrine construction and well improvement). Twelve of the nurses from Sud Ouest and six from the Hauts Bassins also participated in a two-week session at CESA0 on primary health care and village animation.

## 2.5 Recruitment and Training of Village Health Workers

Approximately 80 VHWs from 75 villages in the Sud Ouest have been recruited and given a five-week training program in basic curative treatment skills and disease prevention at a local dispensary. This activity was carried out in collaboration with regional health department staff (regional medical officers and 14 dispensary nurses) and the German aid organization which actively supports primary health care in the Department.

An additional 30 VHWs received three weeks of training in disease prevention. These VHWs were previously trained in curative treatment by another project.

In the Department of Hauts Bassins, 136 VHWs from 85 villages received the five-week training program in basic curative and preventative care.

## 2.6 Village Pharmacies

Village pharmacies have been provided to all villages with a trained VHW.

## 2.7 Itinerant Health Worker Training

Twenty-two itinerant health workers completed their twelve month training. They acquired preventative and curative skills at a level intermediate between that of the VHWs and that of the nurses. They have been given their assignments and are in the process of being transported to their posts.

## 2.8 Other Activities

A new Peace Corps volunteer joined the project in April and was briefed by the health educators before taking up her assignment in the Sous Prefecture of Dano (Dept. of Sud Ouest). She will be responsible for the supervision of eight VHWs in the region. The two PCVs who worked with the project in this region since May, 1981, completed their service in April.

### 3. PROBLEMS EXPERIENCED

#### WATER SUPPLY COMPONENT

##### 3.1 Project Office Relocation

After numerous delays, electrical problems and equipment malfunctions, the new project headquarters was completed and ready for occupancy in late May. The move from temporary quarters was accomplished in stages, with the H.E.R. personnel moving first, followed by project staff. This understandably resulted in a temporary disruption of the administrative routine, but on the whole was accomplished with efficiency and a minimum of inconvenience.

##### 3.2 Moyno pumps

The Moyno pumps are continuing to break down at an unacceptable rate (see Semi-Annual Report No. 4 section 3.4). Robbins-Myers has studied the problem and proposed a potential solution, replacing the nickel-plated rotors with chromium-plated ones. They believe that the nickel-plating is too brittle and flakes off with the flexing of the rotors. To date, the project has received 154 chrome-plated rotors and 40 stators air-freighted to replace those nickel-plated rotors previously in stock and the stators damaged by the defective rotors. With this stock the pump installation teams should be able to finish the 1982-3 campaign, including repairs of previously installed pumps. A recent order of 285 new pumps will hopefully arrive in time for the 1983-4 campaign. It remains to be seen if the new rotors will perform more effectively than the old ones and if the pump failure problem has been solved.

##### 3.3 Jeeps

As the Jeep vehicles get older they require more attention and spare parts. Due to a chronic lack of parts the Jeeps are currently in poor condition. Until recently, the policy of the project/USAID was to keep a minimum of parts at the garage and rely on the local Jeep representative to stock a more extensive supply. The local representative would also be relied upon to order emergency parts not on hand. This policy was intended to encourage the dealership to provide service for all projects using Jeep vehicles and to establish a system that would be in place at the end of the project(s). In practice, it has not worked. The dealership has not, thus far, maintained a large enough supply of parts to meet current needs and has been consistently slow in procuring emergency parts. For these reasons the project has decided to order a large supply of Jeep parts to keep on hand at the garage. A first order has been placed through U.S. Government channels to provide necessary parts for the 1983-4 campaign. A second (larger) order will be

made to supply maintenance needs for the vehicles 2-3 years after the project completion date. This does not preclude the necessity to order emergency parts. Orders placed through private suppliers in emergency situations have arrived in a satisfactorily short time (3-4 weeks). The dealership has promised to equal this performance at lower prices and a trial order has been placed. If they are able to supply the emergency parts quickly the project will continue to work through them. If not, orders will be placed through the suppliers that have the faster delivery time.

In addition to the parts supply problem, the project Jeeps have experienced a number of difficulties of a technical nature, particularly the pickups and Cherokees. The following are chronic problems for which no solution had been readily available until recently:

- a) motor mount breakage
- b) chassis frame breakage at left front
- c) Sheet metal stress tearing at the front of the vehicle
- d) radiator support breakage and leaking
- e) rear axle housing breakage

The Jeeps had other problems, such as battery support breakage, muffler support breaks and fuel vapor filter canister breakage, for which project mechanics were able to find solutions through modifications of existing equipment (see Semi-Annual Report No. 4 section 2.3). Jeep has been aware of many of the above problems for some time. A Jeep representative recently visited and demonstrated a modification they propose for project vehicles which should significantly reduce problems a - d above. The modification involves installing an additional crossmember at a point between the front and second crossmembers running under the motor. This is to reduce the vibrations and flexing of the chassis frame when driving on washboard and bumpy roads. The only solution to problem e (above) is the ordering of several axle housings. This has recently been done.

#### 3.4 Foraco Drill Rig Breakdown

The drilled-well program was significantly impeded by the breakdown of the Foraco drill rig in January-February. Parts needed to replace the main gear assembly were unavailable locally, and a hastily organized mission to Abidjan succeeded in disassembling the broken part, but did not yield the replacement pieces. The problem was eventually solved when the drill rig operator flew to Niamey (Niger) and hand-carried a replacement gear assembly to Ouagadougou. A short-fall in the number of drilled wells executed relative to

the number programmed for this campaign is expected as a result of the prolonged downtime of the Foraco rig.

### 3.5 Evaluation Report Delays

The ISTI-organized mid-term evaluation report includes a number of suggestions and commentary which have an immediate relevancy to on-going project activities. Unfortunately, as of this writing, the technical directors and field technicians who stand to be most influenced by the evaluation team recommendations have not yet received sufficient numbers of copies in French to warrant the convening of a technical committee meeting to discuss the report's implications and applications. Until all interested parties have had a chance to thoroughly peruse the report it is pointless to attempt to act upon its contents. Efforts to reproduce the necessary numbers locally having proven to be far too expensive (more than \$2,500), a project agent has been dispatched to Ouagadougou to search out more feasible alternatives. Assuming the receipt of fifteen additional copies in French, a technical committee meeting has tentatively been scheduled for the end of July.

## HEALTH EDUCATION COMPONENT

### 3.6 Village Support of VHWs

The problem of lack of village support for VHWs (described in Semi-Annual Report No. 4) continues. It remains necessary that project personnel emphasize the need for village support with the village health committees.

### 3.7 Latrine Construction And Other Health Promotion Activities

The sanitation/health education aspect of the VHWs job continues in most cases to progress rather slowly, due at least in part, to a lack of supervision and support.

Further progress in this area may be possible with 1) the availability of 22 itinerant health workers, and 2) postponement of the recruitment and training of new VHWs for one year and a concentrated effort on the support and supervision of existing VHWs. (See Suzanne Plopper's Final Report, Annex D).

### 3.8 Potable Water Supplies In The Project Zone

Greater emphasis must be put on the proper maintenance of project wells (including surrounding hygienic conditions) and on the improvement of traditional wells.

#### 4. GENERAL OBSERVATIONS

##### WATER SUPPLY COMPONENT

##### 4.1. Hydrogeology

See Annex A

##### 4.2 Equipment and Facilities

##### 4.2.1 Jeeps

Despite the problems of spare parts procurement and bad roads, most of the Jeeps have been in operating condition throughout this reporting period. And although downtime has increased this year, wells component project activities have not been significantly handicapped as a result of vehicle breakdowns. Nonetheless, field technicians have been frustrated because they cannot always rely on their vehicles in their present condition. It is hoped that with the refinement of a spare parts supply system and the installation of the previously mentioned crossmember support, downtime can be reduced and vehicle reliability improved. The project has also ordered nine new Jeep CJ10 pickups, expected no later than January, 1984 and a second order of four new Cherokees or Toyota Land Cruisers should be processed shortly. The arrival of these new vehicles should more than compensate for any anticipated present-fleet breakdowns during the next wells campaign.

Jeep has also proposed that the project participate in a two-week, French-language, training session for the chief mechanic, and perhaps one assistant, to be conducted in Detroit. This training would be relatively comprehensive, covering all Jeep components. Jeep will likely pay for the actual training costs as well as part of lodging, food and transportation expenses, the remainder being met with project funds. A more detailed proposal including tentative dates should be forthcoming during the next reporting period.

##### 4.2.2 Mack Trucks

Outside of chronic spring breakage, the Mack trucks have had few mechanical problems. During this reporting period, as in the past, the project Macks have functioned very satisfactorily in the field, with the result that no serious interruption of project field work due to truck breakdowns have occurred. A Mack representative visited the project garage in February, 1983, and studied the spring problem, but was unable to propose any definitive solutions. He will discuss the problem with Mack technicians in the U.S. and attempt to reach a solution there.

#### 4.2.3 Ingersoll Rand and International Harvester

The TH60 has not had any serious breakdowns this campaign. Nonetheless, the project will request that an I.R. technician be contracted to oversee the down-season repair and maintenance of all I.R. equipment (TH60 and compressors) tentatively programmed for early October. The I.R. technician will also be requested to conduct training sessions in aspects of equipment maintenance and repair, and assist in the ordering of G.M., I.H., and I.R. parts, parts catalogs and microfiches. With this technical assistance it is hoped/expected that the TH60 drill rig and the I.R. compressors will continue to perform as well in the 1983-4 campaign as they have in the past.

#### 4.2.4 Moyno Pumps

The newest order of pumps should be problem-free if Robbins-Myers has truly found solutions to the various problems mentioned in this and past reports. If not, it may be fairly concluded that the project experience with the Robbins-Myers Moyno has been a failure. This may be amply demonstrated by the numerous pump-modifications required since the beginning of the project. To wit:

- a) chrome-plated, instead of nickle-plated rotors
- b) heavy duty clutches
- c) inspection ports
- d) nylon foot valves
- e) polished handles

Of the above, the first is clearly the most critical since the performance of these chrome rotors will determine the success or failure of the pump. Project technicians should have a better idea if it will work by the end of the next campaign (they will also have to go back to each pump already installed to make the above modifications).

#### 4.2.5 Warehouse Controls

The system now in place is working well, though human errors continue to cause time-consuming duplication of effort. Greater attention to details by the warehouse clerk will improve this situation. Lack of warehouse space and shelving in the temporary garage are also factors in the inventory system shortcomings that should be reduced when the garage is moved to the new facilities. It seems evident that the system can work, but will require close attention by the project director when the DIMPEX contractors leave. This will be especially the case when there are large amounts of vehicle spare parts which are expected to arrive in the next year or so. As of now, it is the DIMPEX contractors

who oversee the administration of this system. Several of the inventory control forms developed for the project are attached. (See Annex B)

#### 4.2.6 New Facilities

The eventual relocation of the project garage operation from their existing location to the new garage/warehouse facilities will not take place in the near future, as many modifications remain to be completed. Though some of the new buildings are presently being used to house cement and PVC, and the new garage itself will be used to a greater extent in the down season to park vehicles and conduct minor repairs and oil changes, the current (leased) garage facilities will remain the principal site for equipment repair and maintenance through the end of this year.

#### 4.3 Administration

The project administration for this (1982-3) campaign, including financial and inventory control systems, purchasing, budgeting, planning, etc. has evolved and been refined as a result of lessons learned over the preceding two campaigns. It is fair to say that the day-to-day functioning of the project administration is well in hand at this writing, and that there are no serious problems of an administrative nature presently pending.

However, it is the following campaign, the last as the project is presently structured, which will determine to a larger degree the extent to which overall project goals are accomplished.

It seems apparent that, in spite of technical problems (notably the Foraco breakdown) encountered during the 1982-3 campaign, the quantitative goals set out in the 1982-3 Programme D'Activities will be largely achieved. Thus, administrative efforts and priorities must be focused now upon assuring that momentum is maintained and provisions made for an equally successful 1983-4 wells program.

The first step in this process is to estimate material and equipment needs, place the necessary orders and follow through to ensure that supplies are in place at the start up of this Fall's campaign. Several meetings, both internally within the project and involving USAID staff in Ouagadougou, have been held in recent weeks to further this effort.

The TH60 drill rig is one piece of essential equipment that must be in operating condition throughout the next campaign if 1983-4 goals are to be met. Hence the emphasis on bringing out an I.R. technical representative to oversee the off-season maintenance and to assist with training and parts orders.

Minimizing downtime amongst the project fleet of vehicles and trucks is almost equally important to a successful field campaign. Hence the efforts being directed towards parts procurement, new vehicle orders and training for garage staff.

Budgeting and financial analysis also takes on added importance as the project enters its last year. Available funds for construction projects, supplemental equipment purchases, etc. must be obligated during the next budget year, and the question of a project extension addressed.

In short, time constraints will become increasingly problematic the first half of the next reporting period, and the daily administrative routine will take a backseat to longer-range planning. In light of the positive results of the last two campaigns and the administrative structure in place at this time, there is reason to be optimistic.

## HEALTH EDUCATION COMPONENT

### 4.4 Latrines

The response to the latrine building program this campaign has been remarkably better than last year's (see annexes for details). This is partly due to the greater involvement of the nurses in the practical aspects of the training as a result of the in-service training in hygiene that they received. A tactical change on the part of the project personnel also contributed to increasing the number of latrines built. VHWs, upon completion of their training were asked to have already dug the pit for the latrine before the project staff delivered the medical kit and cement for the latrine slabs. Also contributing was an intensive "sensibilization" campaign by the staff in each of the villages. While the figures for latrines constructed in local materials does not show up for the Hauts-Bassin region, it is estimated that approximately 50 such latrines have been built.

## 5. POTENTIAL RELATIONSHIPS

### WELLS COMPENENT

5.1 See Annex A

## 6. CONTRACTOR GOALS AND OBJECTIVES

### WELLS COMPONENT

#### 6.1 Hydrogeologist

(See Annex A)

#### 6.2 Equipment Specialist

- 1) Continue supervising garage and warehouse activities.
- 2) Prepare for the move to new garage facilities.
- 3) Follow up on the proposed I.R. TDY and on Jeep parts orders.
- 4) Prepare new orders for Mack parts.
- 5) Assist in evaluating Moyno pump performance and needs.

#### 6.3 Administrative Specialist

- 1) Supervise financial and inventory controls.
- 2) Assist in the preparation of the 1983-4 local currency budget.
- 3) Assist in logistical planning for the 1983-4 campaign.
- 4) Perform administrative support functions and financial analyses as appropriate.

HEALTH EDUCATION COMPONENT

6.4 Health Educators

Emphasis will be placed on the establishment of an effective system of support and supervision of VHWs and IHWs and dispensary nurses. Regular supervision with emphasis on disease prevention will be aimed at focusing villagers' attention on existing environmental health problems and concrete measures to be taken.

7. ADMINISTRATIVE PLANS

WATER SUPPLY COMPONENT

Scott Welch is planning a vacation in December before extending his present contract.

Dr Houshang Youssof will be returning to take up a long-term assignment in August.

HEALTH EDUCATION COMPONENT.

Both Suzanne Plopper and Steve Lucas will have finished their respective contracts by July 31, 1983. Deborah Dishman and Peter Ashelman will replace them as project health educators.

Bobo-Dioulasso, June 20, 1983

Hydraulics and Rural Equipment Board  
Village Hydraulics Project / US/AID

Attention: Mr. DIALLO, Director

Dear Mr. Diallo,

Please find enclosed the report on drilling installations in the districts of Koloko and Orodara that were made during the months of April to June, 1983.

This report gives an account of a methodological experiment on the choice of drilling sites in the area of the Infracambrian sedimentary table.

Some recommendations have been made by way of conclusions with the purpose of ensuring that work will progress well during the next campaign.

Respectfully,

/sgd/

H. YOUSSEF, Ph.D Eng.  
DIMPEX ASSOCIATES, INC.

Hydrogeologist

HY/kf

cc. Mr. John Figueira,  
General Development Officer  
US AID Ouagadougou

Mr. Elroy Carlson,  
Rural Water Supply Project  
Manager,  
Dimpex Associates Inc.  
Washington. D.C.

DRILLING INSTALLATIONS  
IN THE DISTRICTS  
OF KOLOKO AND ORODARA  
(DEPARTMENT OF HAUTS-BASSINS)

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METHODOLOGICAL EXPERIMENT  
ON THE CHOICE OF DRILLING SITES

H. YOUSSEF

JUNE 1983

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## I INTRODUCTION

This report gives an account of a campaign for installing drillings which took place during the months of April and May, 1983.

During this campaign around 50 sites for drillings were chosen in 40 villages.

Installations were made in the districts of Koloko and Orodara, in the Department of Hauts-Bassins.

## II THE NATURAL ENVIRONMENT

### 1. Geology

All the area of the installations is located on the sedimentary table that lies from the West of the Dedougou - Bobo-Dioulasso - Banfora axis to the Mali border.

It is an area of Infracambrian sandstones. They lie under very numerous facies, going from very hard and compact sandstones to clayey horizons passing through sandy beds, gravel horizons, very schistous sandstones and even clayey schists.

On the geological map, the area of the installations includes, from bottom to top:

Base Sandstone	(P <sub>2</sub> )
Sotuba Sandstone	(P <sub>3</sub> )
Sandstone with Quartz Pebbles	(P <sub>4</sub> )
Schisto-greso-dolomitic Sandstone	(P <sub>5</sub> )
Rose Sandstone	(P <sub>6</sub> )
Toun Schists	(P <sub>7</sub> )

The presence of dolerites must be noted, placed in those sediments, in the form of flows.

Another major feature of the geology is that the region has innumerable faults and fractures (see the geological map of 1:200 000 made after the landsat. study, Sheet No. 8: Bobo-Dioulasso).

## 2. Hydrogeology

Excepting for a band of schisto-greso-dolomitic (P<sub>5</sub>) sandstones that lies throughout the installation area and that contains very little if any water, all the facies of the Infracambrian sandstones are sufficiently aquiferous. On the Hydrogeological Diagram of 1:200 000, the Northern contours of this formation have been drawn and the facies marked by its symbol (P<sub>5</sub>); also to mark facies P<sub>6</sub> and P<sub>7</sub> only their symbols were used.

Among these facies the sandstones with quartz pebbles (P<sub>4</sub>) must be noted. In

these sandstones, from Bobo-Dioulasso to Orodara and Koloko, there are important springs (Kou spring) and permanent watercourses (the Volta-Noire).

These signals permit us to expect interesting water resource possibilities in these formations and would deserve studies in greater depth.

Finally, let us note that the doleritic flows, those volcanic intrusions, spread throughout the area, are not aquiferous formations.

Keeping in mind the importance of the sandstone area, we attempted to make a hydrogeological cross-section through the area between Bobo-Dioulasso and Orodara, along the Bobo-Bamako road.

This cross-section, which would enable us to better understand the hydrogeological phenomena, was made with the help of the results of the drillings of Bobo-Dioulasso (Deep drillings of Bravolia and of the SAFELEC), and those made within the framework of the Project along this road, as well as field work.

A brief analysis of this cross-section shows us that the town of Bobo-Dioulasso is located on an asymmetrical sandstone synclinal with the Precambrian substratum (Birrimian Schists) at a depth of 700 m (BRCM report, 1969) and a doleritic slope a bit further West of Kou on which the deep layer will butt as against an underground

dam, enabling it, thanks to the numerous fractures, faults and diaclases to become emergent at Koukouroue.

Upon observation of the static formations of the layer we have determined that the Kou will probably feed the underground layer of the town of Bobo permanently. The Kou has an elevation of 350 m and in the town's deep drillings the water layers recovered are at a depth of between 93 and 167 m, i.e., at elevations of around 350 and 300 m.

West of the cross-section, in the Orodara region, the thickness of the facies of sandstones with quartz pebbles is estimated to be more than 300 m (IWACO provisional report), where the National Water Bureau (Office National des Eaux) recently perforated a drilling, in which water was found at a depth of 20 m.

Near the backwater the formation of the layer is at a depth of 5 m and it can be observed that the backwater is permanently fed by an underground layer on the Southern side of the town.

### 3. Orohydrography

The Infracambrian sandstone sediments of the Project area are part of a monotonous table, of an average altitude of 450 - 500 m, the border of which is marked by an important cliff between Bobo-Dioulasso and Banfora.

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Further West the watershed of the Volta-Noire goes from 400 m at the level of Bobo, to more than 600 m at the level of Orodara on the ridges along the Bamako road.

To the North of this watershed drainage is toward the North and the East to feed the tributaries of the Volta-Noire.

To the South, the region drains toward the South by the sources and tributaries of the Comoe and the Leraba.

The Volta-Noire, the Comoe and the Leraba are practically the only permanent watercourses of Upper Volta.

The importance of the formations in which these rivers have their sources must be stressed.

(see Hydrogeological Diagram of 1:200 000).

#### 4. Geomorphology

In the light of what has been described in the preceding chapters, we are dealing with a geologically sandstony area, which is relatively uneven, structurally having numerous faults and fractures, hydrologically furrowed by a dense network of backwaters.

In that which refers to the installation of village waterworks, in the relatively short time that we had for an "intensive choice of sites", we were constrained to making an installation based on observation of the landscape.

V<sup>1</sup>

It was, in the first instance, geomorphological observation that enabled us to achieve a better understanding of the hydrogeological phenomena and that guided our exploration of water points.

### III. SELECTION OF RECOVERY WORKS SITE

#### 1. Objective of explorations

The objective of our explorations was to obtain a permanent flow which would fulfill the daily needs of the rural population (10 liters per day and per person).

Generally, exploration for maximum flow from a site is not the primary objective of a water supply campaign in rural areas.

Indeed:

- the use of manual pumps does not go beyond  $1 \text{ m}^3/\text{h}$
- one of the criteria of the success of a works campaign is essentially the utilization of the works; however, the latter are not fully utilized unless they are located close to dwellings. This implies an installation that will not always be the best in the area of a village. And very often the hydrogeologist is obliged to take these constraints into account.

These constraints demand an even more precise exploration method. The difficulty of exploration need not be accompanied by ever more complex studies.

## 2. Choice of a methodology

As was pointed out in section II. 4, topographical and hydrographic reconnaissance of the ground, even if very incomplete, taking into account the nature of the outcrops, are indispensable in site selection.

Establishing a method for water exploration has the purpose of locating recovery works so that there may be, with a maximum of certitude, a maximum permanent flow at the least cost.

A depth of knowledge regarding the natural environment and the conditions for the existence of groundwater will guide the hydrogeologist in his search for water. That is our choice of a methodology.

The method itself being nothing more than practical guidelines that cannot be universal. Knowledge of the environment goes beyond the narrow framework of a method. The method for water exploration in the rocks of the West African substratum is, in the first place, the combination of observations and field-work.

A quasi empirical installation of waterworks, based on morphological observation of the landscape, would seem to be more efficient than classical geological and hydrogeological methods in the regions of the substratum.

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### 3. Analysis of the topography

An examination of the morphology reveals the relationship between fracture and alteration that is at the origin of many phenomena; it makes having an idea of the morphology of the piezometric surface possible (see hydrogeological cross-section).

The topographical map (of 1:200 000) provides precious information.

The morphology of the entire region is an introduction to general knowledge because it provides multiple guidelines for the choice of supplementary prospecting methods.

### 4. Geophysical prospecting by electrical method

A geophysical prospecting campaign is under way, by a team of the HER, in the crystalline and metamorphic regions of the substratum, which are not presumed to be very favorable.

This geophysical prospecting by electrical method is reduced to simple profiles of the drawdown resistivities, preceded and followed by some "S.E."

Several profiles were made for each site. Profiles are generally parallel with each other.

The SE were installed on conductive anomalies taken from the profiles in order to specify their nature and depth.

The SE generally provide diagrams "in ship's bottom" that end in a rising branch which corresponds to the resistant substratum.

The thickness of the alteration shows up in the apparently lowest resistivities. Fractures also show up by conductive anomalies.

The resistivity profiles and particularly the SE profiles can make an effective contribution to the reconnaissance of altered pockets for drillings to be made.

Let us, nevertheless, remember that in the Comtec report (1968): "Survey of mineral resources and groundwater resources in Upper Volta", the authors concluded that the existence of an apparent resistivity measured in profile does not seem to be a necessary condition for choosing a drilling site.

The following observations must be considered:

Geophysical prospecting must be guided by fractures and alteration pockets.

With reference to interpretation, good knowledge of the natural environment prevents erroneous conclusions.

The quality of the quantitative interpretation of SE curves depends on measurement precision and on the quality of the coupling (Schlumberger device). It requires there being some drillings that enable a calibration and presumes close collaboration between hydrogeologist and geophysicist.

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Attached as an annex are diagrams of the three profiles and the SE obtained after the interpretation of the results of work in the area of the village of Tien, on the sedimentary table. (Annex 1).

The profiles are judiciously perpendicular to the ravine.

A deep drilling of 120 m, after having gone through the laterites and clayey layers across 60 m, reached sandy horizons, both fine-grained and medium-grained, but that did not yield any water.

The proximity of a very deep ravine is the cause, the ravine being the natural drain of the aquiferous layer during the humid season.

Our choice was SE 5 that was a little further away from the influence of the ravine.

#### CONCLUSIONS AND RECOMMENDATIONS

At the level of a Rural Drinking Water Supply Project, it is not possible to undertake a hydrogeological "study".

The specific objective is to provide the rural population of Southwest Upper Volta with a drinking water supply system which will fulfill their minimum daily needs (10 liters per day per person).

Nevertheless, it would be detrimental not to take advantage of all existing documents, reports, accounts and data.

Geologists, engineers and consultants, particularly French, have worked on water exploration, in Upper Volta and in West Africa, for more than 30 years. They have left a substantial amount of documents.

Among them is to be found the experience of an entire generation.

Our undertaking must take advantage of that wealth.

This is the reason why we have prepared a bibliographic note (provided as an annex) that is far from being exhaustive. It would be desirable to have it available to the extent that it were possible.

A study of the existing data as their collection proceeded would guide the thoughts of the hydrogeologist in his investigations and exploration. They would also lead to making a synthesis of the data acquired and, finally, to writing a report that would describe the hydrogeological conditions of the Project area. Maps and illustrations must, of course, support said text.

As the evaluation team has correctly stressed, one of the major concerns of the Project would be the insufficient compilation and analysis of the hydrogeological data obtained until now.

Indeed, during the past two years, a considerable amount of data was collected in the field; on the other hand, the construction of wells and drillings and the operations of development and trial pumping, as well as a number of measures relating to water levels in the wells and drillings constitute another source of information.

The need to classify and narrow these data down to essentials would be a task of primary importance.

1. Fact sheet system

To return to service, complete and up-date the fact sheet system for the inventory of hydraulic resources: village fact sheet on the one hand, and drilling fact sheet on the other. They will provide information regarding:

- the location of the water point, its geographical coordinates, its altitude, ....
- the construction of the drill hole, its depth, the depth of the significant water in the aquiferous area, the water level (piezometric surface), the flow, the hydraulic characteristics, ....
- the circulation of groundwater and, possibly, the relationships between geology and hydrology, i.e., the aquiferous relationships, rivers and the specification of feed and drainage areas, if these occur within the boundaries of the area in question. (Annex II).

2. Drilling logs

The compilation and analysis of data will supply specific information on the stratigraphies, lithology, structure and will provide appropriate information regarding the geometry and continuity of the aquiferous area.

It is possible, especially, in the sedimentary table area (sandstone area), to try and discover a generalized aquiferous layer (see hydrogeological cross-section).

Two types of fact sheets have been given as an example, as an annex. (Annex III).

3. Observation of the water points

The compilation and analysis of data will provide information regarding seasonal and yearly fluctuations of groundwater levels. They will show up over-exploited areas and those where a natural source recharges the layer.

This shows the importance of periodical measurements of water levels in the wells and drill holes. The establishment of a network of observation wells is imperative for supervising the layers.

Three types of fact sheets for periodical measurements are provided as an annex. (Annex IV).

4. Drillings development

At this moment most of the Project drillings have not been sufficiently put into production for the drill hole to be completely clean (normally 6 to 10 hours). Thus, the potential full yield, particularly for drillings with a low yield, has not always been achieved. This is why it is recommended that the drill hole be pumped for at least 12 hours and if possible longer, in order to obtain a satisfactory level of productivity and to improve the specific capacity of the works.

It is also necessary to proceed to a pumping trial which would include an 18 hour pumping cycle for each drill hole producing a yield by air injection of  $5 \text{ m}^3/\text{h}$  or more.

The trials should include, preferably an 18 to 24 hour pumping cycle followed by an 18 hour recharge cycle.

A fact sheet for recording the results of trial pumpings has been given as an annex. (Annex V).

5. Water analysis diagram

It is advisable to begin the chemical analysis of a representative series of wells and drill holes. The water samples must undergo complete analysis for the identification of anions and cations.

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The results are shown on the Schoeller-Berkaloff diagram (see the annex)

The quality of the water must be completed by measuring the pH, the specific conductivity, the silica.

#### 6. Strengthening the Hydrological Team

The Village Hydraulics Project provides an opportunity to increase hydrogeological knowledge.

Strengthening the hydrogeological team is recommended (by recruitment of an assistant hydrogeologist) in order to

- improve the collection of data
- improve site selection
- better follow the evolution of drilling operations
- improve classification of fact sheets
- improve compilation of data and information.

#### 7. Village Mobilization

Village water supply involves punctual installations. We have noted above the constraints which the hydrogeologist is obliged to take into account in his operations.

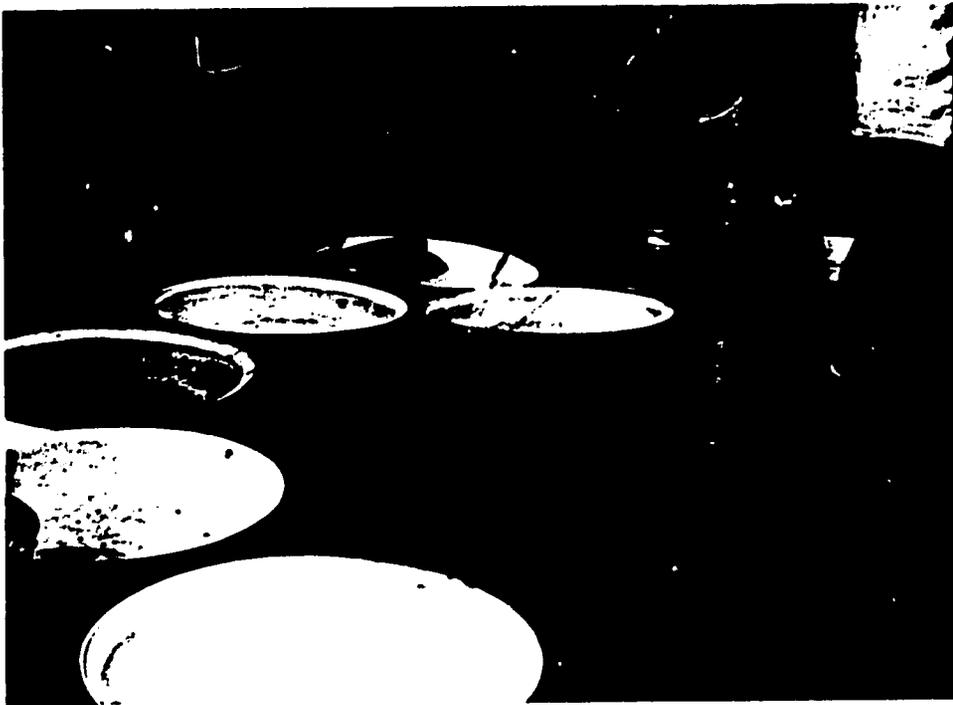
Nevertheless, the problem of pumping out which has not yet been solved, makes it necessary to take up again the question of drilling policy.

The difficulty lies in the maintenance and repair of manual pumps, on the one hand, and health protection of the water point, on the other hand.

The water point provides the pivot and the means to introduce notions of hygiene practice in the village. Thus health benefits would be obtained by hygiene protection measures regarding the drill hole and improved handling of the water between the water point and the point of consumption.

I hope I may be allowed, at the end of my report, to quote the Administrator of the Department of Hauts-Bassins and the President of the Village Hydraulics Project Coordination Committee. He stated, at the 4th Meeting of that Committee, in October, 1982, "I ask all the members of the Committee to double their fervor, in order that the populations concerned be not only sensitized by also mobilized for the success of the operation."

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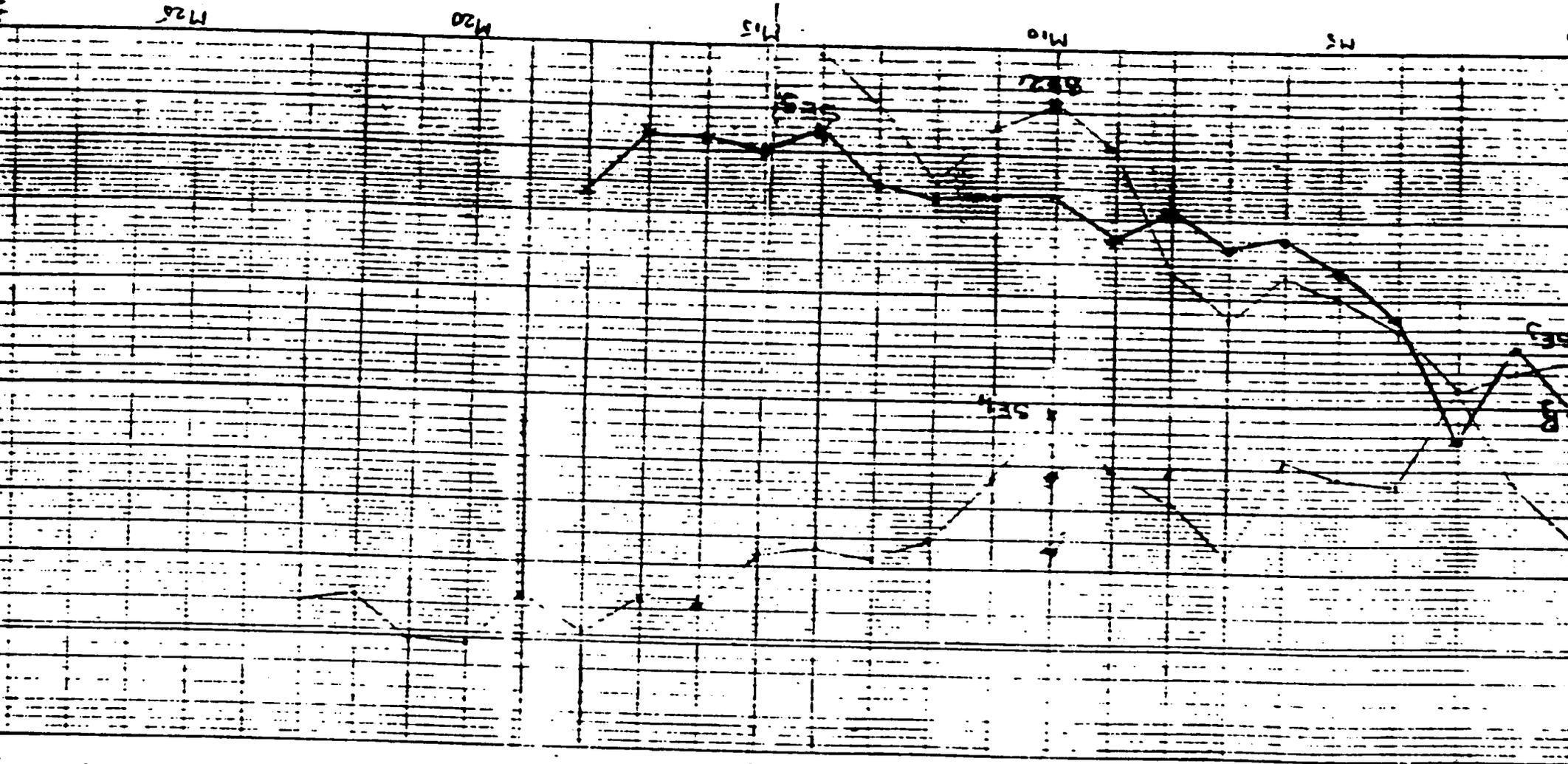
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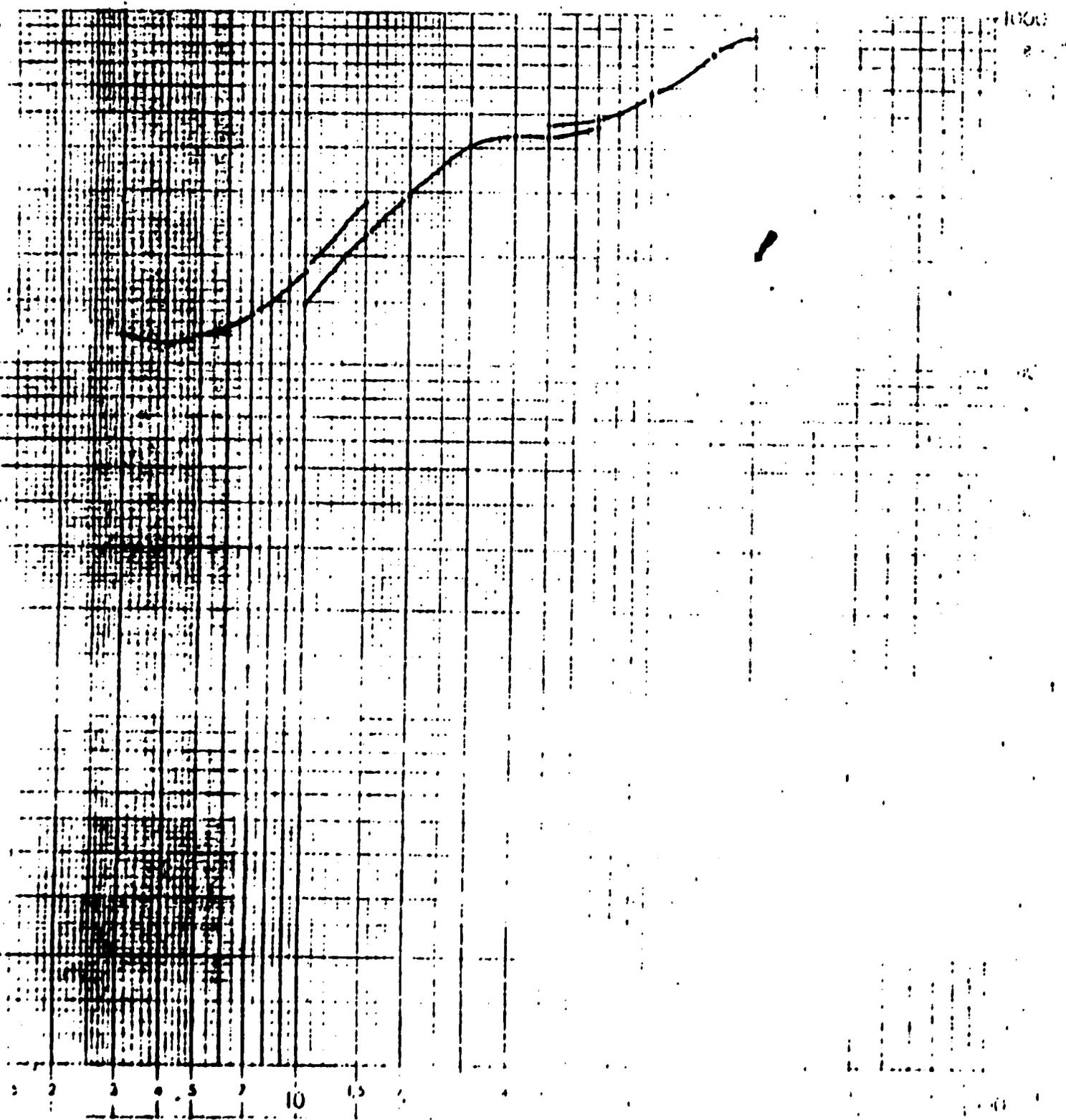
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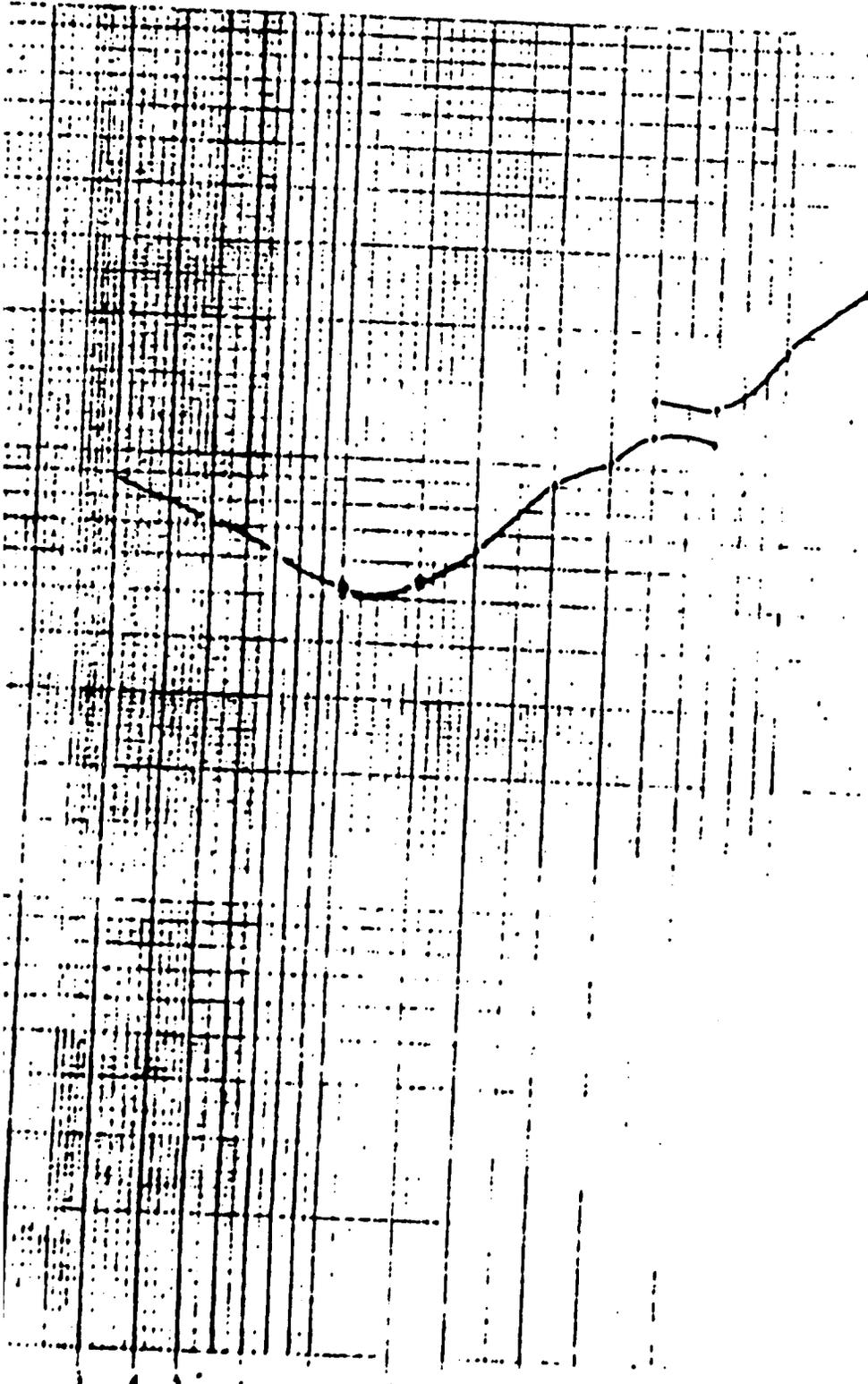
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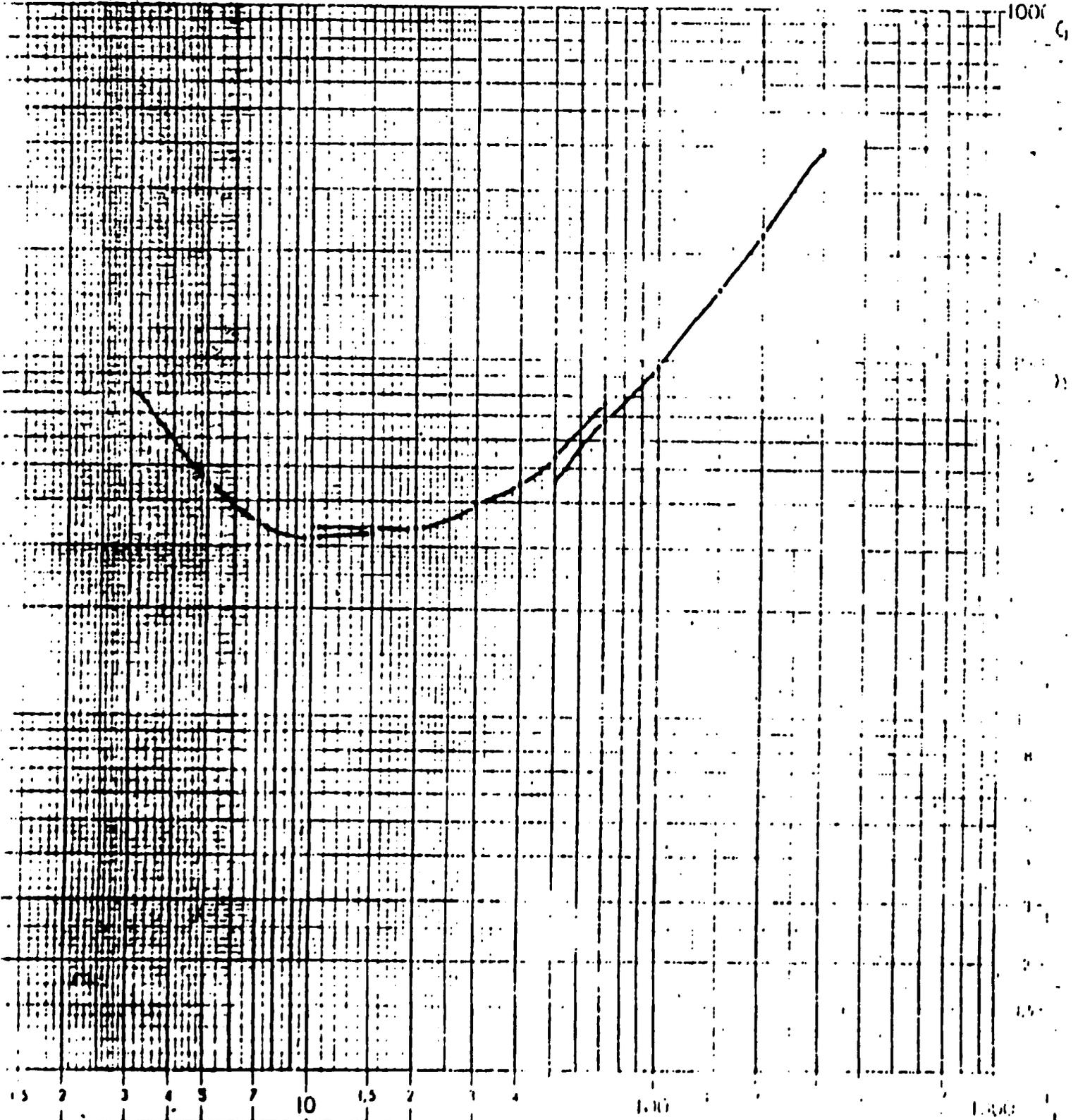
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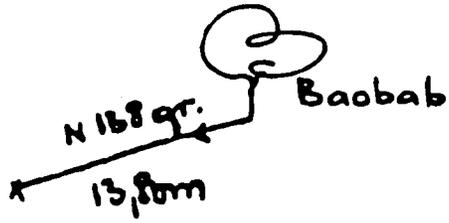
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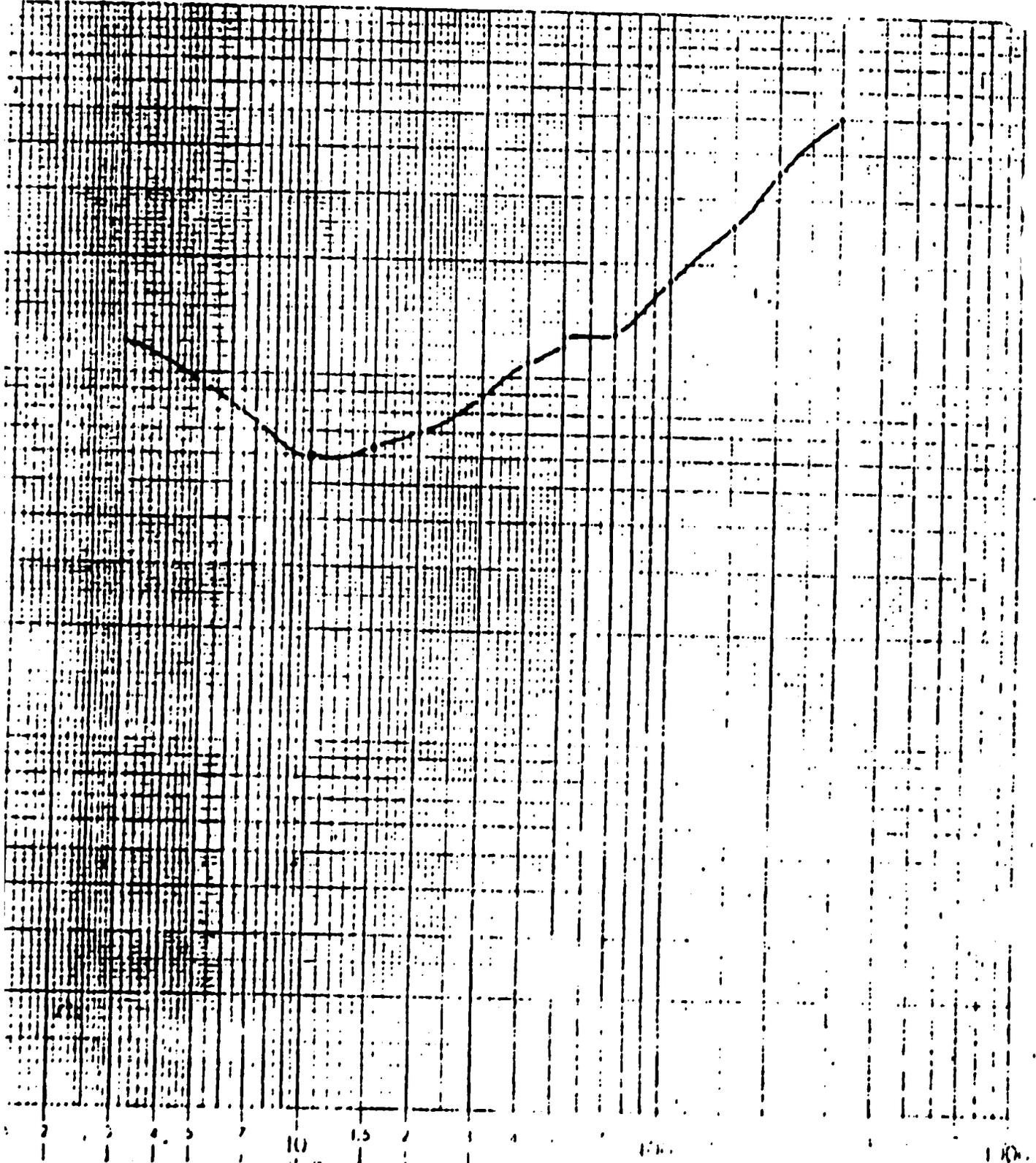
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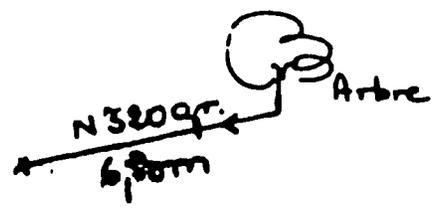
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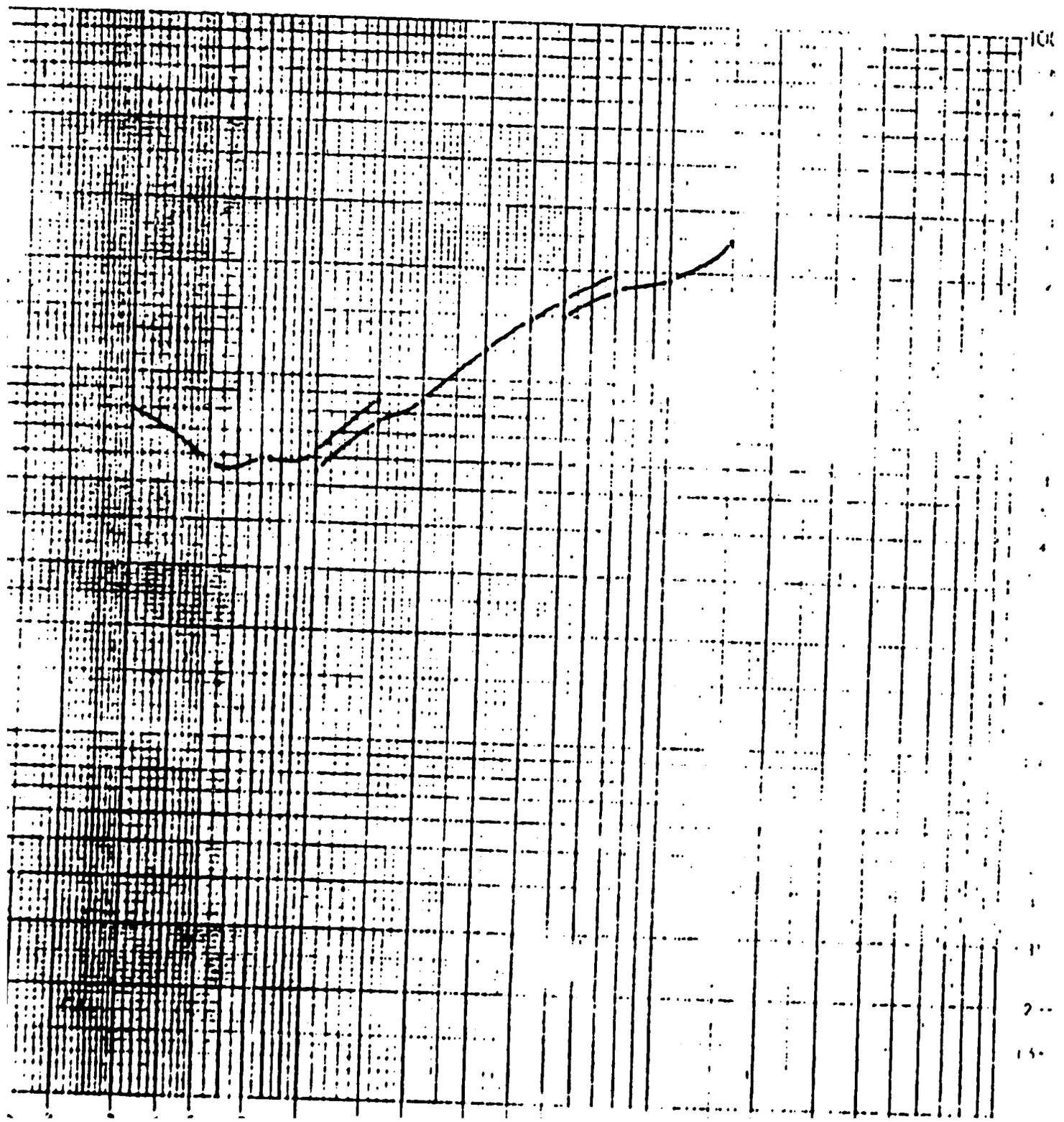
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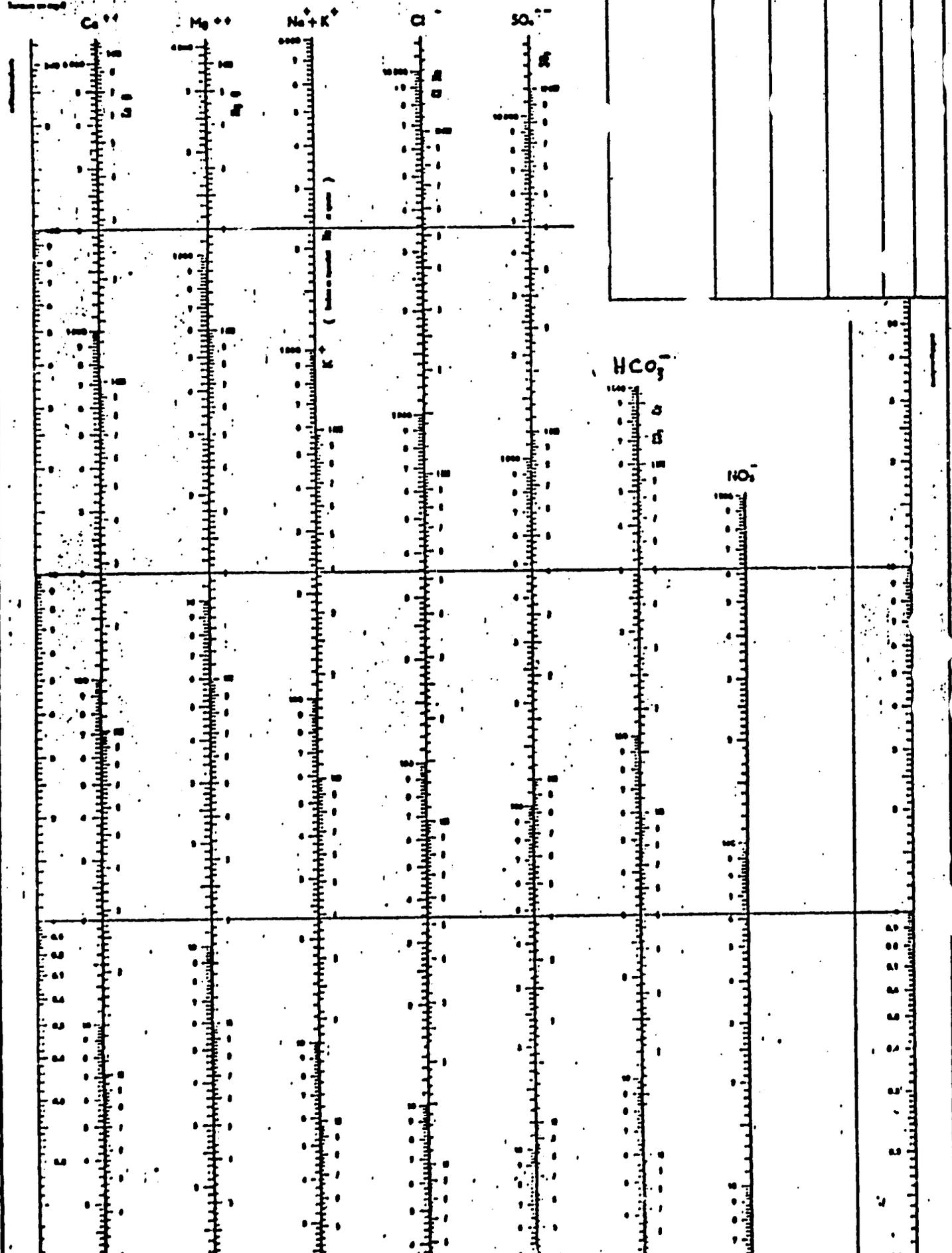
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DIAGRAMME  
D'ANALYSE D'EAU

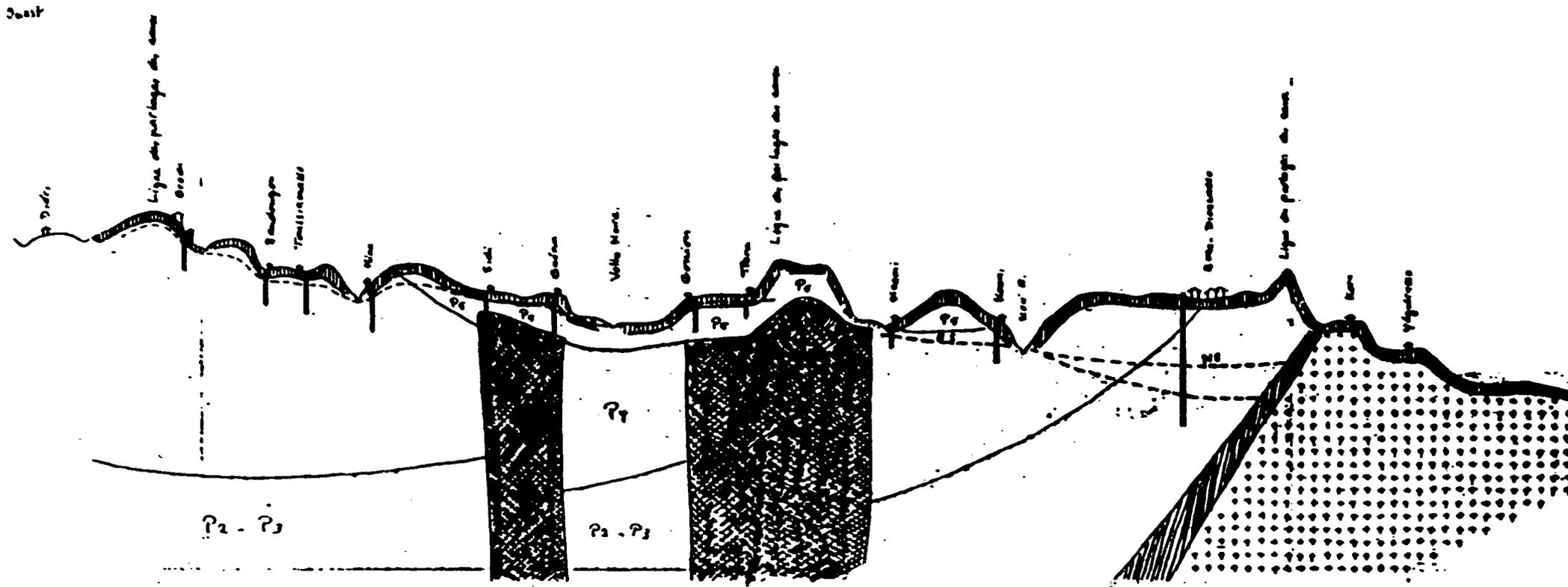
1ère R. SÉRIE  
2ème R. SÉRIE

LEGENDE

Figure	no	Alt. (m) en 19	P altitude (m)	no	no



# COUPE HYDROGÉOLOGIQUE LE LONG DE LA ROUTE BOBO DIULASSO-BAMAKO



## LEGEND

- |   |  |  |   |
|---|--|--|---|
|  Dolérite  |  P <sub>1</sub> Grès de Sakhé | <b>ROCHES MÉTAMORPHIQUES</b>   |  Niveau Statique de la Nappe |
| <b>ROCHES SÉDIMENTAIRES</b>   |  P <sub>2</sub> Grès de Base  |  Schiste Argileux |  Forage                      |
|  Dolomique   | <b>ROCHES INTENSIVES</b>   | <b>ROCHES CRISTALLINES</b>   |   |
|  P <sub>2</sub> -P <sub>3</sub> Grès Schiste-Graie-Dolomique |  Dolérite                     |  Granite          |   |

## ECHELLE

Horizontale: 1 : 200,000  
 Verticale: 1 : 4000

Établi par: H. YONCOP

## ANNEX B: OUTLINE FOR COST DETAIL JOURNAL

The detail journal divides all project expenditures amongst ten office and field teams. Elements in this process include:

Bons de sortie: equipment issued from warehouse stocks, including vehicle parts, tools, field materials, oil, cement, pvc, etc. Where initial purchases were made in dollars, costs are converted to CFA at LIFO (replacement) rates.

Bons de commande: materials purchased locally and delivered directly to field technicians, by-passing the project warehouses. Includes gravel, some field supplies, some oil stocks. Where materials are purchased with a bon de commande and placed in the warehouse stocks they are not considered to have been consumed until a bon de sortie is issued.

Checks and petty cash: salaries, rents, social security payments, minor cash purchases.

Gasoline: detail journal entries are based on the carbon copies of brigade chiefs' and technical director's gas coupons X and average pump price.

The detail journal is updated monthly, and is presently the only means of assessing actual costs per field team.

The sub-divisions comprise:

- 1) Office expenses
- 2) Garage and warehouse expenses (including H.E.R. equipment support)
- 3) Wells brigade, Hauts Bassins
- 4) Wells brigade, Bougouriba
- 5) TH60/development teams
- 6) Foraco rig
- 7) Maconery team #1
- 8) Maconery team #2
- 9) Pump installation team #1
- 10) Pump installation team #2





MANUFACTURER  
PART #

DESCRIPTION

5361610

BOITE D'EMBRAYAGE

01187

VEN #

MANUFACTURER PART #	DESCRIPTION	VEN #	QUANTITY
AR 044			20
1-10-83 BS 2281	A2789	1	19
4-10-83 BS 2282	A2770	1	18
11-1-83 BS 1899	A2784	1	17
29-1-83 BS 1261	A2987	1	16
8-2-83 BS 1267	A2782	1	15
14-2-83 BS 1272	A2788	1	14
22-2-83 BS 1279	A2986	1	13
11-3-83 BS 1280	A2770	1	12
26-4-83 BS 1951	A2770	1	11

WAREHOUSE PART #

AR = AVIS DE RECEPTION

BS = BON DE SORTIE (BON DE COMMANDE INTERIEURE)

SAMPLE INVENTORY CARD

Best Available Document

MINISTRY OF PUBLIC HEALTH

PROJECT: US-AID No. 686 0228

REPORT ON ACTIVITIES

OCTOBER 1982 - JUNE 1983

Reminder of Activities Planned for the Period in Question

- 1) Endeavor to sensitize villages that have not yet firmed up their adherence to the activities of the Project.
- 2) Training of Nurses of the two Departments in health animation by CESAO (West African Center for Economic and Social Studies) in order that they may gain fore-knowledge of Primary Health Care, to better collaborate in the training and supervision of Village Health Workers.
- 3) Integrate the first promotion of Health Extension Agents into the project activities.
- 4) Recruit and train the Village Health Workers in the new sectors of the project area.
- 5) Prepare a Village Health Worker Training Guide in collaboration with a team from the Ministry of Public Health.
- 6) Organize together with Medical Care Development, a seminar on the quality control of wells.
- 7) Bacteriological analysis of the water supplied by the Project.

I - CSPS (Health and Social Development Center) ACTIVITIES

In accordance with the program submitted to the Coordination meeting in the month of October, the Health Section undertook the sensitization of villages with a view to the recruitment and training of Village Health Workers.

It also undertook in the same villages the construction of demonstration latrines, prompted the election of Health Committees, and held educational talk sessions.

The trained Village Health Workers received, by village, a stock of medications in order to carry out elementary cure care while at the same time dispensing health education in their area.

The following tables summarize these different CSPP activities in the two departments.

A) DEPARTMENT OF HAUTS-BASSINS

CENTER OF	Number of Village Health Workers	Number of Villages	Latrines	Health Committee	Slabs	Stocks	Educational Talk Sessions
F O H	14	8	6	4	6	8	18
N'DOROLA CENTER	9	9	1	3	8	9	18
KOUROUMA	7	4	8	-	-	4	9
SILORLA	18	8	1	8	-	8	19
KAYAN	17	9	7	9	1	9	28
MOROLABA	10	5	1	-	-	5	5
SAMOROGOUAN	10	6	-	-		6	6
KOURIGNON	8	5	10	5		5	8
TOUSSIANA	4	2	3	2		2	2
PENI	11	5	5	5		5	8
SATIRI	11	9	3	2		9	9
BAMA	13	11	2	3		3	6
LENA			4				
KARANGASSO-VIGUE	4	4	1			4	7
SUBTOTAL	136	85	50	39	15	66	143

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B) SOUTHWEST DEPARTMENT

CENTER OF	Number of Village Health workers	Number of Villages	Latrines	Health Committee	Slabs	Stocks	Educational Talk Sessions
DISSIN	18	18	12	18	-	1	25
ZAMBO	12	10	3	10	-	4	20
RAPLA	3	3	-	3	-		6
TIANKOURA	3	4	-	4	-	2	9
IOLONIOLO	5	5	5	5	-	5	15
DOLO	4	4	4	4	-	4	16
BODIGUI	8	6	-	6	-	6	18
BAMAKO	5	5	5	5	-	5	20
GACUA	6	6	-	6	3	6	12
BROUM-BROUM	4	3	-	3	3	4	15
DIPEO	6	4	12	5	-	6	12
LOROPENI	8	7	-	8	4	8	8
KAMPTI	6	6	12	6	-	6	12
BATIE	10	8	-	8	4	8	10
LEGMOIN	4	4	-	4	-	4	12
NAKO	3	3	-	3	2	3	9
TOTAL	106	96	53	102	16	72	209

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II - TRAINING

1) Seminar on Water Quality Control

From December 6 to 9, 1982, a seminar was held on water quality control for the benefit of Project Sanitarians, organized and staffed by Medical Care Development personnel.

2) Seminars on Primary Health Care

Different seminars were organized by the project's technical personnel in certain CPCS for the benefit of nurses of both departments, the subject revolving around primary health care and stressing sanitary factors in particular.

DEPARTMENT OF HAUTS BASSINS

<u>Dates</u>	<u>Location of the Seminar</u>	<u>Centers that sent a nurse</u>
December 17 to 22, 1982	TOUSSIANA	Bama Foh Péni Kourignon Toussiana
January 17 to 23, 1983	N'DOROLA	Kourouma Silorla Kayan N'Dorola Bangasso Samorogouan Sindou

SOUTHWEST DEPARTMENT

<u>Dates</u>	<u>Location of the Seminar</u>	<u>Centers that sent a nurse</u>
February 8 to 15, 1983	DIEBOUGOU	Dissin Zambo Ioloniolo Bamako Dolo Bondigui Bapla Tiankoura Diébougou
January 1983	GAOUA	Gaoua Nako Broum-Broum Loropéni Kampti Batié Legmoin Dipéo

- 3) We also requested CESAO for a special session for the benefit of nurses in the project area, on the subject: Animation and Pedagogy for the implementation of Primary Health Care at the village level.

Twenty-three (23) nurses attended this seminar.

Hauts Bassins

Oroada 3  
Houndé 3  
Satiri 1  
N'Dorola 4

Southwest

Diébougou 5  
Dano 2  
Batié 2  
Nako 1  
Loropéni 1  
Gaoua 1

- 4) The project's technical personnel prepared a guide addressed to training personnel. This work was submitted to a special commission of the Ministry of Public Health in order to obtain their criticism and suggestions.

### III BACTERIOLOGICAL ANALYSIS OF THE WATER

This activity was not developed due to lack of materials.

Nonetheless, the Sara-Kongo drilling water was analysed chemically and bacteriologically.

The latter tests showed that that water is contaminated with bacteria. We are continuing with the analyses in order to draw a conclusion and to adopt the appropriate behavior regarding this drilling.

### IV - The first promotion of Health Extension Agents was assigned to the Project area

The following Centers received a Health Extension Agent:

#### Hauts-Bassins

##### Sub-Prefecture of Houndé

1. Béréba

##### Sub-Prefecture of Bobo-Dioulasso

2. Satiri
3. Bama
4. Léna

##### Sub-Prefecture of Toussiana

5. Kourignon
6. Péni

##### Sub-Prefecture of N'Dorola

7. N'Dorola

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8. Kourouma

9. Silorla

Sub-Prefecture of Orodara

10. Orodara

Sub-Prefecture of Fôh

11. Fôh

Southwest

Sub-Prefecture of Dano

1. Founzan

2. Guéguéré

3. Oronkua

4. Babora

5. Dano

Sub-Prefecture of Gaoua

6. Gaoua

7. Kampti

8. Legmoin

9. Nako

Sub-Prefecture of Dissin

10 and 11. Dissin (2 Health Extension Agents)

TO: Pierre Leger  
Director, International Office  
Medical Care Development  
FROM: Suzanne Plopper  
Senior Health Specialist, January 1981 - May 1983  
USAID/GOUV Rural Water Supply Project  
SUBJECT: End of Service Report

The following report is a summary of my experience with the health component of the USAID/GOUV Rural Water Supply Project; of progress achieved in the various activities; of problems encountered and proposed solutions or changes as appropriate; and conclusions. (All comments concerning village-level activities are based on Project experience in the Department Sud Ouest, the region for which I was responsible.)

The overall goal of the USAID/GOUV Rural Water Supply Project is to improve the quality of life of 40% of the rural population of the Project zone (the Sud Ouest and Hauts Bassins Departments) by providing this population with 1) a potable water supply which meets their minimal daily requirements (10 liters per day per capita), and 2) an effective health education program to maximize the potential health benefits inherent in an improved water system (USAID Project Paper, June '79).

The following health component activities were set forth in the Project Agreement:

- 1) the recruitment, training and supervision of village health workers (VHWs) in each of the 550 Project villages (villages programmed to receive a Project well). These VHWs are to be trained in basic curative treatment skills and in disease prevention (including environmental hygiene, early childhood nutrition and health education);
- 2) the recruitment, training and support of 110 itinerant health workers (IHWs), to become the first-line trainers and supervisors of VHWs;
- 3) the periodic testing and treatment of Project wells;
- 4) the construction of a demonstration latrine in each Project village; and
- 5) project support of the National Center for Health Education and, in turn, its support of Project health education activities (by the projection of films and production of visual aides as appropriate to Project activities).

The health component has the following staff: a Voltaique technical director; two American health educators; four Voltaique sanitarians (two during the first year of Project activity and two additional near the beginning of the second year); five Peace Corps volunteers (of the original four who joined the Project in 1981, two were medically terminated after one year of service and the remaining two completed service in April 1983 and were replaced by the fifth); and support staff. The health component has contracted with the Nursing School (Ecole des Infirmiers Brevetés) in Bobo Dioulasso and CESAO (Centre d'Etudes Sociales d'Afrique Occidentale) also in Bobo, for the training of itinerant health workers and with CESAO for in-service training for nurses. The Project has collaborated with regional and local health personnel and other organizations in the recruitment, training and supervision of VHVs. Visual aides for VHV training and village animation have been purchased from GRAPP (Groupe de Recherche et d'Appui pour l'Autopromotion Paysanne), based in Bobo Dioulasso.

## PROJECT PROGRESS

### Village-level activities

Health component activity in the Department Sud-Ouest began early 1981 with VHV recruitment in the Sous Prefecture of Dano. Approximately 35 VHVs were recruited as a result of a meeting with village chiefs in March. They received four weeks of curative treatment training in the dispensary nearest their village during the month of July. This training focused on the symptomatic treatment of common illnesses in the region and on the simple treatment of wounds. During this four-week period, Project staff did a community study in each village with a VHV. (These studies were, in fact, hastily done and are not of much value.) Additional VHVs were recruited and trained in curative treatment until, by May '82, 57 VHVs had been recruited and trained.

In principle, each village with a VHV also formed a village health committee whose role it is to:

- establish with the VHV and the villagers where the VHV will treat people and his hours of service;
  - make people aware of the role of the VHV and, due to the fact that, he is a volunteer, the importance of village support to his ability and motivation to serve in this role;
  - manage the finances of the village pharmacy;
  - intervene when the VHV submits to them particular problems; and
  - assist the VHV in the promotion of appropriate disease prevention activities in the village.
- 6

During the months of February, March and April '82, approximately 52 of the above 57 VHVs participated in three-four weeks of training in disease prevention. This training was conducted by Project staff. During each of these three months, the sanitarian and a PCV worked with a group of 8-10 VHVs in one of their villages while the other PCV and I worked with another group of VHVs in another of their villages. Training focused on 1) the causes and prevention of common diseases in the region, 2) how to do causeries and otherwise promote sanitary measures and early childhood nutrition in the village, and 3) practical tasks (eg the construction of demonstration latrines and waste water soak holes, well improvement and bouille demonstrations). The achievement of these practical tasks was dependant upon the presence of favorable locales, especially in the case of well improvement and waste water disposal. The training was designed such that each VHV was given time and equipment to build a demonstration latrine with concrete slab and foundation during the training period. Most did build the slab and foundation but not all have completed the latrine. Demonstration latrines with the slab made of local materials (wood and mud) were also emphasized. A few of these have been built as well.

For the past one and one-half years, VHVs in the S/P of Dano have been supervised by the Project sanitarian, two PCV's and one dispensary nurse. This supervision has been, for the most part, irregular due to the lack of personnel. In addition, monthly supervisory meetings have been conducted at the level of each of the six dispensaries by the regional medical officer (of Dano), PCVs and/or sanitarian. Beginning in May-June '83, an itinerant health worker (IHV) is to be placed at each of five dispensaries and a PCV at the sixth. (The remaining six IHVs to be assigned to the Sud Ouest will be assigned to other regions where there are likewise a number of VHVs already.)

Health component activity in other sous prefectures in the Sud Ouest began in the Fall of '82. Of the eight remaining sous prefectures, VHVs have been recruited and trained earlier in six by other individuals and organizations (including individual nurses, regional medical officers, the Catholic Mission and the German aide organization). The Project collaborates closely with local health personnel and other organizations in all aspects of VHV/primary health care related activity.

With the expansion of Project activity from one sous prefecture to nine, it has become necessary for dispensary nurses to conduct essentially all VHV training (with back-up and support of Project personnel). Most nurses who are expected to train and/or supervise

VHVs in the near future have been given a week of in-service training in sanitation by Project personnel and two weeks training in animation at CESA0. Each has been given a copy of a training guide drafted by Project personnel for the training of VHVs in disease prevention. (This guide has also been forwarded to the MOH for review.)

To date, the total number of VHVs recruited and trained in the Sud Ouest is as follows (by sous prefecture and dispensary-training center).

<u>Sous Prefecture</u>	<u>Dispensary/training center</u>	<u>villages</u>	<u>VHVs</u>	
Dano	Babora	9	9	
	Dano	12	12	
	Fouñzan	9	10	
	Guéguéré	8	9	
	Koti	8	8	
	Oronkua	7	7	
Dissin	Dissin	21	21	
	Zambo	10	11	
Diebouyou	Bamako	5	5	
	Bapla	3	3	
	Bondigui	6	8	
	Dolo	4	4	
	Iolonioro	7	10	
	Tiankoura	3	3	
Gaoua	Boroum Boroum	3	4	
	Dipeo	5	6	
	Gaoua	20	24	
Nako	Nako	7	7	
Batié	Batié	7	8	
Kampti	Kampti	11	11	
Legmoin	Legmoin	10	14	
Loropeni	Loropeni	7	8	
		<i>total:</i>	<u>182</u>	<u>202</u>

#### Itinerant health workers

The first class of 22 itinerant health workers completed their one-year training program in March '83. They are to be assigned to their postes in May and June '83. The assignments, based on locales with the largest number of VHVs, will be evenly divided between the two departments. The next class of 30 IHVs should enter training sometime this summer. By the end of the Project (July '84), there will be a maximum of 52 IHVs trained.

~~Water testing~~  
To date, only several Project wells have been tested (as part of a training program conducted for Project personnel by Pierre Leger of Medical Care Development in December '82). A lack of equipment, vehicles, organization and time continue to retard this activity.

#### Demonstration latrines

To date, demonstration latrines with concrete slabs and foundations have been completed in 1/4 to 1/3 of villages with a VHW in the Sous Prefecture of Dano. Another 1/3 to 1/2 of the VHWs in this region have built the slab and foundation but have not completed the latrine. A few demonstration latrines have been built with slabs made of local materials (wood and mud). In other sous prefectures, VHW training (of which latrine construction is a part) is in progress.

#### National Center for Health Education (CNES)

CNES and Project personnel have met several times to discuss possibilities of collaboration in health component activities. Problems encountered with the anticipated collaboration are discussed in the following section of this report.

#### PROBLEMS

The following comments pertain to problems experienced and/or changes proposed in the execution of health component activities.

##### Village health worker activity

It was originally planned that the health component would recruit and train a VHW in each of 550 Project villages (villages designated by the wells component to receive a Project well) and that all village-level health component activity would take place in these villages. This plan has had to be modified for three reasons.

First, the goal of recruiting and training 550 VHWs during the life of the Project is unattainable given 1) the 18 month delay between the signing of the Project Agreement and the beginning of Project activity, 2) the amount of time and resources required for the recruitment, training and supervision of VHWs, and 3) the limited number of staff (Project and MOH) available to carry out this task. To date, there are approximately 400 VHWs in both departments (recruited by this Project and others). While the number is perhaps impressive, inadequate attention has been given to the quality of the recruitment, training and supervision of these VHWs.

The recruitment of VHWs (and the introduction of the idea of primary health care to villagers) has generally been done with a single or at most two, village contacts, via sous prefecture or canton level

meetings with village chiefs or individual village meetings. Villages have generally responded positively to having someone trained to provide them curative treatment in the village. However, the importance of choosing an effective VHW, the importance of village support of the VHW and the role of the village health committee have not always been well understood. VHWs have been recruited who were too young, who were not respected throughout the village and who later left the village. Village support of VHWs has been minimal. Many village health committees which have been formed (ie members named) have been inactive. These problems are, at least in part, a result of the pace of Project activity (both initial village contact and later VHW supervision).

Likewise, it has been difficult to ensure quality training of large numbers of VHWs at a time, that is to provide the necessary training materials and support to nurses.

The supervision of VHWs recruited and trained thus far has been for the most part inadequate, at least with regard to their role in disease prevention. All VHW supervision to date has depended upon dispensary nurses (whose primary responsibility is to provide dispensary services) and Project personnel. (Even with the recent graduation of the first class of IHNs, many VHWs recruited and trained during the '82-83 campaign in the Sud Ouest will depend upon dispensary nurses for their supervision for at least a year.) In many cases, there has been virtually no supervision or very minimal supervision focused on the curative treatment aspect of the VHW's job.

As VHWs receive only minimal training in disease transmission and prevention, they cannot be expected to have much impact in their villages, at least initially, without active and effective support of health personnel. And as disease prevention is the long range goal of primary health care, adequate supervision and support of VHWs is imperative. It is therefore proposed that there be no new recruitment and training of VHWs during the '83-84 campaign, and that maximum effort be put into the establishment of a stable and effective system of supervision of existing VHWs.

A second issue concerning VHW activity is the choice of villages and the anticipated liaison the health component was to have had with the wells component of the Project. During the first year of Project activity, the choice of villages for the recruitment and training of VHWs was based on the wells component list of Project villages. Of 50 villages from this list from which a VHW was recruited and trained (in the S/P of Dano), 23 villages have never received a Project well. As a result, the possibility of the health component complimenting

the well component by establishing "an effective preventive health education program to maximize the potential health benefits inherent in an improved water system" (Project Agreement, p. 1) was nullified in nearly half of these villages. The potential of this original focus of the health component is also effectively nullified in most villages with a Project well by the fact that the one Project well seldom meets the needs of most villagers, either because of 1) the size of the village, 2) the distance between quarters, or 3) the fact that with a pump, only one person can be served at a time. In most of these villages, therefore, many people must continue to use other sources of water: generally polluted traditional wells and ponds.

Thirdly, since primary health care is a major focus of the GOV's National Health Plan, the recruitment and training of VHVs has been and continues to be initiated by other individuals and organizations throughout the Project zone, using other criteria in the choice of villages. All of these efforts 1) contribute to the same goal of improved health status of rural villagers, and 2) require the same inputs of nursing/IHM personnel and financial and logistical support. Thus, while the health component continues to emphasize villages with Project wells in the recruitment of VHVs, we have taken the position of supporting all VHV activity in the Project zone in collaboration with all other participating individuals and organizations. In the Sud Ouest Department, as of the '82-83 campaign, the Project provides 1) the initial VHV pharmacy to all new VHVs, and 2) support for the disease prevention aspect of training for all VHVs (including the provision of materials for the construction of a demonstration latrine per village). The German aide organization is providing 1) a sizeable initial stock of pharmaceuticals plus logistical support for the renewal of all VHV pharmacy supplies (VHVs pay for all pharmacy supplies beyond the initial pharmacy), and 2) logistical support for the coordination of primary health care activities in the Department. The MOH has placed a nurse in the Health Department Office to coordinate all primary health care activities in the Department. The placement of IHVs in the Department will be based on the concentration of VHVs throughout the Department (irrespective of any designation of "Project village").

#### Demonstration latrines

Another component of the primary health care program which was perhaps malconceived is the requirement of building demonstration latrines with concrete slabs and foundations (as suggested in the

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Project agreement by the fact that "materials are to be provided by the Project"). In much of the Project zone, there have not previously been any latrines in any villages in which the health component is working. Furthermore, the necessary cement and iron for the demonstration latrine 1) is a luxury by the standards of most villagers, and 2) is not easily available outside of major towns. Thus, while the Project can achieve (at least to some degree) the construction of such latrines by making this part of VHW training or a condition for receiving the VHW pharmacy, it is doubtful that such luxury latrines will serve as a useful model to other villagers in the near future. For this reason, Project staff have insisted, at least in some regions, that a second demonstration latrine be built in each village - with the slab and foundation made of local materials (mud and wood).

### Transportation

The health component has experienced a number of transportation problems. Project sanitarians were initially provided Honda 125 XL motorbikes which are inappropriate due to the nature of the sanitarian's job. Each of the four sanitarians is responsible for health component activities (including the transport of village pharmacies, cement and water testing equipment) in approximately one-half of a department. Jeep vehicles have been ordered and made available to two sanitarians (in September '82 and January '83); the final two vehicles are not expected to arrive before Fall '83.

Jeep vehicles have also been problematic, given the road conditions in Upper Volta and the lack of spare parts. Among the five vehicles of the health component alone:

- one Cherokee was put on blocks for six months during the first year of Project activity and its tires used as spares for other vehicles as there were no spare tires. (This vehicle was then taken by the USAID Project Manager and given to another project; it was replaced by a pick-up whose condition is such that it must go to the garage for repair following virtually every trip en brousse)
- one Cherokee has been on blocks for 13 weeks to date, due to a lack of spare parts for the rear axle which broke for no apparent reason. Other parts have since been removed to use on other vehicles.
- a third Cherokee has had a number of breakdowns.
- the CJ 8 which was put into service in January of this year has a broken rear axle.

Such breakdowns, combined with a lack of spare parts, seriously retards project activity.

As noted earlier, the analysis of water quality of Project wells called for in the Project Agreement has not occurred as planned. This is due to a combination of factors including lack of necessary equipment, vehicles, time and organization and skill. While these constraints have prevented progress in this activity to date, it has at the same time become apparent that there are more crucial water quality problems and therefore more important measures to undertake in terms of village water supply/quality than the routine testing of Project wells.

With few exceptions, properly covered Project wells give clear water, in contrast to most unprotected traditional wells. However, even in villages where they exist, Project wells often do not meet the needs of more than 50% of the population either because of 1) the size of the Village, 2) the distance between quarters, or 3) the fact that with a pump, only one person can be served at a time. There have been many pump breakdowns and some villages have waited ~~1-2 weeks~~ <sup>3-4 months</sup> for a Project repair team. (The Project has the only spare parts for the Moyno pump in Upper Volta; and the pump is said to be too complex for villagers to be trained in its repair.) Therefore, large numbers of people are forced to continue to use other sources of water, generally ponds and unprotected and polluted traditional wells.

Given these constraints, appropriate measures to take include:

- 1) ensuring maximum protection of functional traditional wells;
- 2) ensuring proper drainage around Project wells (most of which have serious waste water problems); and 3) leaving wide-diameter wells open with a cover which would allow several people to draw water at a time. While any obvious contamination of Project wells must be addressed, it is rather illogical to expend limited resources on the routine testing of Project wells producing clear water while 1) a large number of people in the same village must continue to rely on polluted sources, sources which can be improved, and 2) obvious waste water problems continue to worsen around Project wells.

National Center for Health Education (CNES)

Project support for the National Center for Health Education, with the anticipation that this center would provide the Project with useful services, has not occurred as planned for several reasons. First, the idea of using the cinebus (a Jeep Cherokee) in Project villages is not appropriate technology given that 1) this vehicle is plagued by repair problems like the other Project Jeeps, 2) this activity would likewise encounter maintenance problems of film

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few films available in Upper Volta which are relevant to the health and environmental conditions and resources of Upper Volta. This cinema has been perhaps more effectively used for in-service training of health personnel.

The idea of CUIS producing visual aides such as posters, flip-charts and flannelographs is a valid one. Some posters have been made. However, Project staff have not had sufficient time to collaborate with CUIS staff regarding the development of other visual aids. The project has been able to purchase a flannelograph series on environmental hygiene from GRAF in Cote d'Ivoire.

### CONCLUSION:

A major problem with the health component of the USAID/UNEP Rural Water Supply Project is the lack of a realistic and detailed project plan. Very broad goals and activities were laid out in the project agreement with little thought given to their appropriateness or to the feasibility of achieving them. There has been a great reluctance to question these goals and activities in light of realities faced on the terrain and constraints within the project. People count the numbers of VHTs recruited and trained, and latrines built, but little attention is paid, for example, to 1) the appropriateness of the model of demonstration latrine, 2) the quality of initial input or following support of VHTs, 3) the real water problems faced in Project villages, 4) the complexities of working in a zone with an already existing primary health care program, 5) constant transportation problems, or 6) the problem of collaboration between the two components of the Project -- which is not simply a problem of planning and working together but also one of goals and activities which may go together in theory but which may be difficult to execute in reality due to different resources and ~~other~~ constraints.

Unless some of these issues are addressed, the Project will terminate with certain numbers of outcomes to report but with questionable long term value to be gained from them.

cc. USAID Mission - Ouagadougou  
Project/health component staff (french copy)

**Best Available Document**

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