WATER AND SANITATION
FOR HEALTH PROJECT

COORDINATION AND
INFORMATION CENTER

Operated by CDM FIVE
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for International Development

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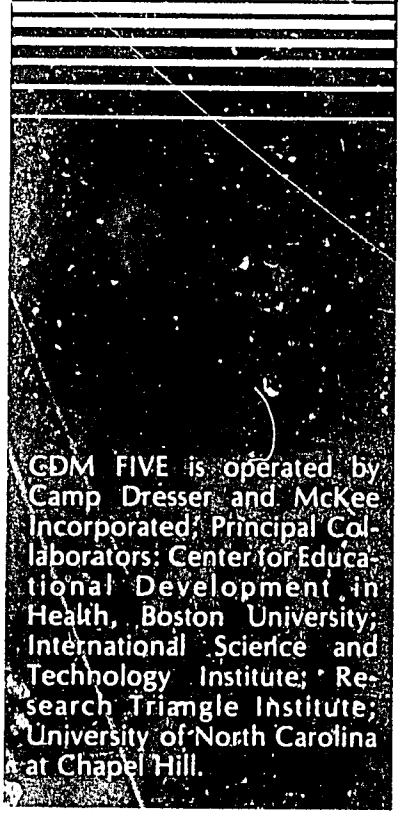

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# PARÁ VILLAGE WATER SUPPLY:

# PRE-FEASIBILITY REPORT

## WASH FIELD REPORT NO. 40

**APRIL 1982**

Prepared For:
Social Development Attache, U.S. Embassy, Brazil
Order of Technical Direction No. 66

WATER AND SANITATION
FOR HEALTH PROJECT

WASH

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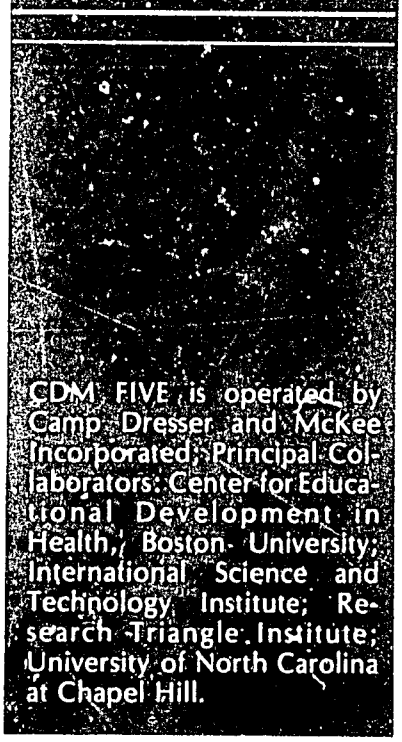



12 April 1982

Mr. Samuel Taylor
Social Development Attache
U.S. Embassy Brasilia
APO Miami 34030

Dear Mr. Taylor:

On behalf of the WASH Project I am pleased to provide you with two copies of the Para Village Water Supply Pre-Feasibility Report. This is the final report by Dr. William M. Turner and is based on his trip to Brazil from Feburary 4 to 9, 1982.

This assistance is the result of your request on behalf of Fundacao Esperanca on November 6, 1981 in Cable Brasilia 09222. The work was undertaken by the WASH Project on November 10, 1981 by means of Order of Technical Direction No. 66, authorized by the USAID Office of Health in Washington.

We are also sending copies of the report to Fundacao Esperanca in Santarem and Esperanca Inc. in Phoenix, Arizona.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner

Dennis B. Warner, Ph.D., P.E.
WASH Project Director

DBW:PFH:mcl

cc: Mr. Victor W.R. Wehman, Jr.
S&T/HEA

WASH FIELD REPORT NO. 40

BRAZIL

# PARÁ VILLAGE WATER SUPPLY
# PRE-FEASIBILITY REPORT

Prepared for Social Development Attache, U.S. Embassy, Brazil, under Order of Technical Direction No. 66

Prepared by:

Dr. William M. Turner

April 1982

Water and Sanitation for Health Project
Contract No. AID/DSPE-C-0080, Project No. 931-1176
is sponsored by the Office of Health, Bureau for Science and Technology
U.S. Agency for International Development
Washington, DC 20523

TABLE OF CONTENTS

## ACKNOWLEDGMENTS

Fundaçao Esperança is a medical and public health project which has been serving the population around Santarem in the State of Pará, Brazil, for twelve years. One of the most common medical problems confronting Esperança is the continual reinfection of children with enteric diseases. In order to address the suspected principal cause of this problem, Esperança decided to develop a water supply project for the villages of its service area. Through the U.S. Agency for International Development (USAID), Esperança requested assistance from the Water and Sanitation for Health (WASH) Project. In February 1982, WASH consultant Dr. William M. Turner, President, American Groundwater Consultants, Inc., spent a week in Brazil with Esperança staff and prepared the following report for Esperança use in seeking funds for the water supply project.

The WASH project is operated by the CDM FIVE under contract to USAID. CDM FIVE is operated by Camp Dresser and McKee Incorporated. The principal collaborators are the Center for Educational Development in Health, Boston University (CEDH), International Science and Technology Institute (ISTI), Research Triangle Institute (RTI), and University of North Carolina at Chapel Hill (UNC). The Coordination and Information Center of the WASH Project is located at 1611 North Kent Street, Room 1002, Arlington, Virginia 22209 USA. Telephone: (703) 243-8200; Telex No. WUI 64552; Cable Address WASHAID. The contact person at the WASH Project concerning this report is Mr. Paul F. Howard, P.E., Project Officer.

The headquarters of Fundaçao Esperança is at Caixa Postal 222, 68.100 Santarem, Pará, Brazil. Telephone 522-1079. The contact person is Mr. Steven Alexander.

Esperança, Inc. is a major funding and support organization for the Brazil project and is located at 5901 West Indian School Road, Suite 1, Phoenix, Arizona 85033 USA. Telephone (602) 247-5635. The contact person is Mr. Charles Post.

# PART I

## PROJECT SUMMARY

1. TITLE: Pará Village Water Supply Project

2. SCOPE:

   a) Implementation of well drillers training program based upon existing capabilities in the area.

   b) Expansion of existing handpump manufacturing facility.

   c) Implementation of village well drilling projects by trainees.

   d) Training of village water supply and health promoters building upon existing infrastructure.

   e) Development of local capabilities in the construction of sanitary waste disposal facilities for villages utilizing existing infrastructure.

3. BACKGROUND: Within the State of Pará in Brazil's Amazon region are innumerable small settlements of individuals who have migrated into the area encouraged by the Government of Brazil's (GOB) plan to develop the Amazon Basin. The settlement process has been rapid and unplanned, and people presently lack adequate sanitary water supply and waste disposal facilities. In the outskirts of Santarem, one of the largest cities of the central Amazon, squatters inhabit the city periphery and have no municipal water or sewerage facilities.

4. RESPONSIBLE GOVERNMENT AGENCY: Responsible Government agencies are the Amazon Development Agency (SUDAM) and the Special Public Health Service (SESP).

5. INSTITUTIONAL SUPPORT: Although government agencies with responsibility for meeting water supply and sanitation needs of the area exist, they seem not to take an active role in the rural areas. Indeed there are reported cases of individuals within Santarem who have sought sanitary waste disposal facilities, which a local agency was known to have provided some citizens, but without success.

Local PVO organizations in the area seem most responsive to the needs of squatters and rural villagers in providing health care and sanitary water supply. It is likely that the PVO operating as an executing agency for the responsible GOB agencies would be most effective.

6. DURATION:

Training and pump and sanitary waste disposal component manufacture.....12 months

Well and sanitary facility construction.....On-going

7. STARTING DATE: June 1982

8. SUMMARY OF ESTIMATED PROJECT COST:

Loan Funds

| | |
|---|---|
| Proposed Project | $ 3,000,000* |
| Working Capital | $ 1,000,000 |
| Total | $ 4,000,000 |

This is to be obtained from external sources.

9. FINANCIAL STRATEGY: It is proposed that loan funds be advanced to a GOB agency with the provision that Fundaçao Esperança be made the executing agency in the area to be served. Evidence indicates that the people served will gladly pay for wells and sanitary waste disposal facilities if only they are made available. The costs of these facilities are within their means to pay, including the payment of moderate interest. No replacements of handpumps have been necessary yet. However, this item is relatively inexpensive, and the pump can be repaired by local individuals so that O & M costs are negligible.

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* Included in this figure is a $140,000 grant component as follows:

| | | |
|---|---|---|
| (a) | Feasibility study | $ 10,000 |
| (b) | Training program | 10,000 |
| (c) | Upgrade pump and sanitary facility construction | 20,000 |
| (d) | Well construction | 50,000 |
| (e) | Sanitary facility construction | 50,000 |
| Total..... | | $ 140,000 |

Items (d) and (e) would be loan funds repayable to the executing agency by owners of wells and sanitary facilities.

10. SECTOR DEVELOPMENT PERFORMANCE: Institutional strengthening in the area of interest is necessary.

11. OUTPUTS OF THE PROPOSED PROJECT:

a) Feasibility study.

b) Expected investment project: US $4 million.

c) Institutional improvements.

d) Training of local entrepeneurs to serve rural water supply and waste disposal needs.

e) Implementation of well drilling and sanitary wastewater disposal facilities in rural areas.

12. GOVERNMENT PRIORITY AND COMMITMENT:

GOB support to project is assumed because of its commitment to the goals of the International Drinking Water and Sanitation Decade (IDWSD) and its support of Fundaçao Esperança.

13. EXPECTED BENEFITS:

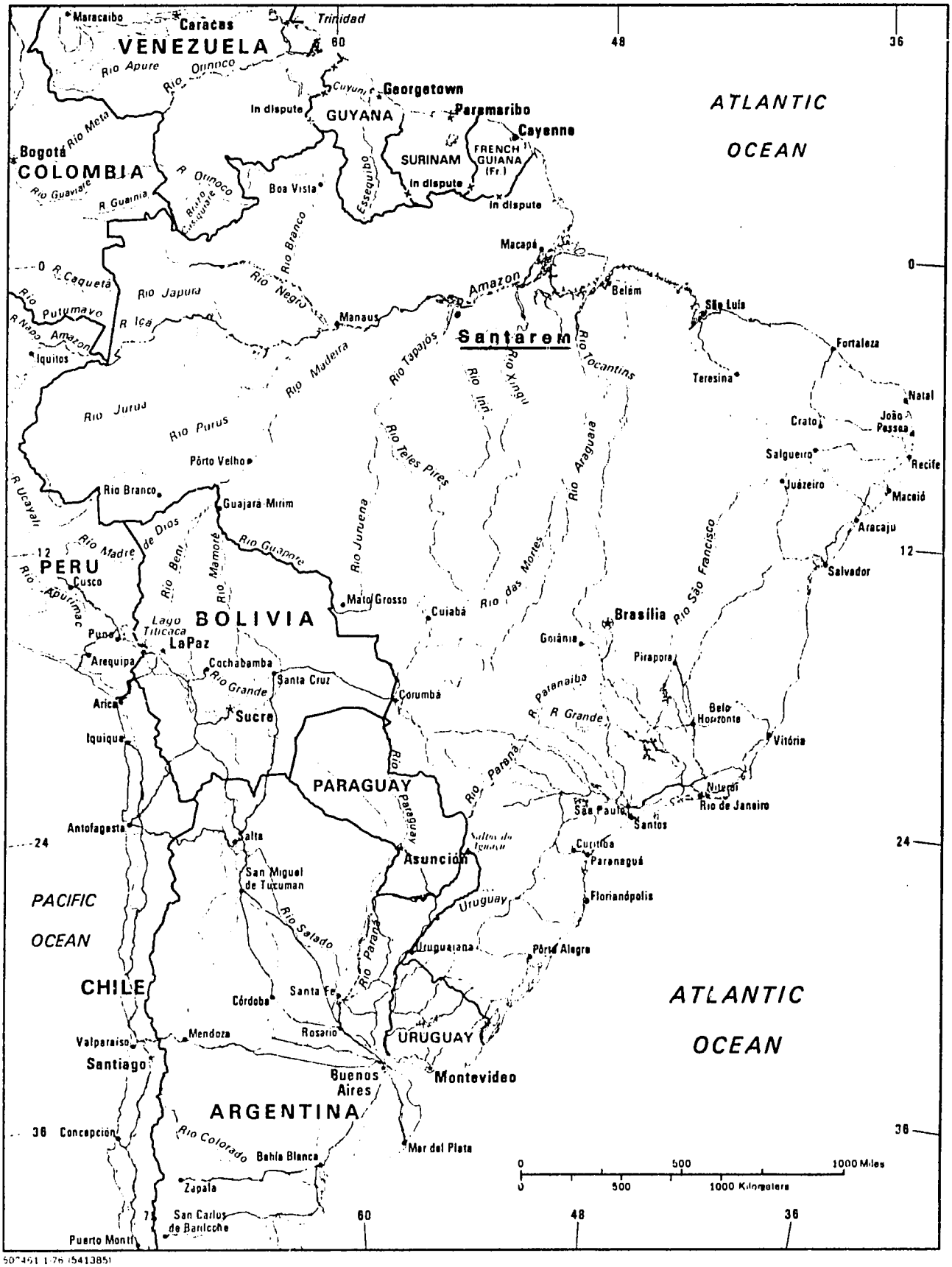
a) Improved sanitary water supply leading to reduction in enteric disease.

b) Time saved in having ready access to water will be available for increasing standard of living through other productive endeavors.

c) Individuals trained in well drilling and construction of sanitary waste disposal facilities will have improved standard of living, and their enterprises over time should produce jobs for others.

d) Improvement of social services will lighten the burden of government and serve to meet objectives of IDWSD.

# Brazil




50°461 1-76 (541385)
Azimuthal Equal Area Projection
Scale 1:2,000,000
Boundary representation is not necessarily authoritative

# PART II

# BACKGROUND

## Chapter 1

## INTRODUCTION

Many of the enteric diseases of the 350,000 people within the service area of Fundaçao Esperança in the Central Amazon basin are caused by unsanitary water. In May 1981 the Social Development Attache at the United States Embassy in Brasilia, on behalf of Fundaçao Esperança, requested assistance from the U.S. Agency for International Development (USAID) for the purpose of improving village water supplies in Esperança's service area.

The request resulted in the issuing of Order of Technical Direction No. 66 under which the Water and Sanitation for Health (WASH) Project sent a consulting hydrogeologist to Santarem in Pará for the purpose of determining the most appropriate method of developing sanitary water supplies especially in the highland villages.

### 1.1 Esperança and the Franciscans

Fundaçao Esperança* was created in 1970 by Fr. Luke Tupper of the Order of Friars Minor (OFM-Franciscan monks) to improve health conditions in the central Amazon basin. The Franciscan Order has had an established presence in this area since 1943 and has extended its work into nearly every community within an area five times the size of Illinois.

Since 1970 Esperança has provided medical and dental services through its hospital ship, which regularly plies the Amazon and its tributaries, and through more permanent land-based health care facilities in Santarem and in outlying villages

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*Esperança, Inc. is an Arizona nonprofit corporation formed in 1970 to support health care work in the Central Amazon basin of Brazil. Fundaçao Esperança is a separate, legal, non-profit Brazilian entity which obtains about 90 percent of its current funding from Esperança, Inc.

which are staffed by health aides and promoters. As of November 1979 Esperança estimates it had provided direct medical services to a total population of 25,593 people. Today Esperança services include an active program of shallow and deep well construction under the very able direction of the Reverend Mauris Hawickhorst, OFM (Fr. Mauro). The area served by Esperança is shown in Figure 1.

Over the past several years, Esperança has developed an extensive community health aide selection and training program. The program trains local individuals for six months and upon completion of the course, the health aides are licensed as rural nursing attendants (and one as a laboratory auxiliary) by the Secretariat of Health of the State of Pará.

All of the Esperança efforts in the region are coordinated from Santarem where Esperança maintains a preventive health maintenance clinic complete with laboratory and surgical facilities. The operation is well organized under a capable and dedicated staff of well-trained professional and technical personnel most of whom are Brazilian. The organization is no longer officially affiliated with the Franciscan Order, although both organizations cooperate extensively and share the same goal of bettering the lives of those they serve.

Esperança has the support of the municipality, which pays the staff of local technicians, and, with this support, it is very effective in its work. Its expatriate personnel, all of whom have spent many years in Brazil, are fluent in Portuguese and sensitive to the customs and needs of the local people. This sensitivity brings with it the recognition that any changes in the living standard of the people may have far-reaching consequences.

## 1.2 The Process of Change

Bringing about change is not a simple process of sending technical experts to the area, of conducting surveys and studies, or of bringing workers, engineers, and others to the United States to be trained and to acquire North American skills and values. The staff of Esperança recognizes that its work will result in the modification of culture and the patterns of life and cause a readjustment of a people's relationship to its total environment.

A new idea will be accepted only when it is perceived in the preexisting culture to be a useful one. A program to introduce modern water supply must not only make available more efficient and better methods of supply, but the means of supply must also be acceptable.

Innovations are not necessarily transmitted of a piece. Once they are accepted by a people and they become part of its culture they might be modified by that culture. The new element might acquire a new form and perhaps a meaning different from the form and meaning in the culture of origin. Any program which would introduce modern technology and industry among a more traditional people must be directed by an awareness of the far-reaching social and cultural changes implied. It is fortunate, therefore, that within the central Amazon basin there are individuals with the sensitivity and understanding to bring about social and cultural changes in a gradual manner through the introduction of vastly improved hygiene for the people of the area.

## Chapter 2

## WATER AND SANITATION CONDITIONS IN THE PROJECT AREA

Many of the villages served by Esperança are located in highland areas adjacent to the Amazon and Tapajos rivers. In these areas, the depth to ground water is commonly 70 meters. It is not possible, therefore, to construct shallow wells by augering or digging, and it is not practical to lift the water to the surface with a normal lever-type handpump. The objective of the consultant, therefore, was to devise a well-drilling method and a pumping method which would accomplish Esperança's objective and which could also be used in villages outside Esperança's area.

The various methods of well drilling in rural areas are well known, and a search of the area was made for available technology, including well drillers, pump manufacturers, distributors and machine shops. The results of this effort were rewarding. Visits were also made to many of the rural villages.

### 2.1 Sanitary Waste Disposal

If water is to be supplied by tubewells, the ground water must be protected from contamination. Visits to villages showed that privies are common and used extensively. Inspection of these facilities indicates that, although ground water contamination is, of course, possible and in fact probable, the greatest threat to human health is the lack of cleanliness of the privies themselves. Population density is low enough that wells can be constructed away from privies on ground that is higher than the ground on which privies are constructed.

At present, the government of the state of Para has a program of constructing parts of privies, for example, squatting slabs. These parts are sold primarily within Santarem. It is felt that Esperança could adapt this program to meet village needs. From meetings held with villagers at which Esperança personnel spoke with villagers about health and nutrition, it was evident that Esperança's efforts and expertise are well respected and that the village people are making concrete efforts to improve sanitary conditions within their villages. It is felt that any effort made by Esperança to improve refuse and excreta disposal facilities will be easily accepted and that the village people will be willing to pay for materials and labor to construct these facilities.

## 2.2 Drilling Conditions

The area adjacent to the Amazon and Tapajos rivers consists essentially of sand and clay deposits which contain fresh water very near the land surface. Away from the Amazon and other rivers in the Amazon basin the land rises sharply to an area called the planalto. The planalto consists of the in-place chemical weathering product of the alluvial material which fills the Amazon structural basin. The results of the chemical weathering produce a soil which consists almost uniformly of clay minerals and alumina minerals with a reddish coloring formed by residual insoluble iron minerals. This in-place weathering product or residual soil is commonly called a sapropel or saprolite. It is usually quite soft and easily dug with a shovel and any type of drilling equipment.

With increasing depth, unaltered sediments may be reached eventually. An indication that the bedrock is near will be the occurrence of small undecomposed material which resists drilling within the sapropel. The size and frequency of these remnants increases as the undecomposed bedrock is approached.

Within the sapropels a saturated zone is eventually reached where the sapropels will yield small amounts of water for wells. The amount of water produced will depend upon the character of the original sediment. If the original bedrock in the area was a sandstone, as it appears to have been in some areas, the sapropel will have a large amount of sand which will yield water easily to wells. Otherwise, wells will have low yields. For small villages with low water requirements this poses no problem.

## Chapter 3

## PROGRAM OF THE FRANCISCAN ORDER

### 3.1 Well-Drilling

About 12 years ago Fr. Mauro perceived a need for better water supplies and set about developing low-cost tubewells and pumping equipment. He educated himself in the design and construction of positive displacement pumps which could be attached to a handle at the surface by means of sucker (pump) rods and which would effectively extract five to ten liters per minute from depths of 40 meters or less. Along the way, he hired several mechanically-gifted local men. They experimented with various methods of constructing their pump from inexpensive locally-available materials.

The resulting pump is constructed from PVC pipe and fittings and from PVC fittings which they modify themselves. They have fashioned light-weight wooden sucker rods from locally available hardwood with the assistance of a local saw mill and broomstick plant. They built their surface equipment out of locally available hardwood also. Their first wells were drilled using a hand auger, and with the hand auger they were able to construct wells up to 40 meters deep. These wells were cased with PVC drain pipe which they had slotted with a hand saw. Sand was prevented from entering at the bottom of the well by placing coarse gravel on the bottom of the well inside the casing.

The initial wells were satisfactory in the lowland areas near the Amazon, and at the time of the consultant's visit these wells were quite popular, particularly in the parts of Santarem where there is no municipal water supply.

It is gratifying to see a project replicated; this is a tribute to the project's success. To increase productivity, it is desirable for local entrepeneurs to enter a business which others have pioneered. It was, therefore, with some satisfaction that, during the present survey, a local, independent well digger was discovered drilling a well. In fact, he may have been using equipment which Fr. Mauro has reported missing. The entrepreneur was augering a well to a depth of about 40 meters and when visited was in the process of installing the PVC casing.

More recently, Fr. Mauro has turned his attention to the problem of drilling wells in the higher planalto adjacent to the Amazon and Tapajos rivers where the depth to water is up to 70 meters. About two years ago, through a newspaper advertisement, Fr. Mauro learned of a Bucyrus Erie 20W-type cable tool rig which was for sale at an auction about 200 miles south of

Santarem. With funding arranged by the local diocese of the Franciscan Order, he purchased the rig for about $5,000. With this rig he is now able to drill to 70 meters easily. However, there remained the problem of lifting the water to the surface.

## 3.2 Drawing Water

This problem was solved to the apparent satisfaction of the communities which now have wells. Fr. Mauro simply constructed a 25 liter bailer with a check valve at the bottom. The bailer is carefully lowered to the bottom of the well by means of a nylon rope attached over a pully to the bailer at one end and to a crank-driven drum at the other. It commonly takes about five minutes to draw 25 liters of clean water from one of these wells.

It would be difficult to gauge the acceptance of this well-construction program if the wells were simply donated to each community, but they are not. They are sold for a rather high price. The deeper wells are now being sold for about 7,000 cruzeiros (about US$70) per meter, of which the local county government pays about one-half. Even so, a village well costs the village more than US$1,000 which is very dear by local standards. In talking with village women, it is evident that their wells are regarded with pride and are well maintained. In fact, in some instances it seems as though the women themselves elected to spend community funds for the well project.

It appears that the greatest test of acceptance of a technically-innovative project has been passed; namely, the willingness of the user to pay for it with scarce financial resources.

## 3.3 Suggested Improvements

Practically speaking, wells of this type can serve communities of only about 20 families or less, but this is an adequate solution for most communities. The limitation is imposed by the necessity of manually lowering and withdrawing the bailer. Two improvements on the method of extraction might be the use of a small diesel-powered pump with commercially-produced steel and bronze pumping cylinders and sucker rods. This method, however, would drain the financial resources of the communities. Probably the most effective method would be the use of draft animals such as donkeys and horses which are used in the area. Instead of using a cranked drum to raise the bailer, the nylon rope would simply be tied to a yoke on the animal. The animal would walk a path back and forth alternately raising and lowering the bailer as needed and more quickly than can be done by hand. In this manner, probably more than 20 families could be served by each well. This method is used in Ecuador to raise 20 liter buckets from great depths.

## 3.4 Reconciliation of Esperança and Franciscan Goals

It is evident that both Esperança and the Franciscan Order share some of the same goals, and it is clear too that the current Franciscan program can provide sanitary water supplies to the village health centers established by Esperança.

If Esperança becomes the executing agency, it would serve its objectives to support the program of Fr. Mauro and the Franciscan Order. In addition, the work of Fr. Mauro could be expanded to provide training to local individuals in the construction of sanitary waste disposal facilities. This is a reasonable approach because it recognizes the technical strength of the Franciscan program and it would be amenable to the Franciscans.

The technology already available in the region is satisfactory to serve all other community needs for the present. The challenge that remains is to spread this technology throughout the region and to create a climate of acceptance in other villages.

# Chapter 4

# RECOMMENDATIONS

It is clear that the well-drilling technology already developed is accepted by those villages which have these new wells. It is a fact that everyone in the immediate vicinity of Santarem is aware of Fr. Mauro's capabilities. The problem Fr. Mauro now faces is to increase the number of drilling crews, promote the concept in other villages, and train maintenance people. In these endeavors, it is evident that both Esperança and Fr. Mauro have parallel and complementary goals. It is suggested that this infrastructural seed be nurtured to grow into a successful rural water supply program. The steps necessary to realize such a project are set forth as tasks below for the purpose of effective project planning and implementation.

## 4.1 Task I - Organize Training Facilities

Fr. Mauro presently works out of a small workshop at the local Franciscan seminary. To train others in the construction and maintenance of the Mauro pump, it will be necessary to expand the physical plant slightly. It is felt that the Franciscan Order will donate the use of the property and any suitable building it may have. The seminary certainly has sufficient space to hold training seminars and house trainees. In addition, the Esperança Center in Santarem has classroom facilities which it uses for training its own field health workers. Approximately $50,000 would be adequate to organize this facility and to create facilities for training and construction of wastewater disposal facility components.

## 4.2 Task II - Organize Training Courses

It is envisioned that most of the course will consist of hands-on training which will last up to six months. Classroom sessions will be held on the fundamentals of geology and the occurrence of ground water. These lectures will be given on a voluntary basis by geologists employed by mining companies in the area. Fundamentals of pump construction and water-well drilling will be taught by Fr. Mauro and employees of a local mineral exploration company. Lectures in sanitary health aspects of clean drinking water supplies will be given by the staff of Esperança.

Hands-on experience in pump construction will be taught by Fr. Mauro's technical assistants who currently build all of the pumping equipment. Their instruction will cover mechanical skills including welding and woodworking. Drilling skills will be taught by Fr. Mauro and his drillers using augering and cable tool methods. Trainees will be sent out to drill

wells in nearby communities and equip them with pumps. Initial wells will be constructed with the augering technique in and around Santarem. Upon mastery of this drilling technique, trainees will work on the cable tool rig and may even be trained in cable tool methods using a tripod or springboard. As part of the course, trainees would construct their own drilling equipment to take with them upon completion of the training.

### 4.3 Task III - Training Courses on Sanitary Waste Disposal

In this task, individuals who have been trained in construction of wells will also be trained in the principles and construction of sanitary waste disposal facilities using technologies which are inexpensive, socially acceptable and appropriate to the area. In this effort, government health officials from the Servico Especial de Saude Publica (SESP) and from Esperança will be called upon to assist.

### 4.4 Task IV - Selection of Trainees

Within the region, both the Franciscan Order and Esperança have a widespread daily presence, and their personnel are familiar with all of the people they serve. It is proposed that promising and enterprising young women and men be selected for their practical intelligence and mechanical ability. Input of local leaders will also be sought in this selection process. The size of the first training class may range from five to ten individuals.

### 4.5 Task V - Promotion of Tubewells and Waste Disposal Facilities

Those communities which presently have wells drilled by Fr. Mauro are pleased with their investments and will be examples to others of the desirability of having wells. Certainly Esperança personnel can promote the health benefits of a well, as can the Franciscans through their frequent contacts with the people. During the present survey, strong-willed women of several communities were encountered who had obvious pride in their wells and obvious leadership qualities. It is suggested that these women be made promoters of village wells.

In deciding to construct a well, villagers should also be informed of the importance of maintaining a clean water supply and of the importance of properly located and constructed waste disposal facilities. It should be the goal of this project to construct both a safe water supply and a sanitary waste disposal system. It is felt that communities which have decided upon a well will wish to ensure that it continues to provide clean water and will also pay for those components necessary to construct waste disposal facilities.

## 4.6 Task VI - Commercialization

Heretofore well construction has been financed almost entirely by the beneficiaries of the program. Furthermore, it is evident that at least one entrepreneur is becoming involved, though probably without any training. It seems that to perpetuate the effort begun by Esperança and Fr. Mauro, the trainees must operate commercially when they complete the course. These individuals will no doubt be watched closely by Fr. Mauro, the Franciscan Order and Esperança personnel to insure that they are carrying out their new profession satisfactorily. No doubt if further assistance is needed, the driller will be able to seek help from Fr. Mauro and his technical staff. Indeed, drillers will probably continue to purchase their pump parts from Fr. Mauro.

## 4.7 Funding

The funding required for the implementation of the project herein described is minimal compared to the funding which may be required to enable maximum participation by rural populations in this program. Because of this, sources of funds are being sought which may be provided as loans to individuals and villages. Experience in the region demonstrates the willingness of the people to pay for these facilities.

Esperança is seeking a grant to establish the training program and loan capital to create a local credit bureau. Individuals and communities could then borrow funds for community and/or home improvements including financing for the construction of wells, pit privies, floors for houses, and other items.

Bearing in mind the very low per capita income of people in the Amazon basin, it would be unwise to lend more than 20 percent of the total value of a project because of the debt burden it would place on the local people. It would seem to be more productive for people to delay the water supply and sanitation improvements while they accumulate the capital to pay for 80 percent of the cost than to obtain the improvements sooner but end up paying a much higher price because of interest payments. In some countries, the extension of more than 20 percent credit is unlawful. Local people and communities are willing to pay for water and, with some widely available capital, it is felt that the demand for well water and sanitary facilities will increase and will lead to a healthier and more productive people.

Consequently, grant funds or loans are being sought which may be administered by Esperança as an executing agency in the Santarem area.

## Chapter 5

## CONCLUSIONS

Based on the present survey it may be concluded that:

1. Well drilling and technical capability is available from Fr. Mauro of the Franciscan Order in Santarem.

2. Villages accept the drilled well concept and are willing to pay for these wells.

3. Bailing of the drilled wells is the only practical method for drawing water from wells deeper than 70 meters, and the method is satisfactory and acceptable to village people.

4. A training program should be implemented under the direction of Fr. Mauro and Esperança to train well drillers who would work in the rural areas on a commercial basis.

5. Local institutions with responsibility to meet the health needs of outlying villagers may need strengthening.

6. Sanitary waste disposal facilities should be brought to the people, and persons should be trained in their construction. These individuals will ideally be the same persons who are trained in well construction.

7. Funding must be sought to further these goals either through grants or through loans. Esperança is a suitable executing agency for grant and loan funds particularly if a government agency is willing to be a guarantor for the loan funds.

APPENDIX A

MEMORANDUM

November 10, 1981

WATER AND SANITATION FOR HEALTH (WASH) PROJECT
ORDER OF TECHNICAL DIRECTION (OTD) NO. 66

TO: Dr. Dennis Warner, Ph.D., P.E.
WASH Project Director

FROM;: Mr. Victor W.R. Wehman, Jr., P.E., R.S.
S&T/HEA/CWSS
AID WASH Project Manager

SUBJECT: Provision of Technical Assistance Under WASH Project Scope of Work for USAID/Brasilia (Brazil)

REFS: A) Letter Pimental/Arbuthnot, 5/20/81
B) Letter Isely/Pimental, 6/9/81
C) Letter Taylor/Isely, 7/20/81
D) Letter Isely/Taylor, 8/24/81
E) Brasilia 09222, 11/06/32

1. WASH contractor requested to provide technical assistance to USAID/Brasil (Esperanca-PVO) as per Ref. E., para. 3. Contractor will need to do extensive coordination prior to sending consultant to ensure consultant properly matched to scope of work.

2. WASH contractor/subcontractor/consultant authorized to expend up to 20 person days of effort over a 4 month period to accomplish this technical assistance effort.

3. Contractor authorized up to 18 person days of international and/or domestic per diem to accomplish this effort.

4. Contractor to coordinate with personnel identified in Ref. E., para. 2 and with Mr. Sam Taylor (see Ref. C) as necessary and appropriate on scope of work.

5. Contractor should keep LAC/DR/HN (C. Mantione), LAC/DR/ENGR (C. Mathews) and Brazil desk officer appraised of progress, ETA's of consultants, and provide them and Mr. Taylor in Brazil with copies of this OTD.

6. Contractor authorized one (1) international round trip from consultant's home base thru Washington, D.C. (for briefing) to appropriate point in Brazil and return thru WASH (for debriefing) to consultant's home base.

7. Contractor authorized internal travel in Brazil as necessary to accomplish scope of work.

8. Contractor authorized to obtain secretarial, interpreter, graphics or reproduction services in Brazil and in WASH CIC as necessary to accomplish tasks. These services are in addition to level of effort specified in para. 2 and para. 3 above.

9. Contractor authorized to provide for car rental, if necessary, to facilitate effort. Mission and/or PVO is encouraged to provide Mission/PVO vehicles, if available.

10. Consultant to leave a draft report in field before leaving Brazil of professional quality (typed). Final report is due to Mission within 30 days of consultant's leaving field.

11. Mission, Esperanca and local coordination individuals should be contacted immediately and technical assistance initiated as soon as convenient to Mission/PVO and consultant. Portuguese speaking and reading ability may be very important in this OTD and this should be determined early on if necessary or not.

12. Appreciate your prompt attention to this matter. Good luck.

VWW:ja

ACTION COPY

Department of State

INCOMING TELEGRAM

PAGE 01 BRASIL 09222 061957Z 3810 023401 AID2042
ACTION AID-35

ACTION OFFICE STHE-01
INFO LASA-03 LADP-03 LADR-03 PPCE-01 PDPR-0. PPPB-03 AAST-01
ENGR-02 RELO-01 DAEN-01 MAST-01 DO-01 022 A4 87

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FOR VICTOR WEHMAN S&T/HEA

E.O. 12065: N/A
SUBJECT: WATER AND SANITATION FOR HEALTH PROJECT (WASH)

1. FUNDACAO ESPERANCA, A BRAZILIAN PRIVATE AND VOLUNTARY ORGANIZATION (PVO), SERVING THE POOR OF THE CENTRAL AMAZON BASIN SINCE 1970, HAS ASKED THE EMBASSY TO REQUEST THE SERVICES OF WASH IN PLANNING AND IMPLEMENTING A WELL DRILLING PROJECT IN RURAL COMMUNITIES ASSOCIATED WITH THEIR HEALTH DELIVERY SYSTEM.

2. FUNDACAO ESPERANCA IS AFFILIATED WITH ESPERANCA, INC., 5901 W. INDIA SCHOOL ROAD, SUITE 1, PHOENIX, ARIZONA 85033, A REGISTERED PVO WITH AID. FOR MORE BACKGROUND, AID/W SHOULD CONTACT MR. CHARLES POST AT THE ABOVE ADDRESS OR FROM MR. STEVEN ALEXANDER, CAIXA POSTAL 222, 68.100 SANTAREM, PARA, BRAZIL.

3. ESPERANCA REQUESTS THAT WASH SEND A CONSULTANT TO SANTAREM FOR 7-10 DAYS IN JANUARY 1982 FOR THE PURPOSE OF ASSISTING THE FOUNDATION PLAN A PROJECT. BASICALLY, ESPERANCA NEEDS A TECHNICIAN WITH A BACKGROUND IN WELL DRILLING WHO MAKE RECOMMENDATIONS ON HOW TO MAKE MORE POTABLE WATER AVAILABLE TO THE POPULATION OF 350,000 INHABITANTS SERVED BY ESPERANCA. ACCORDING TO ESPERANCA'S HEALTH OFFICIALS, AT LEAST TWO THIRDS OF HEALTH PROBLEMS OF THE AREA ARE ASSOCIATED WITH WATER BORNE DISEASES AND SANITATION PROBLEMS.

4. PLEASE ADVISE AVAILABILITY OF TECHNICIAN AND PROBABLE ETA.
MOTLEY

Rec'd S/T/HEA (Wehman) 11/9/81
Passed to WASH 11/9/81

UNCLASSIFIED