

PD-AAZ-990



WATER AND SANITATION  
FOR HEALTH PROJECT

# ASSESSMENT OF THE ENVIRONMENTAL SANITATION CONSTRUCTION COMPONENT: INTEGRATED HEALTH AND NUTRITION SYSTEMS PROJECT IN GUATEMALA

Operated by  
CDM and Associates

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WASH FIELD REPORT NO. 104

NOVEMBER 1983

The WASH Project is managed  
by Camp Dresser & McKee  
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Technology Institute, Inc.;  
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University of North Carolina  
at Chapel Hill

Prepared for:  
USAID Mission to Guatemala  
Order of Technical Direction No. 150

November 16, 1983

Charles Costello, Director  
USAID Mission  
Guatemala City, Guatemala

Attention: Paul Cohn

Dear Mr. Costello:

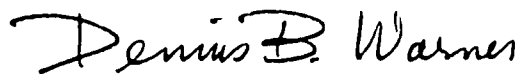
On behalf of the WASH Project I am pleased to provide you with 10 copies of a report on The Assessment of the Environmental Sanitation Construction Component of the Integrated Health and Nutrition Systems Project in Guatemala.

This is the final report by Dr. Henry Van and is based on his trip to Guatemala in late July and early August.

This assistance is the result of a request by the Mission in May of 1983. The work was undertaken by the WASH Project by means of Order of Technical Direction No. 150, authorized by the USAID Office of Health in Washington in mid-July of 1983.

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, Ph.D., P.E.  
Director  
WASH Project

cc. Mr. Victor W.R. Wehman, Jr.  
S&T/H/WS

DBW:ybw

WASH FIELD REPORT NO. 104

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ISA 62287

ASSESSMENT OF THE ENVIRONMENTAL  
SANITATION CONSTRUCTION COMPONENT:  
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Prepared for USAID Mission to Guatemala  
under Order of Technical Direction No. 150

Prepared by  
Henry Van, Ph.D.

November 1983

Water and Sanitation for Health Project  
Contract No. AID/DSPE-C-0080, Project No. 931-1176  
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## TABLE OF CONTENTS

CHAPTERS	PAGES
ACKNOWLEDGEMENTS.....	i
ACRONYMS.....	ii
EXECUTIVE SUMMARY.....	iii
1. INTRODUCTION.....	1
2. PROJECT BACKGROUND.....	2
2.1 Objectives and Goals.....	2
2.2 Project Area Map.....	4
2.3 Project Schedule.....	4
2.4 Administrative Structure.....	4
2.5 Financial Arrangements.....	8
3. PROJECT ASSESSMENT.....	11
3.1 Schedule.....	11
3.2 Organizational.....	13
3.3 Administrative.....	15
3.3.1 Financial.....	15
3.3.2 Personnel.....	16
3.3.3 Salaries.....	17
3.3.4 Studies and Designs.....	17
3.3.5 Purchasing.....	17
3.3.6 Warehousing.....	18
3.3.7 Transportation.....	18
3.3.8 AID Supervision.....	18
3.4 Construction.....	19
3.5 Operation and Maintenance.....	20
3.6 Community Participation.....	20

4.	CONCLUSIONS AND RECOMMENDATIONS.....	22
4.1	Schedule.....	22
4.1.1	Conclusions.....	22
4.1.2	Recommendations.....	22
4.2	Organizational.....	24
4.2.1	Conclusions.....	24
4.2.2	Recommendations.....	25
4.3	Administrative.....	26
4.3.1	Financial.....	26
4.3.2	Personnel.....	26
4.3.3	Studies and Designs.....	27
4.3.4	Purchasing.....	28
4.3.5	Warehousing.....	29
4.3.6	Transportation.....	29
4.3.7	AID Supervision.....	30
4.4	Construction.....	30
4.4.1	Conclusions.....	30
4.4.2	Recommendations.....	31
4.5	Operation and Maintenance.....	31
4.5.1	Conclusions.....	31
4.5.2	Recommendations.....	31
4.6	Community Participation.....	31
4.6.1	Conclusions.....	31
4.6.2	Recommendations.....	32
	REFERENCES.....	33
	APPENDICES	
A.	Itinerary.....	34
B.	Officials Contacted.....	35
C.	Places Visited.....	37
D.	Photographs of Projects Visited.....	38

## ACKNOWLEDGEMENTS

This report is the result of frank discussions with the many people listed in Appendix C and is based on their comments and suggestions.

There are not enough words to express my appreciation to those named below for their contributions and magnificent hospitality.

Completion of the assignment was greatly facilitated by support given by USAID/Guatemala personnel, particularly by Mr. Paul Cohn, Mr. Gary Vaughn, Ms. Clara Carr, Mr. Charles E. Costello, Mr. Edward Baker, Eng. Hugo Oliva, Eng. Victor Dardon, Eng. Ricardo Perez and Dr. Leonel Barrios.

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The overviews provided by Drs. Francisco Zambroni, Danilo Aldana and Edgar Lara, and Mr. Gustavo Linares are greatly appreciated.

Equally important, thanks are extended to the project's beneficiaries in the 10 communities visited for their excellent hospitality and the time they donated to discuss their views on the benefits of having clean and safe drinking water and sanitary excreta disposal systems.

Appreciation is extended to Dr. Petra Reyes for her valuable comments and suggestions.

Without the valuable assistance of Mrs. Blanca Rosa de Giron, it would have been impossible to have completed the draft report during the period of assignment in Guatemala.

## ACRONYMS

USAID	United States Agency for International Development
GOG	Government of Guatemala
WASH	Water and Sanitation for Health Project
MOH	Ministry of Health
TSR	Rural Sanitation Technician
PSR	Volunteer Rural Health Promoter
DGSS	General Health Services Directorate
ES	Environmental Sanitation component
PSC	Personnel Services Contract
ISA	Environmental Sanitation Inspector
TAR	Rural Aqueduct Technician

## EXECUTIVE SUMMARY

The Integrated Health and Nutrition System Project (USAID Project No. 520-0251) was initiated with the signing of the loan agreement on September 30, 1980. The project is designed to improve the health/nutrition status and overall welfare of the rural poor in the departments of Totonicapan, San Marcos and Solola through full community participation in all aspects of the subprojects. Project financing was provided by: (1) \$5,000,000 loan by the United States Government (USG) through AID, plus a \$800,000 grant; (2) counterpart funds of \$6,181,000 from the Government of Guatemala (GOG).

This report assesses the project's environmental sanitation (construction) component with special focus on the technical, administrative and financial processes currently in use. Also, the feasibility of completing the project within the specified completion date (September 1985) is evaluated.

The environmental sanitation component of the project consists of the construction of 114 water supply systems, 7000 simple pit latrines, home improvements (400 demonstration models and 1,000 subloans to families), renovation of health posts (24 major and 20 minor renovations) and construction of 13 health posts. The project also includes two additional components: (1) Primary Health Care involving the training of the auxiliary outreach personnel who have the capacity to reach the predominantly rural poor and dispersed population which is not regularly served by any of the formal structured posts, centers or private clinics, and (2) Support Systems including an information system, a project evaluation system, a logistics system, a regional supply warehouse and a maintenance system.

The project is being carried out by the Guatemalan Ministry of Health (MOH) under the direction of the Director General of Health Services who coordinates MOH's implementation activities in the three loan components.

Since the project was initiated, implementation has been hampered by:

- (1) delays in ratification of the Loan Agreement by the Guatemalan Congress costing the project over nine months of non-productive time,
- (2) reorganizations due to a change of Government,
- (3) difficulties in hiring field personnel,
- (4) difficulties in purchasing construction materials, equipment and gasoline due to the lengthy purchasing process and unavailability of some materials in the country,
- (5) severe lack of transportation needed to ensure timely implementation,
- (6) lack of adequate coordination, and
- (7) cumbersome administrative procedures.



In spite of these hindrances, the Environmental Sanitation (ES) component has proceeded with construction of water supply and latrine systems. Considering the starting date of September 1980, overall progress has fallen so far behind schedule that the USAID Mission requested an in-depth analysis of this component to ascertain the bottlenecks and to recommend methods to improve implementation of the construction.

Conclusions and recommendations address changes in component sizes and/or extension of the completion date (see Sections 4.1.1 and 4.1.2). Below, recommendations have been grouped into major and minor subdivisions.

#### Major Recommendations

- Changes in the scope of the project and/or extension of the completion date are recommended to facilitate project implementation (see Sections 4.1.1 and 4.1.2).
- Another AID consultant construction supervisor under a personal services contract (PSC) should be hired (see Section 4.2.2) to assist the present AID consultant construction supervisor.
- AID should pay the salaries of six key project personnel for the next 2-3 months until the GOG approves their position (see Sections 3.3 and 4.3.1) so that personnel don't become demoralized and eventually slow their activities or even resign.
- The possibility of using the bidding (Licitacion) process to purchase materials should be explored (see Section 4.3.1) in order to expedite procurement of materials.
- The project should hire one design engineer, six environmental sanitation inspectors (ISA's) or regroup the already trained Rural Aqueduct Technician (TARs), and one assistant engineer (see Section 4.3.2) to adequately staff the ES group and speed up the engineering and construction activities.
- Provide more AID direct-hired engineering supervision to the ES component (see Sections 4.3.2 and 4.3.7) to strengthen the project's AID engineering representation within the project's MOH central administration.
- Eliminate the housing improvement component since its implementation may cause discontentment within the communities. Also, the amount of engineering effort is greater than the benefit given. It is recommended that this component be replaced by either additional water supply and latrine systems or Lorena-type stoves. These replacement components would cause a greater positive impact on communities. The Lorena-type stove would contribute to the reduction of respiratory disorders caused by the gases in the house as a result of cooking on the floor.
- Technical assistance should be requested by MOH from AID to assist the General Health Services Directorate (DGSS) procurement department in speeding up the purchasing of materials (see Section 3.3--Purchasing).

- To support the project initially, AID should assume responsibility for procurement of all materials until such time that the project is well stocked (see Section 4.3.4).
- One additional 8-ton truck and a pick-up truck should be procured (see Section 4.3.6) to facilitate transportation of materials and supplies.
- Nine motorcycles for the ISAs or TARs should be procured (see Section 4.3.6) to improve mobilization of this personnel and reduce time lost due to lack of transportation. These personnel would be more productive if they had their own transportation.
- Procurement of the topographic equipment needed to develop water supply systems design data should be undertaken as soon as possible by DGSS or AID (see Section 3.3--Studies and Designs).

#### Minor Recommendations

- Conduct information seminars for project personnel at least every three months to improve coordination and communication among the various project components (see Section 4.2.2).
- Rural Sanitation Technicians (TSRs) should be better informed by the area physicians of their role in the environmental sanitation component (see Section 4.2).
- Area physicians and engineers should better coordinate project activities among themselves in order to adequately set priorities. Also, communication among themselves needs to be strengthened for a more efficient project implementation (see Section 4.2).
- The central project administration should exercise leadership in promoting better coordination and communication among project personnel to improve the establishment of priorities, facilitate the project's implementation and provide direction (see Section 4.2.2).
- The engineering design group should be provided with programmable calculators to expedite preparation of studies and designs.
- Communities should be fully involved in those aspects of the project that require their assistance, such as organization of the labor force, procurement of local materials and changes on project implementation.
- To stimulate pride in the facility and to document the participation of the community as well as that of the GOG and US, a permanent plaque should be installed to be unveiled at the inauguration of each facility.

## Chapter 1

### INTRODUCTION

Based on a request from USAID/Guatemala, Order of Technical Direction (OTD) No. 150 was issued by the AID/Washington Office of Health on July 11, 1983, requesting the Water and Sanitation for Health (WASH) Project to provide technical assistance to the Government of Guatemala (GOG) as follows:

Conduct an assessment of the construction aspects of the Integrated Health and Nutrition System Project (AID Project No. 520-0251). The assessment was to be action- and product-oriented, covering the technical, administrative and financial processes currently used by the GOG project directors to conduct project construction of the environmental sanitation subsystems. The WASH consultant was also asked to make recommendations as to whether the project could be completed within the specified completion date (September 1985) under the existing conditions. The consultant was also asked to determine what and how improvements might be made to facilitate implementation.

Dr. Henry Van, a Georgia Institute of Technology environmental engineer, was assigned to carry out the assessment and prepare recommendations. He arrived in Guatemala City on July 25, 1983, completed his assignment and prepared a draft report in English on August 12, 1983 (Appendix A).

During the period of this assessment another consultant, under a separate contract, was conducting an assessment of the primary health care training program.

The report is based principally on the study of background documents and on discussions with people directly involved in the project, both in Guatemala City and in the project area. The names of the people who have contributed to assessment of the problems and formulation of recommendations are listed in Appendix B.

## Chapter 2

### PROJECT BACKGROUND

#### 2.1 Objectives and Goals

The principal project goal is to improve the health/nutrition status and overall welfare of the rural poor in the departments of Totonicapan, San Marcos and Solola through full community participation in all aspects of their subprojects. Achievement of the goal will be measured in terms of a 10% decrease in overall maternal and child mortality, a 15% decrease in infant mortality, and a 10% decrease in infant/child malnutrition.

The purpose of the project is to develop the institutional capacity of the MOH to increase the coverage and effectiveness of a fully integrated rural health delivery system in the target area. Achievement of the project purpose will be measured in terms of (1) a 76% increase in attendance at health posts and centers from .5 per capita to .88 per capita attendances per year; (2) an increase in coverage of the rural health post/center network from 75% of the rural population within 7 km of a health post to 95%; and (3) an increased coverage of environmental sanitation from 28% to 41%.

To reach the overall goals and objectives, the following specific goals were established in the loan agreement.

- ° Water Supply Systems. Construct approximately 114 water systems in small communities utilizing, for the most part, gravity-flow technology.
- ° Latrine Systems. Construct 7,000 simple pit latrines.
- ° Health Education Program. One of the principal functions of the community promotion process is to provide health education to the target group. The objective of health education is to change sanitary and related health practices in order to achieve the desired impact on health through use of improved water and sanitation systems. Technicians in rural sanitation (ISR) and promoters help the inhabitants of rural communities understand the links between clean water, hygiene and health. Health education should improve the understanding; but adequately designed, used and maintained water supply and excreta disposal systems help lower disease rates.
- ° Home Improvements. This subcomponent addresses the poor living conditions in the target area which contribute to and exacerbate health problems caused by inadequate environmental sanitation. In order to reduce the high levels of respiratory and other communicable diseases, resources will be provided to make home improvements in ventilation, cooking arrangements, food and water storage and general household hygiene.

Home improvement resources will be limited to a total cost of US \$150.00 per model. Materials will include fencing, screening, proper

storage containers, material for floors, materials for improved cooking arrangements and ventilation.

It is estimated that about 400 demonstration models will be financed under the project (about US \$60,000). In addition, the project will finance subloans to about 1000 families (about US \$150,000) to purchase materials for home improvement.

- Primary Health Care. This component addresses the constraints posed by the absence of an integrated and systematic approach to primary health care, the lack of access to services, and the low quality of existing services. The focal point of service delivery is auxiliary outreach personnel who have the capacity to reach a predominantly poor rural, dispersed population which is not served regularly by any of the formal structures, posts, centers or private clinics. At the health post level, back-up and referral services will be provided to complement those services provided by outreach workers. The project utilizes the existing Ministry of Health (MOH) personnel structure and volunteer health promoters (PSR) who will be incorporated into that structure as the primary community-based health practitioners. Training curricula, service norms and support systems for health promoters, midwives, and supervisory personnel will be standardized for replication in other areas by the end of the project.

In order for the first or lowest level of the rural health objectives to be met, outreach workers must be supported by a well functioning fixed facility network which provides logistic support, supervision, and a base for referral of cases outside PSR, midwife and TSR service norms. Under the primary health care component this facility network will be called Health Post Center Network.

Survey data was obtained and included an inventory of the physical condition of MOH buildings in the project area. Based on this data 24 health posts and centers will require major renovation and 20 will require minor renovation. Also, 13 new health posts are scheduled to be constructed.

- Support Systems. To effectively develop the integrated rural health delivery system, a support system is being implemented. This system consists of:
  - Information System
  - Project Evaluation
  - Logistics Systems
  - Regional Supply Warehouse
  - Maintenance System
- Corrective and Preventive Maintenance. Operators of equipment at the MOH health posts and centers will be trained by regional technicians to perform simple preventive maintenance procedures. Equipment requiring repair by a qualified technician will be either transported to the regional maintenance shop or repaired on-site by the technician.

## 2.2 Project Area Map

The area covered by the project, namely the departments of Totonicapan, San Marcos, and Solola, is shown on the map in Figure 1.

## 2.3 Project Schedule

The project agreement was signed by the United States AID in September 1980 but was not approved by the GOG until May 1981. It was legalized in June 1981 by the Ministry of Public Affairs. The project completion date is September 30, 1985. The major events to date are:

1. In June 1981, the GOG requested the transfer of US \$120,000 from loan and counterpart funds to begin to prepare bidding documents for equipment, personnel and materials. However, this sum was not authorized until October 1981; as a result, the personnel to be contracted had to go through a more elaborate hiring process.
2. Personnel started to be brought aboard in August 1982.
3. The paperwork to obtain the first advance for environmental sanitation began in March 1981. However, a study had to be conducted to determine how this advance (community revolving fund) was to be implemented. Due to this reason no funds could be used until the study was complete. The paperwork and study were completed in January 1982. All this time the environmental sanitation component remained functionally idle.
4. Vehicles were scheduled to be ordered in 1981; but since the study for the community revolving fund was being conducted, funds could not be used. The General Health Services Directorate (DGSS) purchasing department had earlier assumed it would be able to procure the vehicles in 1981, but for the reason above did not program the purchase for 1982. The community revolving fund was approved in January 1982, whereupon funds could be used but it was too late to purchase the vehicles that year. Facing a substantial delay in the procurement of the vehicles, MOH thought that procuring them through AID would be more expeditious.

These examples provide a very clear picture of the magnitude of the delay in which the project began. Thirty months have passed since eight personnel positions for the project were submitted for GOG approval. These have not, to date, been approved. AID had to finance such personnel for a year in order to get the project going.

## 2.4 Administrative Structure

The project is integrated into the MOH's infrastructure and is directly under the jurisdiction of the General Health Services Directorate (see Figure 2). The project established a Regional Complex which is comprised of the Environmental Sanitation Component (ES) which does the engineering and construction. The Regional Complex houses the engineering and design group, latrine factory, supply warehouse and maintenance facility. For the health aspects of the project there are three MOH area centers. Figures 3

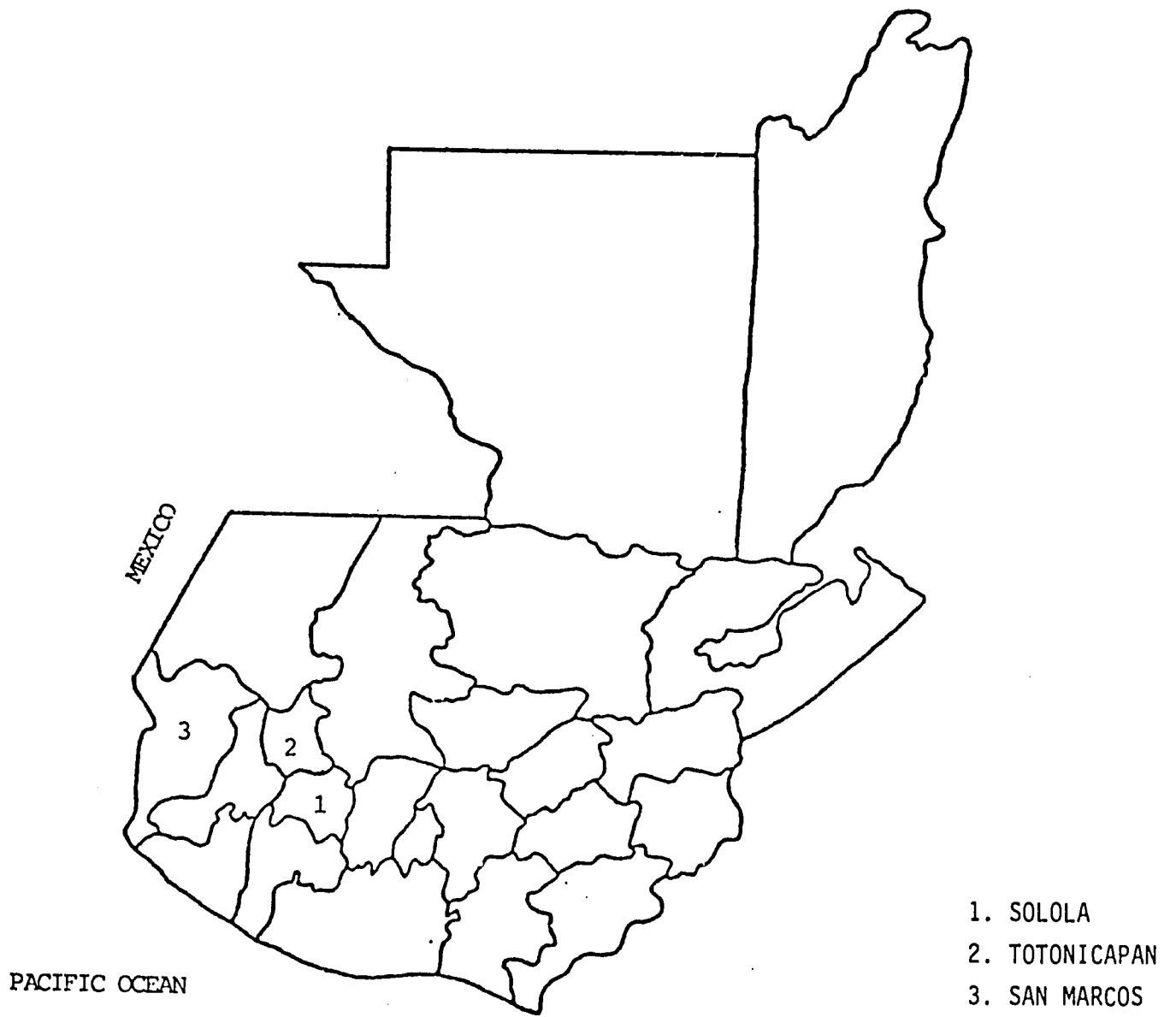
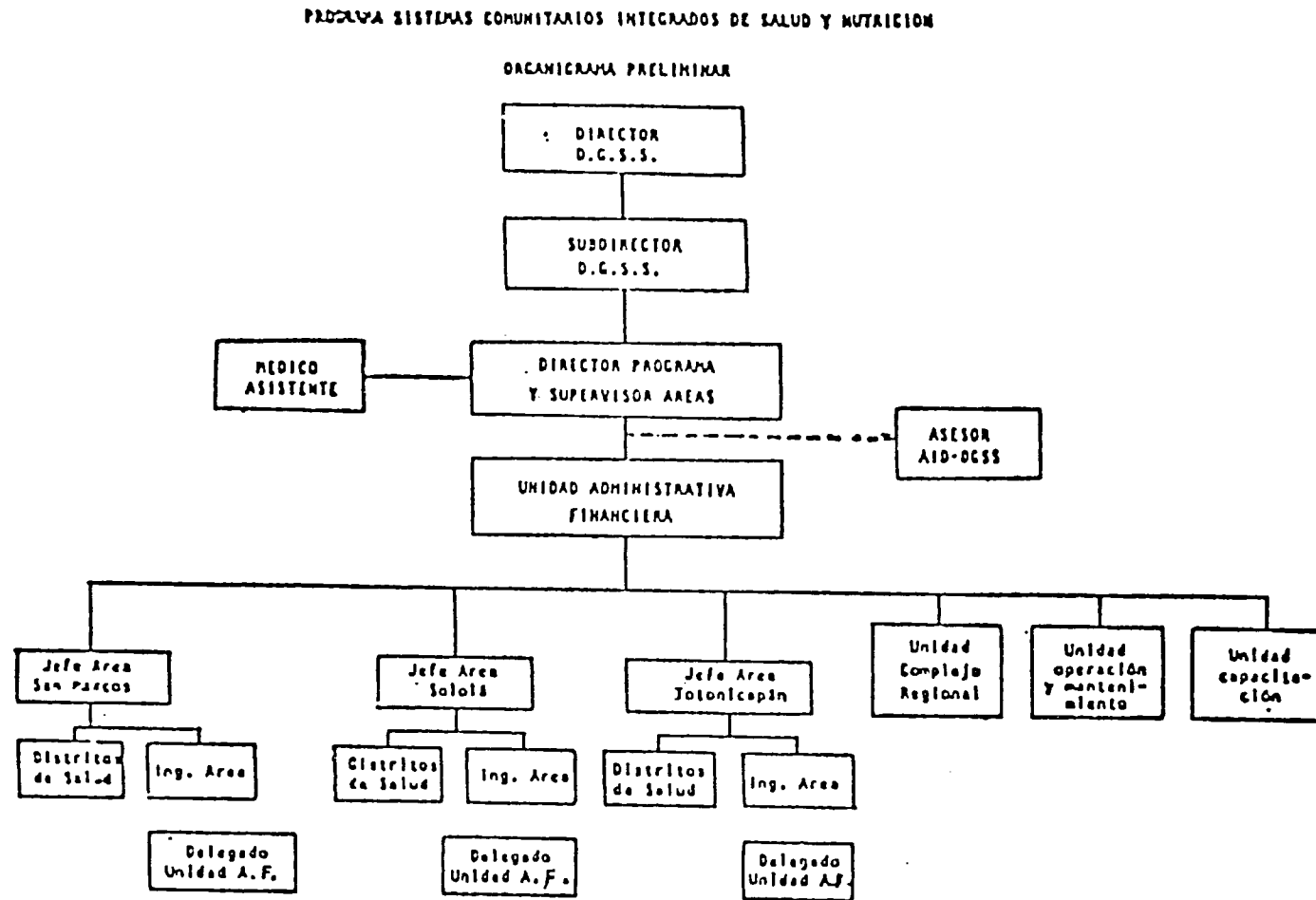


Figure 1. MAP OF GUATEMALA SHOWING THE PROJECT AREA

Figure 2. Project Organization Chart



-9-

Source: AID "Diagnóstico" (see references)



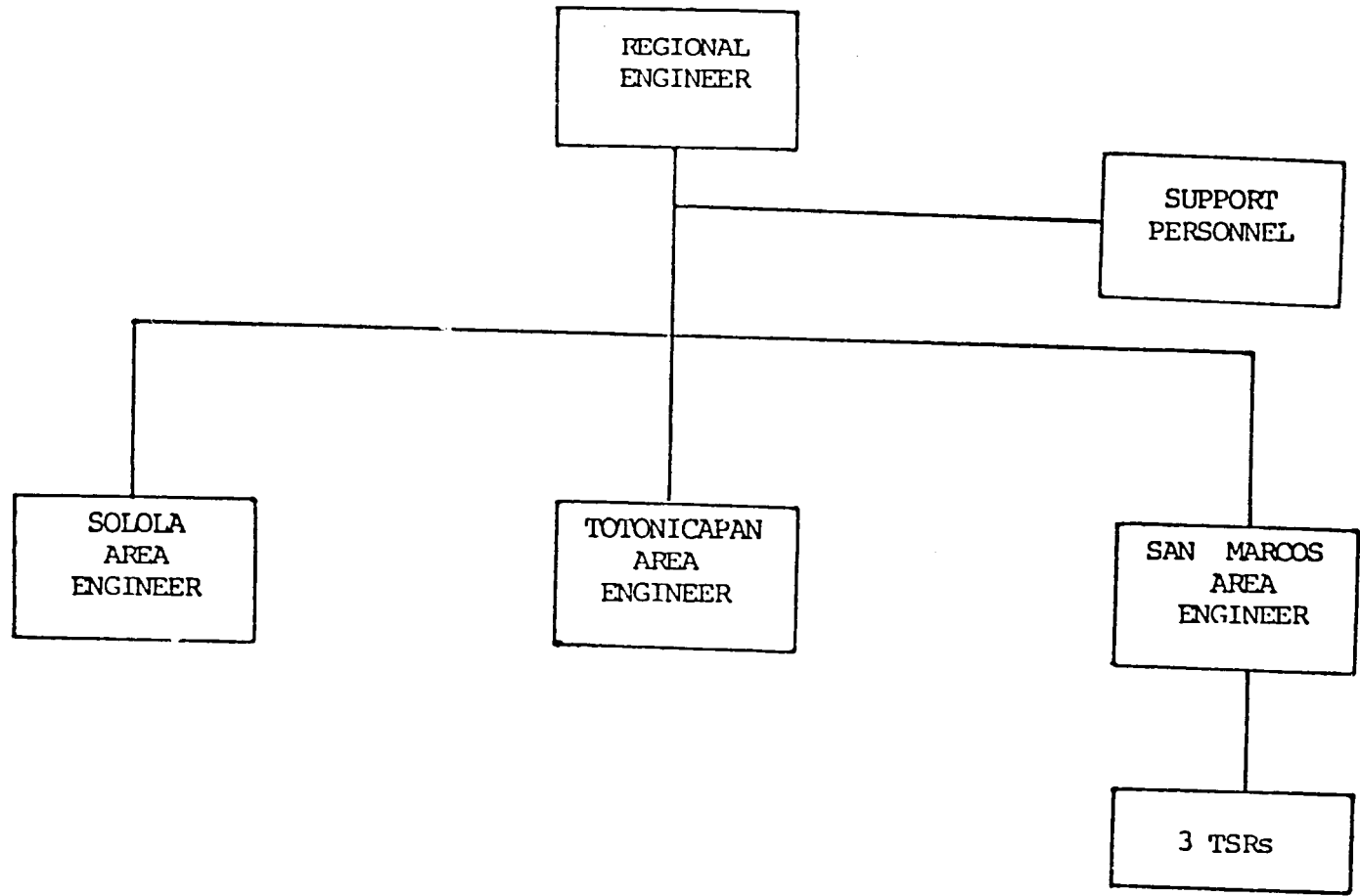


Figure 3. PROJECT ENVIRONMENTAL SANITATION ORGANIZATION CHART

and 4 show the project's engineering and construction and the maintenance groups organizations, respectively. The ES component coordinates many of its activities with the area chief physician who is in charge of the health area center. The area chief physician has the authority of allocating fuel to the ES area engineers and assigning TSRs to ES activities such as performing preliminary sanitary surveys. The information gathered during the sanitary survey is used to select candidate communities which may qualify for a water supply and latrine system. Figure 5 shows the relationship between the ES and the other administrative units.

The DGSS is the project implementing unit whose management is comprised of a Director, Assistant Director, Administrator and the Project Coordinator. The ES is in charge of preparing studies and designs as well as implementing the construction with area engineers, one assistant field engineer, one assistant engineer, one engineering draftsman, one water quality technician, one surveyor, two chainmen and one reproduction specialist.

ES has been charged with the construction of the following:

- 114 water supply systems
- 7000 simple pit latrines
- Housing improvement
  - 400 models
  - 1000 subloans to families
- Renovation of health posts
  - 24 minor renovations
  - 20 major renovations
- Construction management of 13 health centers

Purchasing for the entire project is the responsibility of the DGSS purchasing department. Warehousing and control of materials is the responsibility of the DGSS central warehouse while materials are in Guatemala City, and the regional warehouse when materials are sent to the regional complex warehouse located in Totonicapan.

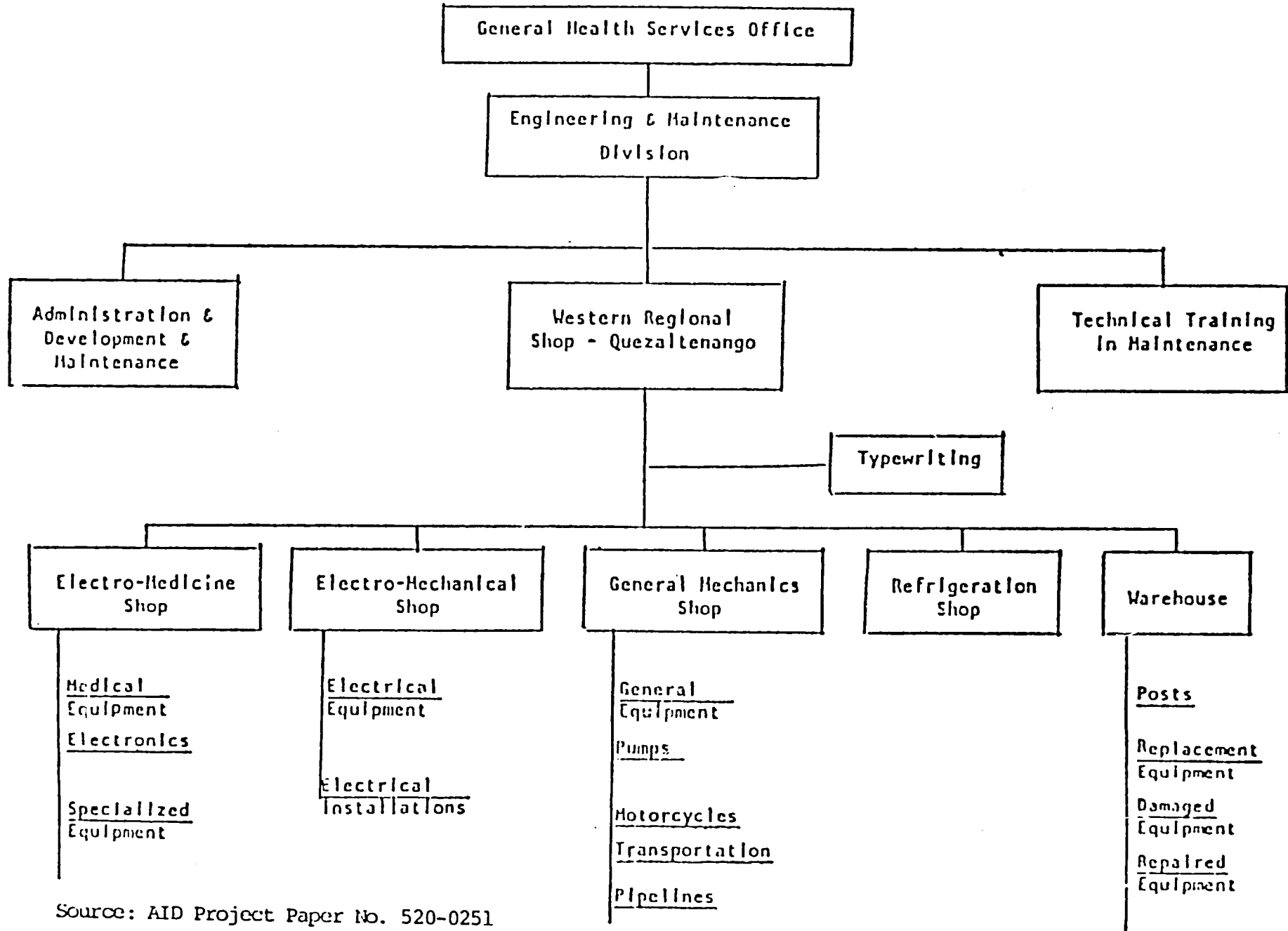
## 2.5 Financial Arrangements

The flow of funds for the environmental sanitation component was initiated by the establishment of a community revolving fund approved in October 1981 to partially recuperate the investment.

The purchasing of equipment and construction materials is done by means of advances from loan funds against a program and budget prepared by DGSS. The DGSS has 30 days to liquidate the advancement.

Figure 4

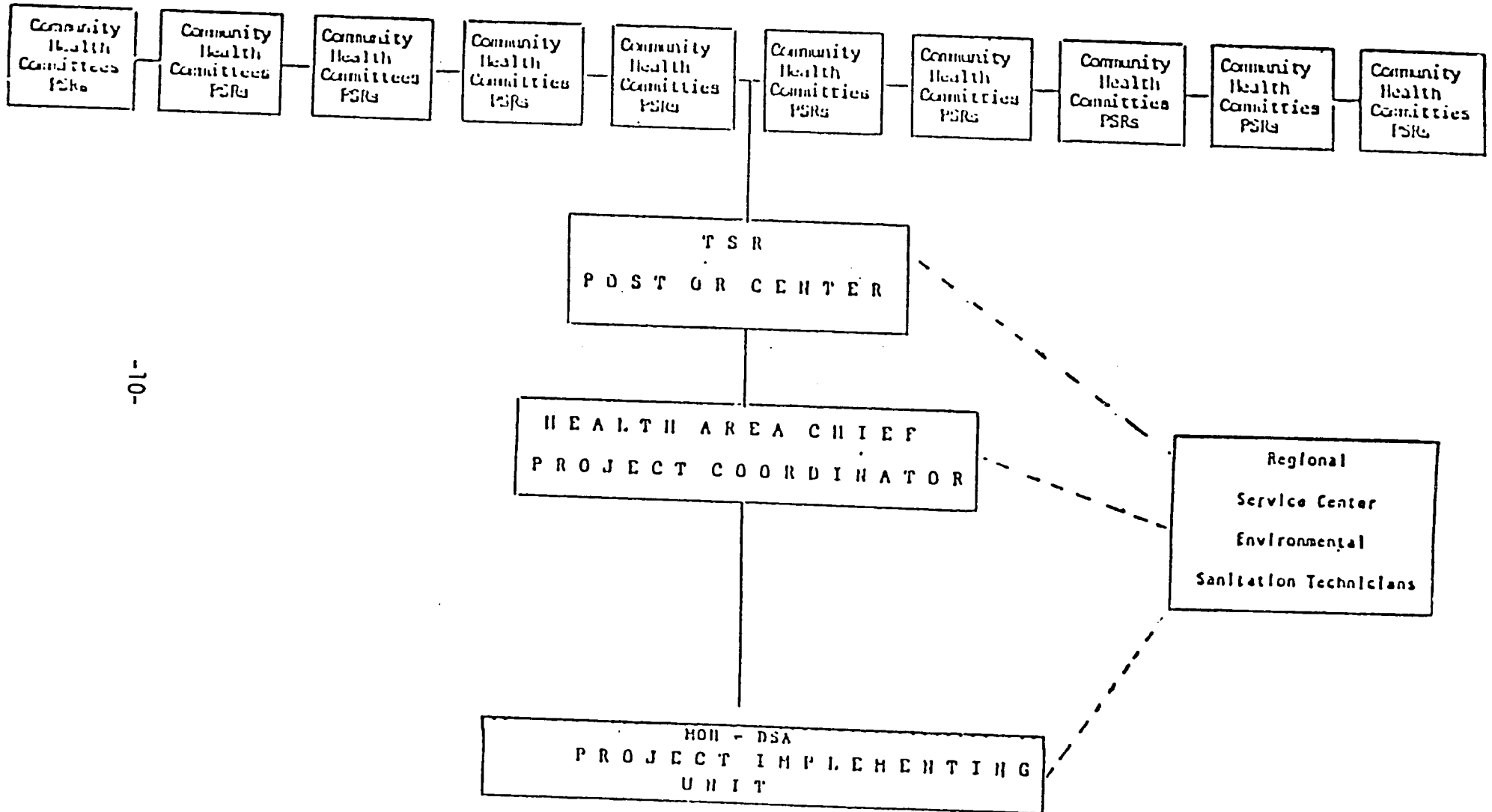
ORGANIZATION OF THE RURAL AREA'S MAINTENANCE SYSTEM



-6-

Figure 5

ORGANIZATION OF ENVIRONMENTAL SANITATION PROGRAM



-10-

## Chapter 3

### PROJECT ASSESSMENT

#### 3.1 Schedule

Table 1 shows the timetable for major pre-implementation and implementation events. The project paper scheduled initiation of the construction activities for the environmental sanitation component in April 1982. Actually, construction did not begin until October 1982. This section presents reasons for the project's slow progress.

Estimates of the ES component progress as of July 30, 1983, given as a percentage of the work to be completed by July 1983 is as follows:

	<u>Actual % Completed/ Programmed % of Total Goals</u>
Construction of 114 water supply systems	13/53
Installation of 7000 latrines	23/43
Housing Improvements	
400 models*	0/85
1000 subloans for families*	0/85
Renovation of health posts	
24 minor renovations*	0/12
20 major renovations*	0/12
Construction of 13 health centers*	**

\*These activities have not been initiated and no program has been prepared.

\*\*Will not be programmed until 1984.

Table 1

Timetable of Major Pre-Implementation and Implementation Events

<u>EVENT</u>	<u>DATE</u>
- AID/W grant and loan authorization	6/80
- Grant agreement signed	8/80
- Loan agreement signed	9/80
- Grant Coordination Personnel (CPs) met	11/80
- Orientation seminar for project health personnel in project area and central MOH staff	11/80
- Environmental sanitation training course for 6 TSRs and sanitation inspectors	12/80
- Arrival of grant-financed advisers for medical supply and distribution system	2/81
- Arrival of grant-financed advisers for maintenance system	2/81
- Congressional ratification and loans CPs met	3/81
- Completion of baseline data collection for project evaluation	6/81
- Evaluation of SINAPS completed	7/81
- Grant-financed advisers arrive for community organization, training and health education	8/81
- Initiation of training program for community level health practitioners	10/81
- Grant-financed advisers for Environmental Sanitation component arrive	10/81
- Revolving fund established and operating for Environmental Sanitation component	11/81
- Installation of information system	12/81
- Completion of construction of regional center, health posts, and MOH staff appointments	3/82
- Regional center and health post center equipment arrives	3/82
- Initiation of drug and medical supply system	4/82
- Initiation of maintenance system	4/82
- Initiation of community environmental sanitation construction, training and health education activities	4/82
- Annual project evaluation completed	6/82
- Five water systems installed	9/82
- Planning workshop to review mid-project evaluation results with central, area, and local personnel	1/83
- Twenty-five water systems installed	5/83
- Mid-project evaluation completed	5/83
- Thirty-five water systems installed	5/84
- Forty-nine water systems installed	5/85
- End-of-project evaluation completed	6/85

Source: USAID, Community-Based Health and Nutrition Systems, (Project Paper No. 520-0251), Washington, D.C., May 1980.

In June 1983, the U.S. AID Mission contracted with Mr. Valle, a private Guatemalan consultant, to conduct a diagnosis of the project administrative aspects (see references at the end of Chapter 4). Because of the thoroughness of Mr. Valle's report, administrative problems are not covered here except as they relate to the technical problems.

### 3.2 Organizational

Figure 5 shows the relation of the ES with other project components which are also an integral part of MOH. ES has an AID consultant as supervisor of technical assistance whose responsibility is to oversee the overall engineering and construction activities. This person reports directly to the AID chief of health programs. Also, there are three area construction engineers, one for each of the departments included in the project area (Totonicapan, San Marcos and Solola). The area engineers report directly to the project regional engineer; however, their respective offices are located in the area health center in which a physician is in charge. Some of the engineers' activities must be coordinated with the physician in charge.

The manpower support needed to perform preliminary community surveys has to be requested and coordinated with the area chief physician. This manpower is provided by the TSRs.

Figure 6 shows the MOH organizational chart. ES area construction engineers have had problems in obtaining the assistance of the TSRs whenever they have needed them. In some cases, the engineers have had to wait several weeks to obtain needed assistance. This has caused delays because the area engineers are forced to leave their activities in order to get the information that TSRs are responsible for. The reason for the TSRs not being available is because they have to attend to other project responsibilities or carry on MOH activities outside the project. TSRs are not only attending to project activities but to regular MOH responsibilities as well since they are integrated into this organization. Since the project is integrated into the MOH infrastructure, these delays may be unavoidable. To date, of the three area engineers, only the engineer in the department of San Marcos has his three environmental sanitation inspectors (ISAs) which the project paper stipulates. The other two area engineers have been working for the most part alone. The lack of these ISAs has caused the area engineers to work at a slower pace. But these positions have not been authorized by MOH.

Originally, through an AID grant, nine TSRs were trained by Agua del Pueblo (a private volunteer organization) in rural aqueduct technology. These TSRs, after graduation from the course, were to become Technicians in Rural Aqueducts (TARs). The plan was for these TARs to be assigned to the three area engineers and assist them in their work. After completion of their training the TARs were tested by ES engineers at the same time as other TSRs who had not had the training. Surprisingly, the TARs scored lower than the TSRs. The reason for the TARs' low performance during this test has never been assessed.

Ministry of Health and  
Social Assistance  
Minister  
Vice Minister  
National Health Council

# MINISTERIO DE SALUD PÚBLICA Y ASISTENCIA SOCIAL

Central Administration

Legal Advice

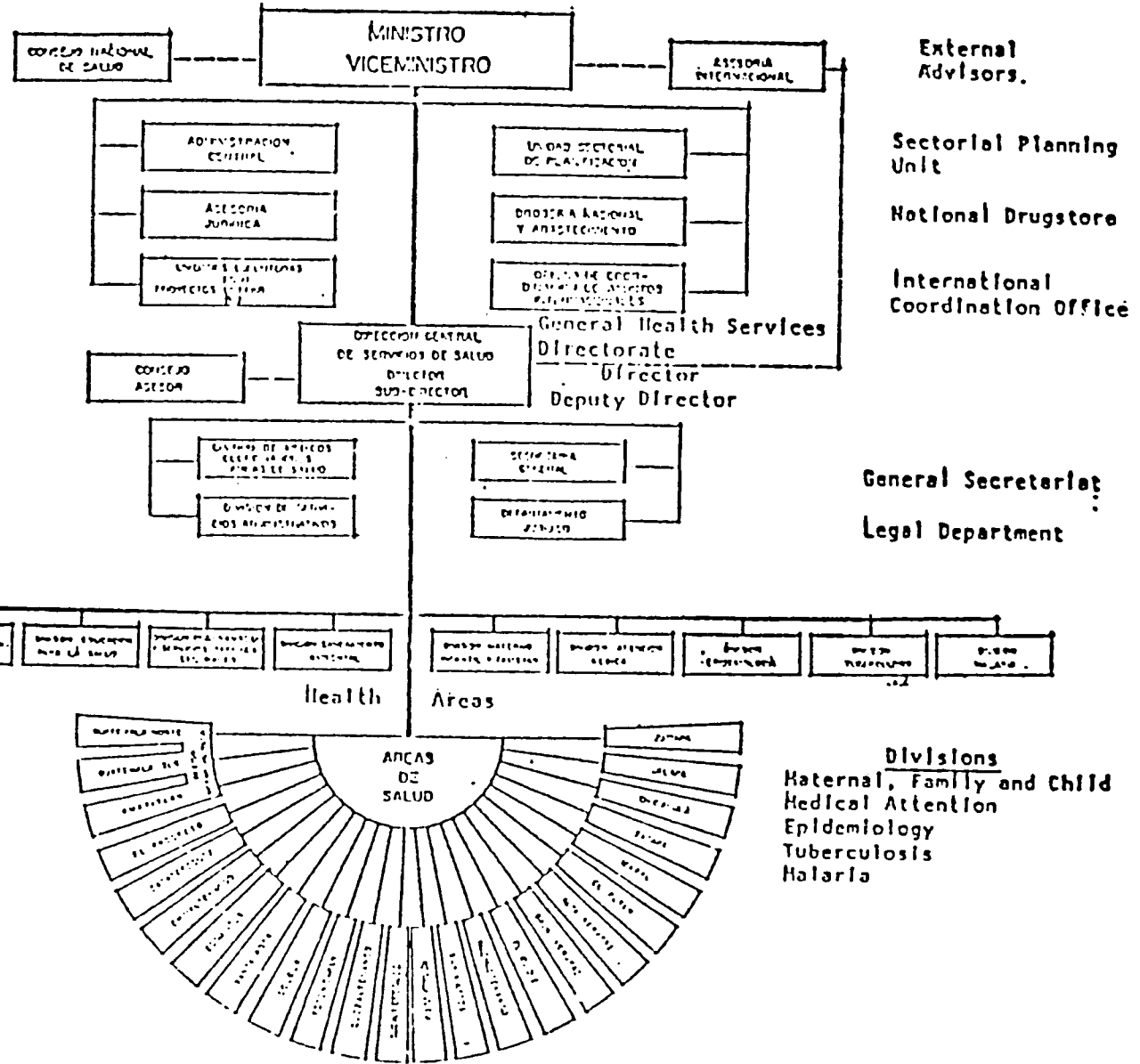
Special Executing  
Units - IDB

Advisory Council

Health Area  
Supervisory Doctors

Administrative  
Services Division

Divisions  
Laboratory  
Human Resources  
Health Education  
Programming & Tech. Services  
Environmental Health



External  
Advisors.

Sectorial Planning  
Unit

National Drugstore

International  
Coordination Office

General Secretariat  
Legal Department

Figure 6. MOH Organization



After the above test, the TARs were assigned by the DGSS to area health centers and were never used in activities for which they were trained. At present, only six of the original nine trained TARs are working for the MOH. If in fact the low scores seen did not reflect actual ability, this loss of resources may be significant.

At present, the ES engineering and construction team is understaffed.

### 3.3 Administrative

#### 3.3.1 Financial

A revolving fund was set up in January 1982 with US \$10,000 counterpart funds to pay per diem and expenses no greater than US \$300. However, the procedure for obtaining travel funds is a constraining factor since each request must be accompanied by about a dozen or more signatures depending on the places visited by the person conducting the work. All the signatures must be obtained by the person traveling. In many instances the employee has to leave his duties to try to get the required signatures. This has caused project delays since the engineers must devote time to processing their per diem papers through the system. These activities are conducted at the project central administration in Guatemala City, approximately three to four hours traveling time from the project areas.

There have been project delays due to the lack of construction materials. Although these delays have been caused by a number of different problems, the major problem is the manner in which loan funds are obtained for purchasing materials.

The budget for counterpart funds is submitted to the GOG in June and is approved in December. This is the time when the GOG specifies the ceiling the budget should have. Frequently, the budget approved is somewhat less than the requested one. Of course, many times an extension of the budget is submitted in an attempt to obtain additional funds to try to reach the original budget. However, this is not possible every time. Once the budget is approved, the MOH submits its program and budget to AID with a voucher for the amount requested. AID reviews it and makes the disbursement against a definite program and budget. The funds are then awarded to MOH which in turn notifies the DGSS accounting and the funds are deposited in the Bank of Guatemala. The DGSS proceeds to conduct the purchasing of the required materials. Once the funds have been awarded, MOH has 30 calendar days to present receipts for the amount of the disbursement. The problem has been that MOH has not been able to meet this deadline and AID does not make another disbursement until all receipts are in. This has caused delays in speeding up the purchase of more materials.

The first disbursement request was submitted to AID in April 1982, and funds were awarded in June 1982. In 1983 the second AID disbursement was made to construct 21 water supply and latrine systems which ES began to construct in June 1983.

Travel advances have been paid late; and, for the past two months, the salaries of six key project employees have not been paid, causing signifi-

cant demoralization for these individuals. Since the GOG has not yet approved the positions of these employees (including four from ES), AID has been paying for their salaries with project grant funds for the past 12 months. As of July 1983, AID stopped paying the salaries of these employees. However, their positions have not yet been approved by the GOG and probably will not be approved for another three months. This has caused further demoralization of the personnel. To further complicate things, in September 1982 the GOG ordered a cutback of counterpart funds for 1983. Because another government administration has taken over as of August 8, 1983, policies will probably change; but it is uncertain how this will affect the project.

Both a project coordinator and an administrator informed the WASH consultant that there seems to be an imbalance of funds expended to date. This information was provided toward the end of this assessment, therefore, there was not sufficient time to investigate this matter further.

### 3.3.2 Personnel

The project has had problems hiring personnel. The procedure for hiring personnel at all levels is lengthy and complicated, as delineated below:

1. The project director submits the personnel action document to the Office of Civil Service.
2. The potential employee is classified.
3. A meeting of the President of Guatemala with his Cabinet Ministers is held to approve or disapprove the position.
4. If the position is approved, the personnel action is submitted to the Ministry of Finance.
5. If the Ministry of Finance approves the position based on the GOG's budget, the personnel action is submitted to the Ministry of Health.
6. If the Ministry of Health approves the personnel action, it is submitted to the presidential palace for the President's signature.

The above process takes up to eight months to complete. This lengthy process has caused delays in hiring the required personnel.

Supervision of the project has not been a problem up to now. However, when the construction speeds up, it is expected that one AID supervisor will not be enough. The projects are distant and the roads are not good. One supervisor will have problems attending to all the projects. Also, in the event that this one supervisor is unable to be on the job, there is no other person to fill in and provide continued supervision. If important decisions need to be made in the field, or field construction engineers need technical assistance during the absence of the present supervisor, the project may suffer further delays.

### 3.3.3 Salaries

As long as AID covered salaries, ES personnel had no problems in this area. AID discontinued this practice in May 1983, however, and since then these six employees have not been paid.

### 3.3.4 Studies and Designs

This activity has had problems due to the lack of personnel and the lack of drafting and topographic equipment. The equipment has been ordered twice by ES but somehow the MOH has not purchased it. AID-approved topographic equipment is not available in Guatemala or in the Central American area authorized by AID. At present, a purchase order is being processed to procure the equipment from the U.S. However, if there is no representative in Guatemala that can perform maintenance and repairs, the project will suffer delays when the equipment must be sent to the U.S. for repairs or maintenance.

### 3.3.5 Purchasing

Purchasing of materials and equipment has been a very slow and cumbersome process which has caused considerable delays in the construction. ES engineers have had to borrow materials and equipment in order to continue working. Considerable improvising of equipment has been required. Construction projects have been stopped for up to three months because of the lack of materials or proper equipment. In some cases, the wrong materials have been ordered by the DGSS purchasing department.

Delays have also been caused by the fact that the GOG requires five estimates to accompany the request for a purchase order. Some suppliers no longer want to submit estimates because the GOG never buys from them. The purchasing department then has to devote more time to searching for estimates in other cities. In the meantime, the purchase order request cannot be submitted. Such events have caused delays with the project because material has not arrived at the construction site as programmed. Also, suppliers do not always have all the materials required; therefore, only a partial order is provided. Many times a partial order is not sufficient to make real progress.

In many cases, some of the required construction material is sent to the regional complex warehouse but other required material is not sent (e.g., PVC pipe is sent but not the PVC welding solvent, or the galvanized pipe is sent but no pipe cutter or pipe threading equipment). This manner of delivering materials has caused considerable delay in the construction of the subprojects. In spite of lengthy and detailed field reports for the past nine months from the AID construction supervisor to the project administration about these problems, the situation has remained practically unchanged.

AID requires that materials be purchased for the project with loan funds from those countries included in Code 941 of AID Handbook 11, "Country Contracting". However, in some cases suppliers have had difficulty pro-

viding the materials or equipment because either they do not have the required items or do not have U.S. dollars to purchase them from U.S. suppliers.

Communities are doubtful of government projects. When communities see that materials are lacking, members immediately conclude that the project will not be implemented. Usually, by this time villagers have contributed a considerable amount of work and become demoralized. As a result project personnel have to invest more time to keep the community's spirit up.

### 3.3.6 Warehousing

The project has taken an old hospital and remodeled it to fit their operational requirements. This facility called the Regional Complex, is located in the department of Totonicapan. This complex houses the project warehouse. The warehouse is very well organized and has a good shipping and receiving procedure. Materials are often inventoried and everything is logged in a Cardex and filed by project so that tracing materials during the project can be accomplished expeditiously. There are no problems with this project element.

### 3.3.7 Transportation

The construction component has been negatively effected by the lack of transportation. MOH thought it would be able to procure the vehicles in 1981. However, project funds were not available until an ongoing financial study was completed. Unfortunately, the deadline for '81 purchases had passed, with two results: 1) it was not possible to purchase the vehicles in 1981 and 2) programming for 1982 was submitted without this purchase. Therefore, the vehicles were programmed in June 1982 in order to permit purchase in 1983. In March 1983, MOH requested that AID procure two pick-up trucks and two eight-ton trucks. The two pick-up trucks have arrived in country and are in the process of being documented. These will soon be on the project. The two eight-ton trucks will probably arrive in about two months.

The lack of transportation has been a real problem and has caused serious delays for the construction. In two cases the communities have paid for the transportation of the construction materials just to get the project going.

One area engineer has been without transportation since the project began and has to wait until he can borrow a vehicle to go to the construction site. This situation is critical. The presence of the engineer at the construction site is extremely important in this project because community members rather than experienced construction workers are used.

### 3.3.8 AID Supervision

Within the Environmental Sanitation component, there seems to be a lack of direct AID engineering supervision. To date, the AID engineering involvement has been limited to acceptance and certification of the projects and

the supervision provided by the AID consultant who reports directly to the Chief of Health Programs. However, at the management level, AID engineering involvement has not been substantial nor continuous. The lack of this representation has caused a weak engineering representation before the MOH project management.

### 3.4 Construction

During his visit the consultant assessed six aspects of construction as follows:

- Engineering capacity - The team of engineers is comprised of civil engineers. Two have experience in aqueduct design and construction. The other two have obtained their experience while working with the project. The team has experienced problems but nothing that has caused a considerable delay and problems usually have been corrected quickly. Their material estimates reviewed during the WASH consultant's visit were well organized and easy to understand. However, the design team in the Regional Complex did not have programmable scientific calculators needed to perform the required design calculations for the aqueducts. The designs are taking longer because all calculations are done manually. The design work could be speeded up if the engineers had these calculators.
- Construction quality - Ten projects were visited throughout the project area (see Appendix C and D). These projects were in various stages of construction, and it was convenient to assess the quality at various construction phases. Based on the activity observed, no problems were found. Concrete appeared to be of good quality. The concrete mix used is 1:2:3 (one part cement: two parts sand: three parts aggregate) and about 4 1/2 gallons to 6 gallons of water per bag of cement depending on the moisture of the fine aggregate used. The fabrication (cutting and bending) of rebars to be used as reinforcement in the concrete is done by project personnel. However, the engineers are often having problems in obtaining the right quality sand or rock due to the location of the springs. Quality of the cap-pings visited was very good. Considerable ingenuity is being used to make the best use of the available water resources.
- Latrines - The latrines are manufactured by the ES in the Regional Complex. The rate of production is 50 seats and 25 slabs per day. Quality of the seats and slabs is excellent with no voids, cracks or exposed rebars. Concrete is prepared with care, including measurement of ingredients, finishing of surfaces and curing. The only problem is the lack of transportation. This has created a warehouse space problem since the space in the latrine manufacturing area is limited. Therefore, transportation of the latrines to the project site is important.
- Housing improvements - Housing improvements have not been initiated. The problem is the lack of materials and transportation. ES engineers

have been giving priority to the water supply and latrine systems, given the limited availability of construction materials. ES engineers have been talking to several communities about the housing improvement component and have noticed that the majority of the communities feel it is not fair for some to get model improvements for free while the rest must borrow funds. During the consultant's visit to the communities, five expressed similar feeling. This is an indication that initiating an activity of this type may bring more problems than benefits. Also, the engineering time involved in performing 1,400 cost estimates is time-consuming and may take more time than originally planned.

- Health post renovation - To date, 26 renovation estimates have been prepared and submitted to date for review and approval before submitting to AID. So far, no problems have been experienced with this subproject.
- Construction of health posts - This activity is programmed to be implemented in 1985. However, ES will only supervise the construction, which will be conducted by as a private firm. At present, ES is assisting the DGSS in the preparation of construction and bid documents.

There has not been any laboratory testing of the construction materials. This is not feasible because all testing would have to be done in Guatemala City, often 6-8 hours by car from the construction sites, and thus impractical. However, the engineers explained simple field tests, such as the silt test for sand, and their criteria for selection of rock as well as how they carefully monitor the quality of the concrete mix. Field engineers check the slump at the placing site.

The most critical problems the construction component has had are lack of construction materials, topographic equipment and transportation.

### 3.5 Operation and Maintenance

This component has not had problems. Communities are being trained to operate and maintain their water supply and latrine systems. Communities visited by the WASH consultant were asked about this aspect. All seem to fully understand their responsibilities.

### 3.6 Community Participation

The ES has not experienced any problems obtaining community participation. On the contrary, this aspect of the project has been excellent. Communities have performed well; in fact, some who already have their systems are helping their neighboring communities to organize. In order to do this, communities hold meetings involving their respective water and sanitation committees to discuss organizational problems.

The communities visited by the consultant expressed their sincere appreciation to the GOG and AID for all the help and financial assistance pro-

vided and seemed very pleased at having water and latrines in their communities.

## Chapter 4

### CONCLUSIONS AND RECOMMENDATIONS

Whereas the preceding chapters have focused on the project background and the project assessment, this chapter focuses on the conclusions and recommendations concerning those aspects which have impacted construction implementation for the Integrated Health and Nutrition System Project. Conclusions are drawn and appropriate recommendations are developed to address the problems discussed previously.

#### 4.1 Schedule

##### 4.1.1 Conclusions

The construction component is far behind schedule. In fact, work has not been initiated on some of the components. Construction and renovation of health posts has not started yet, and it is unknown when these activities will begin. The housing renovation component is advancing very slowly.

On the other hand, work is well advanced on the surveys and designs for the health posts to be renovated, and good progress is being made on the construction of the water systems and installation of latrines considering the delays the project has suffered. However, construction progress has not been substantial enough to recuperate the 21 months lost since October 1982, when construction of the first eight water supply systems began.

An analysis of the present situation indicates that the construction team (3 area engineers) could build 30 water systems every six months with their respective latrine and housing improvements subprojects, providing that they have a continuous supply of construction materials, an adequate number of vehicles and a good logistical support system (fuel, tires and travel expenses). If these conditions are met, the construction goals as originally established by the loan agreement could be met within the originally established time frame. However, if the present situation persists or only slight improvements are made, the originally established goals cannot be met.

Based on conversations with community committees and project construction engineers, it appears that the housing improvement component will cause more problems rather than have a positive impact. There are insufficient housing improvements to satisfy the communities and it seems that people are unhappy that some community members get free housing improvement (models) and others do not.

##### 4.1.2 Recommendations

Recommendations for goals and scheduling are listed below:

- ° If the material supply, transportation and logistical support problems are corrected, the following is recommended:



1. Delete the housing improvements since it is believed the implementation of this component would probably cause more problems than benefits. In other words, the effort is greater than the benefit to the communities. The funds originally allocated to housing improvements should be used in the following manner:

a) Construct four more water supply and latrine systems. There are US \$210,000 allocated for housing improvements. Each water and latrine project would cost approximately US \$50,000. This means that four more water and latrine projects could be added to the water supply and excreta disposal goals.

b) An alternative is to use the US \$210,000 to supply communities with a Lorena-type stove. Each stove costs approximately US \$33.00. Assuming 100 houses per community, the number of communities served would be approximately 64. This many stoves could make a greater positive impact than the housing improvements.

Considering the above, project goals should be revised as follows:

<u>Component</u>	<u>Present Goal</u>	<u>Revised Goal</u>
Water Supply Systems	114	118
Latrines	7,000	7,400
Home Improvements		
Demonstration Models	400	0
Subloans to Families	1,000	0
Renovation of Health Posts		
Major Renovation	24	24
Minor Renovation	20	20
Construction of Health Posts	13	13
Installation of Lorena Stoves*	0	6,400

\*This is an alternative project component in case the addition of the four water supply systems and the 400 latrine systems is not desirable and/or feasible.

Based on this recommendation a reasonable construction schedule for the water/latrine systems is as follows:

August - October 1983	:	21 Systems *
November 1983 - February 1984	:	25 Systems
March - June 1984	:	23 Systems
July - October 1984	:	22 Systems
November 1984 - March 1985	:	19 Systems

\*Each system includes one water supply system and 400 latrines.

° If existing conditions persist or only slightly improve, it is recommended that the project construction goals be changed as follows:

<u>COMPONENT</u>	<u>PRESENT GOAL</u>	<u>REVISED GOAL</u>
Water Supply Systems	114	85
Latrines	7,000	5,250
Home Improvements		
Demonstration Models	400	0
Subloans to Families	1,000	0
Renovation of Health Posts		
Major Renovation	24	18
Minor Renovation	20	15
Construction of Health Posts	13	13

- ° Another alternative recommendation is to extend the project completion date to September 1986 because of the large amount of work that still has to be done in order to complete the project. However, even with this extension, every effort possible should be made to correct administrative problems related to material supply, transportation, and logistical support. If these administrative aspects do not improve, it will be difficult to meet the originally established construction goals.

The above recommendations are based on past performance experience and on the expectation that recommendations on other administrative aspects of the project will result in removing some of the existing bottlenecks to allow a more expeditious implementation of the project.

## 4.2 Organizational

### 4.2.1 Conclusions

One of the weaknesses of the present organizational structure is that the TSRs mainly work with the project's medical staff. Apparently the TSRs have been used to conduct activities outside those related to the program. Thus, little time is left to work with the engineers in obtaining preliminary information required to initiate a water supply and latrine system construction feasibility study. Based on the information gathered, it is evident that in relation to environmental sanitation, the majority of the TSRs are not functioning as planned.

A second weakness is the lack of good coordination between the area chief physicians and the area engineers. Up to now there has been a noticeable gap in this relationship which has prevented an adequate establishment of priorities with respect to project environmental sanitation and primary health care components.

A third weakness is that as a result of carrying out responsibilities which their respective positions call for, area physicians do not provide the priority that some of the environmental sanitation activities demand. Also, in some cases decisions which the area physician needs to make, with respect to assisting ES, are not made fast enough. Therefore, the execution of an engineering or construction activity is often delayed. There seems to be considerable lack of coordination and communication throughout

the program which has caused: a) loss of time and resources, and b) delays in the construction component. In many instances, technical personnel have to leave their work sites to try to solve administrative matters which are totally outside their scope of work.\*

An observation was made relative to the project supervision. Due to the difficult topography of the project area and the dispersion of some of the projects, one AID supervisor will not be sufficient. This will be even more evident when the construction component picks up speed. Up to now this has not been felt because construction activities only began in October 1982, and progress has been slow due to the limited supply of materials and lack of transportation.

Proper staffing of the ES component is critical to timely implementation of construction activities and to project success.

#### 4.2.2 Recommendations

It is recommended that:

- ° Project central administration inform area physicians and TSRs of the TSRs' role in the project. It is important that these individuals know how valuable the assistance of the TSRs is to the implementation of the ES component.
- ° To achieve a better coordination and to encourage more communication among project personnel, the project coordinator should conduct an information seminar at least every three months to discuss project problems and priorities within the various project components. These seminars should involve regional personnel. Also, this type of activity would allow everyone concerned to know the project and learn how the various components integrate with one another. The project is an integrated one and an effort should be made to achieve that goal. As a result of this, area physicians and engineers could improve their relationship with each other.
- ° The central project administration should be the catalyst of this coordination activity at all levels, especially since the project must integrate several components and since the success of one component is directly dependent on the success of another.

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\*Valle, Garrido, Juan; Program Sistemas Comunitarios Integrados de Salud y Nutricion Financiado por Proyecto A.I.D. 520-U-033, "Diagnostico Contrato No. 520-0251-C-00-3061-00", Guatemala, 6 de Julio de 1983.

- Another AID supervisor and technical assistant should be contracted to assist the present AID consultant construction supervisor. The candidate for this position should be a construction/civil engineer with experience in water projects who is willing to spend a great deal of time in the field. A private consultant firm is not recommended. Two experienced project supervisors are required, providing the ES staff is complete. The supervisors can then concentrate on supervision rather than on being part of the construction team.

#### 4.3 Administrative

##### 4.3.1 Financial

##### Conclusions

The environmental sanitation component has suffered from considerable delays due to:

- Inefficiency of the central administration in paying personnel salaries and travel advances.
- Length of the process required to purchase materials and supplies.

Also, the project coordinator and administrator have stated that there seems to be an imbalance of funds expended to date.

##### Recommendations

It is recommended that AID pay the salaries of six key project personnel for the next 2-3 months until the GOG approves their positions (see Section 3.3--Financial) to avoid demoralization among these individuals.

It is recommended that the possibilities of using the bidding (Licitacion) process to purchase materials be explored. Based on discussions with administrative personnel, this process could speed up the procurement process.

It is recommended that a closer and expert look be given to the project expenditures to determine if in fact there is an imbalance and what action should be taken.

##### 4.3.2 Personnel

##### Conclusions

The environmental sanitation component has been short of personnel. To date, only one of the three area engineers has the three assistant engineers stipulated by the project paper. The project's design engineer resigned and to date this position has not been filled because the MOH project central administration believes it is not necessary to replace this person. However, if the construction activity speeds up, this individual will be needed to expedite preparation of the studies and designs. Also, two of the project areas (Tonicapan and Solola) need three environmental

sanitation inspectors each. To date these area engineers have been, for the most part, working alone. These inspectors are greatly needed.

It is evident that good quality work has been done by the AID engineering technical consultant and supervisor. Since his appointment, considerable improvement has occurred with respect to coordination and construction strategy. It appears that there is little interaction between the AID consultant and supervisor and the project central administration. This lack of communication is important because it would help considerably to develop a better relationship and to establish engineering and construction priorities.

Because the work load could be substantial if the construction activity progresses more rapidly, it will be necessary to contract another AID construction supervisor engineer (see Section 4.2.2).

#### Recommendations

It is recommended that if construction goals remain as originally established by the loan agreement, one design engineer, six environmental sanitation inspectors (ISAs) and one assistant engineer be hired to speed up the engineering and construction activities. If the recommendation of reducing the construction goals is selected, it is recommended that only the six ISAs be hired (three for each of the two areas which lack the assistance). The AID supervisory consultant is vital to the construction component. Also, it is recommended that he interact more with the project central administration as well as be invited to management meetings held at the administration level. This would permit more engineering representation when decisions are made. Such interaction would be very beneficial to the project.

It is recommended that another AID construction supervisory consultant engineer be hired to assist with this activity and help expedite the construction component (see Section 4.2.2).

It is recommended that the ES project component have more direct supervision from the AID direct-hired engineering staff to strengthen the engineering decision-making process. One of the AID direct-hired engineers should attend project management decision-making meetings. The AID construction supervisors should report to an AID direct-hired engineer in order to obtain more technical support.

#### 4.3.3 Studies and Designs

#### Conclusions

Good progress has been made on the studies and designs for the water supply and latrine systems and renovation of health posts. The evaluation of candidates for housing improvements in the communities has been slow. Practically nothing has been done in the area of subloans to communities for housing improvements. The design group has been working with borrowed equipment. The equipment often has to be returned before the work is completed, causing further delays.

## Recommendations

It is recommended that the housing improvement component be eliminated and the funds be used either to provide Lorena stoves to all villagers or to provide more water supply systems with their respective latrines (see Section 4.1.2).

It is recommended that adequate design equipment be provided to the design group to avoid delays in producing designs.

### 4.3.4 Purchasing

## Conclusions

The environmental sanitation construction component has suffered significant delays due to the lack of equipment, tools and construction materials. To date, in order to make any progress, ES has had to improvise tools and borrow equipment and materials such as:

- Pipe cutters
- Work bench vises
- Steel bending equipment
- Surveying equipment
- Threading tools
- Cement
- Drafting equipment
- Trucks

In many cases, construction of a water system has had to be stopped for up to three months because of the lack of required materials. Often the wrong materials have been ordered by the purchasing department causing further delays. There is poor communication between field engineers and purchasing department staff. Purchasing department management does not delegate enough activities and has created a decision funnel which has resulted in materials procurement delays.

The lack of construction materials has not only caused delays in the construction activity but has also affected the project's credibility in the eyes of the communities. When construction materials fail to arrive at the project site, communities think that AID and GOG are not serious about completing the projects. As a result, heavy promotion has to be conducted in order for the communities to continue believing in the project and the work of the staff. The additional time expended on promotion means further delays since construction cannot continue until the communities believe in the project again.

## Recommendations

It is recommended that technical assistance be requested from the DGSS to AID as soon as possible to assist the DGSS procurement department in speeding up this process and to recommend an appropriate management system to facilitate efficient procurement procedures for the construction component.

To speed up the construction, it is necessary to adequately stock the project's warehouse. Since at present DGSS is having problems procuring the equipment and materials, it is recommended that AID procure materials and equipment for a period of time until a sufficient stock is on hand. This would constitute a tremendous help to the project and would speed up the construction activity.

It is recommended that before purchase orders are sent to suppliers, both field engineers and the purchasing staff understand the specifications of the materials being requested and set priorities for their delivery to avoid misunderstandings and consequently delays because the wrong materials are sent.

#### 4.3.5 Warehousing

##### Conclusions

It is evident that the regional complex staff has worked very hard to maintain a very adequate warehouse that is well organized through a good procedure for receiving and shipping construction materials.

##### Recommendations

It is recommended that project administration support warehouse personnel in continuing a good operation of the facility. This is a key component to the expeditious construction of the subprojects.

#### 4.3.6 Transportation

##### Conclusions

To date, after the lack of equipment, tools and materials, the lack of transportation has been the next most important factor responsible for considerable delays in the construction component. In many cases, even when the materials have been available, the construction activity has remained stopped because the required transportation to take the materials to the construction site is unavailable. This has caused significant delays and considerable frustration on the part of the communities and the construction team. The project is well into its third year and still has no trucks to transport materials. Because the GOG was having problems procuring the vehicles for the construction component, the GOG requested AID to procure them from the U.S. In March 1983 two pick-ups and two eight-ton trucks were ordered. At present, the two pick-up trucks have arrived and are being legalized by MOH and should soon be delivered to the project. The two eight-ton trucks should be shipped from the U.S. in another 30 days or so.

If the required vehicles are not delivered to the project soon, the construction component will continue to suffer serious delays.

## Recommendations

It is recommended that:

- ° Prompt attention be given to delivery of the two pick-up trucks which have arrived from the U.S. to improve mobilization of field personnel. This should also be done when the two eight-ton trucks arrive in the country.
- ° Motorcycles should be provided to the nine inspectors in order to provide them with more flexibility of movement.
- ° One additional 8-ton truck should be procured in order to speed up the delivery of materials. This could help make up for lost time.
- ° One additional pick-up truck should be procured for the design engineer and regional administrator.

### 4.3.7 AID Supervision

#### Conclusions

There is not enough direct AID engineering supervision. To date, the engineering and construction supervision provided by AID direct-hired engineering personnel has been limited to certification and acceptance of the completed projects. Based on conversations with the AID direct-hired engineering personnel, it seems that the AID engineering group is adequately staffed to conduct this supervision.

#### Recommendations

It is recommended that AID direct-hired engineering personnel be assigned more direct supervision of the construction component and be allowed to interact with the project's central administration in order to strengthen the engineering decision-making process within the project. One engineer would be sufficient to perform this activity.

It is recommended that the AID construction supervisory consultants report to the AID direct-hired engineering supervisor to obtain better technical support.

## 4.4 Construction

### 4.4.1 Conclusions

The quality and enthusiasm of the construction personnel is very high. In spite of the numerous problems, many beyond their control, they have proven to be a hard-working group. The construction component has experienced a series of problems because of insufficient materials, tools, equipment, transportation, fuel, and personnel, and because of a lack of coordination between the environmental sanitation and project administration that has delayed salary payments and travel advances.



#### 4.4.2 Recommendations

It is recommended that:

- Coordination be strengthened within all subprojects and at all levels.
- Coordinated promotion be improved for the construction of water systems and the installation of latrines.
- Construction supervision be increased by one more construction supervisor engineer (see Section 4.4.2.).

#### 4.5 Operation and Maintenance

##### 4.5.1 Conclusions

Community members are being trained by the construction engineers in the operation and maintenance of the water supply and latrine systems. Communities visited seemed to understand their duties and responsibilities with respect to operating and maintaining their systems as well as how to collect the maintenance fees.

##### 4.5.2 Recommendation

It is recommended that promotion continue as it has been to ensure communities know how to operate and maintain their systems.

#### 4.6 Community Participation

##### 4.6.1 Conclusions

Community participation has been excellent in the project area. Communities have, in many cases, done work that is beyond their responsibility when the project has not been able to provide transportation of the construction materials. In some cases communities have paid for the transportation of materials because the project has not been able to provide it. In other instances, when certain items have not been available, they have volunteered to buy them just to get the project going.

It is doubted that in most projects the full value of community participation has ever been fully appreciated and evaluated, not only in the monetary value of this important input (estimated at percent of the present project) but also in the inherent development value of this input for the community itself.

Communities have responded very well to the community participation concept when the villagers have seen a more tangible reward for their labor. Some communities have waited up to eight years to get a water supply system. These communities have expressed their sincere appreciation to the project and its sponsors for providing them with the opportunity of enjoying the benefits of clean and safe water.

#### 4.6.2 Recommendations

It is recommended that:

- Communities be fully involved in whatever aspects of the project may require their assistance and that community wishes be taken into consideration in all phases of the project to avoid misunderstanding and make the community feel that it is their project.
- A community be advised as early as feasible of the possibility of assistance in obtaining a water supply system, latrines, or whatever facility the project may provide with a clear understanding of the responsibilities of each party. Undue expectations should not be aroused before the agreement for the installation of the system is accepted to avoid making the communities feel betrayed.
- To stimulate pride in the facility and to document the participation of the community as well as that of the GOG and U.S., a permanent plaque be installed to be unveiled at the inauguration of each facility.

## References

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## Appendix A

### Itinerary

July 25 Traveled to Guatemala City

26 Briefing in AID

27 Review of Project Documents  
Arrangement of Field Trip

28-29 Totonicapan - Discussions with the Regional Engineer,  
Area Engineers, Project Regional Administrator, Chief  
Area Physician, General Staff. Visited the Regional  
Complex, Canton Vasquez, Chuicotom, Jutacaj and Chiyax.  
Returned to Guatemala City.

Aug. 1 Briefing in AID/Review Documentation. Traveled to  
Totonicapan.

2-3 San Marcos - Discussions with the Area Engineer and  
Chief Area Physician. Visited La Fraternidad, Tojchina,  
Las Escobas and Baljetre.

4 Totonicapan - Discussions with the Regional Engineer and  
Regional Administrator. Traveled to Solola.  
Discussions with Area Engineer and Chief Area Physician.

5 Solola - Visited Chuijomil and Los Tablones.  
Traveled to Guatemala City.

8 Briefing in AID  
Report Preparation

9 Debriefing with AID Mission Director, OPH and PDSO  
Report Preparation

10 Debriefing with PDSO, and D.G.S.S.  
Report Preparation

11 Report Preparation

12 Final Debriefing for AID-OPH

13 Return to U.S.

Officials Contacted

Guatemala City:

USAID

Mr. Charles E. Costello, Director  
Mr. Paul Cohn, Chief - Office of Public Health  
Dr. Leonel Barrios, Medical Assistant  
Mr. Gary Vaughn, Program Development and Support Officer  
Ms. Clara Carr, Deputy Program Officer  
Mr. Edward Baker - Chief - PDSO  
Eng. Victor Dardon, PDSO  
Eng. Hugo Oliva, Supervisor/Env. Sanitation

MOH

Dr. Francisco Zambroni, Director Gral./D.G.S.S.  
Dr. Danilo Aldana, Assistant Director/D.G.S.S.  
Dr. Edgar Lara, Project Coordinator/D.G.S.S.  
Mr. Gustavo Linares, Project Administrator/D.G.S.S.

Project Area

Totonicapan

MOH

Dr. Jose Yax, Chief Area Physician

Eng. Cesar L. Soto, Project ES Coordinator/D.G.S.S.

Eng. Luis Cirais, Project ES Area Engineer/D.G.S.S.

Mr. Oliver Xitumul, Regional Project Administrator

San Marcos

MOH

Eng. Julio Rodriguez, Project ES Area

Engineer/D.G.S.S.

Dr. Rudy A. de Leon, Chief Area Physician

Solola

MOH

Dr. Daniel Cardona, Chief Area Physician

Eng. Pedro Tax, Project ES Area Engineer/D.G.S.S.

Dr. Jorge Noe Gonzalez, Director-Health

Center/Santa Lucia Utatlan

APPENDIX C

Projects Visited

Department of Totonicapan

Canton Vasquez

Chuicotom

Jutacaj

Chiyax

Department of San Marcos

La Fraternidad

Tojchina

Las Escobas

Baljetre

Department of Solola

Chuijomil

Los Tablones

Health Centers Visited

Totonicapan

San Marcos

Solola

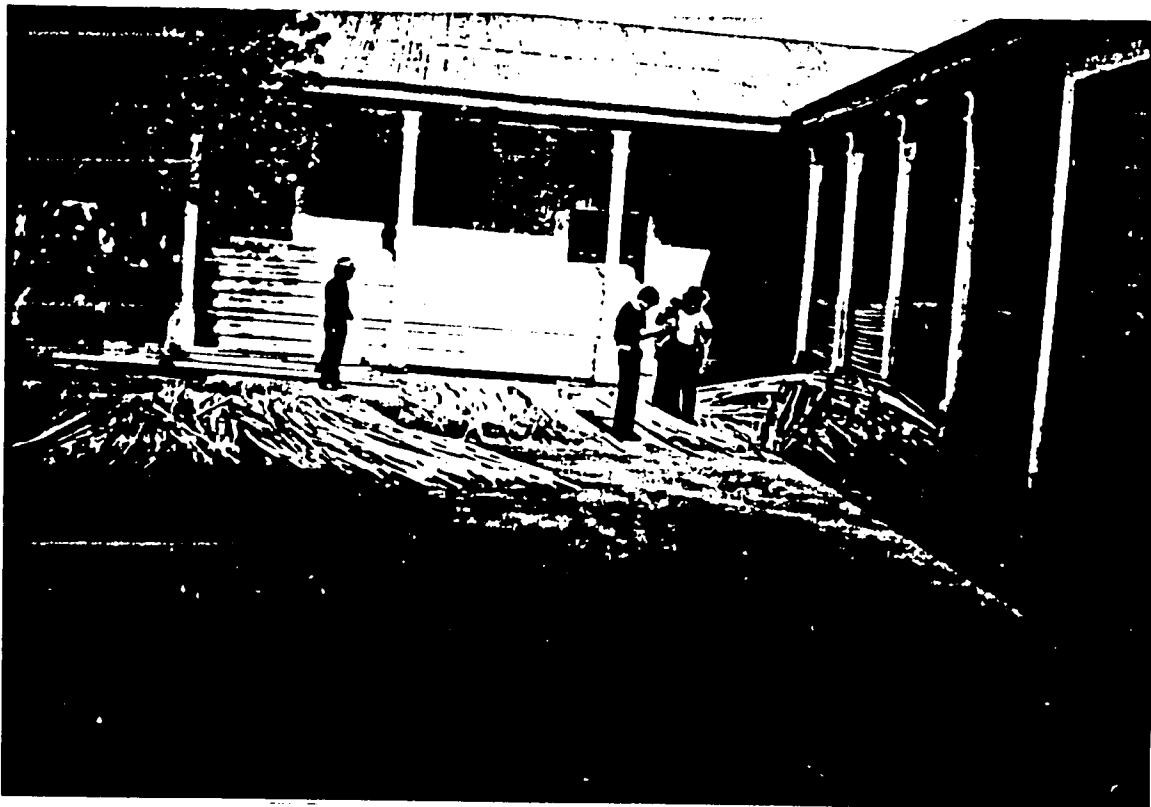
Appendix D

PHOTOGRAPHS OF PROJECTS VISITED





OUTSIDE VIEW OF THE PROJECT REGIONAL COMPLEX IN TOTONICAPAN WHICH HOUSES THE DESIGN GROUP, WAREHOUSE, MAINTENANCE SHOPS, LATRINE FACTORY AND REGIONAL ENGINEERING ADMINISTRATIVE OFFICES.



PROJECT PERSONNEL IN THE PROCESS OF RECEIVING PVC PIPE BEFORE IT IS TAKEN TO THE WAREHOUSE IN THE REGIONAL COMPLEX.



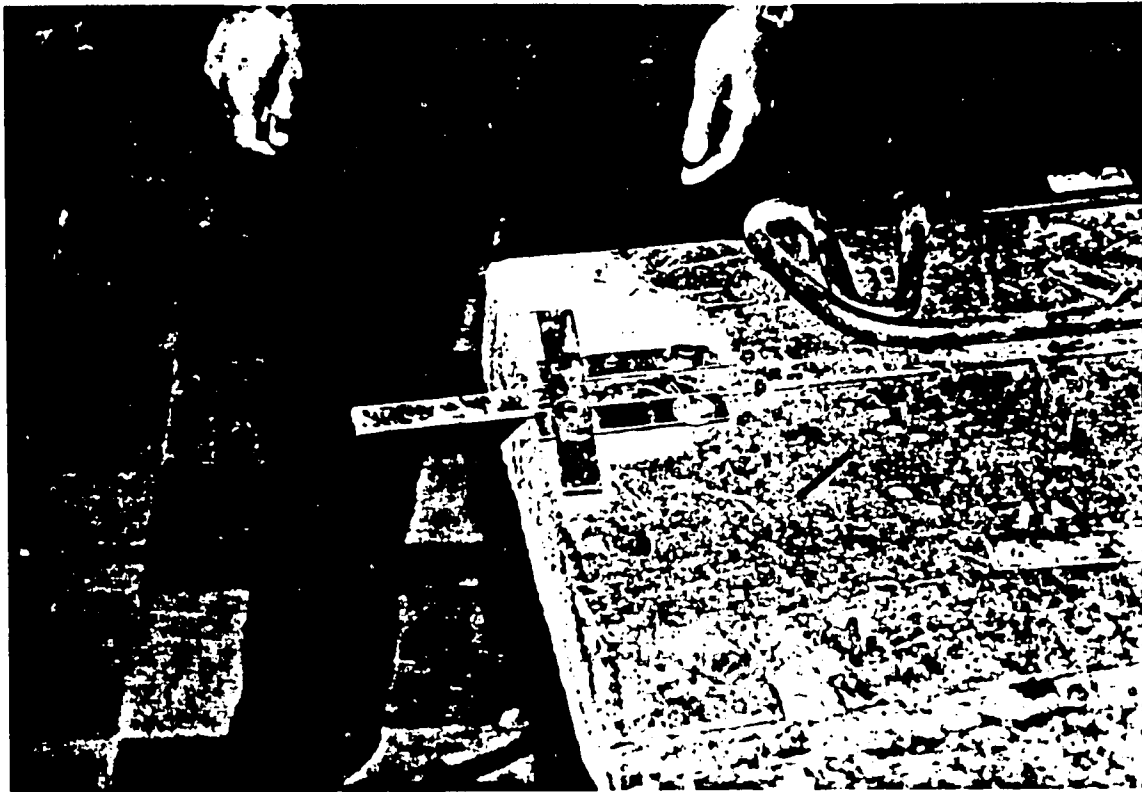
PROJECT REGIONAL COMPLEX - CONSTRUCTION MATERIALS IN THE WAREHOUSE. ALL THESE ITEMS HAVE BEEN PROPLERY DOCUMENTED. THEIR "CARDEX" SYSTEM PERMITS THEM TO KNOW HOW MANY AND WHAT KIND OF ITEMS EXIST OR ARE NEEDED PER SUBPROJECT.



PROJECT REGIONAL COMPLEX VEHICLE MAINTENANCE AREA (THE WOOD SEEN WAS BEING TEMPORARILY STORED IN THIS AREA).



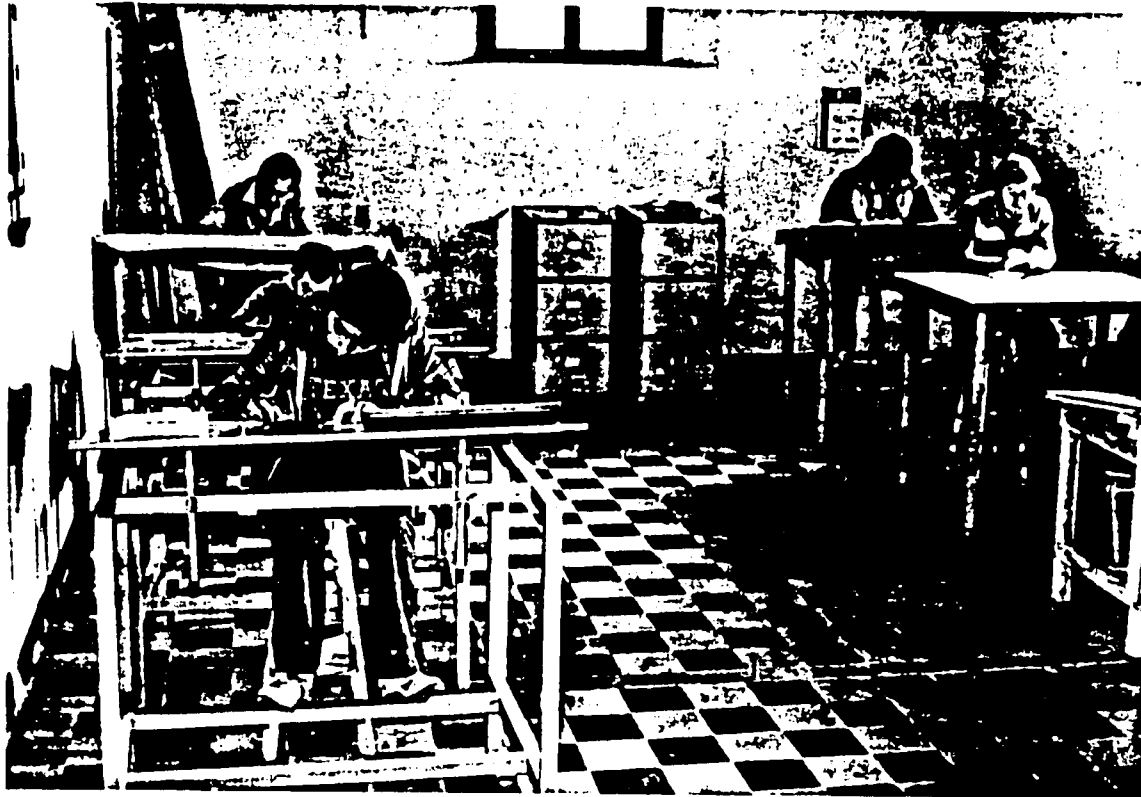
PROJECT REGIONAL COMPLEX - CARPENTRY SHOP MANUFACTURING LATRINE SEAT TOPS.



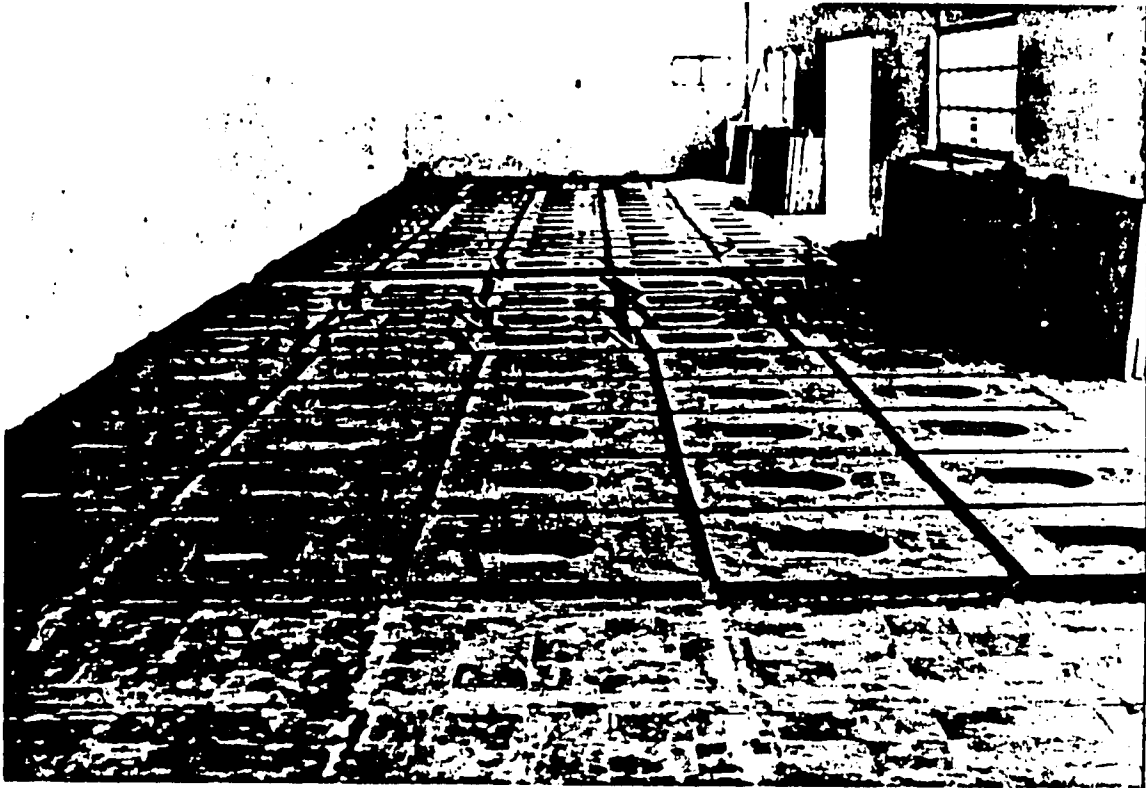
PROJECT REGIONAL COMPLEX - WORK BENCH IN THE LATRINE FACTORY WITH IMPROVISED VISE IN ORDER TO GET THE JOB DONE.



PROJECT REGIONAL COMPLEX - IMPROVISED ELECTRIC DRILL BEING USED IN THE LATRINE FACTORY.



PROJECT REGIONAL COMPLEX - DESIGN AND DRAFTING PERSONNEL.



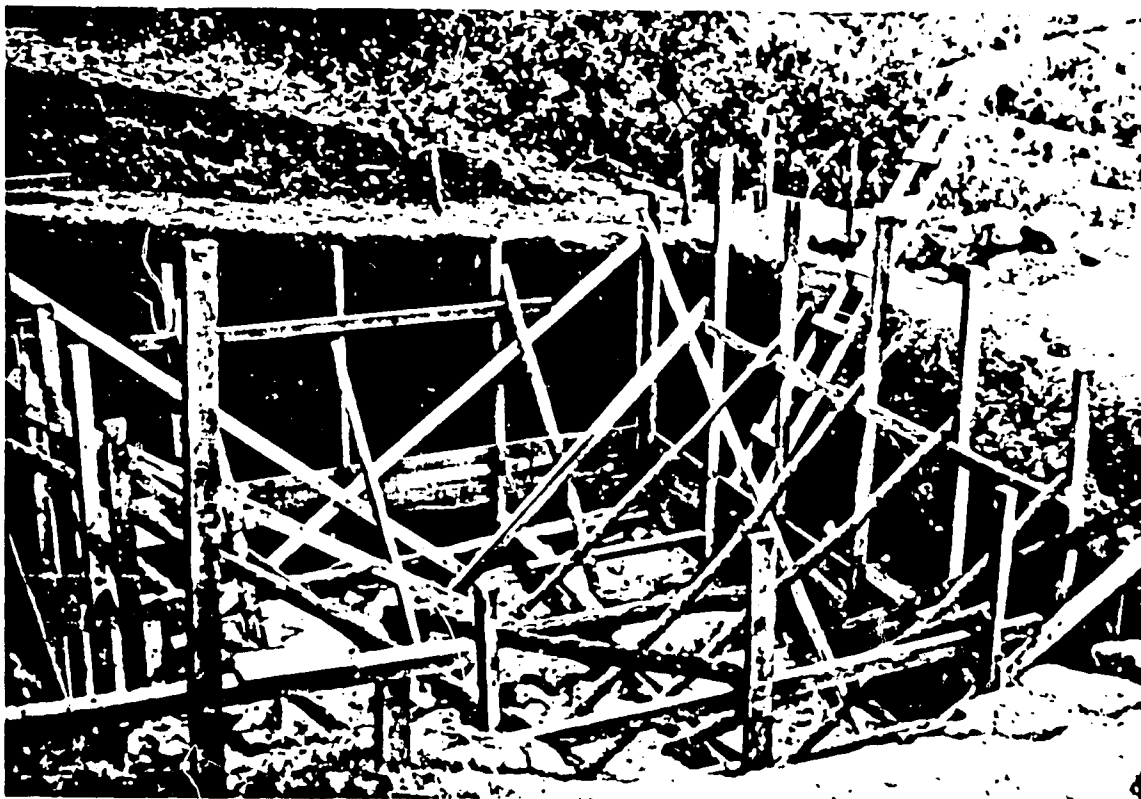
PROJECT REGIONAL COMPLEX - LATRINE SLABS BEING CURED AT THE LATRINE FACTORY. VERY ORGANIZED AND WELL DONE OPERATION.



PROJECT REGIONAL COMPLEX - LATRINE SEATS BEING MANUFACTURED.



SPRING WATER COLLECTION SYSTEM FOR THE COMMUNITY OF CHUICOTOM IN THE DEPARTMENT OF TONICAPAN. THIS COMMUNITY IS 4 KILOMETERS FROM THE WATER SUPPLY SOURCE. 1) SPRING WATER COLLECTION PIPES AND 2) COLLECTION TANKS.



WATER DISTRIBUTION TANK UNDER CONSTRUCTION FOR THE COMMUNITY OF CHUICOTOM. THE CONSTRUCTION ACTIVITY HAD BEEN STOPPED FOR OVER FOUR WEEKS DUE TO THE LACK OF REBAR AND CEMENT.



SPRING CAPPING PROJECT CALLED JUTACAJ UNDER CONSTRUCTION. IT WILL SERVE THE COMMUNITIES OF JUTACAJ, RACANA, SICALBE AND JOSE SIGUILA IN THE DEPARTMENT OF TOTONICAPAN. THERE WILL BE 220 HOUSEHOLD CONNECTIONS. THE LENGTH OF THE DISTRIBUTION LINE WILL BE 35 KILOMETERS. IT WILL SERVE 1,400 PEOPLE.



THIS PICTURE SHOWS THE END OF THE COLLECTION BOX. THE TWO ARROWS INDICATE THE TWO MAIN SPRING VEINS WHICH WILL BE FEEDING THE WATER DISTRIBUTION TANK.





COMMUNITY MEMBERS CARRYING SAND TO THE CONSTRUCTION SITE WHERE THE SPRING CAP IS BEING BUILT FOR THE JUTACAJ PROJECT IN THE DEPARTMENT OF TOTONICAPAN.



TYPICAL SIMPLE PIT LATRINE OF CHIYAX LOCATED IN TOTONICAPAN.



SPRING CAPPING UNDER CONSTRUCTION FOR CASERIO LAS FLORES IN THE DEPARTMENT OF SAN MARCOS.



TRENCH FOR THE WATER TRANSMISSION LINE UNDER CONSTRUCTION. THIS CAN GIVE AN IDEA OF THE TYPE OF TERRAIN THE COMMUNITIES HAVE TO WORK WITH.



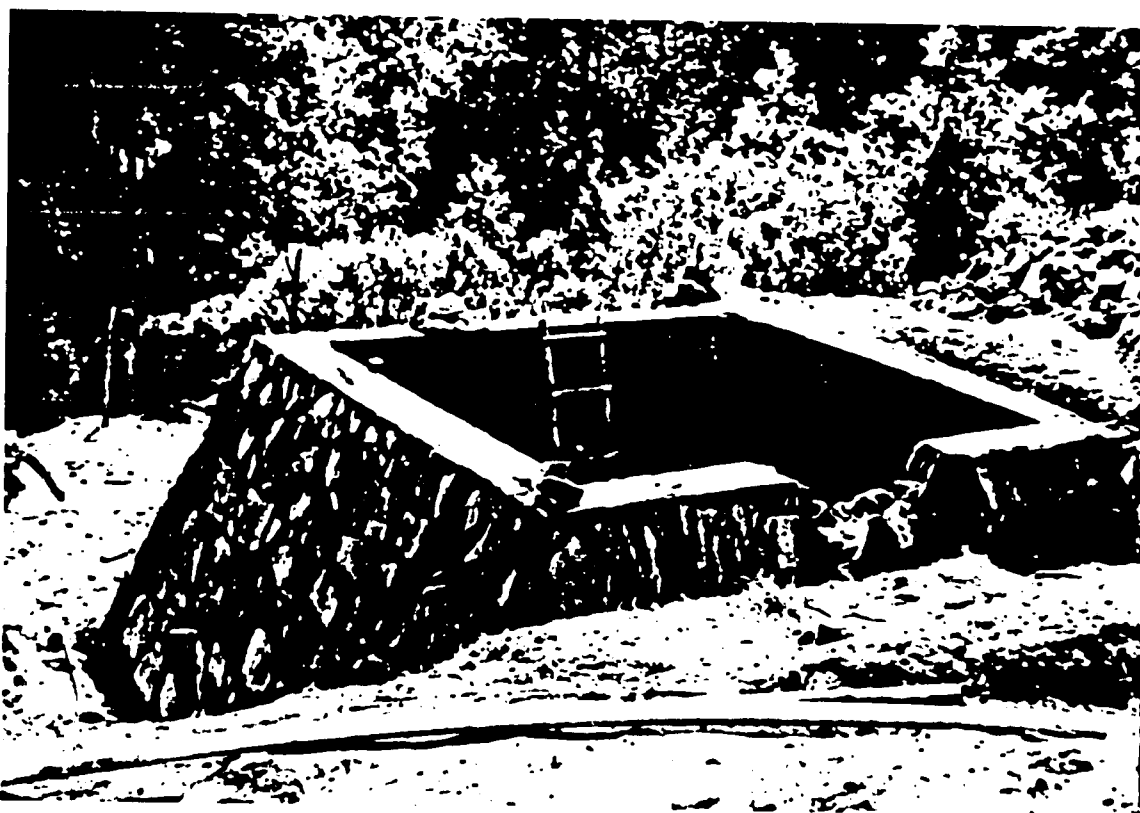
TYPICAL WATER STAND POST SERVING FOUR HOUSES IN BALJETRE IN THE DEPARTMENT OF SAN MARCOS.



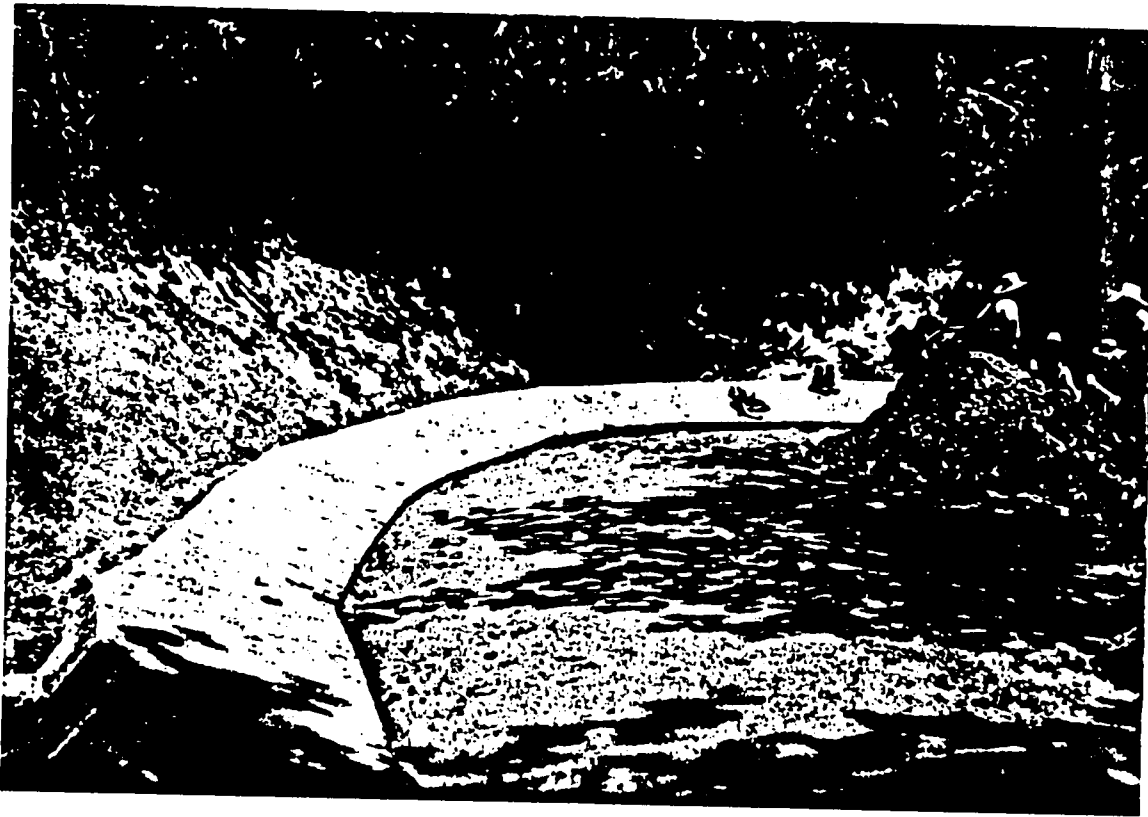
SPRING CAP CONSTRUCTED FOR THE COMMUNITY OF BALJETRE IN THE DEPARTMENT OF SAN MARCOS.



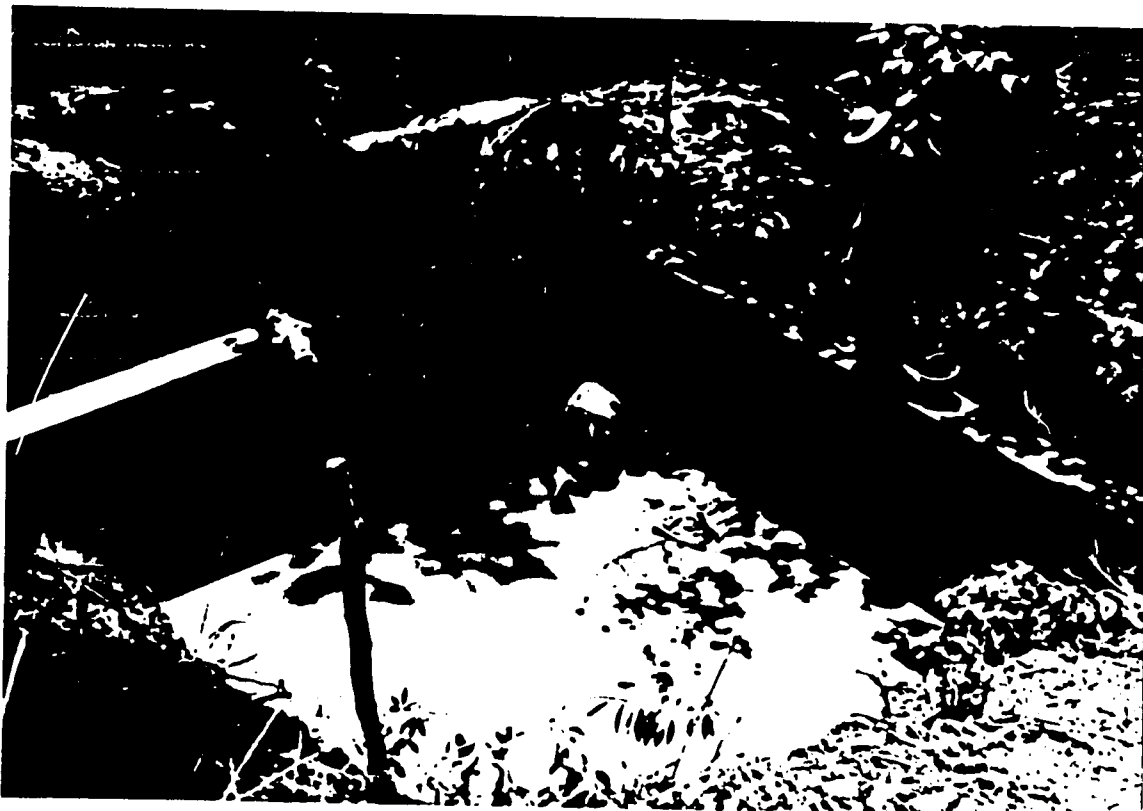
SPRING CAPPING COMPLETED FOR THE COMMUNITY OF CHUIJOMIL IN THE DEPARTMENT OF SOLOLA WHICH WILL SERVE 50 HOUSEHOLD CONNECTIONS.



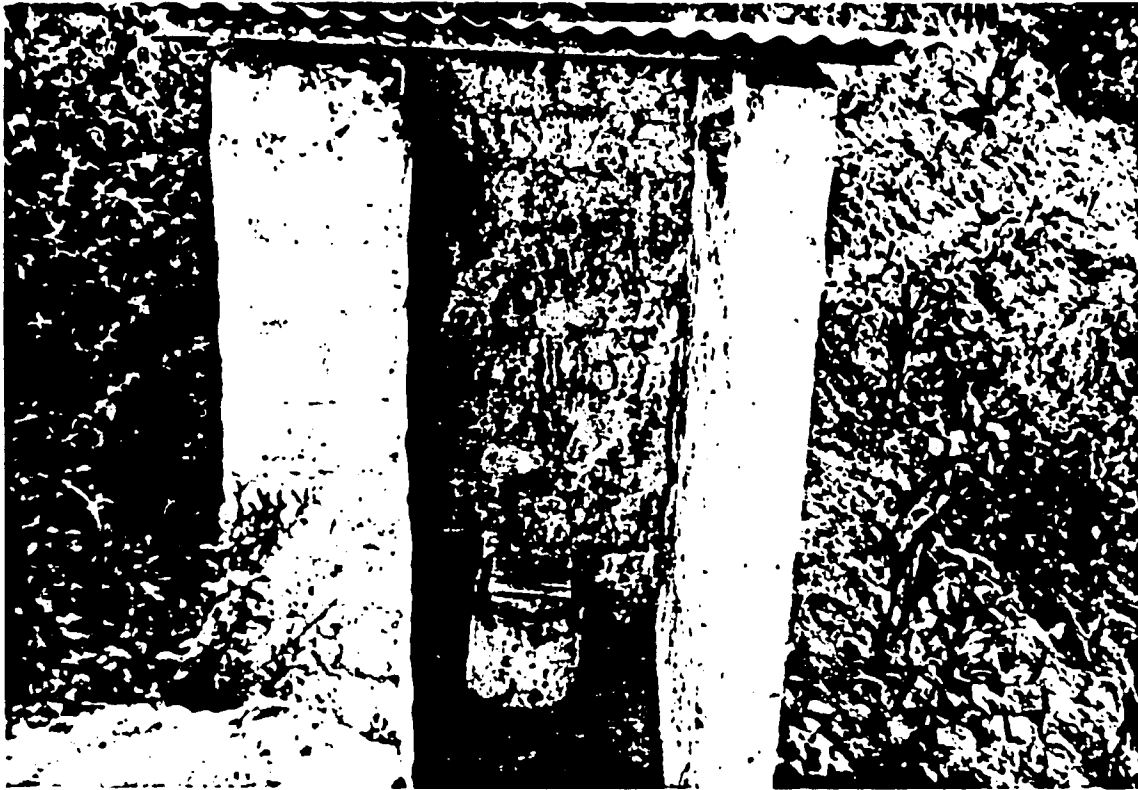
WATER DISTRIBUTION TANK UNDER CONSTRUCTION FOR THE ABOVE COMMUNITY.



SPRING CAPPING COMPLETED FOR THE COMMUNITY OF LOS  
TABLONES IN THE DEPARTMENT OF SOLOLA WHICH WILL SERVE  
180 HOUSEHOLD CONNECTIONS 6 KILOMETERS AWAY



WATER DISTRIBUTION TANK UNDER CONSTRUCTION FOR THE  
ABOVE COMMUNITY.



TYPICAL SIMPLE PIT LATRINE IN THE COMMUNITY OF BALJETRE IN THE DEPARTMENT OF SAN MARCOS.



AS A SYMBOL OF APPRECIATION TO THE G.O.G. AND U.S.A.I.D. THE COMMUNITY OF TOJCHINA PROVIDED FRUIT TO THE VISITING WASH CONSULTANT. COMMUNITIES ARE VERY GRATEFUL FOR THEIR PROJECTS.