

9365942  
FD-FAW-678  
USD-49207  
b2



WATER AND SANITATION  
FOR HEALTH PROJECT

# EMERGENCY WATER SUPPLY AND SANITATION ASSISTANCE TO ETHIOPIA - OPERATION AND MAINTENANCE ASPECTS

Operated by  
CDM and Associates

Sponsored by the U.S. Agency  
for International Development

1611 N. Kent Street, Room 1002  
Arlington, Virginia 22209 USA

Telephone: (703) 243-8200  
Telex No. WU1 64552  
Cable Address WASHAID

## WASH FIELD REPORT No. 146

### SEPTEMBER 1985

The WASH Project is managed  
by Ganto Dresser & McKee  
International, Inc. Principal  
cooperating institutions and  
subcontractors are: Associates  
in Rural Development, Inc.,  
International Science and  
Technology Institute, Inc.,  
Research Triangle Institute,  
Training Resources Group,  
University of North Carolina

Prepared for the  
USAID Office of Foreign Disaster Assistance  
Activity No. 131

WASH Field Report No. 146

EMERGENCY WATER SUPPLY AND SANITATION ASSISTANCE  
TO ETHIOPIA

Operation and Maintenance Aspects

Prepared for the USAID Office of Foreign Disaster Assistance  
under WASH Activity No. 131

by

Charles E. Kline, P.E.

September 1985

## Table of Contents

Chapter	Page
ACKNOWLEDGEMENTS.....	iii
LIST OF ACRONYMS.....	v
EXECUTIVE SUMMARY.....	vii
1. BACKGROUND.....	1
1.1 Previous Related Work.....	1
1.1.1 Initial WASH Involvement	
1.2 Request from USAID/Ethiopia.....	1
1.3 Scope of Work.....	1
2. ITINERARY.....	3
3. FIELD TRIP ACTIVITIES.....	5
3.1 Introduction.....	5
3.2 Purpose.....	5
3.3 Itinerary.....	5
3.4 Summary.....	6
4. PROJECT DEVELOPMENT.....	9
4.1 Infrastructure Considerations.....	9
4.2 Sector Requirements.....	10
4.3 Present Situation.....	11
4.4 Project Constraints.....	13
5. CONCLUSIONS.....	15
5.1 Population Centers.....	15
5.2 Assistance Possibilities.....	16
5.3 Overview.....	16
6. RECOMMENDATIONS.....	19
6.1 Production Development.....	19
6.2 PVO Operation and Maintenance Programs.....	19
6.3 PVO Water Supply Projects.....	19
6.4 WSSA Consultancy.....	20
6.5 WSSA Operation and Maintenance Assistance.....	20
6.6 Human Resources Assistance.....	21
6.6.1 Operation and Maintenance Specialist	
6.6.2 Water Supply and Sanitation Engineer	

**APPENDICES**

	<b>Page</b>
A. Field Trip Report.....	23
B. Draft Proposal on Water Supply Schemes.....	53
C. Terms of Reference for Consultancy Services.....	71
D. OXFAM Report (extract) on Water Supply in Wello Region.....	83

## ACKNOWLEDGEMENTS

The following individuals, institutions and organizations have contributed a great deal to the preparation of this report and deserve appreciation and thanks:

- Ato Biru Itissa - General Manager, Water Supply and Sewerage Authority, National Water Resources Commission
- Ato Mulugeta Kebede - Head, Engineering and Technical Service Department, Relief and Rehabilitation Commission
- Ato Ephrem Guade - Head of Water Supply Department, Relief and Rehabilitation Commission
- Ato Tadesse Damenu - Wello Region District Manager, Ethiopian Water works Construction Authority, National Water Resources Commission
- Mr. Kalidas Ray - Chief, Water Section, UNICEF

The staff of USAID/Ethiopia and a host of dedicated volunteers serving in the relief shelters and feeding stations in Wello Region.

## LIST OF ACRONYMS

EWCA	Ethiopian Water Works Construction Authority
GOE	Government of Ethiopia
lcd	Liters per capita per day
NGO	Non-governmental Organization
NMSA	National Meteorological Services Agency
NWRC	National Water Resources Commission
OFDA	Office of Foreign Disaster Assistance
PVO	Private Voluntary Organization
RRC	Relief and Rehabilitation Commission
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WASH	Water and Sanitation for Health Project
WRDA	Water Resources Development Authority
WSS	Water supply and sanitation
WSSA	Water Supply and Sewerage Authority

## EXECUTIVE SUMMARY

In response to a request from USAID/Ethiopia dated 1 March 1985, the Water and Sanitation for Health (WASH) Project was asked by the Office of Foreign Disaster Assistance (OFDA) to provide a water supply and sanitation consultant for a six- to eight-week assignment in Ethiopia. The primary role of the consultant was to perform duties related to the provision of emergency water supply and sanitation (WSS) assistance to the drought-affected areas in Ethiopia. With the production (well) development program in progress through UNICEF, the more specific goal was to investigate means to improve water supply capabilities in the emergency relief shelters in Wello Region, through maximum utilization of existing resources. The consultant spent seven weeks in Ethiopia, 3 March to 17 April 1985, on this assignment. This report contains his observations, conclusions, and recommendations.

### Current Situation:

Due to the present drought, water resources have declined substantially. River flows are much reduced, springs and hand-dug shallow wells have dried up, groundwater levels have fallen far below minimum average levels, bore-hole yields have decreased and water holes and ponds have dried up.

The present effort in production development is very fragmented with little coordination of effort. The Ethiopian Water Works Construction Authority (EWWCA), the Relief and Rehabilitation Commission (RRC), bi-lateral agencies and private voluntary organizations (PVOs) are all drilling wells wherever it suits their individual interest. All are self-serving in that they have their own definition of "urgent needs."

Effective operation and maintenance is for all practical purposes, non-existent. EWWCA, which is responsible for operation and maintenance over most (75 percent) of the country, tries but is hindered by lack of mobility, tools, trained technicians and an inefficient stores distribution system.

The reliability and operation of water supply systems in the shelters is seriously limited by a lack of trained pump operators, shortages of replacement equipment, spare parts, and fuel and the general absence of rapid maintenance services. Few shelters have qualified engineers and those that do lack the trained technicians and works supervisors required to carry out maintenance and repair activities.

The water supply and sanitation situation in Ethiopia will remain critical for some years to come even if the drought should end this year. Urban and rural population centers (and relief shelters for as long as they exist) will continue to remain in a "crisis" condition until the relevant water authority obtains the human and material resources to rehabilitate and upgrade existing systems.

Effective sanitation practices in the shelters is a myth. The traditions of the shelter occupants, for the most part, do not include body bathing, handwashing, clothes washing, and centralized toilet use (if one is starving, they also don't seem important).

## Conclusions:

The overall needs of the water supply sector in Ethiopia are massive and would require years or decades to fulfill. However, two facets that could significantly improve in the near-term situation are (1) coordination of production development and (2) improvement in operation and maintenance procedures.

The quickest and most effective means of improving water supply capability in the shelters is via operation and maintenance.

There will be no significant improvement in sanitation within or adjacent to the shelters until there is a significant improvement in the amount of water available (and it will then come naturally--not by enforcement).

## Recommendations:

1. Since there is little possibility of meaningful involvement in the area of coordination of well drilling activities, limit further effort in this direction.
2. Develop, in the near term, an operation and maintenance assistance program to be implemented under the auspices of USAID through a PVO. Concerning operation, run pumps more hours per day (12 hours is normal). Concerning maintenance, ensure that pump sets are capable of running more hours per day.
3. Search out viable PVO water supply projects and offer financial and technical assistance. This should be carried out by close liaison between USAID/Ethiopia and PVO field offices and by pointed dialogue with head offices of the PVOs in the United States.
4. Provide consultancy services to the Water Supply and Sewerage Authority (WSSA) to advise and assist in the development and implementation of operation and maintenance management systems. If this cannot be accomplished directly with the government of Ethiopia (GOE), consider doing so through UNICEF.
5. Develop an operation and maintenance assistance project for WSSA in Wello region. The package should be offered directly to WSSA by USAID.
6. Field, through WASH, a short-term (six to eight weeks) operation and maintenance specialist to continue to expand USAID-supported emergency water activities.
7. Supplement the present USAID/Ethiopia staff with a senior water supply and sanitation engineer.

## Chapter 1

### BACKGROUND

#### 1.1 Previous Related Work

##### 1.1.1 Initial WASH Involvement

On 7 November 1984 the USAID Office of Foreign Disaster Assistance (OFDA) requested the Office of Health to send specialists to Ethiopia to assess the status of well drilling equipment and the need for equipment rehabilitation. AID responded by authorizing WASH to carry out this assignment. The report of this consultancy (WASH Field Report No. 138) made several recommendations for emergency assistance. Based on these recommendation, in December, WASH recommended that Dr. Dennis B. Warner be sent to Ethiopia to evaluate project implementation possibilities.

#### 1.2 Request from USAID/Ethiopia

After reviewing the work of Dr. Warner, USAID/Ethiopia decided that another engineer was needed to further expand USAID-supported emergency water assistance and to continue the coordination of USAID and GOE water activities through the National Water Resources Commission (NWRC) and the RRC. In response to a request from USAID/Ethiopia, dated 1 March 1985, WASH was asked by OFDA to provide a water supply and sanitation consultant for a period of six to eight weeks. As a result, a second WASH consultant, Mr. Charles E. Kline, arrived in Addis Ababa on 5 March 1985.

#### 1.3 Scope of Work

The primary responsibilities of the new WASH consultant were closely tied to the identification, review, and monitoring of USAID-supported emergency water supply and sanitation assistance. The scope of work for this assignment was as follows:

1. Continually assess and keep USAID/Ethiopia informed of the emergency water supply and sanitation needs in the drought-affected areas. This involved field visits to the most affected areas as well as frequent meetings and discussions with representatives of the GOE, UN organizations, bi-laterals, and non-governmental organizations (NGOs).
2. Identify the priority operational and capacity expansion needs for emergency WSS assistance. This required close coordination with other donor agencies to determine priorities for immediate action.
3. Review proposals from the donor community that may be appropriate for USAID assistance for emergency WSS activities. This required an understanding of the available procedures for channeling USAID assistance to the drought-affected areas. Close coordination and

the development of good working relationships with all relevant organizations (GOE, UN, bi-laterals, and NGOs) were essential.

4. Advise USAID/Ethiopia on the technical, managerial, and administrative feasibility of such proposals for emergency WSS assistance.
5. Monitor the technical and administrative aspects of USAID-financed emergency WSS activities.
6. Provide technical liaison on emergency WSS matters between USAID/Ethiopia and other organizations working in the drought-affected areas.

## Chapter 2

### ITINERARY

C. E. Kline departed from the United States on 3 March 1985, arrived in Addis Ababa on 5 March and returned to the U.S. on 17 April.

While in Ethiopia, the WASH consultant was provided with office facilities, secretarial assistance and transport by USAID. Travel permits for visits to relief shelters were obtained by USAID. A single field trip was taken to shelters in Southern Shoa and Wello Regions during the period 20-28 March. Shelters visited were Mille, Bati, Korem, Alamata, Mersa, Kobo and Harbo. Throughout this period the WASH consultant kept USAID/Ethiopia officials informed of all activities and involved them when possible in discussions with GOE and NGO officials.

## Chapter 3

### FIELD TRIP ACTIVITIES

#### 3.1 Introduction

From 20-28 March 1985 a field trip was made to shelter camps and feeding centers at Mille, Bati, Korem, Alamata, Mersa, Kobo and Harbo in the Wello Region.

#### 3.2 Purpose

The primary purpose of the field trip was to gather information and gain insight regarding water supply and sanitation conditions in northern Shoa and Wello Regions as follows:

1. To assess the general status of water supply and sanitation facilities in and around the emergency shelter areas, feeding centers and food distribution centers.
2. To assess, in particular, the present level of effort in the area of operation and maintenance (O&M) and to identify areas where immediate improvement would maximize utilization of existing facilities.
3. To recommend assistance activities for water supply and sanitation operation and maintenance actions by both donors and operational agencies.

#### 3.3 Itinerary

- 20 March: By car Addis Ababa to Dessie (430 km) with visits (some brief) to Debre Birhan, Robit, Senbete, Efeson, Karakore, Kemise, Chefa and Kembolcha.
- 21 March: By car Dessie to Kembolcha to Dessie (50 km) with visits to RRC warehouses and EWWCA regional office.
- 22 March: By car Dessie to Mille (180 km) with visit to Kembolcha.
- 23 March: By car Mille to Dessie (180 km) with visit to Bati.
- 24 March: By car Dessie to Kembolcha to Dessie (50 km).
- 25 March: By car Dessie to Korem (240 km).
- 26 March: By car Korem to Dessie (240 km) with visits to Alamata, Kobo and Mersa.
- 27 March: By car Dessie to Guder to Kembolcha (109 km).
- 28 March: By car Kembolcha to Addis Ababa (399 km) with visit to Harbo.

### 3.4 Summary

In general the availability of water at all sites was found to average between two and five liters per capita per day (lcd), under normal conditions. This is significantly lower than the availability of three to seven lcd reported in February 1985 thus signifying a deterioration in supply capability. Numerous examples were observed in which camps obtained a portion of their water supply from existing town systems that were unable to meet the combined needs of the town, the camp and the additional people from the villages seeking food and shelter. In most cases lines of people waiting for water in the villages were longer than lines in the camps.

In an attempt to focus on the operation and maintenance (O&M) aspect, consider:

- "The water supply problems of the towns are intertwined."<sup>1</sup> Destitute populations migrate to the relief camps, and while waiting to be admitted, overwhelm the meager resources of the adjacent villages and towns. After being released, having no place to go, they return to the town or village, creating a significant population explosion.
- Water consumption rates in the camps and feeding centers are in the order of two to five lcd, with most being nearer three. While this is sufficient for survival, it is insufficient to allow promotion of personal hygiene practices that, considering the overcrowded conditions of the camps and shelters, are essential to public health. A goal of 10 lcd for normal camp operation appears reasonable.
- Problems arising from inadequate water and sanitation become increasingly severe as camp populations rapidly expand.
- "The reliability and continuous operation of water supply systems in camps is seriously limited by a lack of trained operators, shortages of spare parts and equipment, and general absence of rapid back-up maintenance service for major repairs."<sup>1</sup>

While the provision, by EWCA/UNICEF/USAID, of new sources of water at the camps/shelters will increase production capability, it is unrealistic to assume that per capita supply capability will improve dramatically. Camp populations are growing (Mille increased from 9,000 to 14,000 in one month), and this population increase will continue to absorb any increase in supply. Also, camps that receive either part or all of their supplies from a town water supply (Alamata, Kobo, Harbo) may find that the town discontinues this service once the new wells are producing since the towns' needs, in general, exceed those of the camps/shelters.

---

<sup>1</sup> Dr. Dennis B. Warner, WASH Field Report No. 145, Emergency Water Supply and Sanitation Assistance to the Ethiopian Drought and Famine, Arlington, Va., WASH Project, July 1985.

Details along with observations, assessments and, where appropriate, recommendations are contained in Appendix A, "Field Trip Report on Visits to Mille, Bati, Korem, Alamata, Mersa, Kobo and Harbo Shelter Camps and Feeding Stations."

## Chapter 4

### PROJECT DEVELOPMENT

#### 4.1 Infrastructure Considerations

The Ethiopian Government established the National Water Resources Commission (NWRC) in 1981. The Commission has three authorities and one agency under its umbrella. It also has a Water Resources Council composed of high level representatives from government ministries that deal with water and related activities.

The three authorities and the agency under the Commission are:

- The Water Resources Development Authority (WRDA), which is responsible for all irrigation activities in the country (established 1981).
- The Water Supply and Sewerage Authority (WSSA), which is the owner and operator of all water supply systems in both rural and urban centers (established 1981).
- The Ethiopian Water Works Construction Authority (EWWCA), which is responsible for the construction of all water works in the country (established 1980).
- The National Meteorological Services Agency (NMSA), which is responsible for the investigation and study of weather and climatic conditions of the country (established 1980).

At the time the NWRC was established EWWCA was already responsible not only for the construction of all water works in the country but also for the operation and maintenance of the systems. In effect EWWCA was the constructor and owner of the water supply systems throughout the country.

The establishment of the WSSA in 1981 brought about a significant organizational change: both EWWCA and WSSA became part of NWRC and, more importantly, the ownership of the country's water supply systems were transferred from EWWCA to WSSA.

It was recognized that the transfer of system ownership would take time since WSSA would need to develop its own resources in order to operate and maintain its newly acquired systems. The sequence of transfer of systems from EWWCA to WSSA was to be on a region-by-region basis as follows:

- |                        |    |                            |
|------------------------|----|----------------------------|
| 1. Southern Region     | -  | Gamo Gofa, Sidamo and Bale |
| 2. Central Region      | -  | Shoa and Arsi              |
| 3. Southwestern Region | .. | Kefa, Illubabor and Welga  |
| 4. Northwestern Region | -  | Gojam and Gonder           |
| 5. Hararge Region      | -  | Hararge                    |
| 6. Wello Region        | -  | Wello                      |
| 7. Tigray Region       | -  | Tigray                     |
| 8. Eritrea Region      | -  | Eritrea                    |

The actual transfer has been much slower than planned, due mainly to WSSA's lack of resources, both human and material, that would enable them to effectively operate and maintain the systems. To date they have assumed operation and maintenance responsibility for only the Southern and Central Regions, leaving the other six regions under EWWCA.

#### 4.2 Sector Requirements

In December 1984 the NWRC defined the assistance required to give relief to the drought-affected population of Ethiopia.

The requirements were based on the following strategies:

1. To maintain and repair existing systems.
2. To complete partially completed systems.
3. To improve existing systems, including bore-hole replacement.
4. To increase the number of systems by building additional systems in towns and villages serving as relief centers.
5. To construct new systems in resettlement areas.

It was estimated that the program would give water supply relief to some 2.9 million people. The total cost of the project (hardware and materials only) was estimated at 99 million Birr (U.S. \$48 million). Included in the requirements, but not in the cost, was a request for three senior hydrogeologists and two senior drilling experts for a period of two years.

On 2 April 1985 the WASH consultant received a copy of a draft proposal for "Operation, Maintenance and Rehabilitation of Urban and Rural Water Supply Schemes" from Ato Biru Itissa, General Manager of WSSA (see Appendix B). This proposal is more specific than the "Global" proposal of NWRC in that it deals only with:

1. Routine/recurrent maintenance
2. Periodic maintenance
3. Establishment of maintenance crews:
  - Preventive maintenance crew
  - Mobile maintenance crew
  - Rehabilitation crew

While the envisioned program deals with the entire country, it does not include construction of new schemes. It does, however, include maintenance in the areas to the south and west where "resettlement" is centered. The program is divided into three "stages":

- Stage I - covers schemes desperately in need of immediate pump, generator/drive and tank replacement. It also includes replacement of handpumps.
- Stage II - covers schemes that require replacement of pumps and drives that currently function and could be delayed until Stage I is essentially complete.

- o Stage III - covers schemes that are in good operational state but will require replacement after some years of service. In the meantime these schemes will require preventive and scheduled maintenance.

The proposal indicates an estimated cost of 17.2 million Birr for Stage I, 13.5 million Birr for Stage II, and 7.1 million Birr for Stage III for a total of 37.8 million Birr.

This proposal has the advantage that it could be implemented in stages, the most important being Stage I. While the proposal contains a cost estimate for Stage I, it contains no details required for project preparation.

In March 1985 WSSA submitted a request to UNICEF for provision of a management consultant to "review the existing situation and assist in the development and implementation of an Operational and Maintenance Management System for both Urban and Rural Water Supply schemes at the Regional Level." (see Appendix C)

The consultant's Terms of Reference includes input concerning:

- Organization structure
- Personnel management
- Financial management
- Supplies, procurement and equipment
- Field operation and maintenance

The request to UNICEF, on a grant basis, includes:

- Vehicles
- Office machines, materials and supplies
- Cost of consultants

#### 4.3 Present Situation

Ethiopia has some 249 towns (excluding Addis Ababa and Asmara) that are considered as urban centers. According to present classification, towns with a population greater than 10,000 are considered urban, while those below 10,000 are classified as rural. Without taking into account the quality and quantity of water provided or the condition of the water supply system, some type of water supply system exists in only 127 urban towns; however, of these, only 20 have a properly organized and adequate water supply system. According to studies and surveys, the existing water supply systems in the remaining 107 towns need to be rehabilitated or replaced. No type of water supply system exists in the other 122 urban centers.

With respect to rural water supply systems, it is estimated that about 1,500 bore holes, 1,340 shallow wells and 290 springs exist in the eight NWRC regions of the country. NWRC estimates that 40 percent of these systems are inoperable for one reason or another. It is estimated that less than five percent of the population has access to reasonably clean water.

Development of the water supply sector has been slow due to lack of adequate capital, shortage of qualified personnel, lack of reliable sector data and ineffectiveness of institutional arrangements.

The overall needs of the water supply sector in Ethiopia are massive and will require decades to fulfill. However the most urgent needs at this time are related to the "emergency relief shelters." The water supply situation in these shelters is similar to that throughout the country. The present effort in production development is very fragmented. There is little coordination of effort. EWWCA, RRC, bi-laterals and PVOs are all drilling wells wherever it suits their interests. All seem self-serving in that all have their own definition of urgent needs. Effective operation and maintenance is, for all practical purposes, non-existent. The reliability and operation of the water supply systems in the shelters is seriously limited by a lack of trained pump operators, shortages of replacement equipment, spare parts, and fuel and the general absence of rapid maintenance services. Few shelters have qualified engineers and those that do lack the trained technicians and works supervisors required to carry out maintenance and repair activities.

The uncoordinated production development effort within the country has a definite adverse impact on the critical water supply situation in the shelters, in that the shelters are given no special priority. While EWWCA's 1985 well drilling schedule indicates that about 50 new wells will be developed throughout the country, only two of the scheduled new wells were at relief shelters--Bati and Mille. The USAID-funded project for 12 new wells at specific relief shelters in the Wello Region will improve the water supply situation in the shelters, but the question is--when? EWWCA is in the process of adding the 12 new wells to their program, but there is no assurance that they will be given priority consideration. Indeed EWWCA argues that the shelters are not the first priority. Their view is that it is more important to improve water supply in the villages and towns in an effort to halt migration to the shelters. This view must be given serious consideration.

The water supply situation in the towns and villages is, in many cases, more critical than that of nearby shelters. Indeed many of the shelters obtain their supply from adjacent towns making it impossible to separate the requirements of the shelter and the town. On the positive side, wells are being developed and, even though the development lacks coordination, any new water supply source helps to alleviate the critical situation and can be termed "emergency relief."

From an operational standpoint the situation is truly critical. With some 40 to 50 percent of the 3,500 water supply facilities in the country out of service, the task of rehabilitation is formidable. Adding the need for ongoing routine maintenance makes an effective operation and maintenance effort almost impossible under present conditions. EWWCA and WSSA, together responsible for operation and maintenance in the country, both state that their major requirement is hardware. There is no doubt that the Regional Offices suffer from lack of replacement equipment, spare parts, tools, maintenance materials and rehabilitation materials. This appears to be more a problem of logistics and storekeeping, however, than one of critical shortages. NWRC warehouses in Addis Ababa have considerable inventories on hand. These inventories seem to remain in the central stores for long periods of time. Motor generators and submersible pumps were observed that had been in storage for six years.

If NWRC, EWWCA and WSSA all received their entire "shopping lists" tomorrow, their new inventory (not including items presently in stock) would consist of:

515	Mono Pumps
319	Submersible Pumps
249	Centrifugal Pumps
325	Motor Generators
24	Drilling Rigs
235	Vehicles
64,000	Meters
26	Mobile Workshops

This amount of equipment would go a long way toward rehabilitation of the country's existing supply sector. Nonetheless, the lists of equipment and material needs developed by NWRC overlooks one, singularly important, component of a rehabilitation effort--the human resources required to utilize the equipment effectively. The lack of trained personnel in the water supply sector is, by far, its most urgent need. Other things such as equipment and spares can be donated--qualified personnel cannot!

#### 4.4 Project Constraints

There are many factors that will impede emergency water supply project development in Ethiopia. These include lack of trained personnel, and shortages of equipment, spare parts, tools and rehabilitation materials. However, there are two more restrictive limitations to meaningful project development: (1) the current political situation between the United States and the GOE, and (2) prevailing U.S. legislation. The first makes it virtually impossible to implement projects within the infrastructure (EWWCA, WSSA, RRC) of the GOE. The second prohibits assistance that might be classified as "development aid that makes a permanent improvement in the productive capacity or welfare of the Ethiopians." The water supply and sanitation sector is part of the existing infrastructure of the GOE and assistance to the sector must be through the GOE. Further, strict interpretation of existing U.S. law would prohibit almost all physical assistance, especially within the infrastructure, since it could be classified as "development."<sup>2</sup>

---

<sup>2</sup> Passage of the African Famine Relief and Recovery Act of 1985 in April 1985 and subsequent re-interpretations of existing legislation on development assistance now allow USAID to provide both emergency and development assistance to Ethiopia.

## Chapter 5

### CONCLUSIONS

#### 5.1 Population Centers

The drought and resulting famine throughout Ethiopia have brought the population of the country to the brink of disaster. It is estimated that one million people have died and an additional eight million are presently at risk of starvation. This devastating situation has brought about massive migrations of rural populations to towns and villages. These abnormal concentrations of famine-stricken people have prompted the establishment of various types of relief shelters (dry feeding centers, wet feeding centers, relief camps, etc.) invariably to be located near existing towns and villages.

The influx of people to these existing towns and villages has sparked "population explosions" that are self-perpetuating. The shelters operate on a "pass through" basis. The malnourished are admitted and receive food and medical attention until they are judged healthy enough to survive outside the shelter. The people discharged from the shelters are immediately faced with a desperate situation--where do they go? There is no home to return to; there is nothing there--no food, no livestock, no plows, no seed and no water. This is why they came to the shelter in the first place. They have no choice except to move to the adjacent town or village where there is at least hope for food and water. The persons discharged from the camps, and those waiting to be admitted, literally "overwhelm" the town. The town of Alamata has grown from a population of 15,000 to 65,000 in the past year. Mille, with a 1984 population of 784, has a shelter nearby with a population of 14,000. Bati, a town of 10,000 in 1984, is adjacent to a shelter with a population of 17,500 plus some 4,000 to 5,000 waiting at the shelter gate to be admitted.

Unfortunately the persons discharged from the camp find that they are worse off outside the camp. The situation is so desperate that many resist being discharged and shelter officials must ask for police/military help to evict them. This only aggravates the problem since the discharged people simply join the thousands waiting to be admitted. When their turn comes they are again starving, and thus they qualify again for admittance.

The number of shelters is increasing and each shelter continues to grow in size once established. This situation is going to continue until the rural farming areas have recovered from the drought and the land is once again capable of supporting people. This may take years.

Prior to establishment of the relief centers, all of the population centers (towns and villages) had severe water supply and sanitation problems. Previously existing problems such as widespread poverty, and inadequate financial, technical and human resources have been compounded by the famine. Water supply systems that were marginal before are now stressed to the point that per capita water supply capability in the shelters is, in most cases, better than in the adjacent towns. The situation makes it clear that the water supply and sanitation problems of the shelters cannot be separated from those of adjacent towns--they are one and the same. Also, it is no less clear that if USAID is to make a significant contribution toward alleviating the critical

water supply situation, the "development" constraint must be set aside. Anything done to improve water supply capability anywhere in Ethiopia's rural and urban population centers can only be classified as "relief."

## 5.2 Assistance Possibilities

There are tremendous possibilities for meaningful assistance to Ethiopia in the water supply sector, but the various constraints discussed previously severely limit viable opportunities. Further, any assistance, if it is to have a significant impact on the "emergency" situation that now exists must be implemented as soon as possible. There is no time for studies and extensive planning procedures--the need is now.

The key water sector authorities (NWRC, EWWCA, WSSA) have set forth their needs, as they perceive them, in various proposals and requests to the donor community. These proposals and requests deal almost exclusively with hardware "shopping lists" and do not recognize the more important human resource needs. All the equipment in the world is of little use without trained personnel to operate and maintain it and without qualified institutional personnel to define manage and direct programs.

## 5.3 Overview

Considering the constraints to meaningful effort in the water supply sector on a government-to-government basis, the urgent need to respond to the emergency situation, and the inability of the existing water supply infrastructure to cope with their normal problems, to say nothing of emergency relief needs, the following conclusions emerge:

- In the area of production development, the responsibility for establishing priorities and coordination of effort belongs to the NWRC. Circumstances preclude USAID in-depth involvement with NWRC. Hence, no further effort should be expended in this direction. The well-drilling program is going to be exactly what NWRC wants it to be, nothing more and nothing less.
- The most likely opportunity for meaningful assistance in alleviating the critical water supply situation in Ethiopia is in the area of operation and maintenance with a specific effort to maximum utilization of existing systems. From an operational standpoint the goal should be to run pumps 24 hours per day while the maintenance goal should be to insure that the pumps can run 24 hours per day.
- The most viable avenue for development of an operation and maintenance assistance effort will be through an established private voluntary organization such as OXFAM providing financial and technical assistance. Thus direct involvement with the GOE is minimized.
- Water supply systems in all the shelters are marginal. Water supply capability in the shelters varies from two to five lcd. While this is sufficient for survival, it is insufficient to allow promotion of

personal hygiene practices that, considering the overcrowded conditions of the shelters, are essential to public health. There is little hope for improvement until there is an excess of water above the amount required for drinking and cooking.

- Effective sanitation practices in most of the shelters are impeded by the size of the population. While shelter officials, in general, insist that latrine use is enforced, actual utilization is a myth. Latrine use can be enforced when dealing with relatively small concentrations of people but to expect it to successfully control 35,000 people living on 200 acres, as in Korem, is unrealistic.
- The PVOs in Ethiopia are aware that water supply is a basic component of any relief effort. Many have programs in the planning stage. These programs represent opportunities for USAID to provide assistance in the water supply sector. USAID, however, must expend some effort in order to become involved.
- Assistance to the water supply and sanitation sector is the most urgent "need" in Ethiopia today. The need goes far beyond water supply in relief shelters and adjacent towns. It is vital that improvement be made in the areas of water resource development, water resource management, water conservation, and irrigation. Assistance in these areas offers USAID its best opportunity to alleviate drought and famine conditions in Ethiopia.
- While the provision by EWWCA/UNICEF/AID of 12 new wells in the shelters in Wello will increase production capability, it is unrealistic to assume that per capita supply capability will improve dramatically. Camp populations are growing rapidly (Mille grew from 9,000 to 14,000 in one month), and this population increase will absorb any increase in supply. This again emphasizes the point that the only way to increase supply from finite sources is to improve operation and maintenance procedures.

## Chapter 6

### RECOMMENDATIONS

#### 6.1 Production Development

USAID should limit further activity in the area of development of well-drilling programs. At present the major effort in the water supply sector is dedicated to production development--the drilling of wells. The NWRC is responsible for coordinating all water-related activities in Ethiopia. Outside of managing their own drilling work, however, little effort is directed toward coordination or control of well drilling activity. Since there is little possibility of meaningful involvement in the area of coordination of the well-drilling activity, and since the various institutions, authorities and organizations have given production development first priority, USAID's future efforts would be much more meaningful if directed to areas in the water sector that at present receive little or no attention (repair, rehabilitation, etc.). This is not to say that USAID should not support a viable well drilling program such as a PVO program, if given the opportunity, but rather that effort should not be expended in trying to develop such programs.

#### 6.2 PVO Operation and Maintenance Programs

USAID should develop, in the near term, an operation and maintenance assistance program for Wello Region through a PVO such as OXFAM. While all of the PVOs are concerned about water supply and sanitation, OXFAM in particular devotes a major portion of its efforts to the improvement of water storage, treatment and distribution. OXFAM water supply packages are used in almost all of the relief shelters. They have a good relationship with the GOE, and in Wello Region, which has the highest concentration of relief shelters, they work directly with EWWCA in the areas of supply, operation and maintenance (see Appendix D). OXFAM personnel recognize the importance of maintenance and rehabilitation and agree that an improvement in maintenance would result in significant improvement in water supply capability. However, their efforts are limited. They have a small staff and since they work through EWWCA they are plagued by EWWCA's problem--restricted mobility, and a lack of spare parts, replacement equipment and materials.

OXFAM is in a unique position to expand its effort toward maintenance and rehabilitation and to have a significant impact on the present water supply situation in Wello Region. USAID should pursue this opportunity both at the Mission level and with OXFAM headquarters. Undoubtedly a program through the OXFAM organization offers the best chance for USAID to quickly undertake an emergency water supply effort in Ethiopia.

#### 6.3 PVO Water Supply Projects

Offer USAID financial and technical assistance to viable PVO water supply projects. There are some 50 PVOs actively involved in emergency relief efforts in Ethiopia. Regardless of the type of involvement, whether it be feeding, intensive feeding, shelter and regular feeding, dry ration or medical care,

water supply is of paramount importance. While the PVO's program aims are widely divergent, the common need for water offers a broad field of opportunity for USAID to assist with a minimum of program development effort. Moreover, the PVOs are doing the planning.

Involvement will take some promotional effort, both in Ethiopia and the United States. USAID/Ethiopia should continue to let PVOs know that USAID is interested in supporting emergency water supply and sanitation projects and would welcome proposals from the PVOs for evaluation. This expression of interest should be made to the PVO field offices repeatedly. Concurrently, AID/Washington should mount a promotional effort directed at the PVO headquarters of the PVOs in the United States, informing them that USAID is interested in providing financial and technical assistance for emergency water supply projects in Ethiopia.

#### 6.4 WSSA Consultancy

Consultancy services to advise and assist in the development and implementation of WSSA's operation and maintenance management systems should be provided. As described in Chapter 4, WSSA is not fully operational. According to its charter, WSSA is the owner/operator of all of the water supply systems in Ethiopia. Due to a lack of resources, however, WSSA has assumed this responsibility in only the Southern and Central regions. WSSA is not concerned with production development; they are responsible for operating, repairing and maintaining water supply systems. Recognizing that it faced serious problems in the management of the overall operation and maintenance program, WSSA, in March 1985, submitted a request to UNICEF asking for funding assistance for consultancy services in the operation and maintenance sector. Discussions with UNICEF indicate that while they consider the request viable they would be unable to fund the project at this time.

While the consultancy service would not directly address "emergency water supply", it would focus on one of the root causes of the "emergency" water supply situation, namely, that 50 percent of the existing water supply systems in Ethiopia are inoperable, due primarily to lack of maintenance. Should it be impossible to provide the service directly to the GOE, consideration should be given to channeling the assistance through UNICEF.

#### 6.5 WSSA Operation and Maintenance Assistance

USAID should develop an operation and maintenance assistance package for WSSA's Wello Region. As mentioned earlier, WSSA's ability to assume additional responsibility for operation and maintenance is seriously limited by a lack of trained pump operators, and shortages of replacement equipment, spare parts, trained technicians and qualified work supervisors. Discussions with WSSA management indicate that they would be interested in assistance that would allow them to assume responsibility for operation and maintenance in other regions. Wello Region would be a prime candidate for such expansion. It has the highest concentration of relief facilities; it relates to USAID's production development effort (through UNICEF); and there is an operation and maintenance presence, i.e. EWCA/OXFAM. Again the offer should be made

directly to GOE; however, if this cannot be implemented, UNICEF should be considered as the implementing agency.

## 6.6 Human Resource Assistance

### 6.6.1 Operation and Maintenance Specialist

A short-term (six to eight weeks) operation and maintenance specialist through WASH is recommended to:

- a. prepare, with EWWCA/OXFAM assistance, an inventory of existing water supply systems in the Wello and develop a list of material and equipment needs
- b. prepare a preliminary maintenance (repair) program with attendant manpower and equipment requirements
- c. utilizing information from a) and b), prepare a draft operation and maintenance package to be offered to WSSA.

### 6.6.2 Water Supply and Sanitation Engineer

The present USAID/Ethiopia staff should be supplemented with a senior water supply and sanitation engineer. Development of programs aimed at alleviating the critical water supply situation in Ethiopia will require considerable effort. The responsibilities of the engineer would include assessment of emergency water supply and sanitation needs, identification of priority programs, evaluation of donor programs in the water supply sector, monitoring the technical and administrative aspects of USAID-financed water supply activities, and provision of technical liaison on emergency water supply matters between USAID/Ethiopia and other organizations working in the drought-affected areas.

APPENDIX A  
Field Trip Report

UNITED STATES AGENCY  
FOR  
INTERNATIONAL DEVELOPMENT

ADDIS ABABA  
ETHIOPIA

FIELD TRIP REPORT  
ON  
SITS TO MILLE, BATI, KOREM, ALAMATA, MERSA, KOBO AND HARBO  
SHELTER CAMPS AND FEEDING CENTERS

20-28 MARCH 1985

BY

CHARLES E. KLINE  
WATER SUPPLY & SANITATION SPECIALIST

4 APRIL 1985

## SUMMARY

This report describes visits between 20-28 March 1985 to shelter camps and feeding centers of Mille, Bati, Korem, Alamata, Mersa, Kobo and Harbo to assess the water supply and sanitation conditions on behalf of the United States Agency for International Development, Addis Ababa, Ethiopia.

During these visits discussions were held with camp administrators, officials of RRC and EWWCA, and with representatives of donor organizations. Water supply and sanitary facilities were inspected and note was made of areas where additional improvements are possible.

In general the availability of water at all sites was found to average between 2-5 liters per capita per day, under normal conditions. This is significantly lower than the availability of 3 to 7 liters per capita reported in February 1985 signifying a deterioration in supply capability. Numerous examples were observed, as reported previously, where camps obtained a portion of their water supply from existing town systems that were unable to meet the combined needs of the town, the camp and the additional people from the villages seeking food and shelter. In most cases lines in the villages waiting for water were longer than lines in the camps.

Recommendations are included herein for each of the camps visited. Additional comments are included concerning maximum utilization of existing and scheduled new sources (increased pumping) to improve per capita supply.

## 1.0 Introduction

On 20-28 March 1985, Walter North, AID staff, Charles Kline, Water Supply & Sanitation Specialist and Ato Tefera, driver, travelled by road to various shelter camps in the northern Shoa and Wello Regions on behalf of the United States Agency for International Development, Addis Ababa (AID). This report describes those aspects of the trip dealing with water supply and sanitation, particularly concerning operation and maintenance.

### 1.1 Purpose of Trip

The primary purpose of this field trip was to gather information and gain insight regarding water supply and sanitation conditions in northern Shoa and Wello Regions with regard to the following:

1. To assess the general status of water supply and sanitation facilities in and around the emergency shelter areas, feeding centers and food distribution centers.
2. To assess, in particular, the present level of effort in the area of operation and maintenance (O & M) and to identify areas where immediate improvement would maximize utilization of existing facilities.
3. To recommend assistance activities for water supply and sanitation O & M action by both donors and operational agencies.

### 1.2 Itinerary

- 20 March: By car Addis Ababa to Dessie (430 km) with visits (some brief) to Debre Birhan, Robit, Senbete, Efeson, Karakore, Kemise, Chefa, Kembolcha.
- 21 March: By car Dessie to Kembolcha to Dessie (50 km) with visits to RRC warehouses and EWWCA Regional office.
- 22 March: By car Dessie to Mille (180 km) with visit to Kembolcha.
- 23 March: By car Mille to Dessie (180 km) with visit to Bati.
- 24 March: By car Dessie to Kembolcha to Dessie (50 km).
- 25 March: By car Dessie to Korem (240 km).
- 26 March: By car Korem to Dessie (240 km) with visits to Alamata, Kobo and Mersa.
- 27 March: By car Dessie to Guder to Kembolcha (109 km).
- 28 March: By car Kembolcha to Addis Ababa (399 km) with visit to Harbo.

## 2.0 Findings

### 2.1 Mille Feeding Station

The feeding station is located about 5 km southeast of Mille town adjacent to the Mile River. Population of the camp, operated by ERC/RRC, is approximately 14,000 in the camp plus 3,000 outside the camp. This is a significant increase in population reported earlier (12 February) at 2,200 camp residents and 7,000 non-residents.

The primary source of water for the camp is the Mile River which according to OXFAM has shown E-coli counts of 3,000 per 100 ml. Secondary supply is by tanker (9,000 liter capacity) from a well 25 km away. Normally the camp receives two or three tankers per day. Storage facilities consist of one 12,000 liter capacity "pillow tank" and one 14,000 liter OXFAM storage tank. The "pillow tank" is supplied by the tanker, while the OXFAM tank is supplied from the river source. Shower stalls were available but have been disconnected in order to conserve water.

On the day of our visit the camp was, essentially, without water. The pump supplying water from the river had been removed some time earlier by EWWCA and the tanker had made only one trip up to 4:00 p.m. that day.

The removal of the pump, for purposes of repair, without installation of a replacement unit has placed the camp in a desperate situation in that on a "bad" day, such as the day of our visit, the total supply to 14,000 camp residents could be as little as 9,000 liters (less than 1 lpcd). EWWCA advised, at a later date, that indeed they had removed the pump for repair, had found repair impossible and were considering other alternatives.

Mille is scheduled to have a new well constructed by EWWCA under the auspices of UNICEF, financed by AID. This should be given top priority.

Sanitation facilities are minimal. There was one new pit latrine but it did not appear to have been used (too clean). There were no sanitation guards to enforce sanitary practices and no one seemed too concerned.

### Recommendation

1. Top priority - deepen and enlarge the infiltration well and install a new pump unit to replace the one removed.
2. Continue the practice of chlorinating water pumped from the river. Provide fence and guards to prevent use of river water other than pumped, chlorinated supply.
3. Construct additional storage, in anticipation of completion of a new well. (A new well with an assumed yield of 2 lps will produce 72,000 liters per 10-hour pumping day.) Addition of two 50,000 liter OXFAM tank would give the camp 150,000 liters of storage - 10 liters per capita.
4. Establish O & M capability which will allow a 20 hour per day pumping schedule.

5. Provide sanitary guards to enforce use of the latrines.

## 2.2 Bati Shelter Camp

Bati camp is adjacent to Bati town and is situated along a small spring-fed stream which separates the camp from the town. Population of the camp, operated by ERC/RRC is approximately 17,500 with several thousand outside the camp waiting to enter (and refusing to return to their homes).

The primary source of water is from two wells located within the camp. Supply from these wells is stored in a 50,000 liter OXFAM tank. Supplemental supply is by EWWCA tanker from Kembolcha, 30 km to the west. This supply is stored in 3-12,000 liter "pillow tanks." Camp officials indicated that the camp normally used 80,000 liters per day. However, on the day of the visit both wells were out of service and the 37,000 liter tanker had not arrived from Kembolcha. The camp official indicated that the tanker usually made 2 trips per day.

In addition to the well and tanker supply there is a spring about 3/4 of a mile north of the camp. This spring appeared to be yielding 1-2 lps via two inch feed pipes which had been placed through a low concrete dam. The spring is well protected and is used extensively by the camp residents even with the long walk and long wait in line at the spring.

EWWCA had some days earlier completed a new well in a meadow about a quarter of a mile east of the camp. The submersible pump is installed and connected to a 30 kva diesel motor generator. Camp officials indicated they expected EWWCA pipe-laying crews in a few days.

The situation in Bati was similar to that in Mille. While the camp normally had a supply of 3-4 lpcd circumstances on this day had reduced the supply to 0 lpcd. A EWWCA crew was in the process of completing repairs on one of the camp wells and indicated that they would attend to the other before leaving.

The pumping regime of the two camp wells was said to be 12 hours per day. If this is true, which is doubtful, the two wells would, assuming a yield of 1 lps, produce 86,000 liters per day. This is more than the 80,000 liters camp officials said were normally used. If the camp normally received two-27,000 liter tanker loads per day it would seem to indicate that actual yield of the wells is probably on the order of .5 lps each.

Latrines had been constructed on high ground above the camp but they appeared to be little used. During the visit only one person was noticed returning from a latrine.

### Recommendation

1. Construct a new 50,000 liter storage facility in anticipation of completion of the new EWWCA well. On the basis of a 2 lps yield from the EWWCA well and .5 lps from each of the existing camp wells it would appear that the camp will soon have a production capacity of some 130,000 lpd (12 hour pumping regime) versus storage capacity of about 86,000 liters.

2. Provide sanitation guards to enforce use of the latrines. New latrine sitings should be chosen which are more appropriate considering the location of the two camp wells (at a lower elevation than wells).
3. Assess the feasibility of developing the spring (1-2 lps yield) north of the camp as an additional source of water. This would require pumping and considerable pipe but would be an excellent emergency supply in case of failure of one of the wells.

### 2.3 Korem Shelter and Feeding Center

Korem shelter and feeding center, the largest in the country, is located about 1 km north of Korem town. RRC and SCF each operate separate camps (divided by the main road) providing both shelter and feeding. RRC reports the SCF camp provides shelter and special feeding to 12,000 plus dry rations to another 7,000, while the RRC camp provides feeding for 10,000 people and dry rations for an additional 5,000, giving a total camp population of approximately 35,000 (MSF staff who provide medical services to both camps indicate the total population figure to be nearer 25,000).

The water supply systems for the two camps are completely separate. The SCF draws water from a well, 500 meters south of the camp, equipped with an electro-submersible pump that pumps to two-14,000 liter OXFAM tanks located at the southern limit of the camp. The yield of this well, which operates 12 hours per day is said to be just sufficient for SCF needs. Camp officials estimate the yield of the SCF well to be about 80,000 lpd. The RRC camp supply is from a well located in the camp, near the administration building. Water is pumped to a 15,000 liter elevated storage tank. The pump is operated 12 hours per day and produces approximately 45,000 liters daily. The supply is inadequate for the needs of the RRC camp and distribution is for a limited period each day.

In addition to the RRC well supply, MSF is in the process of developing a spring located to the west of the RRC camp. The intention is to pump from the spring to a 14,000 liter OXFAM tank located on high ground between the spring and the camp. Development of this spring source is proceeding slowly due to lack of funds. It is estimated that the spring might produce up to 1 lps.

Latrines are available in both camps and their use is enforced by sanitation guards. However, the camps are now in the process of erecting new latrines, on an urgent basis, since a promised vacuum truck (to empty the latrines) was not going to arrive.

Korem is scheduled to have two new wells constructed by EWWCA. These wells are also components of the water supply improvement agreement between UNICEF and AID. Depending on hydrogeological surveys it is possible that both wells will be adjacent to one camp or the other. In any event the systems of the two camps should be interconnected once these wells are constructed, and both camps should also construct additional storage to raise the total storage of both camps to 100,000-150,000 liters. With present reported production of about 125,000 lpd and a possible increase from the two new EWWCA of about

180,000 lpd (12 hour pumping regime) this additional storage would allow distribution of at least 6 lpcd.

#### Recommendation

1. Complete the protection of the spring adjacent to the RRC camp and install an appropriate pumping, storage and distribution system. Provide regular chlorination to the system either of the wet well or at the storage tank.
2. Once siting of the two new EWWCA wells is known, construct, in appropriate locations, 100,000 to 150,000 of additional storage and at the same time interconnect the systems of both camps.
3. Consider the feasibility of providing vacuum truck service to Korem and all the other camps in Wello (possibly two trucks operating out of Dessie on a regular schedule).

#### 2.4 Alamata Feeding Center

The Alamata feeding center is a nonresidential facility located at two sites: World Vision upper camp, located at the north edge of town, World Vision lower camp, located at the south edge of town. The World Vision upper camp serves about 12,000 persons, the lower camp some 3,000 persons.

The World Vision upper camp draws its water from the town water system. The main source of water is a river from which a 6 km pipeline conducts water to a 216,000 liter reservoir north of town. The World Vision upper camp receives supply from the town reservoir and stores, on site, in a 50,000 liter OXFAM reservoir. The World Vision lower camp, at present, hand carries (25 women) their supply, the source of which is a new well about 1/2 mile east of the lower camp. The camp has an elevated storage tank (600 liters) which is not in use at present.

Alamata is also scheduled to have two wells constructed under the EWWCA/UNICEF/AID agreement. The Alamata town water system is woefully inadequate for the town, the feeding center and the tens of thousands of additional people who have migrated to Alamata because of the drought. Since the major portion of the feeding effort is dependent on the town water supply, it is appropriate to assume that the wells will be integrated into the town supply. Care must be taken to ensure that an agreement be formalized with Alamata town which would define the amount of daily water supply to be allocated to the feeding centers. This quantity should be based on existing camp requirements (based on say 10 lpcd) plus allowances for future growth and wastage. It will be necessary to determine the storage requirements of the feeding centers which will be required to enable them to utilize their water allocation.

Latrines at the sites are well located; however they also are being forced to continually construct new latrines because of lack of means to empty them. Sanitation guards are utilized and handwashing is promoted.

## Recommendation

1. Provide some disinfection of the water at the reservoir since part of the town (and camp) supply will most probably be drawn from the river.
2. Once the siting of the two new wells has been determined and their interconnection to the established town system has been defined, assess the most appropriate storage strategy at the feeding centers to ensure capability to utilize allocated daily quantities. Assuming that the wells will be integrated into the town supply, it is important that agreement be reached with the town defining quantities to be allocated to the centers.
3. Based on (2) above construct appropriate storage at the feeding centers.

## 2.5 Kobo Feeding Center

The Kobo feeding center is located on the grounds of the Catholic Church in Kobo. Population of the camp, operated by SCF, is 1,000 children plus some 3,000 family members. MSF has established a medical facility immediately adjacent to the SCF camp. Present population at the MSF facility is about 60.

Both camps share supply from town via an existing 2 inch water line laid some years ago to provide service to the church's orchard irrigation system. At present each camp has only 1-1/2 inch tap each. Storage at the SCF camp consists of a 1,500 trailer-mounted tank which is filled at night. The MSF camp has a 1,000 liter elevated storage tank which is also filled at night. SCF is erecting an elevated steel tank with a capacity of 30,000 liters which both camps will share when completed. In addition to this elevated tank there is, some 100 meters west of the elevated tank, a circular, open top, concrete reservoir which, in the past, serviced the old orchard (no longer in existence).

Kobo is scheduled to have one well constructed under the EWWCA/UNICEF/AID agreement. This well, at a yield of 1 lps, will produce some 40,000 liters per 12 hour pumping day or about 10 lpcd for the existing population. The camp will have an excellent secondary supply from the existing 2 inch service line. However, to ensure emergency supply in event of a malfunction of the new well, it would seem prudent to utilize the additional storage available in the old concrete reservoir.

Sanitation of the camp is excellent. The latrines are located well away from the camp. The camp is fenced and the only egress to the latrines is through a single gate which is also the only way to re-enter the feeding center. The gate is guarded and persons wishing to re-enter must wash their hands with soap before they are allowed through the gate.

## Recommendations

1. Complete installation of the 30,000 liter elevated storage and construct appropriate distribution systems for both camps.

2. Obtain approval from the Catholic Church to utilize the existing concrete reservoir. Once obtained provide the reservoir with a cover and interconnect it to the system. The interconnection should be such that both reservoirs float on the system if possible. If not feasible the concrete could be operated on a fill and draw regime.

## 2.6 Mersa Feeding Station

The camp at Mersa is relatively new and is operated by EECMY/RRC. It is a non-resident feeding facility that provides some 2,000 individual feedings each day.

The Mersa camp water supply was the worst, in terms of quality, found during the field trip. The supply is drawn from an infiltration pit in the bed of a large river (nearly dry) immediately adjacent to the camp. A raised 10,000 liter OXFAM tank provides storage on the site. The water is very turbid (chocolate color) and must be contaminated since the river bed upstream is used by the people being fed at the camp for washing, bathing, defecation and drinking. The camp recently had a bad siege of "acute dysentery" and during the previous week some 1,000 people were moved, by RRC, to another camp.

There is a latrine on site for use of the resident orphans and the staff, but it will not accommodate persons being fed. The areas outside the camp slope to the river (and the camp's water supply) and are used as open field latrines.

EWCA is scheduled to construct a new well at the Mersa camp under the UNICEF/AID agreement. The development of this well should be given the highest priority possible.

### Recommendations

1. Expedite the completion of the new well to be constructed by EWCA.
2. Install an additional, semi-elevated, 14,000 liter storage tank and convert the existing tank to a sedimentation tank with use of a flocculent if possible.
3. Due to high turbidity continue to chlorinate heavily.
4. If feasible consider plowing the areas outside the camp which are being used for defecation.

## 2.7 Harbo Feeding Center

The Harbo feeding center is located along the main road 20 km south of Kombolcha. The camp is operated by CONCERN/RRC and two weeks previous to this visit had a population of 7,000-8,000. Security problems prevented an earlier attempt to visit the camp (on 20 March); however, with assistance from RRC a visit was arranged on 28 March 1985.

Upon entering the camp it was noted, with surprise, that the camp was virtually empty - population only about 1,000-1,200 residents. It was explained by CONCERN that the camp had recently suffered an epidemic of "acute dysentery" and once cleared up (?) the major portion of the population had been relocated. No explanation was offered as to why and where and none was solicited.

The CONCERN representative indicated that the camp water supply was from a well belonging to Harbo town and that the well supply was interrupted periodically due to malfunction. I asked if they had a secondary source and was told no - the town well was the only source available. (Note: this is a direct contradiction to the information received by Warner on 14 February. He was informed that in addition to the Harbo town well, EWWCA had completed a well for the camp in January, but the pump and engine set had malfunctioned and they were waiting for EWWCA to repair the system. I saw no sign of a new well on the camp site, but I did not enter every building or tent.)

The camp is well laid out (better than any other visited) on a level, sloping site. Storage is located at the upper edge giving good pressure to the distribution system, expansion of which is planned. The storage capacity of the camp has recently been augmented by a new 50,000 liter OXFAM tank bringing the total capacity up to 68,000 liters. Water consumption at the camp is reported to be about 50,000 lpcd when the camp is fully occupied.

Pit latrines are well located in the lower area of the camp but it was reported that CONCERN has had problems in encouraging their use.

While Harbo is scheduled to have two wells constructed under the EWWCA/UNICEF/AID agreement, the present status is not clear, i.e.:

1. One source indicates a Harbo town well is the only source.
2. Another source indicates that in addition to the Harbo town well EWWCA completed a new well for the camp in January (being repaired in February).
3. RRC Regional Office in Dessie indicates that the Japanese intend to drill a bore hole for Harbo camp. CONCERN confirmed that a Japanese team had been to the camp and picked a site for their new bore hole.

This situation will bear close attention to ensure that AID does not pay for a well installed by a Japanese grant.

#### Recommendation

Harbo seems to be in good shape concerning camp water supply and sanitation, and with the completion of the scheduled two new wells should be in a position to reach a distribution capability of near 10 lpcd.

### 3. Conclusions

Dr. Dennis B. Warner in his "Field Trip Report" dated 11-14 February 1985 presented "Conclusions and Recommendations" with which I fully agree. Rather than reiterate the same in this report I will merely expand on certain parts thereof bringing emphasis to what, I believe, is the single most important aspect of emergency relief in the water supply and sanitation sector, namely: operation and preventive maintenance as related to emergency pumping regimes. Dr. Warner's report sections "Conclusions" and "Recommendations" are attached hereto.

In attempt to focus on the operation and maintenance (O & M) aspect consider:

- . The water supply problems of the towns are intertwined." Destitute populations migrate to the relief camps and while waiting to be admitted overpower the adjacent villages and towns. After being released - having no place to go - they return to the town or village creating a significant "population explosion.
- . Water consumption rates in the camps and feeding centers are in the order of 2 to 5 lpcd with majority being nearer 3. While this is sufficient for survival it is insufficient to allow promotion of personal hygiene practices which, considering the overcrowded conditions of the camps and shelters, are essential to public health. A goal of 10 lpcd for normal camp operation appears reasonable.
- . Problems arising from inadequate water and sanitation become increasingly severe as camp populations rapidly expand.
- . The reliability and continuous operation of water supply systems in camps is seriously limited by a lack of trained operators, shortages of spare parts (and equipment) and general absence of rapid back-up maintenance service for major repairs.

While the provision, by EWWCA/UNICEF/AID, of new sources of water at the camps/shelters will increase production capability, it is unrealistic to assume that per capita supply capability will improve dramatically. Camp populations are growing (Mille - 9,000 to 14,000 in 1 month) and this population increase will absorb any increase in supply. Also camps which receive either part or all of their supply from town supply (Alamata, Kobo, Harbo) may find that the town discontinues this service once the new wells are producing (the towns needs, in general, exceed those of the camps/shelters).

If it is assumed that the 12 new wells at the camps/shelters in Wello raise the per capita supply capability 2-5 lpcd to 3-7.5 lpcd (50%) - and this is an optimistic assumption - the per capita supply capability will be only about 50% of that desirable (10 lpcd).

Accepting that the new wells will not increase per capita supply to desired levels, and may not increase the per capita supply at all, the urgent question becomes - with the new wells in place how can production be increased?

The answer is - emergency water supply needs from finite sources are met by emergency pumping regimes. Under present EWWCA practice wells are operated up to 12 hours per day, depending on storage available. There is no reason to believe that the new wells will be operated on a different regime. If this pumping regime results in production of 3-7.5 lpcd, a change to a 22 hour pumping regime would increase production by 83% to 5.5-13.7 lpcd, much nearer the goal of 10 lpcd.

Office of the Assistant Secretary General

For Emergency Operations in Ethiopia

FIELD TRIP REPORT

ON

VISITS TO GEWANE, MILE, BATI, HARBO, ALAMATA, AND KOREM  
SHELTER CAMPS AND FEEDING CENTERS

11-14 FEBRUARY 1985

By

Dr. Dennis B. Warner

Water Supply Specialist

23 February 1985

## SUMMARY

This report describes visits over 11-14 February 1985 to shelter camps and feeding centers at Gewane, Mile, Bati, Harbo, Alamata, and Korem to assess the water supply and sanitation conditions on behalf of the Office of the Assistant Secretary General for Emergency Operations in Ethiopia.

During these visits discussions were held with camp administrators, officials of RRC and EWWCA, and with representatives of donor organizations. Within the limitations of time, the water supply and sanitation facilities were inspected, and note was made of the recent improvements in water systems, especially those provided by EWWCA and OXFAM.

Despite recent improvements, however, the availability of water at all sites was found to average between 3 and 7 liters per capita per day, a figure inadequate for basic health maintenance. Problems were also seen where camps obtained their water supply from existing town systems that were unable to meet the combined needs of the town, the camp, and the growing influx of people from the villages seeking food and shelter. In such cases, the dangers of inadequate sanitation and limited water availability pose high risks of disease transmission through contaminated water supplies.

Where appropriate, recommendations are included herein for each of the camps visited. On a more general level, additional suggestions are made with regard to planning and coordination, design and construction, and operation and maintenance. The most important of these are believed to be: (1) consider the water supply and sanitation needs of each new camp before it is established, (2) encourage closer coordination between camp operators, EWWCA, and donor organizations, and (3) establish minimum water supply and sanitation criteria for operating shelter camps and feeding centers.

## 1.0. Introduction

On 11-14 February 1985, Dr. Dennis B. Warner, Water Supply Specialist, Dr. Martin Buechi, Monitor, and Ato Kabete, driver travelled by road to various shelter camps in Wello Region on behalf of the Office of the Assistant Secretary General for Emergency Operations in Ethiopia (ASG/EOE). This report describes those aspects of the trip dealing with water supply and sanitation.

### 1.1. Purpose of Trip

The primary purpose of this field trip was to gather information on water supply and sanitation conditions in the drought-affected areas of Wello Region with regard to the following:

- (1) To assess the general status of water supply and sanitation facilities in and around the emergency shelter areas, feeding centers, and food distribution centers of the drought-affected areas.
- (2) To identify immediate needs for water supply and sanitation improvements in the above areas.
- (3) To recommend priorities of needs and relevant assistance activities for coordinated water supply and sanitation actions by both donors and operational agencies.

### 1.2. Itinerary

- 11 February: By car Addis Ababa to Gewane (380 km). Visited Gewane village and nearby ERCS feeding center.
- 12 February: By car Gewane to Mile (150 km) to Bati (100 km) to Kombolcha (45 km). Visited ERCS/RRC feeding center at Mile and ERCS/RRC shelter and feeding center at Bati.

- 13 February: By car Kombolcha to Harbo (10 km) to Kombolcha (10 km) to Alamata (215 km). Visited offices of CONCERN at Harbo and Ethiopian Water Works Construction Authority (EWWCA) at Kombolcha.
- 14 February: By car Alamata to Korem (20 km) to Korem (20 km). By air Alamata to Addis Ababa (400 km). Visited shelter camps and feeding centers run by RRC and SCF at Korem. Visited feeding centers and food distribution centers run by World Vision, Sisters of Charity, and RRC at Alamata. Also visited Alamata town.

## 2. Findings

### 2.1. Gewane Feeding Station

The feeding station is located two to three kilometers from Gewane town and about 200 meters from an established village. Operated by the ERCS, the station at the time of the visit was providing supplementary feeding to approximately 1000 people with another 1500 receiving dry rations. Some shelter is available at the camp for the very weak and sick and some people have erected temporary huts of woven reeds outside the camp. Since the feeding station began operations only ten days before the visit, the feeding shelters, kitchens, and latrines were not yet fully completed.

No permanent water supplies are available in the feeding station. The nearby village has an elevated water tank that apparently is supplied by the Gewane town system. The camp, however, does not draw upon the village water supplies. Instead, it obtains its water from Gewane town by means of a 9000 liter tanker truck which makes two trips per day. At first, the tanker made up to four trips per day, but this left the town water supply inadequate for its own needs, and the camp supplies were reduced to two tankers per day. The ERCS camp administrator reported that there were no plans to develop any further water supply system for the camp.

Separate pit latrines for men and women are located about 100 meters from the center of the camp. There are no showers or specific bathing or clothes washing facilities. Some work has begun on the construction of a ground level reservoir to hold water brought by the tanker truck. At

present, people fill their containers directly from the tanker. Spillage occurs during this process and people then must walk through muddy pools to reach the tanker tap. At the time of the visit, an ERCS engineer was working in the camp for a few days.

Recommendation:

- (1) Complete the water storage reservoir.
- (2) Consider developing an on-site source of water for the camp - either several shallow hand dug wells with handpumps or a borehole with a diesel engine and pump.

2.2. Mile Feeding Station

The feeding center is located about 5 km from Mile town and about 0.5 km from the Mile River. Operation of the center is by the ECRS and the RRC. Approximately 2200 camp residents receive supplemental feeding and another 7000 non-residents, who live in temporary reed huts outside the camp, receive dry rations.

Water supply for the camp comes from two sources. The primary source is the Mile River, from which water is pumped from an open infiltration well on the river bank to a 130,000 liter storage tank. The water then flows by gravity to two clusters of water taps in the camp. The centrifugal pump, diesel engine, piping, storage tank, and taps were supplied by OXFAM within the last two months. Unfortunately, the system was not working at the time of the visit, and the camp was being supplied water by tanker trucks from a borehole 25 km away. The camp was receiving two or three tankers per day (18,000 liters), which discharged their water into a 27,000 liter capacity "pillow tank". Water from this flexible tank was being drawn off for the distribution taps and a solar water heater. Shower stalls were available but had been disconnected in order to conserve water.

Because of the current shortage of water, people from the camp area were drawing some of their supplies from the river, which is highly contaminated by human and animal wastes. According to OXFAM, a recent bacteriological test of the river water gave an E-coli count of about 3000 per 100 ml.

It is probable that improper operation of the primary water system contributed to its breakdown. An inspection of the infiltration well showed that a channel had been opened between the well and the river in order to increase the inflow of water into the well. The high silt load in the river, therefore, was not filtered out by the water flowing through the sands of the riverbank, with the result that turbid waters in the well entered the intake pipe and eventually clogged the pump. When the pump stopped, there was no one in the camp with either the necessary tools or knowledge to carry out the required cleaning of the pump chambers. At the time of the visit, camp workers were digging a new infiltration well, but this too was directly (and improperly) connected to the river by an open channel of water. A camp official stated that they had not yet informed OXFAM of the problem with the pump.

The camp official was advised not to connect the infiltration well directly to the river because it was necessary for the river water to pass through the sand before entering the well. He also was advised to inform OXFAM of the problem and obtain proper guidance on the design and construction of an infiltration well.

### Recommendation

- (1) Dig a larger and deeper infiltration well on the river bank. Keep the foot valve of the intake pipe at least 0.5 meter above the bottom of the well. Consider filling the well with graded gravel, stones, and boulders as a means of improving sediment removal.
- (2) If the river bank sands are not suitable for an infiltration well, consider drilling a borehole for the camp.
- (3) Continue the practice, recommended by OXFAM, of chlorinating the water pumped into the storage tank.

### 2.3. Bati Shelter Camp

Bati camp is adjacent to Bati town and is situated alongside a small stream which separates the camp from the town. At the time of the visit, 17,000 people were resident in the camp, down from a high of 28,000 reported several weeks earlier. The majority of residents are sheltered within canvas tents.

The camp has been drawing water from the town system since the camp was established in 1984. In recent months, the Ethiopian Water Works Construction Authority (EWWCA) has made several improvements to the camp water supply and OXFAM has provided a 45,000 liter storage tank, piping, and water taps. At present, there are two boreholes within the camp. One is equipped with a diesel engine and direct drive submersible pump which pumps to the OXFAM tank. The ERCS camp coordinator claimed the diesel engine, which was recently installed by EWWCA, is unreliable and should be replaced. The other borehole, until recently, had been abandoned, but EWWCA has just rehabilitated it and was in the process of installing a diesel engine and direct drive submersible pump. This borehole is also connected to the 45,000 liter storage tank.

Water from the storage tank flows by gravity to several water tap distribution frames supplied by OXFAM. The ERCS coordinator said that the pressure in the line was not sufficient to supply all of the taps in the camp, and even when the second borehole became operational, overall water supply would be insufficient for camp needs. He claimed that the camp used about 80,000 liters per day, but to obtain this total EWWCA tanker trucks made daily trips to Kombolcha, 30 km to the west, to obtain water. Water from the tanker trucks is currently stored in large pillow tanks at the upper end of the camp.

Two areas with multiple water taps were inspected. Both had queues of people, which were kept orderly by the guards, but both had poor drainage, which caused people to walk through muddy pools to reach the taps. New shower stalls were under construction but will not be used until the water system pressure and capacity are increased. Water is reportedly available in the camp for drinking, cooking, and bathing, but not for clothes washing. Camp officials have posted guards to keep people out of the adjacent stream, which is said to be highly polluted with bilharzia.

The camp coordinator reported that pit latrines had been built on the peripheries of the camp and that vacuum tankers were used to empty them when they became full. This could not be confirmed as no one was available to show me the latrines. When asked what, if any, water supply and sanitation improvements were needed in the camp, the coordinator gave the following list:

- (1) new water generator (diesel engine)
- (2) tanker truck controlled by the camp
- (3) more steel pipes
- (4) water disinfection chemicals
- (5) another borehole

EWWCA has moved a Halco rotary drilling rig to Bati to drill a new borehole to augment the town water supply.\* It was not possible during the visit to assess the overall capacity of the town system. When the current works are completed, it appears that the town and the camp will each have two boreholes. However, it is not certain whether the two boreholes in the camp will be adequate to meet all of its water supply needs.

#### Recommendation

- (1) Assess the capacity and overall reliability of the new water supply system being built for the camp and for the town.
- (2) If the camp system, as planned, does not have the capacity to provide camp residents approximately 10 liters per capita per day (lcd), determine whether new pumping and storage equipment is required for the two camp boreholes or whether a third borehole is needed for the camp.

#### 2.4. Harbo Feeding Center

The Harbo center is located along the main tarmac road 20 km south of Kombolcha. The camp is operated by CONCERN and has a resident population of 6,000 to 7,000. Because of security problems, I did not enter the camp but instead met with the camp engineer at the residence of the CONCERN staff.

The engineer reported that the camp uses two boreholes. One belongs to the Harbo town supply but is also connected to the camp. The other was drilled for the camp by EWWCA with the Halco drilling rig (currently at Bati) one month ago. Unfortunately, the pump and engine set for this borehole has malfunctioned and CONCERN is waiting for EWWCA to repair the system.

---

\* Both the NWRC and EWWCA have stated that the Halco drilling rig will be used in Wello Region for improving water supplies at shelter camps and feeding centers.

Water consumption at the camp is reported to be about 50,000 liters per day. When both boreholes were operating, they supplied the camp with 15,000 to 20,000 liters/day. Another 25,000 liters per day is brought by tanker truck (two trips daily) from Kombolcha. The remainder of the daily water needs is taken directly from a nearby river (polluted) by the camp residents. Water is stored at Harbo in a new 13,000 liter storage tank supplied by OXFAM and in an old 5,000 liter tank. When the camp supply is operating, water is distributed to the people through two OXFAM water tap frames. The camp engineer reported that 200 pit latrines have been constructed in the camp. CONCERN has had some problems, however, in encouraging the camp residents to use the latrines and in finding sufficient eucalyptus poles for constructing the latrine slabs.

Additional needs: The camp engineer indicated that Harbo camp needs another borehole\* plus additional technical assistance for system construction and better training for pump operators.

#### 2.5. Alamata Feeding Center

The Alamata feeding center is a non-residential facility located within Alamata town. World Vision operates two feeding sites serving a total of 10,600 persons daily and the Sisters of Charity operate a third feeding site serving an additional 10,000 persons. All persons served by these centers must find shelter in the town, whose population has swelled from 15,000 to over 65,000 in the past year. In addition, the RRC distributes dry rations to the local peasant association.

Both the town and the feeding sites draw their water from the town water system. The main source of water is a river from which a 6 km pipeline conducts water to a 40 year old concrete reservoir of 216,000 liter capacity in the town. From the reservoir, a gravity main carries water through the town, and a recently installed bypass carries water to a new 50,000 liter storage tank supplied by OXFAM to serve one of the two World Vision feeding sites. Water is available at this site through several OXFAM tap distribution frames. In the town, water from the main concrete reservoir is distributed through 14 public fountains, of which only six are reported to be functioning.

\* EWWCA officials have indicated that the Halco drilling rig will move to Harbo camp as soon as it completes its work at Bati.

A second source of water is provided by two boreholes in the town, one of which pumps directly to the old concrete reservoir. Several other old boreholes are in the vicinity of the town but are not used at present.

Overall, the Alamata water system is woefully inadequate for the town, the feeding center, and the tens of thousands of additional people that have flocked to Alamata because of the drought. During the rainy season the pipe intake at the river frequently becomes blocked with sand. Moreover, the 6 km gravity main to the concrete reservoir was severely damaged in a flood last December. Although the pipeline was promptly repaired, the 4-inch cast iron main continues to leak and in any event cannot carry sufficient flow to meet all of the needs of the town and feeding center. The mayor of Alamata estimated that the system provides about 300,000 liters per day but the town and feeding center require at least twice as much. A total of 50,000 liters per day is currently provided to the upper World Vision site and the Sisters of Charity site adjacent to the OXFAM storage tank. The lower World Vision feeding site has no direct water line, and water must be obtained from public fountains in the town. World Vision intends to replace the 4-inch cast iron main with a larger 6-inch pipeline, but no construction date has yet been set.

General sanitation and excreta disposal pose serious problems to the town and feeding center. Being non-residential in nature, the feeding sites cannot easily control the sanitation practices of the people coming for food. The problem is made worse by the four-fold increase in town population. Latrines have been constructed at the feeding sites but defecation behavior is difficult to control outside the sites. As a result, several open areas leading to the sites have become large communal toilets. The danger of contamination of the town water supply is high, especially since disinfection of the water is not practiced. According to the mayor, the priority water needs of the town are chlorination of the water supply, construction of a larger reservoir, and improvement of the 6 km intake pipeline.

#### Recommendation

- (1) Redesign the pipeline intake chamber at the river to prevent clogging with sand.
- (2) Replace the existing 4-inch cast iron gravity main from the intake to the reservoir with larger diameter pipe capable of serving both the town and the feeding center.

- (3) Provide some disinfection of the water at the reservoir. Ideally, this should be an on-line chemical feeding unit on the pipeline leading into the reservoir. As an emergency expedient, a simple drip chlorinator could be installed on the reservoir tank itself.
- (4) Provide additional latrines outside the feeding sites. These latrines will need to be cleaned daily to encourage people to use them.
- (5) If the supply of water from the river cannot be increased to meet the needs of the town and camp, consider rehabilitating one or more of the old boreholes in the town.

#### 2.6. Korem Shelter and Feeding Center

Korem is the site of the largest shelter and feeding center in the country. SCF and the RRC each operate separate camps providing both shelter and feeding. According to an RRC official, the SCF camp provides shelter and special feeding to 12,000 people plus dry rations to another 7,000 to 8,000, while the RRC camp provides feeding for 10,000 people and dry rations for an additional 5,000. Overall camp populations, however, may be much higher. OXFAM estimates the two camps to contain between 50,000 and 60,000 people. The water supply systems for the two camps are completely separate. The SCF camp draws water from a new borehole, 75 meters deep, which is equipped with an electro-submersible pump that pumps to a storage tank on the grounds of a nearby secondary school. From the tank, the water flows by gravity to several taps in the feeding center. The yield of the borehole is said to be just adequate for the SCF camp, leaving no surplus for the RRC camp. The borehole and pumping equipment were provided by EWWCA, while the storage tank was supplied by OXFAM. The water situation in the RRC camp is far more limited. The main source of supply is a 31 meter deep borehole, located in the camp, which is equipped with a diesel engine and a direct drive submersible pump. Water is pumped to a 15,000 liter elevated storage tank, from which it flows to four tap distribution frames. The pump is operated 12 hours per day and pumps approximately 45,000 liters daily. However, the supply is inadequate for the needs of the camp and water is available at the taps for only a limited period each day. EWWCA has provided a second diesel engine to allow the borehole to be pumped continuously (using both engines alternatively), but this engine was inoperative at the time of the visit.

Two springs (not visited) are reportedly used as a supplemental source of water for the camp.

An OXFAM report dated January 1985 suggested three possibilities for increasing the water supply to the RRC camp: (1) drilling a new borehole, (2) pumping from a river separating the camp from the town, and (3) pumping from the springs currently used as a supplemental source of water. The report stated that both OXFAM and EWWCA favor the third alternative as it can be implemented very rapidly.

### 3. Conclusions

The water supply and sanitation conditions resulting from the current drought can be described in terms of camps, towns, and the general countryside. All have been affected by the drought and the associated famine. The camps, which include emergency shelter areas, feeding centers, and food distribution points, have the most noticeable problems because they are very new (some are only a few months old) and have generally been unable to develop water and sanitation systems adequate for the populations being served. In the towns adjacent to the camps, the existing water systems, which were generally inadequate to begin with, are increasingly overtaxed by the burgeoning populations seeking emergency food and shelter.

Thus, the problems of both camps and towns are intertwined. One cannot solve the problems of one without at least considering the problems of the other.

And finally, the water problems of the camps and towns can only be fully understood in terms of the severe drought conditions existing throughout the countryside. Most surface water sources have disappeared. Rivers are down (only the Awash and Mile Rivers were seen to have water) and most streams have completely dried up. The fields are burnt and dusty, and there is little to be seen to keep people on the land. Throughout the region, there is a constant movement of people towards the towns and camps for food, water, and medical attention. Although the water supply conditions in the towns and camps may be inadequate, they are invariably better than those in the villages.

Several general conclusions can be made about the water supply and sanitation conditions in the drought-affected areas of Wello Region:

- (1) Although recent water supply improvements could be seen in all of the camps visited on this trip, the availability of water at all sites was still inadequate for basic health purposes. Accurate figures were not available, but rough estimates indicate water consumption rates of 3 to 7 lcd for the camps and feeding centers described in this report.
- (2) There is need for improved water supply and sanitation facilities for non-resident populations using feeding centers.
- (3) Most shelter camps and feeding centers have given primary emphasis to food distribution and feeding needs and relatively minor concern to water supply and sanitation. The problems arising from inadequate water and sanitation, thus, become increasingly severe as camp populations rapidly expand.
- (4) There are insufficient numbers of qualified engineers and sanitarians to expand and improve water and sanitation systems in the camps. In general, the few available engineers do not have trained technicians and works supervisors to help carry out needed improvements.
- (5) In some cases, problems persist because of a lack of funds, but more commonly the problems remain unsolved because of the absence of special equipment, difficulties of transport, or the shortage of trained personnel.
- (6) Coordination is often weak between the organizations operating camps and the EWWCA. Donor organizations take insufficient advantage of the resources available in government and other donor organizations.
- (7) Similarly, coordination appears to be weak among organizations operating camps that are adjacent to each other. The general tendency seems to be for such camps to act independently rather than collaboratively.
- (8) The reliability and continuous operation of water supply systems in camps is seriously limited by a lack of trained pump operators, shortages of spare parts and fuel, and the general absence of rapid back up maintenance services for major repairs.

- (9) When camps draw their water supplies from nearby towns, they invariably place great pressures on already over-strained town systems.
- (10) The presence of a camp near a town often attracts large numbers of people to the town area, which further aggravates the problems of water shortages and also causes sanitation problems in squatter areas.

#### 4. Recommendations

##### Planning and coordination:

- (1) Consider the water supply and sanitation needs of each new camp before it is established. Avoid siting a camp where it will be difficult to ensure an adequate supply of water.
- (2) Include EWWCA in all discussions of new or improved water supply systems.
- (3) Encourage closer coordination between operators of camps and donor organizations willing to provide technical assistance, equipment, and materials. Establish an updated assessment of water and sanitation needs plus a roster of organizations with resources available for such needs.

##### Design and construction:

- (1) Establish standard criteria for water supply and sanitation services in camps and feeding centers. For example, 5 lcd could be set as a minimum water consumption level for emergency start up operations and 10 lcd for normal camp operations. Similarly, minimum criteria should be established for latrines, drainage, and refuse disposal. Encourage all camp operators to attain these minimum levels.
- (2) To the extent possible, standardize equipment and materials in order to make spare parts more readily available and to allow mechanics to be more familiar with necessary repair procedures.

- (3) As a rule, develop at least two independent sources of water for large camp facilities. Camps with only a single water source are at great risk in the event of a mechanical breakdown or source contamination.
- (4) Because few reliable surface water sources exist, new boreholes should be drilled near existing camp areas. These boreholes should be sited so that they will be available for use in the future by nearby towns or villages when the emergency camps are no longer needed.
- (5) Provide disinfection treatment for all water systems using rivers or streams. Surface water sources are likely to be contaminated by upstream users.

Operation and maintenance:

- (1) Upgrade the training of pump operators at the camps. At the least, such personnel should be able to carry out simple dismantling and cleaning operations on pumps, engines, and pipelines.
- (2) Provide a basic set of tools to pump operators to allow them to carry out the above maintenance.
- (3) Equip a roving engineer or mechanic to visit each camp on a regular schedule, perhaps every two to four weeks, to check on the operation and status of the water system.
- (4) Make advance arrangements with EWWCA or some other organization to provide major repairs when requested.

**APPENDIX B**  
**Draft Proposal on**  
**Water Supply Schemes**

Provisional Military Government Of Socialist Ethiopia

National Water Resources Commission  
WATER SUPPLY AND SEWERAGE AUTHORITY

DRAFT PROPOSAL FOR OPERATION, MAINTENANCE  
AND REHABILITATION OF URBAN AND RURAL  
WATER SUPPLY SCHEMES

Prepared by:- Planning & Programming Dept.  
WSSA

-55-

February, 1985  
Addis Ababa

## Table of Contents

<u>NO.</u>	<u>Page</u>
1 Introduction.....	1
2 Historical Background .....	2
3 Operation & Maintenance Administration.....	3
4 The need for Operation & Maintenance.....	3
4.1 Routine Maintenance.....	4
4.2 Periodic....."	4
5 Establishment of Crews	
5.1 Preventive Maintenance Crew.....	5
5.2 Mobile Crew.....	5
5.3 Rehabilitation & Maintenance Crew.....	6
6. Number of Rural and Urban Water Services to be Rehabilitated and Maintained.....	6
7. Material Requirements /urban/.....	9
8. Rural Water Supply Rehabilitation.....	12
9. Brief Description of Selected Rural Towns.....	15
10. Rural Water Supply Schedule /preliminary cost estimate/ ....	43

## INTRODUCTION

The Government of Ethiopia within its framework of the Ten-Year Perspective Plan has embarked on a programme of improving social services and infrastructure in various regional capitals and major rural population service centers. The programme is intended to assist in the declared efforts by the government to raise the living standard of the rural population and to reduce the rate of migration into the urban centers. To achieve these objectives the government has proclaimed a policy of decentralization and reorganization of the main national economic activities with the aim of spreading equitable economic and social benefits to all regions of the Country. In this respect, the National Water Resources Commission (NWRC) was established to ensure the optimum development, use and control of the nation's inland waters. Among other things the Commission is empowered to make proper provision for adequate supplies of suitable water for irrigation and domestic use and adequate facilities for drainage, the safe disposal of human waste and industrial effluents, and the control and prevention of pollution and disease. Within this framework the Water Supply and Sewerage Authority (WSSA) has been established to operate under proclamation No. 219/81. WSSA has been charged with the responsibility for the provision, operation and maintenance of community water supply and waste disposal services in Ethiopia.

Accordingly, WSSA, has long been committed to sector's development. However, development has up to now been slow due to lack of adequate capital, shortage of suitable qualified personnel, lack of reliable sector data and ineffectiveness of past institutional arrangements were the major bottleneck for the smooth operation of the Authority. Despite these problems still exist, the Authority has now formulated sector programmes, developed institutional arrangements for consideration by the Government and is on the process of establishing seven regional offices to assist the water supply and sewerage organizations at the local level.

In addition, WSSA will set up monitoring and evaluation unit to follow the year to year activities of water services and to measure the effectiveness of these activities, an appropriate system of reporting and evaluation of construction of water schemes their operation and maintenance will be designed instituted and maintained.

### Historical Background

Many of the existing water supply systems in the country were built some 40 years back and as a result, failure of the system is frequent. In addition to the old age, there is a lack of as built drawings and or operation manuals for most of the schemes which consequently contributes to the untimely failure of the system. In fact, most of them were never designed and constructed, they just became established with usage and a minimum of development.

Past experience of operation and maintenance programmes of water supply schemes in the country shows that it is poor both in coverage and efficiency. There is no up-to-date and proper data on the existing water supply schemes, as a result it was impossible to carry out planned operation and maintenance work. In the past planning of maintenance work consisted only on providing manpower and materials usually based on historical experience. Work planning was mostly delegated to field foremen who made day-to-day work assignments and the results varied as widely as the judgements of the individuals, Under such circumstances, it is clear that no significant improvement work can be done on the operation and maintenance of water schemes. Hence the need for collecting data, proper planning and budget allocation for operation and maintenance as well as rehabilitation of schemes in the water supply and sewerage services is an urgent task of the Authority.

The experience in the rural water supply schemes is even worse. In addition to the lack of basic data spare parts and tools, the community had no strong sense of ownership in most of the rural areas. Most of them were built in remote areas and are beyond reach without four wheel drive which is an acute problem of the Authority.

Unless most of the existing urban and rural schemes are maintained effectively and preventing maintenance and follow up is carried out for both old and newly constructed water schemes, it would be very difficult to achieve the required service level for the Community. It must be understood that a neglect of operation and maintenance would render all the efforts and investment resource put into construction worthless.

Hence, operation and maintenance programmes accompanied with the necessary annual costs, manpower and material requirement is an essential part of WSSA's plan. Their implementation and execution should also be undertaken in close co-ordination with the local people and other development programmes of the International Organization and Governments.

#### Operation and Maintenance Administration

The administration of operation and maintenance is done essentially by the respective water supply services of the town. However, at the moment all aspects of operation and maintenance personnel, budget appropriation, purchase as well as the policy matters are looked into by the Head Operation and Maintenance Department of WSSA. This section has the responsibility to supervise the operation of the water supply system of all the towns throughout the Country, (for further classification please refer the new organizational chart). The duties and responsibilities of the Operation and Maintenance Department as well as the Regional and water service stations has clearly been laid down in the functional guide of the new organizational plan.

#### The need for Operation and Maintenance

The production and transmission to consumers of a continuous supply of water is the most important duty of the operation and maintenance services in any town water schemes.

The day-to-day procedures for maintaining a satisfactory quality of supply without interruption consists mostly of giving clearly defined responsibilities and of ensuring, that these responsibilities are efficiently fulfilled. For water supply service officials in developing countries

responsible for water supply scheme maintenance the situation is a familiar one - constantly increasing costs for materials, equipment costs seemingly to double every few year while more and more schemes are added to the water supply system which will require maintenance. Under conditions of limited financial and human resources and other numerous competing high - priority needs, the problem of operation and maintenance of water supply schemes is indeed an acute problem of WSSA and needs especial attention.

Water supply scheme maintenance consists of many different individual work activities performed for different purposes. Maintenance requirements — the kinds and amounts of work to be performed vary with such scheme characteristics such as river diversion, spring development, hand-dug or shallow wells and the level of population served and capacity of the system and the level of service to be provided. Water supply authority have traditionally recognized several categories of maintenance:

1. Routine/Recurrent/ Maintenance — work such as repair distribution system, mal-functioning water meters, seal leakages, change pipes, and perform preventive maintenance on surface pumps and generators and work operations regularly performed on a day-to-day basis where is needed.
2. Periodic Maintenance covers operations that typically need to be repeated only every four to ten years, such as overhaul and replacement of pumps and generator change, spare-parts, accessories etc.

It is considered that these activities would be executed by each water service centers in urban towns. However, for rural schemes operation and maintenance will be carried out by regional mobile crew which will be established in due course of time.

Establishment of Crews To offset this pressing urgent task, the Water Supply and Sewerage Authority (WSSA) will establish a crew of technical personnel who will conduct the necessary operation and maintenances of the urban schemes with special emphasis on rural water supply rehabilitation programmes. The crew will be grouped in three categories such as

1. Preventive Maintenance Crew (local Crew)
2. Mobile Crew and
3. Major Rehabilitation and Maintenance Crew.

The duties and responsibilities of these crew shall be defined as follows:-

1. Preventive Maintenance Crew :- This crew will be a local crew selected from the water services and its main task should be to trace leakages in the distribution system, install or change pipe line water meters, adjust and repair minor parts of generators and surface pumps clean, and grease the machines. Maintain and clean repaired or recently shut-down mains, tanks and other components of the system.
  - Perform regular scheduled and systematic inspection, cleaning and painting of all reservoirs and tanks.
  - Avoidance of reservoir draw-down and sudden changes in direction.
  - Periodic surveys of plants and premises in which cross connection are likely to exist and elimination of such connections.
  - Regularly inspects and tests are backflow prevention devices.
  - Perform other routine preventive maintenance as required within the system.
2. Mobile Crew :- This crew will be staffed with advanced and higher level experienced technician capable of maintaining and repairing pumps, generators and all other electro - mechanical equipment as well as machines and distribution pipelines.
  - Disassembles, maintains and re-assembles pumps, motors and other water supply equipment .
  - Instructs water supply technicians (the local crew) on the procedures of fault finding and methods of routine preventive maintenance.

It is anticipated that this crew will be fully equipped with mobile work-shop tools and accessories as well as built in radios for communication with the regional offices as well as with the head quarter. It's main objectives will be to provide emergency services for needy rural or urban centers on a stand<sup>by</sup> basis.

### 3. Rehabilitation and Maintenance Crew

This is more of reconstruction, improvement, extension and maintenance work activities especially for rural schemes. The duties and responsibility of the crew shall be:

- Replace mal-functioning sub-mersible or surface-pumps, generators, reservoirs and other system of the water supply schemes.
- Change or alter distribution line, repair and install water meters.
- Repair and or replace mains, valves and other fittings.
- Develop or clean water source points .
- Maintains buildings of the water system, roofs, gutters, sky lights, windows and door frames, screens, pump housings, metal railings, grating and miscellaneous metal coverings.
- Performs other related activities as required within the system.

### Number of Rural and Urban Water Services to be Rehabilitated and Maintained

There exists in Ethiopia 249 towns (excluding Addis Ababa and Asmara) which are considered as urban. According to the present classification, towns with a population greater than 10,000 fall under urban and those under 10,000 are classified as rural and both are under the management of WSSA. Without taking into account the quality and quantity of water provided and the status of the water system, some type of a water supply system exists in 127 urban towns. However, of these, only 20 towns have a properly organized and adequate one. According to the information derived from various studies and surveys the nominally existing water systems in the remaining 89 urban towns need to be rehabilitated or completely replaced. No type of piped water supply exists in the other 140 towns. As far as the rural water supply system is concerned it is estimated that about 1500 bore-holes, 1338

shallow wells and 292 springs and a number of cistern and ponds of a different type exist in the eight regions of the country. It is also estimated that about 40% of these schemes need to be rehabilitated.

Details of cost estimate for the rehabilitation of the rural schemes and the number of urban town that are to be properly maintained is given in the following table.

Urban Water Supply Schemes

NO.	Towns	No. of schemes with low level	No. of schemes to be maintained/ Rehabilitated	Population to be served
1	Arsi	7	7	40,000
2	Bale	1	1	8,287
3	Britrea	28	10	120,113
4	Camo Cofa	5	5	49,400
5	Gojam	7	7	134,490
6	Gondar	4	2	24,400
7	Hararghe	8	8	214,534
8	Illubabor	2	2	11,480
9	Keffa	3	3	83,930
10	Shoa	25	15	113,690
11	Sidamo	11	9	78,320
12	Tigray	5	5	91,976
13	Wolega	5	5	44,298
14	Wollo	10	10	56,924
	Total	127	89	1,102,447

Standard Cost for Operation  
and Maintenance of Urban  
Water Supply Schemes by Region

Activity	Harario Region	Southern Region	South-western Region	North-western Region	Eritreia Region	Tigray Region	Wollo Region	Central Region
Drilling	9,909	11,192	9,933	9,280	8,042	6,346	5,269	10,306
Pump Installation	12,022	11,503	10,062	9,950	9,135	9,135	9,100	11,394
Reservoir Maintenance	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450
Distribution "	79,860	79,860	79,860	79,860	79,860	79,860	79,860	79,860
Maint./Rehabilitation cost per scheme	105,241	103,005	103,303	102,540	100,427	98,791	997,679	105,010
Number of Schemes in region	8	20	10	9	10	5	10	22
Total Maintenance cost/Region	841,923	2,120,109	1,033,050	922,800	1,004,870	493,955	976,790	2,310,220

Total Maintenance Cost .... 9,703,773  
 Contingency 20% ..... 2,940,755  
11,644,528

It is estimated that close to 11.6 million Ethiopian Birr is required for the betterment of programme of urban schemes. Detail material requirement is shown in a separate table.

## Material Requirements

The shortage of water supply materials in Ethiopia is an acute problem. Almost all materials are imported and hence require huge foreign exchange which is very scarce for this underdeveloped country. The unavailability of these materials in inadequate quantities have generally resulted in the interruption of services to the community quite often. Moreover, as a result of such delays costs will be increased and create another problem. However, to offset this shortages and related problems, the authority is trying to do its utmost effort to ensure the availability of these materials for the smooth operation of the day - to - day activities of both the rural and urban schemes.

Attached herewith are lists of some important materials which are necessary and are in acute shortage which WSSA could not cope up to procure and stocking them. These materials consists of engineering and laboratory equipment, workshop materials, water quality control instruments, pipes and fittings, machinery, vehicles, office furnitures and other supplies.

NO	Description	Type	Size	Quantity	Estimated total cost
<u>1. Engineering &amp; Laboratory Equipment</u>					
. 1	Theodo light (transit)...	R.D.S.		2	36,000
. 22	Leveling	NOKO		3	10,500
. 3	Drafting Table			3	4,500
. 4	Chairs	Swivel		14	7,000
. 5	Peaks			11	7,700
. 6	Stadia			4	2,920
. 7	Polar Coordinator			3	4,800
. 8	Meter of 50	Metal		3	600
. 9	Range pole		2m	20	800
10	Pataring Variant Rapido Set	110903	8cm	2	500
11	" " " "	110944	"	2	500
12	Compass Design East			3	900
Sub-total					76,720

NO	Description	Type	Size	Quantity	Estimated total cost
<b>2. Shop Equipment and Tools</b>					
2.1	Heavy Duty Tools			2	10,000
2.2	Light Duty tools			4	60,000
2.3	Extractors		Assorted	3 each	90,000
2.4	Grinding Machine			2	2,000
2.5	Drilling Machine			1	1,000
2.6	Mobile workshop			1	1,200,000
2.7	Micro-Meter			2	500
2.8	Dial indicator			3	1,500
2.9	Hydraulic press			1	2,000
2.10	Hoist crane			1	2,500
2.11	Air Compressor	125CFM		2	60,000
Sub-total					1,419,500

### 3. Water Quality Control Instrument

3.1	Aspectro-photo meter			2	40,000
3.2	pH - Meter			2	40,000
3.3	Turbidity meter			2	5,000
3.4	Electric Conductivity Meter			2	5,200
3.5	Micro - Balance			2	14,000
3.6	Electric Dry Oven			2	8,500
3.7	Chemical Sets			1	13,000
3.8	Water Purifier			2	16,800
3.9	Incubator			2	14,000
3.10	High Pressure Steam Sterilizer			2	10,000
3.11	Dry - type sterilizer			2	3,000
3.12	Refrigerator			2	3,000
3.13	Microscope			2	16,000
3.14	Water Bath			2	4,000
3.15	Gas Burner			2	4,000
3.16	Glass apparatus			2 set	16,000
Sub-total					223,000

### 4. Pipes and fittings

4.1	Pipes galvanized		6mt	63,000	2,207,000
4.2	Union		1/2 - 4"	22,000	37,730
4.3	Nipples		1/2 - 4"	34,000	25,730
4.4	Tee		1/2 - 4"	8,000	12,910
4.5	Reducer		Assorted	5,000	15,340
4.6	Plug		"	11,000	68,500
4.7	Elbow		"	35,000	19,570
4.8	Cross		1 - 4"	700	3,170
4.9	Flange		1/2 - 1"	20,000	66,000
4.10	Gate Valve		1/2 - 4"	40,000	138,985
4.11	Check Valve		1 - 4"	2,000	68,900
4.12	Water meters		1/2 - 10"	60,000	1,820,730
Sub-total					4,573,791

NO	Description	Type	Size	Quantity	Estimated total cost
<u>5. Machinery &amp; Equipment</u>					
5.1	Electric Submersible pumps		70-260	90	665,986
5.2	Horizontal Surface pumps		30-240	80	496,305
5.3	Diesel Generators		10- 24	30	1,050,000
sub-total					2,212,000
<u>6. Transportation Vehicles</u>					
6.1	Station wagons	long-base		10	450,000
6.2	" "	short-base		10	400,000
6.3	Pick ups	4 x 4		15	600,000
6.4	Motor cycle			30	45,000
6.5	Carrier Truck with trailer		11 tons	7	1,120,000
sub-total					2,615,000
<u>7. Office Furniture &amp; Equipment</u>					
7.1	Desk(executive & others)			50	25,000
7.2	Swivel Chairs			50	15,000
7.3	Type writer (Arabic)	Olympia		5	2,750
7.4	" " (English)	IBM		5	15,000
7.5	Scientific Calculators			19	1,500
7.6	Photo copy Machine	canon NP-155		1	13,000
7.7	Duplicating "	Gestetner	big	1	3,000
7.8	Mobile radio			10	30,000
7.9	Radio Communication(base station)			5	25,000
7.10	Paper Binding Machine(with plastic binder)			1	
sub-total					138,250
<u>8. Other Supplies &amp; Equipment</u>					
8.1	Chlorinated			30	270,000
8.2	Map			20	100,000
8.3	Camera with all its accessories			1	10,000
sub-total					380,000

Rural Water Supply Rehabilitation

Rural water supply activity in Ethiopia is carried out under 8 regional offices, indicated below

NO.	Regional Offices	Administrative Regions	Location of the regional offices
1	Harariga Region	Harariga	Dire Dawa
2	Southern "	Bale, Sidamo, & Gama Gofa	Awassa
3	Northern <sup>1971</sup> Regional Region	Gojam & Combar	Dahir Dar
4	South western Region	Kefa, Illubabor & part of Wollega	Jimba?
5	Areria Region	Areria	Asmara
6	Higral Region	Higral	Mekela
7	Wollo "	Wollo	Dessie
8	Central "	Shoa, Arsi & part of Wollega	Addis Ababa

The major activities are <sup>210</sup> bore-hole drilling, spring development, hand-dug wells, ponds and cisterns. Most of the schemes have point water supply except the few bigger towns for which large/small distribution systems will be constructed.

To limit crisis that could well be avoided by giving due consideration to rehabilitation and maintenance, priority is given to this activity and hence, the following program is recommended. In order to get the utmost out-put from each scheme preventive maintenance is inevitable. Nevertheless, there are schemes that require immediate rehabilitation because of their present poor efficiency. To fulfill this, the program is divided into three stages on the following conditions.

Stage I will cover schemes that are desperately in need of immediate pump, generator and water tank replacement. It also includes replacement of hand pumps.

Stage II Stage II will cover schemes that require replacement of pumps and generators, however can delay until the replacement of stage I is completed.

Stage III\*- Stage III covers schemes that are in a good operational state and relatively new. However, they require replacement after some years of services. These schemes also require preventive and scheduled maintenance.

List of schemes under this category are as stated below. Detail information of sites that are indicated figuratively will be provided later.

1. Stage I

I. Bore hole

A. Central Region

D.	Site	Awraja	Woreda	Population	
1	Dilela	Chebo &	Wolliso	1,215	- Pump & Generator set
2	Gurura	Chebo & Gurage	Wolliso	1,000	- Well development - Pump & Generator - Storage tank of 3 cu.m - 2 public fountains
3	Goro	Chebo & Gurage	Goro	828	- Pump & Generator - Storage tank of 8 cu.m - 2 public fountains
4	Tajitu	Halkoch & Lutajira	Bora	4,000	- Pump & Generator - 2 public fountains
5	Dora	Halkoch & Lutajira	Bora	1,000	- Pump & Generator - Cattle Trough
6	Abirnoqa	Halkoch & Lutajira	Adam Tulu		- Pump & Generator - Storage tank 8 cu.m
7	Alen Gebeya	Halkoch & Lutajira	Alaba	770	- Pump & Generator - 2 public fountains - Storage tank of 4m <sup>3</sup> - Cattle Trough
	Aspori	Jibat & Wecha	Dandi	1,451	- Pump & Generator - Cattle Trough

006

.....

No.	Site	Awraja	Woreda	Population	Required Required Activity
9	Barbolcha	Yerer & Kereyu	Minjar	4,000	- Pump & Generator set - 1 public fountain - Storage tank of 8 cu.m - 1 cattle trough
10	Elala Ber	Yerer & Kereyu	Minjar	4,000	- Well Development - Pump & Generator - 2 public fountains - storage tank of 8 cu. m - 1 cattle Trough
11	Ataya	Wefat & Timaga	Yifrat & Jile	4,012	- pump & Generator set - 3 public fountains
12	Mika Turi	Selale	Wuchale	2,080	- Pum & Generator set - 3 public fountains - Yard Connection
13	Coha Tsion	Selale	Wore Jaro	4,012	- Pump & Generator set - Source Modification
14	Mehal Meda	Menz & Gishe	Gera Meda	4,626	- Pump & Generator set - Yard Connection
15	Borchota	Yerer & Kereyu	Boset	2,500	Pump & Generator

....!

**APPENDIX C**  
**Terms of Reference**  
**for**  
**Consultancy Services**



	<u>PAGE</u>
I. INTRODUCTION .....	1
II. OBJECTIVES AND SCOPE OF CONSULTANCY SERVICES,.....	2
A. ORGANIZATION STRUCTURE .....	4
B. PERSONNEL MANAGEMENT .....	4
C. FINANCIAL MANAGEMENT (STANDARD COST OF OPERATION AND MAINTENANCE),.....	5
D. SUPPLIES, PROCUREMENT AND EQUIPMENT .....	5
E. FIELD OPERATION AND MAINTENANCE .....	5
III. CONDUCT OF CONSULTANCY SERVICES ,.....	6
IV. MANUALS .....	7
V. REPORTS .....	7
VI. LOGISTIC SUPPORT SERVICES.....	7
VII. COUNTERPART ASSISTANCE & TRAINING .....	8

## WATER SUPPLY & SEWERAGE AUTHORITY

### TERMS OF REFERENCE

#### I. INTRODUCTION

The Water Supply & Sewerage Authority (WSSA) is one of the organizational entities established under the National Water Resources Commission in the Proclamation No. 219 of 1981. The Authority is an autonomous government organization having its own juridical personality.

In accordance with the Establishment Proclamation, the Authority is charged with the functional roles and responsibilities of:-

- Providing water supply and sewerage services for both the rural and urban areas of Ehtiopia.
- Conducting feasibility studies and cause to carry out designs of water supply and sewerage schemes.
- Constructing distribution systems, service reservoir and installing water meters, etc.
- Operating, repairing and maintaining water supply and sewerage schemes.
- Carrying out such other similar activities necessary to achieve the Authority's objectives.

According to the current urban or rural areas categorization policy in the water sector, towns with a population of 10,000 and above fall under urban classification category and those

under 10,000 are classified as rural. So, with the above classification policy, Ethiopia is at present known to accommodate about 249 towns (excluding Addis Ababa and Asmara). Regardless of the quality and quantity of water supply services rendered and the size and complexity of the water schemes in operation, some type of a water supply system is also known to exist in each of the 127 urban towns which are altogether under the administrative jurisdiction or technical supervision of the Authority directly or indirectly.

As far as the rural water supply system is concerned, the Authority is currently entrusted with the functional responsibilities of operating, maintaining and administering about 1500 bore-holes, 1338 shallow wells, 292 developed springs and a number of river intake schemes as well as ponds and cisterns of different sizes and systems in the rural areas of the respective administrative regions of the country.

The Authority is at present facing serious problems in the management of the overall operation and maintenance work of its water supply schemes through proper planning, direction and coordination of its activities. So, the basic objective of the management assistance to be provided by the good offices of the United Nations Children Emergency Fund (UNICEF) under the Consultancy Services is to conduct in depth studies into the existing operation and maintenance situations and develop as well as implement improved methods, procedures and operating practices as required and their documentation into manuals, instructions and directives.

## II. OBJECTIVES AND SCOPE OF CONSULTANCY SERVICES

In line with the overall objectives of the Authority, the consultant shall review existing situation, develop and implement Operation

and Maintenance Management Systems for both the Urban and Rural Water Supply schemes at the Regional Level and all other necessary services required to achieve the objectives of the authority.

To this effect, the assumptions that have been forwarded as the basis of formation of the Three-Level Maintenance Systems are outlined below.

The Water supply schemes will be operating at three different levels, namely at Water Point Service Level which will consist of the provision of proper instructions to skilled water supply technicians and handling of routine repair and maintenance work. It is also intended that preventative and routine maintenance for both rural and urban schemes will be the responsibility of water point service unit level atleast within a given radius of their surroundings. At the Mobile Maintenance Unit Level, the major work will include preventative as well as periodic repair and maintenance, while at the Regional Level, the work will consist of major repair, and maintenance as well as over-haul of water supply schemes both in the rural and urban areas.

The consultant shall be responsible for the development of procedural manuals which outline in detail the functional roles and organization of the concerned internal organizational components and sets forth technical and administrative procedures to be followed by the organizational units appropriate job descriptions for most of the key positions together with the final formulation of conclusions and recommendations.

The task of the consultant shall include but not limited to the following:-

A. ORGANIZATION STRUCTURE

Taking into account the newly developed organizational charts and functional guides and all available information related to the Operation and Maintenance of WSSA, and on the basis of its findings in the field, the consultant shall prepare:-

- 1) Internal Organization and Staffing Patterns.
- 2) Working relationships of all other Departments within WSSA with the Operation and Maintenance Department.
- 3) Work-flows and analyze management processes used in the allocation of human, physical and financial resources; and the means employed to improve the operation and maintenance work activities.
- 4) Organizational structures for the operation and maintenance crews by category (eg. mobile, routine, periodic maintenance etc.) and local level crew strength and develop the systems required and later implement.

B. PERSONNEL MANAGEMENT

- 1) Determine specific duties and responsibilities of each crew and the qualification requirements of personnel within the crew.
- 2) Within the framework of the newly developed staffing plan, establish class titles and prepare job specifications.
- 3) Work-out manpower development plan, identify training needs for the Operation and Maintenance and outline training programmes.

C. FINANCIAL MANAGEMENT (STANDARD COST OF OPERATION AND MAINTENANCE).

- 1) Review the present costing system thereby establishing standard costing system for major operation and maintenance activities.
- 2) Forecast the long range financial needs of water schemes required for the operation and maintenance activities.

D. SUPPLIES, PROCUREMENT AND EQUIPMENT

- 1) Examine warehousing and stores practices of water services for material and supplies required for the operation and maintenance.
- 2) Develop criteria for standardization of various equipment, spare parts and material supplies.
- 3) Develop fleet of machinery, equipment and tools required for a standard operation and maintenance crew size.

E. FIELD OPERATION AND MAINTENANCE

- 1) Examine in detail WSSA's field practices associated with the installation, operation and maintenance of utility distribution.

On the basis of the findings, the consultant shall establish maintenance parameters for the system including frequency of type of maintenance required for the different schemes rural as well as urban.

- 2) Assess adequacy of treatment plant and the level of operation and maintenance required.
- 3) Develop and later implement operation and maintenance management systems for distribution network and related works.
- 4) Carry out inventory of the present systems of water supply, treatment, storage and distribution, including a careful assessment of the present level of water losses, report findings and recommend which portions, if any, of the existing systems need to be maintained.

### III. CONDUCT OF CONSULTANCY SERVICES

The tasks outlined above are to be carried out in two phases.

#### 1. Phase I

All reviews, studies, development and design of various operation & maintenance management systems and related manuals are to be done in phase I. Detailed work programmes and staffing plans for operation & maintenance standard crews for phase II shall be prepared and presented prior to conclusion of phase I.

#### 2. Phase II

Implementation of approved Operation and Maintenance Management Systems, final system designs, and refinement of systems required, if any, (during implementation) shall be done in Phase II.

#### IV. M A N U A L S

The manuals required to be prepared by the consultant shall include the following but not limited to:-

- Operation Manual (field)
- Maintenance Management Manual

#### V. R E P O R T S

The consultant shall submit interim reports indicating findings, monthly progress reports, draft final report and final comprehensive report. The quantity of each report is to be decided at a later date.

#### VI. LOGISTIC SUPPORT SERVICES

A) In order to achieve the above objectives UNICEF, on a grant basis, shall:-

- 1) Provide vehicles for office use and field study trips.
- 2) Supply office machines, materials and supplies necessary for the work.
- 3) Cover all costs of the consultants.

B) WSSA on its part, shall:-

- 1) Provide office for the consultants.
- 2) Provide to the consultants secretaries, drivers and other auxiliary personnel as required.

## VII. COUNTERPART ASSISTANCE & TRAININGS

The consultancy services under the Management Assistance Program of the UNICEF is to be carried out in close coordination with the Authority's Management and with the assistance of the national counterpart personnel to be provided by the Authority in order to successfully meet the study project objectives.

It is also important to note that the consultants are required to identify principal training needs and assistances in developing realistic training programs for prospective employees in the area of operation and maintenance for urban and rural schemes at the Regional Level.

APPENDIX D  
OXFAM Report  
(Extract)  
on  
Water Supply in Wello Region

WATER SUPPLY IN WOLLO REGION OF ETHIOPIA

The Work of EWCA and OXFAM in Relief and Development

by Ben Fawcett and Keith Salt  
Engineers in OXFAM Technical Unit

Addis Ababa  
March 1985

## 6. RECOMMENDATIONS FOR OXFAM'S FUTURE INVOLVEMENT

### 6.1 General

As this report is the result of only an initial and limited appraisal of EWWCA's work in Wollo and the current water supply situation its conclusions should not be considered as any more than a suggested plan of action. Many of them contain a large element of further analysis and assessment, which it is hoped that the present OXFAM staff may be able to carry out. As a result of such work firmer proposals will be able to be made. At the same time, in view of the urgency of the current situation, some action is necessary immediately, in order to follow up the work already done. Consequently the following recommendations are divided between immediate response, which should be considered as referring to the next 3-6 months, and the longer term. Necessarily there will be a considerable amount of overlap between the two programmes.

It is strongly felt, on the basis of nearly four months experience of working with EWWCA in Wollo, that OXFAM should continue its involvement. Nevertheless the scale of that involvement is to be decided by discussions between the engineers who have worked here, the OXFAM Field Director in Addis Ababa and the OXFAM Staff and Trustees in Britain. The details of the final programme will then be decided by the OXFAM engineering staff and representatives of EWWCA both in Wollo and Addis Ababa. Consequently, any recommendations made here are simply the responsibility of the OXFAM engineers involved and make no form of commitment either on behalf of OXFAM or to EWWCA. Dependant on the budget which OXFAM may be able to commit to such support it may be that many of the following proposals should be put to other potential donors. It is hoped that the scale of any OXFAM commitment will become clear in the near future and so make it apparent what other resources will be necessary.

Following a meeting with Ato Abera Aguma, Head of Rural Water Supplies, his staff are preparing a proposal document, including outline budget details, for the support which they hope OXFAM may be able to provide over the next twelve months to increase the regular work of EWWCA. It is hoped that this will be seen as an appendix to this report and will be assessed in conjunction with it.

### 6.2 Areas of Immediate Response

In addition to the continuation of OXFAM's help in providing water supplies to the relief centres in Wollo and neighbouring Regions the following recommendations should be given urgent consideration:

- a more detailed assessment needs to be carried out, by an experienced mechanic, of the present condition of the vehicle fleet and the possibility of repair. Following this, the necessary spares must be procured and a programme of repair carried out. At the same time it will be decided how many new vehicles are needed.
- in support of the new Hands-England drilling rig it is essential for the necessary vehicles to be provided to facilitate its best use. Any other equipment which may prove necessary must also be obtained.
- in pursuance of the objective of maintenance of present facilities, and assuming that the necessary personnel and vehicles will be available to carry out the work, programmes should be set up for:

- a) the assessment of all existing productive boreholes to analyse
    - the need for repair of existing pumps
    - the suitability of existing pumps according to available data
    - the need for future pump tests
    - the needs for alternative pumps
    - the possibility of initial use of OXFAM-supplied Mono pumps
    - the present state of handpumps
  - b) the assessment of handpumps in dug wells to consider
    - their repair and need for spares
    - their possible replacement by more suitable types
- further consideration needs to be given to the supply of spares for both pumps and engines and vehicles so that all can be adequately maintained. If more, immediate shortfalls are evident these should be remedied.
  - help should be given, possibly by any mechanic provided for assistance in vehicle repair and maintenance, in the construction of a properly designed borehole test rig, using the present trailer-mounted equipment mounted on a truck chassis. A suitable, variable flow pump will be needed.
  - four tripods and winches, necessary for maintenance of many facilities and for dug well construction, should be provided.
  - three sets of mobile welding equipment should be provided.
  - following consultation with OXFAM's agricultural advisors a decision should be taken concerning the supply of pumps for the proposed Lake Hayk irrigation scheme, this being viewed as a pilot scheme for other similar projects.

### 6.3 Longer-term Development

It is essential for OXFAM to consider the scale of its involvement in the field of water supply in Wollo and to try to assess the budget which may be available and the length of time over which it is prepared to help. Based on this it will be possible to act appropriately on the following propositions:

- to carry out a feasibility study on the use of the new trailer-mounted HE20 rig for drilling in less accessible areas and to make recommendations for modifications and possible supply of other similar rigs.
- to continue support of maintenance and installation of borehole pumps and handpumps.
- to consider the feasibility of being involved in survey, design and supervision of the EWWCA construction programme of dug wells, spring protection and other appropriate technology schemes, in certain remoter areas of Wollo, in particular where agricultural projects are being supported by OXFAM.
- to carry out an assessment of the needs of other agricultural schemes, similar to the Lake Hayk project, in cooperation with the OXFAM agriculturalist, and consider supply of equipment and advice for these.
- to continue the support of the Kobo Alamata Agricultural Development Project, which has commenced in 1985.

#### 6.4 Personnel

The OXFAM team working in EWWCA, as from the second week in March 1985, will consist of two water engineers, one British and one Ethiopian. It is envisaged that, in order to facilitate the work programme already outlined, two Ethiopian water technicians, experienced in both the practical work necessary and in the management of labour under their control, will be needed. In this way the engineers will be able to concentrate on advice, management and research whilst the technicians can be left to ensure that the necessary construction work is carried out. This is particularly envisaged for the work in the feeding centres, where EWWCA have been seen to be short-staffed. In the longer-term it is hoped that the technicians will be able to assist with much of the assessment of maintenance needs and ensure that this is carried out. At the same time it may be possible to set up a team of labour for well-digging and spring protection to be under their control, as has been done in Welayita in the South of Ethiopia. It is essential that all members of the OXFAM team should have independent transport.

The present British engineer, Keith Salt, is due to remain in Ethiopia until June 1985, whilst the Ethiopian, Mengesha Araya, is employed by OXFAM indefinitely. In the next few weeks, it will be necessary, taking account of the workload and the form of involvement that OXFAM decides to maintain, to decide whether a further expatriate should be employed. In the longer-term, if it is decided to replace Keith Salt, it may be useful to employ someone with a hydrogeological background, together with considerable general water engineering experience.

With regard to the need for repair and maintenance of vehicles it will be necessary to employ an experienced mechanic. He will help to order spares for both vehicles and other plant. In the short-term it may be expedient to request that one mechanic, at present employed by OXFAM in Arba Minch, in Southern Ethiopia, should visit Kombolcha for a short time in order to carry out the further assessment of the state of the vehicle fleet which is suggested here. It is vital that a local counterpart mechanic should be employed by EWWCA to work with any expatriate.