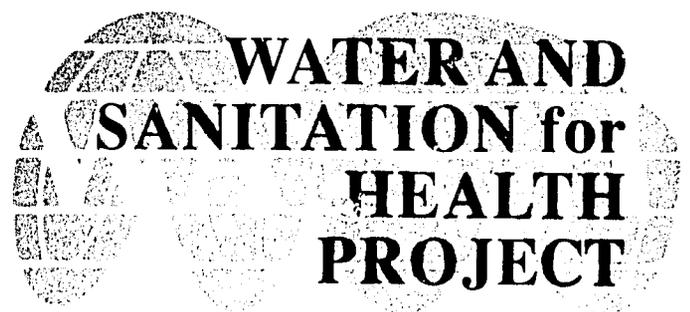


F I E L D R E P O R T

**A PROGRESS REPORT ON
ESTABLISHING REGIONAL TRAINING,
O&M, AND REPAIR WORKSHOPS
IN THE REPUBLIC OF YEMEN**

Field Report No. 347
October 1991



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WASH Field Report No. 347

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IN THE
REPUBLIC OF YEMEN**

Prepared for the USAID Mission to the Republic of Yemen
under WASH Task No. 261

by

Jonathan Hodgkin

October 1991

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Feasibility of Handpump Installation and Manufacture in the Yemen Arab Republic. *WASH Field Report No. 224.* January 1988.

Small Rural Water Systems Project in the Yemen Arab Republic: A Midterm Evaluation. *WASH Field Report No. 197.* September 1986.

Yemen Sana'a Basin Water Resources Assessment. *WASH Field Report No. 164.* June 1986.

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ABOUT THE AUTHOR

Jonathan P. Hodgkin is an engineer with Associates in Rural Development, Inc. in Burlington, Vermont. Mr. Hodgkin has extensive international engineering experience with water supply related issues. He has broad experience working in rural villages and has worked in Yemen, Sudan, Somalia, Chad, and Djibouti. Mr. Hodgkin holds a B.S.C.E. and is an M.S.C.E. candidate.

ACRONYMS

| | |
|------------------------|---|
| CLCCD | Confederation of Local Councils for Cooperative Development |
| CPO | Central Planning Organization |
| CYDA | Confederation of Yemeni Development Associations |
| LCCD | Local Council for Cooperative Development |
| MLA | Ministry of Local Administration |
| O&M | Operation and maintenance |
| PDRY | People's Democratic Republic of Yemen |
| RWSD | Rural Water Supply Division |
| USAID | United States Agency for International Development |
| WASH | Water and Sanitation for Health (Project) |
| YAR | Yemen Arab Republic |
| YR 12.2 (Yemeni Rials) | = \$1.00 U.S. - official rate |
| YR 26.5 (Yemeni Rials) | = \$1.00 U.S. - market rate |

EXECUTIVE SUMMARY

Introduction

In 1988 USAID completed a 10-year project for Yemen's Rural Water Supply Division to establish small rural water supply systems. This project is known as 044, the Small Rural Water Supply Systems Project. The following year, as a result of concerns expressed about the operational status of many of Yemen's water supply systems, USAID proposed a PL480 program to support the systems via the country's local council network. The program was to include the establishment of regional workshops to train pump operators and assist in maintaining and repairing water systems. The Yemen government approved the PL480 project prior to the unification of the Yemen Arab Republic and the People's Democratic Republic of Yemen, but to date there has been no appropriation of funds to support it.

To support the proposed workshops, USAID purchased seven sets of mechanical workshop tools and equipment and 110 pump-operator tool kits. This equipment had been specified as part of the earlier WASH Field Report No. 259, *Operation and Maintenance of Rural Water Supplies in the Yemen Arab Republic* (March 1989). USAID/Yemen released the workshop equipment to Yemen's Ministry of Local Administration (MLA) as a result of an agreement to initiate training and establishment of the workshops. USAID/Yemen then requested the assistance of a WASH consultant to evaluate the progress in establishing four workshops in the northern governorates of the Republic of Yemen, review operations and procedures, and provide on-site operations and maintenance (O&M) training as necessary and appropriate. The consultant completed this assignment with two assistants, August 7 to 23, 1991. The consultancy included field trips to four workshop sites in the Hodeidah and Taiz governorates and a visit to Aden to meet water sector officials.

Findings

Upon visiting the proposed workshop sites, the consultant team found that the regional training, O&M, and repair workshops planned are not yet fully established and operational. In only one case did the team find that a workshop had been fully established, and in that case it had been operational for less than one month. However, because the chiefs of each of the local councils involved are clearly energetic and interested in establishing operational workshops, there is little doubt that they will eventually be formed. In the four northern governorates chosen as workshop sites, the tools and equipment have been transferred to the local council districts where the workshops will be located. Efforts to locate the tools and equipment destined for southern governorates intended for workshop sites met with little success, due at least in part to administrative confusion on the part of the MLA following unification. A full inventory of the equipment distributed to each workshop was not performed, but field visits did reveal that several important pieces of equipment were not

included in the original order. These include welding cables and clamps for the welder, and air hoses and fittings for the compressor.

All of the local council chiefs appear to understand the MLA plan for establishing workshops to support village water projects. However, the proposed mandatory membership fees to be paid by villagers for services do not appear to be workable. The reasons for this include cost, service capability, and accountability to water project role. Traditionally, rural villages have sought private-sector mechanics to perform repair services, with costs having been covered by fees collected from villagers. In most cases basic operating costs can be covered by fee collection, but finances are tight and villagers are likely to be reluctant to pay for regular operation and maintenance service unless there is ample evidence of benefit. In fact, evidence of this reluctance has already surfaced. Even if the villagers are convinced (or forced) to pay fees, the budgets suggested by the income so derived will be insufficient to support an O&M and repair workshop.

Regarding transportation, the rural councils are unable to provide the vehicles required to service water projects. Vehicles were originally provided through the U.S. military excess-commodities program. However, once the vehicles were released to the MLA, they were assigned to other activities. At least one vehicle would be required to ensure that periodic O&M, planned as part of workshop activities, was completed. Training and repair also require visits to villages. Without transportation, workshop staff will be limited in their ability to serve rural pumping needs. This will limit the level of service villages can expect to receive from the workshops and further reduce their willingness to contribute fees for their operation.

Given the central location of the workshops and the lack of vehicles, it is likely that the mechanics will focus on work that is brought to them. This work probably will consist of vehicle repairs, gen-set repairs, and pump-set repairs. If these repairs are requested by paying customers, however, and much of the O&M and repair work for village water projects is provided at reduced cost as planned, there will be little incentive for the workshops to do the latter work.

As planned, the local councils would operate the workshops with contract staff, with fees covering staff and utility costs. The mechanisms for financial control of workshop accounts have not been carefully worked out but are necessary to prevent abuse of the system. The suggestion of the chief of the Ad-Durayhimi to lease the workshops to a private entrepreneur merits consideration. Although such a plan could lead to misappropriation of funds, it would limit the council's financial liability.

Pump operator training, the major focus of the WASH consultancy's recommendations, does not appear to be a high priority among local council representatives. Rather, the opportunity to earn income from the workshops seems paramount in their minds. Training does not provide income and was not included in future plans for the workshops.

The original goal of directly assisting rural water projects by training operators, assisting in O&M, and providing repair services may not be addressed as originally intended. However, the workshops will benefit the rural population and the local councils once they are operational. This is because they will offer well-equipped alternatives to other rural private-sector repair shops and provide training and resources to the villages they serve.

Recommendations

USAID/Yemen's future role in supporting the establishment of rural workshops is now limited and the actual task of completing the work already initiated falls to the MLA. However, USAID/Yemen should complete several tasks in support of what is now an MLA initiative.

If the PL480 program budget is released, USAID should focus the efforts of the workshop component on the training of pump operators. The mission should also purchase the supplementary equipment needed for operation of workshop welders and air compressors as specified in Appendix F. In addition, efforts should be made to determine the location of the workshop tools and equipment destined for the southern governorates and pass on this information to the director general of the Public Water Authority in Aden, who is responsible for rural water supplies in these areas until unification is complete.

Although the local councils believe machinist's lathes and vehicles should be provided to them, the mission need not procure these items. As noted above, vehicles have already been provided and allocated elsewhere, and lathes can be purchased by the MLA or the councils when and if customer demand provides an incentive to do so.

Without the anticipated PL480 funds, the opportunities for the MLA to support the local council workshops are limited. However, there are a number of steps the ministry can take to enhance the establishment of the workshops.

- The MLA should encourage the local councils to commit time and energy to establishing the workshops, as there is little chance that the responsibility for and control of the workshops will pass out of the hands of the local councils as a result of unification.
- The MLA should allow the local councils latitude in how they establish and operate their workshops. The local council leaders are dynamic and appear to have the best interests of the people at heart. They understand the technical and financial limitations of the council villages. However, as implied above, the MLA should insist on strict financial accountability, particularly in areas in which the ministry may be asked to subsidize operations.

- **The MLA should not insist on mandatory membership fees in order for villagers to be able to participate in the workshop program. Furthermore, the ministry should relax the requirement that 25 percent of net revenues and funds raised from the sale of operator tool kits be remitted to the MLA. The workshops will have a difficult enough time without this additional financial burden.**
- **After the workshops are well established, the MLA should evaluate the operational procedures of each to determine which approaches to workshop operation and management are the most successful.**

Chapter 1

INTRODUCTION

1.1 Problem Statement

In late 1988, USAID concluded the last phases of a 10-year support project for the Yemen Rural Water Supply Division to establish small rural water supply systems (Small Rural Water Supply Systems Project-044). The mission expressed interest in maintaining support to the water sector, albeit at a lower level than before. In 1989, concerns were voiced about the operational status of many of the water supply systems built in Yemen with USAID assistance. As a result, USAID proposed a PL480 program to support Yemen's Confederation of Local Councils for Cooperative Development (CLCCD) in the water sector. Although the PL480 project has been approved, funds have not been released.

One component of the project proposed establishing rural training, operation and maintenance (O&M), and repair workshops to support the operation and maintenance of new and established rural water supply projects. Workshop equipment, pump operator's tool kits, and training aids were purchased according to a list supplied in the WASH Field Report No. 259, *Operation and Maintenance of Rural Water Supplies in the Yemen Arab Republic* (March 1989). (A list of the tools and equipment purchased is provided in Appendix E.)

USAID released the workshop tools and equipment to the Ministry of Local Administration (MLA) and distributed them to local councils following an agreement between USAID and the MLA (the successor to the CLCCD). The terms of this agreement are given in Appendix D.

The unification in May 1990 of the Yemen Arab Republic (YAR) and the People's Democratic Republic of Yemen (PDRY), which is to be finalized over a two-and-a-half-year transition period, will affect the operation of the workshops to some degree. This is due mainly to the very different administrative structures the former two countries had in place. The PDRY was much more centralized governmentally than the YAR and had less of a reliance on local councils for administrative tasks. The formation of the MLA is one step toward unification of the two systems' administrative structures. However, since the transition period has yet to be completed and uncertainty still exists as to how the republic's "new law" will affect local councils and public services, there is some reluctance to begin new initiatives.

USAID/Yemen requested the assistance of a WASH consultant to evaluate the current status of the workshops and provide guidance and recommendations to the local councils for improving workshop operations. The consultant arrived in Yemen on August 7, 1991, and presented his findings to the mission on August 21. He was assisted by USAID's General Development Officer and a Program Specialist.

1.2 Scope of Work

The purpose of the WASH consultancy was to visit local councils and determine what has been done to establish workshops and to help the districts maximize their use of the tools provided. The scope of work (see Appendix C) outlined specific tasks as follows.

- Visit up to five sites in the northern governorates of Yemen where O&M equipment has been provided, for approximately two to three days each, in order to review the operations and procedures of the workshops and provide on-site O&M training.
- Prepare a trip report that includes a section on lessons learned about establishing and operating such workshops.

This scope presupposed that the workshops had been formally established and that they had begun operation in support of rural water supply systems. MLA had assured USAID/Yemen that this was indeed the case. However, during the course of the consultancy, it became clear the workshops had not been established. Tools and equipment have been distributed, but very little work at the council level has been completed. As a result, the outlined scope for review of operations and procedures and on-site training were inappropriate. Therefore, this report provides a background for the activity, its current status, and an assessment for the future success of these workshops.

1.3 Approach

The consultant, along with a USAID Program Specialist and an MLA representative, made visits to all of the councils in northern Yemen that had received workshop tools and equipment and interviewed the chief of each. During the course of these interviews, the consultancy team sought to determine why the workshops had not yet been established, what plans the council had to establish them, and how the council planned to operate them. Team members also visited the storage sites for the workshop tools and equipment and Aden, the former capital of the PDRY and now the center of activity for the five southern governorates of the unified Republic of Yemen. Three sets of workshop tools and equipment also had been allocated to councils in two of the southern governorates. Although the team did not visit these councils, they did review the rural water supply policies and programs with council officials.

The following chapters review the project background, political and administrative changes since project initiation, a current status of the workshops visited, and recommendations for future action. Notes about the various water projects visited and a brief review of rural water

supply systems in the southern governorates can be found in Appendixes G and H, respectively.

Chapter 2

PROJECT BACKGROUND

The project history begins with the completion of Project 044, the Small Rural Water Supply Systems Project, and includes an earlier WASH consultancy, the development of the PL480 program, and events that took place after unification.

2.1 USAID Support to the Water Sector

The Rural Water Supply Division (RWSD) of the Ministry of Public Works was first established in 1972 with the mandate to install water systems in rural areas. USAID supported the RWSD through two projects: the Rural Water Supply Project (022) and the Small Rural Water Supply Systems Project (044). The Rural Water Supply Project (locally designated the 022 Project) was active between 1973 and 1979. It assisted the RWSD in developing its hydrological and water-resources capability and provided well-drilling equipment and training. The project also developed water resources for 24 villages. A parallel support project provided salary support, vehicles, and vehicle maintenance and supplies for the water supply construction program.

The Small Rural Water Supply Systems Project (Project 044) was an outgrowth of Project 022. It occurred in two phases. The first phase, from 1979 to 1984, provided assistance to the RWSD in constructing small rural water supply systems, improving the project selection process, upgrading water-system monitoring and maintenance capacities, and instituting village-level training programs. Seventy-two village water systems were completed during this phase of the project. The second phase of the project was to focus more on developing the RWSD's institutional capacity, while at the same time assist in constructing rural water supply projects. During the second phase, 100 water projects were completed.

In addition to these two projects, USAID funded the Local Resources for Development Project (Project 045), which built 13 water projects in the Hodeidah and Hajja governorates between 1979 and 1986 in cooperation with local councils.

In all, USAID has provided more than \$25 million to the rural water sector over the 10-year period 1979-89, after which formal support to the sector ended with the completion of Project 044. In late 1989, USAID commissioned a local consultant to study a number of systems installed under its projects. The initial results of the survey, which suggested that a large majority of the systems were inoperable for indefinite periods of time, alarmed USAID officials. A means for providing reliable and affordable O&M services for these water projects thus became a priority for the mission.

After it completes rural water projects, the RWSD officially turns them over to villages through a local council intermediary. The villages themselves then become responsible for all aspects of their operation and maintenance. In doing so, it is common for a village to collect fees, hire an operator, and purchase fuel. When repairs are required, the village turns to the private sector, both for spare parts and skilled technicians. When necessary, villages seek local council assistance when problems arise that are beyond the village's technical capability and/or financial means. Assistance may be provided if the council has the capacity to do so. Because the local councils provide this ultimate backstopping for rural water supply systems, USAID supported a proposal to establish workshops within the local council structure.

At the completion of Project 044, a small amount of hard currency remained on account. It was proposed that these funds (roughly \$150,000) be used to purchase tools and equipment needed to establish the rural workshops. Vehicles for the workshops were to be provided from excess U.S. military commodities in Europe. The bulk of local funding was to come from PL480 funds, which would be administered jointly by USAID/Yemen and the then Yemen Arab Republic.

2.2 WASH Consultancy

In late 1988, USAID/Yemen requested the services of a consultant to prepare a specific strategy and implementation plan for establishing the workshops. The consultant was to prepare a list of necessary tools and equipment for the centers, specify the space the workshops would require, and prepare a staffing pattern for them. The consultant was also requested to prepare a proposal for USAID technical assistance to and management of the O&M component of the proposed PL480-funded program. The program was intended to support a CLCCD decentralized community development program that was to mobilize local resources to meet local needs.

The consultant spent a month in Yemen in early 1989, visiting rural water supply sites and gathering information on O&M problems and practices. His findings and recommendations were published in *Operation and Maintenance of Rural Water Supplies in the Yemen Arab Republic* (WASH Field Report No. 259). His findings did not support the earlier suggestion that a large number of USAID-supplied water supply systems were out of service due to inadequate O&M. The major conclusions of the report were as follows:

- The maintenance of rural water supply systems is not as bad as originally feared. Community conflict and inadequate water sources also contribute to the total of inoperative systems. Only an estimated 10 percent of systems are out of order at any one time due to O&M problems.

- The private sector does an adequate job of providing services (in the form of spare parts and skilled mechanics) for engine and pump repair.
- The major obstacle to overcoming the O&M difficulties of rural village water supplies is the availability of revenue for making unexpected major repairs.
- Improved O&M practices would reduce the frequency and severity of water system breakdown and increase the availability of potable water.
- The local councils are best suited to assist by providing training for pump operators, but without taking responsibility for water systems.

The consultant recommended that USAID endorse a program to support local councils by providing water system operation, maintenance, and minor-repair training for pump operators. He suggested villagers continue to be responsible for operation, maintenance, and repair of their own water systems and that local councils not become involved in the direct provision of O&M services to rural villages.

It appears that by the time these recommendations were made, verbal commitments to the concept of O&M workshops to support the actual maintenance and repair of rural water supply systems had already been made. Planning for an expanded program to help implement what were termed "small appropriate technology water systems" (meaning handpumps) and to provide O&M services through the CLCCD was already well under way.

2.3 Proposed PL480 Program

The completion of Project 044 signaled the end of USAID support to the rural water sector through the RWSD. However, the mission continued to be interested in the sector and suggested that PL480 funds could be used to support further activities. Quite correctly, the mission believed the CLCCD and its member local councils were the best mechanism for supporting local water-supply-related initiatives. The local councils first developed as self-help organizations during the 1960s. By 1989, they had been legally recognized and a tiered administrative structure had been developed up to the national level. Local councils sought to meet local needs by mobilizing resources available to them. In many areas, the councils have been responsive, within their means, to requests from villagers for assistance in establishing improved water delivery systems. In some cases, local councils also provide financial help when major repairs or component replacement becomes necessary.

In November 1989, USAID submitted a proposal to the Central Planning Organization (CPO) for the use of PL480 funds to support the Local Council Decentralized Small Water System Project. The proposed project contained three distinct components:

- Establishment of new and improved rural domestic water systems
- Promotion of health and environmental practices relating to water and sanitation
- Establishment of regional workshops and training programs to train pump operators and assist in maintaining and repairing water systems

The first component was initially intended to focus on handpump installation where appropriate (mainly in the Tihama area). The proposal now suggests three types of projects (based on village population) using small-scale diesel pumps with limited distribution systems. Handpumps are still suggested for villages of fewer than 150 people in which the water table is less than 60 meters.

The second component was to be implemented by health and environmental trainers who were to ensure integration of health-related measures into the design and construction of new water systems and provide training to pump operators and project beneficiaries in the health and environmental aspects of water supply systems.

The third component was designed to provide pilot regional workshops at the district level. The proposal included pump operator training but went beyond that to suggest direct operation, maintenance, and repair assistance to water projects. PL480 funding for this third component included workshop set-up costs, technical staff training, pump operator training, O&M servicing for rural water systems, and a water system repair program. The workshop tools and equipment purchased with hard-currency funds were to support these workshops. A portion of the funds for the operation of the workshops was to be collected through monthly fees paid by villages for the services they receive; hourly fees were to be charged for repair services. A staff of six comprising a director, clerk/accountant, two mechanics, and two assistants was envisioned. Vehicles were to be provided by USAID through the excess commodities program mentioned above.

The CPO approved the proposed program prior to the unification of the Yemen Arab Republic and the People's Democratic Republic of Yemen in May 1990. As of August 1991, however, no action had taken place to ensure the release of funds for the project, nor is USAID optimistic that it will be. The vehicles have since been allocated to other ministry projects by the MLA.

2.4 Workshop Establishment Activities

In anticipation of eventual approval of the PL480 proposal, USAID purchased and stored nearly all of the tools and equipment for the regional training, O&M, and repair workshops. The project activity completion date for expenditure of the funds dictated that purchases predate final PL480 project approval. USAID also procured five former U.S. military trucks.

As release of the funds for the PL480 project appeared to dim, USAID agreed in December 1990 to transfer most of the tools and equipment to the MLA. By agreement, the transfer took place on condition of the following:

- A four-day training session for the heads of the five local councils chosen for the pilot project begin immediately and include administrative and financial management training
- MLA distribute the workshop equipment plus 15 operator tool kits to the local councils only at the completion of this training
- The local councils initiate establishment of the workshops by leasing workshop space and hiring a financial/administrative supervisor, a mechanic, and an assistant; by beginning to collect fees from villages; and by beginning to provide O&M services

In addition, 25 percent of each workshop's income was to be remitted to the MLA for a fund for establishing new workshops and/or building water projects in the poorest villages (Appendix D provides the details of this agreement). The workshop tools and equipment will remain the property of the MLA, which retains the right to remove a workshop and relocate it to another council district.

The four-day training session did not take place. The equipment was transferred to four local councils in the northern governorates and three councils in the southern governorates. Instructions were apparently given to each local council concerning the establishment and management of the workshop in its district. Although USAID remained skeptical that implementation would proceed as originally planned, MLA officials insisted that the workshops had been established according to plan and were operating to support rural water system operation, maintenance, and repair.

It was at this point that USAID/Yemen requested WASH assistance to track what individual districts had done in establishing workshops and to assist the recipient districts in maximizing the use of the tools provided.

Chapter 3

IMPACT OF UNIFICATION

The initial phase of unification of the YAR and the PDRY in May 1990 holds promise for the future of the Yemeni people. However, this event and the two-and-a-half-year transition period agreed upon for the final and complete union of the two countries has had an impact on almost all aspects of life in the newly formed Republic of Yemen. These changes also have affected and will continue to affect the planned establishment and operation of the USAID workshops. A brief description of Yemen's past organizational structures, the present situation, and the form of the country's final administrative structure as it affects the local councils and regional workshops is outlined in the following sections.

3.1 Past Administrative Structure

Former YAR

From 1962 to 1970 a cooperative movement developed in the former YAR during a period of civil unrest in which communities organized themselves, raised money, and undertook local development on their own. Then, in 1973, the central government legitimized the local council movement under the national Confederation of Yemeni Development Associations (CYDA). To support its activities and fund local projects, CYDA, staffed by elected officials, collected the "zakat" tax. In 1985, a broad restructuring of CYDA created CLCCD, which was established as a governing administrative body for the local councils. The position of national CLCCD general secretary became an appointed one, with an assistant elected by vote of those elected at the next lower level of government. The CLCCD maintained offices staffed at the national and governorate level.

At the same time, the local council areas were redefined to conform to those of the administrative districts, or nahiyas. The CYDA restructuring meant planning would begin at the local council level with approval and budget allocations issuing from the CLCCD. Collection of the zakat tax became the responsibility of the CLCCD, which appropriated the revenues to support development programming according to approved plans. In controlling the budget, the CLCCD balanced national development and allocated funds to less prosperous districts in the country. The CLCCD in turn had to obtain approval for programs from the CPO to ensure that local plans took into account national priorities and did not overlap with the plans and activities of other Yemeni government agencies.

The CLCCD and local council structure existed outside of the formal ministerial organization of the country. Various development activities took place through ministerial channels,

however. For example, the USAID-funded Project 044 was implemented through the Rural Water Supply Division of the Ministry of Public Works.

Former PDRY

In the former PDRY, the administrative structure was quite different from that of the YAR. Locally, six governorates were each administered by the chairman of the Local People's Council, who was nominated by the party and elected to his post. At the village level, National Defense Committees provided organizational structure. A number of associated villages were formed into a markaz, roughly equivalent to the local councils of the former YAR. A number of markaz formed a mudiriah at the next level, just below the governorate. At each level the chairman was an elected official.

Planning and budgeting took place in a much more centralized manner than in the YAR, but some self-help projects did exist. Government services were administered from central offices in Aden and branch offices at the governorate level. Activities at the local level were the responsibility of the mudiriah and markaz, with oversight and control from the governorate level.

In some sectors, including water, projects were initiated locally. Appeals were often made to the mudiriah and governorate levels for assistance, particularly financial assistance for construction and technical assistance for major repairs.

The former PDRY administrative structure did not have parallel ministerial and local council administrative structures; therefore, unification required that the two systems be brought into accord.

3.2 Present Environment

As noted previously, the terms of the Yemeni unification agreement stipulated a two-and-a-half-year transition period during which the political, administrative, and procedural differences between the systems used in the former YAR and former PDRY would be worked out. The transition is due to be complete at the end of 1992.

Currently, considerable confusion and uncertainty about the future administrative structure exists at the local and council levels. No one is quite certain how the operation of the new state will affect his particular work.

In the northern governorates of the Republic of Yemen, CLCCD activities have been subsumed under a new MLA. This appears to be an interim step in reconciling the administrative systems of the two former countries. At the local level, activities appear to be continuing and budgets allocated. However, there is discussion of the "new law" that will

define the new structure and operating environment for the local councils. Several of the people interviewed during the WASH consultancy expressed concern about how the "new law" will affect their activities, projects, and responsibilities. There exists some reluctance to begin major new initiatives until these issues are clarified.

In the southern governorates, most activities seem to have come to a standstill. Previously allocated budgets are insufficient to initiate any new activities. This is in part due to significant salary increases for civil servants to bring them in line with salaries in the north. The governmental structure is largely unchanged in operational terms since unification, and all are awaiting the restructuring they understand is inevitable.

3.3 Future Plans

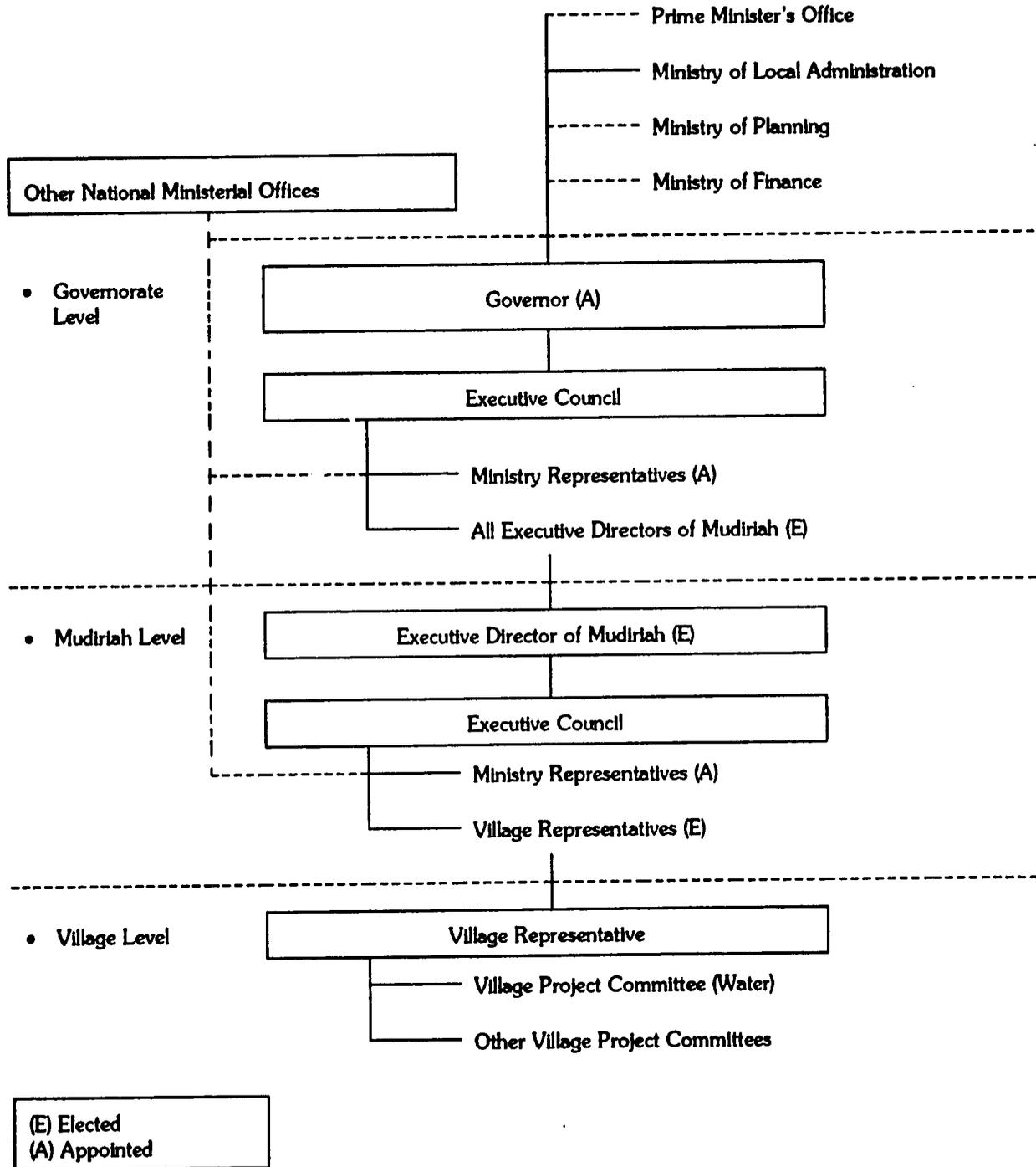
Very recently, a law was passed that outlines the form of administration of the Republic of Yemen. It provides the broad outline for an administrative structure but does not detail operational procedures or specific responsibilities. Under the "new law," as it has been termed, much of the responsibility for administration and operation and maintenance of public services will fall to the governorate level and below. Appointed governors will be assisted by an executive council made up of governorate-level representatives of ministries and executive directors at the next lower, *mudiriah*, level. The governors will be responsible for activities and budgets for all sectors of government activity, while the executive council will oversee administration, operation, and maintenance of all regional and local public services in the governorate. The executive council also will be responsible for planning and budgeting recurring activities and development projects. One of its primary responsibilities will be to coordinate development programs between the various ministries and local authorities.

The *mudiriah* (which will correspond with the former local councils in the northern governorates) will exist within a governorate and will have an elected executive director. The executive director will be assisted by a deputy and an executive council formed in the same manner as at the governorate level. The executive director will manage the affairs of the *mudiriah* under the supervision of the governor and, along with the executive council, will be responsible for implementing government policies and projects within his jurisdiction. The executive director will also develop plans and budgets for approval by the executive council and submission to the governorate and thence to the Ministry of Planning. As at the governorate level, one of the primary roles of the *mudiriah* executive council will be coordination. An organizational chart showing the relationships among the ministries, governorate, and *mudiriah* is shown in Figure 1.

The new structure is not significantly different from that in place in the northern governorates prior to unification. There will be one more level of ministry representatives (at the *mudiriah* level) in order to coordinate more effectively the activities among the ministries

Figure 1

Regional Administrative Structure Under the "New Law"



and local authorities. Both the ministries and the local authorities (through the MLA) will have operations and project budgets. Program and budget coordination will take place initially at the mudiriah level rather than the governorate level as prior to unification. Exactly how decisions are made about projects and whose budgets will be affected are not entirely clear at this point. However, it does not appear that the "new law" will significantly affect the operation of rural water projects or the regional training, O&M, and repair workshops.

Chapter 4

WORKSHOP STATUS

As originally planned, there were to be five workshops in three northern governorates: Haradh, Hajjah Governorate; Al-Munirah and Beit al-Faqih, Hodeidah Governorate; and Al-Mawasat and Al-Shamayatain, Taiz Governorate. When the decision was made, for reasons of equity, that three workshops should be placed in southern governorates (one in the Shabwah and two in the Hadramawt governorates), Haradh was eliminated as a site. Beit al-Faqih was replaced with Ad-Durayhimi when the former would not agree to the terms placed on receiving the equipment (the council did not want to charge membership fees to villages). The four workshop sites the WASH team visited are Al-Munirah, Ad-Durayhimi, Al-Mawasat, and Al-Shamayatain.

The following four sections contain the reports of the visit to each site's local councils.

4.1 Al-Munirah, Hodeidah Governorate

Overview

The Al-Munirah council district is on the coastal plain about 60 kilometers north of Hodeidah. It contains 28 cooperative water supply systems, 4 of which, including a solar pump, were constructed as part of the USAID-funded Project 045 in the early 1980s (see Appendix G). At the time of the consultant team's visit, its members were told that 2 of the 28 systems were out of service.

Typical water supply systems in the district consist of belt-driven vertical turbine pumps coupled with 16 to 18 KW Yanmar or Kubota engines. One such pump-set serves a village of 70 to 100 households. Ground-level tanks from which villagers must collect water are common, although several villages have elevated concrete tanks with limited public standpipe distribution systems. Villagers pay from YR 10 to YR 40 per household per month to support the operation of their water supply system in a district that is among the poorest in Yemen. Occasionally the local council assists the villages in financing major repairs.

Workshop Status

At present, workshop activities have not been initiated. The workshop tools are stored in a locked building in the village of Mojdifah. The chief of the local council seems to understand the MLA plan for establishing the workshops, which was described in Chapter 2.

Once set up, the workshop will be located centrally along the main road in the village of Zaydiyah. The council plans to lease workshop space until a workshop can be built. No staff have yet been identified or hired, and membership fees from villages and individuals have not been collected and will not be until the workshop is established.

The chief of the council indicated he would not set up and begin operations until several missing workshop components are provided. Among the items listed as missing were cables for the arc welder, as well as air hoses and fittings for the air compressor. The chief of the council said what he called a "milling machine" should also be provided as part of the workshop. When shown a typical "milling machine," however, it was apparent that the item he really meant was a lathe. This piece of equipment was necessary, it was explained, to recondition spare parts, saving villagers about 50 percent on spare parts. The council chief also expressed a need for the training program for the mechanics he would hire, as outlined in the PL480 program.

Council Plans for the Future

The chief of the council appeared to understand how the regional training, O&M, and repair workshops were supposed to operate. He indicated that each village in the district would be required to become members of the workshop association for fees ranging from YR 500 to YR 1,000 per month. Private farmers (of which the chief of the council is one) could join voluntarily for YR 500 per month. For this fee, villagers would receive monthly O&M reviews. Minor and major repairs would be performed at a reduced rate, which was not specified. Private farmers would receive the same O&M checks but would pay full price for all repairs. All members would pay full price for the spares and consumables supplied, including oil and any other items fitted during the O&M visits.

The council plans to employ only two people, a mechanic and an assistant, instead of the six outlined in the proposed PL480 project. The mechanic would perform repairs, and the assistant the monthly O&M tasks in the villages. Initially, transportation will be a problem since the MLA has reallocated the vehicles intended for the program. At the outset, the beneficiary villages will be responsible for providing transportation. Later on, the council hopes to obtain a vehicle. Additionally, because the workshop will be located along the main road, the council hopes to supplement its income by performing general vehicle repairs for profit. This practice of profit-making ventures by local councils has precedent: In some districts, the councils own heavy equipment such as bulldozers and loaders, which are leased to local individuals.

Pump operator training does not appear to be high on the council's priority list. When asked about training, the council chief responded that it would be conducted on-site during the periodic O&M checks, apparently by the assistant mechanic. Regarding operator tool kits, the MLA suggests they be sold to the villages for YR 1,000, which would be remitted to the ministry.

Comments

When asked if the council needed any help in organization or suggestions about the operation of the workshop, assurances were given that all was under control. The council chief suggested assistance might be needed in the future, however, in finalizing procedures and financial management.

Despite the council's assurances, several major potential problems seem obvious. For one, villages in this area currently are paying YR 3,000 to YR 5,000 per month for normal operation and maintenance of their water system. The proposed additional workshop membership fee is a significant portion of this sum. If villagers were certain they would receive value for monthly membership fees, they might be willing to pay. However, if transportation costs and the full cost of spares continue to be borne by the villages, it is not clear that they would benefit from such an arrangement.

If some villages cannot or will not pay the membership fee, workshop officials will likely be driven more toward vehicle repair and maintenance as a way to pay the cost of operating and maintaining the workshop. With fiscal integrity, the workshop is likely to make a profit for the local council if it focuses on vehicle repairs, but the nonpaying, or subsidized, services to member villages are likely to suffer as a result.

4.2 Ad-Durayhimi, Hodeidah Governorate

Overview

The Ad-Durayhimi council district is on the Tihama coastal plain just south of Hodeidah. The district has 14 water projects and 11 villages without community water supplies. Two of the water projects were constructed as part of the USAID-funded Project 045 and one under Project 044. The chief of the council said three of the water projects were inoperable, due to community conflict and lack of funds. The configuration of water systems in the district is similar to that of Al-Munirah, with belt-driven vertical turbine pumps coupled with 16 to 18 KW Japanese engines. Villagers in this district also pay from YR 10 to YR 40 per household per month to support the operation of their system. Occasionally the local council assists villages in financing major repairs to their water projects, having paid approximately YR 80,000 during the past two years for such repairs (roughly 10,000 per event).

Workshop Status

At present, workshop activities have not been initiated, but a pile of cement blocks WASH consultants sighted indicates that construction has begun. The workshop tools are stored at two locations: The welder, air compressor, and jack are stored at a workshop belonging to the general secretary of the Hodeidah Governorate located on the main road from Hodeidah

to Beit al-Faqih, and the remaining tools are stored in a locked building in the village of Mokimena. The council chief seemed to understand the MLA plan for establishing the workshops; however, he expressed concern that the approach was unworkable (see the next section). The workshop will be located centrally on land next to where the welder, jack, and air compressor are stored. The chief, who is a mechanic, suggested he would be interested in operating the workshop under certain conditions. Membership fees from villages and private individuals have not been collected, and the chief suggested the villagers would be unwilling to pay them. The chief of the Beit al-Faqih council shares this view and would not, in fact, accept the workshop if fees were required of villages. Instead, the Ad-Durayhimi council chief suggests funding be procured from the private sector, as described below.

Here, as in Al-Munirah, missing workshop components were mentioned. These include the same items mentioned previously as well as some hand tools belonging in the operator tool kits. The chief of the council also considered a lathe to be an essential part of the workshop. He seemed energized and ready to establish the workshop, but not according to the plan the MLA has specified, because of the reasons cited below.

Council Plans for the Future

The chief of the council appeared to understand what the regional training, O&M, and repair workshops were supposed to operate. However, he suggested their approach would not work, believing that the only way the workshop could operate effectively was under complete private-sector control. He indicated he would like to lease the workshop to a mechanic who would pay either a set fee or a percent of net profits to the council. If the latter option were to be used, the chief suggested that 25 percent of profits should be sent to the MLA (to meet the terms of the agreement), 25 percent accrue to the local council, and the remaining 50 percent remain in a workshop account for utilities, replacement of tools, expansion of capability, and to offset the cost of serving local villages at a discount. He suggested that YR 3,000 to 4,000 per month in profits could be the local council share under this arrangement. Perhaps more money would be made once the workshop became established. If so, it would be used to help villages repair their water systems. In addition, villages would get a discount on all services provided by the workshop (10 percent was suggested as reasonable). Vehicle charges for village visits would be covered on an as-needed basis from the workshop account and would not be charged to villagers.

When asked if a mechanic had been identified to run the workshop, the chief of council indicated he would like to work as the mechanic if a lathe were provided and expressed willingness to resign as chief of council in order to do so. If a lathe were not provided, one would eventually be purchased from the profits of the workshop.

When asked about training, the council chief said he had already conducted some training of pump operators. He said it was clear their skills needed upgrading and that the workshop mechanic would be required to continue this training. Most of this training would occur

during periodic maintenance trips to each village. A schedule of one visit each month was suggested initially, with the interval tapering off to one in three months as the pumper began to conduct O&M with more care. Tool kits would be sold to villages and farmers, but the price of YR 1,000 was considered too high; YR 500 seemed more reasonable. The original cost of the tool kits was YR 15,841. In fairness, it may be that the complaint that the tool kits were incomplete is justified. The kits were procured in two parts with the intent that they be combined to form a full kit. Possibly only half of the kits were delivered, or perhaps some of the tools were mixed with the workshop equipment. This may be true in other cases as well; the fact that the chief of the council is a mechanic may account for why it was noticed in this case.

Comments

Given the analysis presented for Al-Munirah, it does appear that the Ad-Durayhimi villagers may be unwilling to pay for workshop services, particularly if they do not yet have confidence in the timeliness or quality of those services. The idea of leasing the workshop to a private entrepreneur, as the council chief suggested, is a creative way for the local council to earn income to support its activities. The success of such a plan depends heavily on the integrity and good intention of all of the people involved, however.

The advantage of the organizational and financial structure as suggested is that it does not commit the villages to monthly fees and allows the villagers to make their own choices about where to obtain operation, maintenance, and repair services. This approach serves the intent of the WASH consultant's recommendation, in that villages would remain free to make their own decisions. The discount on services to villagers could provide some benefit, as would money collected from the mechanic if it were used to support district water projects. Also, by leasing the workshop, the local council would avoid putting itself in a position in which it must subsidize workshop operations.

Despite the council chief's contention that pump operator training is necessary, it is not likely to be conducted with any enthusiasm because of the opportunity to do repair work for paying customers instead. Indeed, the bulk of the work to be done will be in repairing vehicles and farm implements, which paying customers will bring to the workshop themselves. Thus, there likely will be little incentive for the mechanic to serve village water systems when transportation and reduced income (due to the village discount) are taken into account.

Given the interest the chief of the council has shown for operating the workshop himself, it seems certain money could be made from the venture. If the local council is allowed to operate the workshop in the manner described, a careful system of monitoring the services provided and council finances must be implemented to assure MLA officials that adequate service is being provided to villages and that all remittances are made properly. Additionally, a very clear agreement must be made with the mechanic/entrepreneur concerning liability,

replacement of tools and equipment, accounting procedures, and so forth, including under what conditions the MLA could terminate its agreement with the council and mechanic. If these assurances can be made to the MLA's satisfaction, the council should be allowed to try this approach.

4.3 Al-Mawasat, Taiz Governorate

Overview

The Al-Mawasat council district lies in mountainous Yemen, about 30 km south of Taiz. The council offices are in Najid an-Nashamah along the paved road to At-Turbah. The chief of the council said 14 cooperative water supply systems operate in the district, three of which were constructed as part of the USAID-funded Project 044. All projects in the council district were reported to be operational, although subsequent field visits identified at least one that was not pumping due to declining water levels.

Water supply systems in this area are markedly different from those along the coast in the Tihama. A typical water supply system will cover a service area of 100 to 300 square kilometers, with elevation differences of up to 700 meters. There may be 500 to 800 private connections spread over this area. A water system will consist of one or several wells at the base of the service area pumped with diesel-driven, submersible pumps or shaft-driven, vertical turbine pumps.

Water is pumped uphill to a storage tank. At this level, there may be a booster pump to pump water to another tank at a higher level. Power for water pumping is supplied by one or more 100 to 150 KW diesel engines. Distribution systems are extensive and complex and often consist of more than 25 km of pipes spread all over the mountainside. Households almost universally have metered connections and pay according to water use. Typical tariffs range from YR 10 to YR 30 per unit (1,000 liters). Monthly budgets for a number of projects exceed YR 50,000. These projects often employ several people as pumpers, meter readers, clerks, and managers, some of whom own a vehicle. The local council does not provide assistance to rural water supplies except to deliver fuel for a fee.

Workshop Status

As at the previous two sites mentioned, at present, workshop activities have not been initiated here and no workshop staff have yet been identified or hired. Membership fees from villages and private individuals also have not been collected. Tools and equipment are stored in what will eventually be the workshop, a space below the district offices along the paved road in Najid an-Nashamah. The council chief appears to understand the MLA plan for establishing the workshops.

The chief of the council said he did not intend to set up and begin operations until there was some resolution as to the workshop's future. He feared that one of the results of unification and government reorganization could be that the workshop would be removed from council control. He also indicated that the arc welding cables and air compressor hoses were missing. As with the previous councils visited, it was suggested that a lathe be part of the workshop equipment.

Council Plans for the Future

The local council chief appeared to understand how the regional training, O&M, and repair workshops were supposed to operate. In Al-Mawasat, a workshop staff of three technicians is planned: a mechanic to handle pumps and engines, a plumbing technician to take care of distribution systems, and a welder. Each village in the district would be required to become a member of the workshop association for fees ranging from YR 500 to YR 1,000 per month, depending on the size of the village. Private farmers could join voluntarily for YR 1,000 per month. For this fee, members would receive periodic operation and maintenance checks. The mechanic would service pumps and engines on a three-month schedule. Since distribution systems cause more problems than pump-sets, the welder and plumbing technician would make rounds on a monthly basis. When repairs become necessary, village systems would pay for spare parts only, with fees covering other costs. Member farmers would pay 50 to 60 percent of the labor cost for repairs.

Some council members did consider leasing the workshop to a mechanic in the private sector, as suggested in Ad-Durayhimi, but the council as a whole voted down the proposal. Its members thought such a plan would allow too much opportunity for corruption and might not meet the needs of the villages. There is concern that the villages may not want to pay for membership or will not be able to pay, particularly the USAID-financed systems that were built in the poorer areas of the district. Also, private farmers may not be interested in membership. Although the workshop would be located at a nearly ideal place for performing maintenance and repairs on private vehicles, the chief of the council indicated that the workshop would try to survive without resorting to vehicle repairs (except to council vehicles).

The council does not appear to have considered the question of transportation. Clearly a four-wheel-drive vehicle would be necessary for undertaking any field work. The council does have one 4x4 pickup that is used for servicing the two pieces of heavy equipment the council operates. Presumably, the truck would be used until a dedicated 4x4 could be found.

Although some of the pump operators have received training at the RWSD in Sana'a, the council chief said that in many cases additional training is required. He claims the training should be specific to the operator's job and the equipment the individual operates. Training should be conducted on-site. There is variation in the equipment in use in the council area, with both vertical turbines and electric submersible pumps with gen-sets in use. The chief said

he did not intend to distribute the tool kits, thinking they would only get lost. He did say they would be distributed if control of the workshop were removed from the council.

Comments

This council is very different from those found in the Tihama. The Al-Mawasat council is in mountainous terrain where water systems are extensive and complex. The equipment used is larger and more sophisticated. As a result, the extent of O&M services is greater and includes more of an emphasis on distribution systems, larger pump-sets, and complex organization. The villagers have managed to develop a management system that works well, and it is unclear that the workshop, if configured and staffed as planned, would be able to offer any significant added level of service to the village water systems. The workshop will not have the capability or the budget to provide comprehensive servicing to the 14 projects in the district. Some of the services, such as welding, may be valuable since the welding equipment is portable and can be taken to a site where it may be needed.

From a financial standpoint, even if all villages willingly paid YR 1,000, the workshop would have a hard time surviving on water project O&M and repair work alone. Staff costs alone would likely account for more than the membership income of the workshop. Utility and vehicle cost and the cost for workshop consumables such as solvents and welding rods must also be considered. This will likely drive workshop activities toward private vehicle and equipment repair for profit.

4.4 Al-Shamayatain, Taiz Governorate

Overview

The Al-Shamayatain council district is one of three located near At-Turbah in the mountain zone about 70 km south of Taiz. The council offices are presently in At-Turbah but work has begun on a new office complex outside of town along the paved road in the local council area. The consultant team was told that there are 36 cooperative water supply systems in the district, three or four of which were constructed as part of the USAID-funded Project 044. Only two projects in the council district were reported to be out of order, although it appears that many are not operating at full capacity due to declining water levels.

Terrain and land use patterns are comparable to those in Al-Mawasat. As a result, water delivery systems are similarly extensive and complex. Most systems meter water use, with households paying accordingly. As in Al-Mawasat, tariffs range from YR 10 to YR 30 per unit (1,000 liters) and monthly budgets may exceed YR 50,000. Here too, most projects employ a staff of pumpers, meter readers, clerks, and managers, some of whom also own a vehicle. The local council does not now provide services in support of rural water projects.

Workshop Status

This is the only council visited where a workshop had been established. Operational for less than a month at the time the consultant team visited, the workshop is located near the local council offices in At-Turbah. It will be moved to the new council office building when the latter is completed. The council has hired a young mechanic graduate of the Chinese technical school in Yemen.

During the team's visit work was slow. Two small generators were in the shop for repair. The chief of the council indicated that funds were already a problem. The council was paying the mechanic YR 3,000 per month and a monthly rent of YR 1,600 for the space. Utilities were anticipated to add another YR 400 per month to the cost. To add to the burden, as of the visit, no villages had paid for membership in the workshop. The council chief suggested YR 2,000 as a membership fee, to be paid by each village by laying off one of the water project staff, but water project management at the village level had balked at this proposal. (The one water project manager interviewed later indicated he would be willing to pay if he could be assured of good service at a reasonable price.)

This council apparently is running at a deficit, and has been told by the MLA to straighten out its finances and retire the debt by the end of 1992, presumably to coincide with the end of transition to full unification. This constrains the council's finances.

In addition to funding difficulties, the chief of the council was concerned about the upcoming administrative changes resulting from unification. Consequently, he is reluctant to start new projects or commit too much to the workshop until the future organizational structure of the local councils and its relationships to the activities of other ministries have been worked out.

The mechanic at the workshop mentioned the arc welding cables and air compressor hoses that were missing from the equipment list. In the interests of initiating work, the air hoses had already been purchased from the council budget. As in all other districts, the chief of council thought a lathe should be part of the workshop equipment. No operating lathe exists in At-Turbah, which means that any lathe work requires traveling to Taiz.

Training for pump operators does not seem to be a high priority in Al-Shamaytain. Operators have either been trained in Sana'a or in the Persian Gulf area and are, in general, competent. However, interest was expressed in any specialized training for new types of equipment, when and if it were introduced.

Council Plans for the Future

Plans for the future seem somewhat unclear. The hope is that business will increase to the point that the workshop can sustain its own operation and make a profit for the council. The chief of the council will try to interest other local councils in the area to contribute to the

purchase of a lathe in the interest of the whole region. As previously mentioned, he will move the workshop to the new council offices once they are finished, thus saving the rental cost of the present workshop. Plans are also under way to establish a workshop for the heavy equipment the council operates to build and repair roads. If and when such a workshop is established, the council may combine it with the existing one to handle both water systems and heavy equipment.

Although there was no vehicle in evidence at the workshop, this was not mentioned as a constraint to operations or provision of services to water supply projects. In order to raise money, the council may reduce membership fees from the initially suggested YR 2,000 to somewhere in the range of YR 500 to YR 1,000. This may allow the projects to keep all present staff and still participate in the program.

Comments

As at Al-Mawasat, it is not clear that the workshop can offer any significant level of service to the village water systems. At present there is only one mechanic, and he does not have a dedicated vehicle and so cannot provide comprehensive servicing to the district's projects. Yet also as at Al-Mawasat, some of the services, such as welding, may be valuable enough to water projects to get them to participate in the program to some degree.

It is already apparent that from a financial standpoint, the workshop will have a hard time surviving on water project O&M and repair work alone. The location of the workshop in At-Turbah is good for vehicle and other private-sector work. The type of work the mechanic is already performing is likely to be indicative of the long-term work pattern. Once the workshop becomes more firmly established, monthly cash flow problems may be reduced. However, the council still may have to continue subsidizing the operation of the workshop.

4.5 Southern Governorates

Exploring the status of and determining the progress made toward establishing the workshops in southern governorates was not a part of the original scope of work. However, the team did attempt to determine exactly where the workshop equipment was located and the current status of the workshops.

At the time of this writing, it is unclear what the disposition of these workshops is. The knowledgeable individuals at MLA were on leave or otherwise unavailable when the consultant team conducted its investigation. In Aden, those working in the water sector did not know that workshop equipment had been donated to southern governorates and did not know what plans may have been made to establish the workshops. (A report detailing the findings of the field trip to Aden is the subject of Appendix H.)

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The regional training, O&M, and repair workshops are not yet fully established and operational. However, in the four northern governorates, tools and equipment have been transferred to the local councils where the workshops will be located. The chiefs of each of these local councils are clearly energetic and interested in establishing an operational workshop, which, there is little doubt, will eventually take place.

The current status of the workshops results from slightly different understandings of the need for and role of these workshops and the problems in obtaining funding for the proposed PL480 program that would support them. The original argument that the workshops were necessary because of the poor state of repair and nonoperation of many water systems appears to have been faulty.

The establishment of fully functioning rural workshops to support the water sector would be beneficial, but experiences in other countries indicate that such workshops' overhead costs and logistical difficulties are often too great and their responsiveness inadequate. If the workshops are to be successful in Yemen, an annual budget of US \$1,000 to \$3,000 per water system should be allocated (Wyatt and Bates 1987), and a full-time staff of 10 or more will be required to perform all servicing adequately. In none of the districts is this level of budgeting anticipated from fees alone. Furthermore, all indications are that the local councils see the workshops not so much as a way to support water projects as a way to make money and support local council activities, which include water projects. Yet, given the present status of the workshops, the likelihood of major support to establish them, and the capability of the private sector to meet village water sector needs, this is a reasonable approach.

Although a full inventory of the equipment distributed to each workshop was not performed, it appeared all of the tools and equipment had been delivered to the four councils visited. The tools for the pump operator's tool kits were purchased from two vendors and were supposed to be combined to form a full kit. (There appears to be some confusion about this, which should be explained to the councils.) The field visits did reveal that several important pieces of workshop equipment were not procured along with the original order, however. These include welding cables and clamps for the welder and air hoses and fittings for the air compressor. (An inventory of these items and price estimates are included in Appendix F.) All chiefs of councils indicated that a lathe should have been a part of the original order as well. A machinist's lathe is an expensive piece of equipment that requires specialized skills to operate properly and therefore was not originally included as part of the workshop materials.

All of the council chiefs appeared to understand the MLA plan for establishing the workshops to support village water projects, but the plan's proposal for mandatory membership fees to be paid by villagers for services appears to be unworkable. The reasons for this conclusion include cost, service capability and vehicles, and accountability to water project role.

Traditionally, rural villages have sought out private-sector mechanics to perform repair services. The pump operator has performed what limited maintenance servicing and minor repairs he could. In most cases basic operating costs have been covered by fee collection, but finances now are tight, as indicated by the difficulty villagers have in collecting funds for major repairs. Therefore, villagers are likely to be reluctant to pay for regular operation and maintenance service unless there is ample evidence that they will benefit from it. In one council, the chief said he did not think the villages would willingly pay for membership in the workshop association. In another, villagers have already expressed reluctance to pay. Even if villagers are convinced (or forced) to pay fees, the budgets suggested by the income so derived are insufficient to support an extensive O&M and repair workshop as outlined in the PL480 proposal.

Funding difficulties notwithstanding, the capability to service water projects is critical to the success of the workshops, and at least one vehicle would be required to ensure that periodic O&M is completed. Training and repair also require visits to villages. Yet, vehicle purchase was beyond the financial means of the workshop procurement. Vehicles were made available from the surplus U.S. Army motor pool. However, the MLA has allocated these to other tasks and hence they are no longer available to the workshops. Without this transportation capacity, workshop staff will be limited in their ability to serve rural pumping needs. This will limit the level of service that villagers can expect to receive from the workshops and further reduce their willingness to contribute fees for their operation.

Given the central location of the workshops and their lack of mobility, it is likely they will focus on work that is brought to them. This work probably will consist of vehicle repairs, gen-set repairs, and pump-set repairs. Several individuals interviewed indicated that this work would be sought and welcomed it as a way to make money for the council. This poses a potential problem, however. If the workshops have the choice to perform repairs for paying customers or do O&M and repair work for village water projects at reduced cost, there will be little incentive to do the latter work, which also is more difficult and requires transportation.

The financing mechanism the MLA suggested for the workshops includes collecting fees from participant villagers and using those funds to provide basic O&M services. The workshop would be operated by the council and the council would hire staff and cover operating costs from the fees they collect. It is clear that some maintenance and repair work will be performed for private-sector customers for a profit, but the mechanisms for financial control of such an arrangement have not been carefully worked out. Detailed financial procedures are necessary to prevent abuse of the system. The suggestion of the chief of the

Ad-Durayhimi to lease the workshop to a private entrepreneur is an interesting one. Although it may contain opportunities for misappropriating funds, it limits the council's financial liability.

Pump operator training, the major focus of the WASH consultant's recommendations, does not appear to be a high priority among local council representatives. Instead, as mentioned previously, the opportunity for the workshops to provide income seems paramount in their minds. Training does not provide income and was noticeably left out of the councils' future plans for the workshops.

Workshop equipment has been purchased and distributed to the local councils, but the original goal of directly assisting rural water projects by training operators, aiding in O&M, and providing repair services may not be addressed as originally intended. However, once operational, the workshops will benefit the rural population and the councils. At a minimum, they will provide a well-equipped alternative to other rural private-sector repair shops for pump-sets, vehicles, and gen-sets. At best, the workshops will also provide a source of training, advice, and a reliable shop resource to the local council villages in the area they serve.

5.2 Recommendations

Since USAID/Yemen's future role in supporting the establishment of rural workshops is limited and the actual task of completing the work already initiated falls to the MLA, recommendations are provided for each.

USAID/Yemen

The recommendations given for USAID/Yemen assume that the PL480 funds will not be released for the project as outlined in Chapter 2. Unless these funds are released, however, the scope of USAID's future involvement is very limited. The following recommendations are made.

- Purchase the supplementary equipment needed to operate workshop welders and air compressors. The total dollar expenditure for this procurement should be less than YR 40,000. (The specifications for this equipment and a budget are provided in Appendix F.)
- Determine the location of the workshop tools and equipment destined for the southern governorates and pass on this information to the director general of the Public Water Authority in Aden, who is responsible for rural water supplies in these areas until unification is complete.

- Although local council chiefs expressed interest in machinist's lathes and vehicles, do not procure these items. Although a lathe could be of benefit when operated by a competent machinist, lathes are not considered basic workshop equipment. Vehicles will be needed if an effective training and O&M program is to be initiated, but they are beyond the budgeting capability of the mission. Besides, vehicles have already been provided and the MLA has chosen to use them for other purposes.
- If in fact the PL480 program budget is released, focus the efforts of the workshop component on training pump operators. If practical, the recruitment of Peace Corps volunteers to help operate and administer the workshops should be considered.

Ministry of Local Administration

As with USAID/Yemen, without the anticipated PL480 funds, the opportunities for the MLA to support the local council workshops are limited. However, there are a number of recommendations that, if followed, should enhance the chances of establishing the workshops successfully. The MLA should do the following.

- Encourage the local councils to commit time and energy to establishing the workshops; there is little chance the responsibility for and control of the workshops will pass out of the hands of local councils as a result of unification.
- Reassign the vehicles originally provided for the workshops back to the workshops, as was the intention of the donation. The vehicles will greatly enhance workshop capacity to assist rural water projects.
- Allow the local councils latitude in how they establish and operate their workshops. These leaders are dynamic and appear to have the best interests of the people at heart. Additionally, they understand the technical and financial limitations of their villages. However, insist on strict financial accountability, particularly in areas in which the MLA may be requested to subsidize operations.
- Do not insist on mandatory village participation in the workshop program by demanding fees. Furthermore, relax the requirement that 25 percent of net revenues be remitted to the MLA and that the operator tool kits be sold. The workshops will have a difficult enough time without this additional financial burden.

- **After the workshops are well established, evaluate the operational procedures to determine successful and unsuccessful approaches to workshop operation and management.**

If PL480 funds become available, the full range of activities envisioned as part of the project should be undertaken. Particular attention should be paid to pump operator training. There is little question that the workshops can benefit the rural people of Yemen.

Appendix A

BIBLIOGRAPHY

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Appendix B

PERSONS INTERVIEWED

USAID/YEMEN

| | |
|----------------------|--|
| Phillip Gary | Mission Director |
| Viviann Gary | General Development Officer |
| Abdul-Hamid Al-Ajami | General Development Program Specialist |

Ministry of Local Administration

| | |
|--------------------------|--|
| Noman Abdul-Jabbar Noman | Deputy, Local Council Section |
| Abdulwahad M. Abdulwahad | Director General of International Organizations |
| Abdul Malek Salam | Director of Cooperation for International and Regional Organizations |

Local Councils for Cooperative Development

| | |
|----------------------------|---|
| Yahya AboAlieth Al-Qaham | Chief of Al-Munirah Council |
| Mohammed Abdu Abdullah | Treasurer of Al-Munirah Council |
| Abdullah Mohammed Digrah | Chief of Ad-Durayhimi Council |
| Mohammed Abdullah Azziz | Chief of Al-Mawasat Council |
| Ali Sabr | Chief of Al-Shamayatain Council, Mechanic Al-Shamayatain Council |
| Mohammed Abdulwahad Bhatha | Water Project Manager, Al-Shamayatain Council |

Aden Governorate

| | |
|--------------|---|
| Saleh Mohsin | Secretary General of the Executive Office of the People's Council |
|--------------|---|

Public Authority for Water—Aden

| | |
|----------------------|---|
| Kahlid Mohsin Bonami | Director General-Public Water Authority, Aden (five governorates) |
| Zeid Ahmed Taha | General Director of Lahej Water Authority |

UN Organizations

| | |
|------------------|---|
| Awad Abdul Salam | Officer-in-Charge, WHO sub-office, Aden |
| Mahani Mohsil | Program Officer for Health, UNICEF-Aden |

Appendix C

SCOPE OF WORK

Background: WASH field Report No 259, Operation and Maintenance of Rural Water Supplies in Yemen, was completed in March 1989. This report provided a plan and equipment list for the establishment of workshops for O&M services in support of rural water projects in Yemen.. Subsequently USAID purchased the recommended equipment. A proposal for the use of PL480 funds to support a decentralized local development/water program was submitted to the Yemen government for approval. The proposal was approved prior to unification of North and South Yemen, however no action has been taken to ensure the release of funds after unity and USAID is not optimistic that the funds will be released. Given this situation USAID and the Ministry of Local Councils agreed to release the equipment to the Ministry for distribution to select local councils in December 1990. The equipment provided in the tool boxes almost directly corresponds with the equipment recommended in WASH report 259.

A planned four day training session was not held since the various Local Council heads did not arrive as scheduled. Instead a person from the Ministry provided individualized brief explanation sessions when he handed out the equipment. Given the lack of training provided at the onset, there is concern regarding the implementation of the conceived plan of action at each site. The purpose of this assignment is to: track what individual districts did in established workshops and to assist the recipient districts maximize the use of the tools provided.

Specific Tasks:

1. Visit up to five sites in the northern governorates of Yemen where O&M equipment has been provided, for approximately two to three days each, in order to review the operations and procedures of the workshops, assess their effectiveness and, to the degree possible, provide on-site constructive advice.
2. Prepare a trip report which shall include a section on lessons learned in establishment and operation of such workshops in Yemen.

SKILLS NEEDED: A mechanical engineer with experience in operations and maintenance of water supply systems. Consultant will be Jonathan Hodgkin

SCHEDULE

Start: July 16, 1991
Field Work: August 5-23, 1991
Finish: December 15, 1991

Appendix D

**MEMORANDUM FROM USAID TO MLA
CONCERNING EQUIPMENT HANDOVER**

memorandum

DATE: December 10, 1990

REPLY TO
ATTN: /

Mansour Shamiri *M. Shamiri*

SUBJECT:

Distribution Plan of Hand Tools and Equipments for Central Workshops to be established in seven districts five of which have been identified.

TO:

Viviann Gary, GDO.

Today, at 10:00 a.m. the following items of the remaining equipments procured for Ministry of Local Administration (MLA) were transferred (receipt attached) from USAID warehouse to MLA Warehouse:

| <u>Quantity</u> | <u>Item</u> |
|-----------------|-----------------------------|
| 7 | Work bench |
| 7 | Tool Boxes Gray |
| 7 | Tool Boxes Red Big |
| 2 | Tool Boxes Red Small |
| 7 | Slide Hammer Puller set |
| 7 | Adjustable Ratchet threader |

These items concluded the transfer of all equipments procured for the MLA except for one T.V. and one video stored in USAID Warehouse. This remaining two items will be handed out as soon as MLA provides evidence acceptable to USAID that these items will be used for training purposes.

Distribution and Implementation Plan:

According to discussions with Mr. Abdulmalik Sallam, project counterpart, MLA, the following steps and procedures will be adopted:

1. MLA will distribute the equipments to Local Councils Heads of the following identified districts:

| <u>District</u> | <u>Governorate</u> | <u>No. Water projects to be served</u> |
|------------------|--------------------|--|
| 1. Haradh * | Hajjah | 20 |
| 2. al-Munirah | Hodeidah | 20 |
| 3. Beit al-Faqih | Hodeidah | 60 |
| 4. Al-Shamaytain | Taiz | 30 |
| 5. Al-Mawasat | Taiz | 20 |

* May be replaced by Abs.

2. Heads of the above Local Councils will be trained for four days starting tomorrow Dec. 11, 1990. This training will emphasize on administration and financial management of workshops. On the last day of training they will receive the equipments.
3. Local Councils Heads will be also given fifteen tool boxes each.
4. Each Local Council will rent two or three rooms for the workshop in a mid-district location that is feasible for the provision of services.
5. Each Local Council will hire a financial and an administrative supervisor for the workshop to be paid an allowance of about YR. 1,500 each.
6. Each workshop will hire a Mechanic and a Mechanic assistant experienced in plumbing or/and welding.
7. Each Local Council will receive a Monthly Membership Fee equivalent to YR. 1,000 from each water project for maintenance services.
8. Services provided by workshops will include monthly maintenance visits to each project site.
9. 25% of each workshop monthly income will be put in a bank account payable to the department of the cooperatives and International Organization, MLA, to be used for establishment of new workshops in the most active Local Councils districts or for building water projects in the poorest villages.

Appendix E

TOOLS AND EQUIPMENT PROVIDED TO MLA

Hand Tools for Central Workshop

| Item | Description | Quantity |
|------|---|----------|
| 16. | Metric tap, dia and drill set, Ref. 1498 | 1 set |
| 17. | Tap cutting fluid, Ref. 572 | 5 gal |
| 18. | Grease gun, heavy duty, 16 oz, Ref. 576 | 1 ea |
| 19. | Starrett No. 216 Micrometer .010MM resolution (with case), Ref. 1451 | 1 ea |
| 20. | Starrett No. 120 dial callipers, 150mm range, Ref. 1447 | 1 ea |
| 21. | Feeler/thickness gauge, 13 leaf metric, Ref. 1460 | 1 ea |
| 22. | RPM gauge, hand-held analog (Model 1600-4, Jones Instrument Company) | 1 ea |
| 23. | Voltage tester AC/DC type, Can Std Approved, Ref. 1423 | 1 ea |
| 24. | Economy hand drill, Ref. 1560 | 1 ea |
| 25. | General-purpose Jobbers drill set, 13-pc. metric with case, Ref. 1519 | 1 set |
| 26. | 10-pc., long arm metric hex key set, Ref. 1778 | 1 set |
| 27. | Cutting pattern coal pick, Ref. 1909 | 1 ea |
| 28. | Shovels, round point, open back long handle, Ref. 1906 | 2 ea |
| 29. | Precision-cast aluminum level, 30-in/metric ruled edge, Ref. 1471 | 1 ea |
| 30. | Cylinder hone set, Ref. 1888 | 1 set |
| 31. | Ridge reamer, Ref. 1888 | 1 ea |
| 32. | Swivel grip oil-filter wrench, Ref. 1891 | 1 ea |
| 33. | General-purpose pump, oiled st. 9-in spout, 16 oz cap., Ref. 589 | 1 ea |
| 34. | Master mechanic's 12-drawer chest, Ref. 1894 | 1 ea |
| 35. | Master mechanic's 9-drawer roller cabinet, Ref. 1894 | 1 ea |
| 36. | Mechanic's hip-roof steel toolbox, Ref. 1899 | 2 ea |

| | | |
|-----|---|-------|
| 37. | Pilfer-resistant tool chest, 6.7 cu. ft., Ref. 1897 | 1 ea |
| 38. | 100-pc. 1/4, 3/8, 1/2 drive metric socket and tool set, Ref. 1835 | 1 set |
| 39. | Torque wrench, 10-150 dual in/metric 1/2 in adj. ratchet, Ref. 1856 | 1 set |
| 40. | 8-pc. metric 3/8 drive, manual impact driver, Ref. 1852 | 1 ea |
| 41. | Vice grips, 7-in std jaw without wire cutters, Ref. 1815 | 1 ea |
| 42. | Vice grips, 10-in curved jaw without wire cutters, Ref. 1815 | 1 ea |
| 43. | 5-pc. all-purpose pliers set, Ref. 1803 | 1 set |
| 44. | Internal/external retaining ring tools, Ref. 1811 | 1 ea |
| 45. | Tin snips, 12-in solid steel, straight pattern, Ref. 1644 | 1 ea |
| 46. | Tin snips, 10-in solid steel, curved pattern, Ref. 1644 | 1 ea |
| 47. | 1-pc. urethane, dead blow hammer, Ref. 1869 | 1 ea |
| 48. | 1-lb ball peen hammer, premium-grade wood handle, Ref. 1871 | 1 ea |
| 49. | 2-lb ball peen hammer, premium-grade wood handle, Ref. 1871 | 1 ea |
| 50. | 12-lb wood-handled blacksmith's sledge-carbon steel head, Ref. 1873 | 1 ea |
| 51. | 4-lb drilling hammer, wood handled, Ref. 1872 | 1 ea |
| 52. | 16-oz fiberglass-handled nail hammer, straight claw, Ref. 1874 | 1 ea |
| 53. | 1/2 doz 10-in mill file, smooth cut, Ref. 1687 | 6 ea |
| 54. | 1/2 doz 12-in mill file, bastard cut, Ref. 1687 | 6 ea |
| 55. | 1/2 doz 8-in round file, 2nd cut, Ref. 1687 | 6 ea |
| 56. | File handles for above, Ref. 1691 | 6 ea |
| 57. | File cleaner, Ref. 1691 | 1 ea |
| 58. | 14-in pipeline welders, half round file, Ref. 1687 | 2 ea |
| 59. | Standard-pattern hacksaw, Ref. 1683 | 2 ea |
| 60. | Std. carbon steel blades for hacksaw, Ref. 1683 | 2 ea |
| 61. | 300 mm metric steel rule, Ref. 1440 | 1 ea |
| 62. | Diamond-tipped scriber, Ref. 1429 | 1 ea |
| 63. | 20-pc. mechanic's punch and chisel set, Ref. 1627 | 1 set |

| | | |
|--|---|--------|
| 64. | Metric tri-square, Ref. 1441 | 1 ea |
| 65. | 5-pc. ezy-out screw extractor set, Ref. 1516 | 1 ea |
| 66. | 30m/100ft 3/8-in-wide steel tape rule, Ref. 1436 | 1 ea |
| 67. | 18-in. std chrome adjustable wrench (normal opening), Ref. 1812 | 1 ea |
| 68. | 12-in. std chrome adjustable wrench (normal opening), Ref. 1812 | 1 ea |
| 69. | 8-in. std chrome adjustable wrench (normal opening), Ref. 1812 | 1 ea |
| 70. | 24-in. heavy duty pipe wrenches, Ref. 1813 | 2 sets |
| 71. | Crowbar-gooseneck claw and wrecking bar, 36-ft HD, Ref. 1860 | 1 ea |
| 72. | 3-sheave pulley block wood shell, bronze bushed, Ref. 460 | 1 ea |
| 73. | 2-sheave pulley block wood shell, bronze bushed, Ref. 460 | 1 ea |
| 74. | 3/4-in manila rope (for above blocks), Ref. 541 | 600 ft |
| 75. | Pipe cutter (1/2-in-to-3-in), Ref. 1491 | 1 ea |
| 76. | Pipe threaders, 1-to-2-in. (1, 1.25, 1.5, 2-in) ratchet set, Ref. (SD84-6), Reed Mfg. Co. | 1 ea |
| 77. | Pipe threader, 2.5-to-3-in, Reed Mfg. Co. (85-10) | 1 ea |
| 78. | Wheeler puller-combination 2-to-3-jaw reversible gears, Ref. 1324 | 1 ea |
| | Estimated weight per kit: _____ kilos Cost per one (1) set: YR _____ Cost for five (5) sets: YR _____ | |
| Reference numbers indicate where items are found in the McMaster-Carr Catalog 94, unless otherwise noted. Equivalent items are acceptable. | | |
| Doc 05040 | | |

Pump Operator's Tool Kit

| Item | Description | Quantity |
|------|--|----------|
| 1. | 2-blade electrician's pocket knife (spear/screwdriver), Ref. 1655 | 1 ea |
| 2. | Standard-pattern hacksaw, Ref. 1683 | 1 ea |
| 3. | Std. carbon hacksaw blades, Ref. 1683 | 1 doz |
| 4. | 10-in mill file, bastard cut, Ref. 1687 | 1 doz |
| 5. | 8-in round file, bastard cut, Ref. 1687 | 1 doz |
| 6. | 14-in pipeline welder's half-round file, Ref. 1687 | 1 doz |
| 7. | Metric pocket hex key set (1.5 to 6mm), Ref. 1779 | 1 ea |
| 8. | 10-pc., slotted/Phillips screwdriver set (prem. grade), Ref. 1784 | 1 set |
| 9. | 5-pc. maintenance pliers set, Ref. 1803 | 1 set |
| 10. | Vice grips, 7-in curved jaw without cutters, Ref. 1815 | 1 ea |
| 11. | Heavy duty pipe wrenches (24-in straight), Ref. 1813 | 2 ea |
| 12. | 8-in adjustable wrench (prem. grade), Ref. 1812 | 1 ea |
| 13. | 12-oz. ball peen hammer, Ref. 1871 | 1 ea |
| 14. | Steel toolbox (24 x 9 x 10 or sufficient for tool kit), Ref. 1896 | 1 ea |
| 15. | Corrosion-resistant brass lock for toolbox, Ref. 836 | 1 ea |
| 16. | 1/2 kilo rag cloth | 1 ea |
| 17. | Whisk broom | 1 ea |
| 18. | 10-liter metal bucket | 1 ea |
| 19. | Scrub brush | 1 ea |
| 20. | 8-in utility funnel | 1 ea |
| 21. | Wire brush | 1 ea |
| 22. | Shovel | 1 ea |
| | Estimated weight per kit: _____ kilos Cost per one (1) set: YR _____ Cost for eighty (80) sets: YR _____ | |

USAID retains the right to increase or decrease the number of sets by twenty (20) sets.

Reference numbers indicate where items are found in the McMaster-Carr Catalog 94.
Equivalent items are acceptable.

Doc: 05010

Small Engine Workshop Equipment

| Item | Description | Quantity |
|------|---|----------|
| 81. | Diesel generator, 4-to-6-Kw 220V/50Hz. Single-phase air-cooled engine preferred. Manufacturer must have an agent in YAR. | 1 ea |
| 82. | Portable welder—Medium duty, 4-to-6-Kw, 150-to-200 Amp. Diesel-driven preferred but petro acceptable. Manufacturer must have an agent in YAR. | 1 ea |
| 83. | Welding helmet, ltwt. plastic, fixed plate, #10 shade, Ref. 651 | 1 ea |
| 84. | Welding rods (mild steel) | 1 ea |
| 85. | 150-to-200-psi compressor (horiz. tank mount, 220V single phase), Ref. 1195 | 1 ea |
| 86. | Manual chain hoist and trolley (2,000-lb cap.), Ref. 472 | 1 ea |
| 87. | Lifting sling (6-ft, 2-in type 44), Ref. 542 | 1 ea |
| 88. | Hydraulic jack (Sampson 5 ton), Ref. 428 | 1 ea |
| 89. | Bench grinder (220V phase 6-in wheel, Ref. 1705) | 1 ea |
| 90. | Electric drill (220V 1/2-in heavy duty VSR), McMaster-Carr No. 95, p. 1601 | 1 ea |
| 91. | 10-ton hydraulic jack press, Ref. 1479 | 1 ea |
| 92. | Combo bolt and wire rope cutter, Ref. 1641 | 1 ea |
| 93. | Steel-top workbench (72-in x 36-in), Ref. 189 | 1 ea |
| 94. | Laminated maple-top workbench (72-in x 30-in), Ref. 161 | 1 ea |
| 95. | Multipurpose mechanic's bench vice, Ref. 1765 | 1 ea |
| 96. | Chain vice with tripod and stand, Ref. 1764 | 1 ea |
| 97. | Economy yoke pipe vice (1/8-in-to-2-in pipe), Ref. 1764 | 1 ea |
| 98. | Double ratchet puller, Ref. 470 | 1 ea |
| 99. | Small engine overhaul tool kit, Ref. 1889 | 1 ea |
| 100. | Safety glasses (cool view), Ref. 648 | 1 ea |
| 101. | Injection nozzle tester, Owatonna Tool Co., Ref. 4200 | 1 ea |
| 102. | Adapter kit, Owatonna Tool Co. No. 4201 | 1 ea |

| | |
|--|---|
| | Estimated weight per kit: _____ kilos Cost per one (1) set: YR _____ Cost for five (5) sets: YR _____ |
| <p>USAID reserves the right to increase or decrease the number of sets by one (1) set.</p> <p>Reference numbers indicate where items are found in the McMaster-Carr Catalog 94, unless otherwise noted. Equivalent items are acceptable.</p> <p>Doc: 05050</p> | |

Appendix F

SUPPLEMENTARY EQUIPMENT LIST

Supplementary Equipment

Field visits revealed that several items important to the proper functioning of the Regional Training, O&M, and Repair Workshops were not procured with the original workshop equipment. These items included accessories necessary for the operation and use of the portable welder and the air compressor. Seven sets of these items are necessary to complete the outfitting of the workshops. The items needed, along with cost estimates, are listed in the following table.

Welder¹

| | | |
|------------------------------------|---------------|------------|
| Arc Welding Cable - 200 Amp Rating | 15 meters | YR 2,250 |
| Welding Cable Lugs | 2 each | 100 |
| Arc Welding Electrode Holders | 1 each | 400 |
| Arc Welding Ground Clamp | <u>1 each</u> | <u>400</u> |
| | | 3,150 |

Air Compressor²

| | | |
|-----------------------------------|---------------|------------|
| Air Compressor Hose with Fittings | 8 meters | YR 800 |
| Tire Inflator with Manometer | 1 each | 650 |
| Air Blowgun Nozzle | <u>1 each</u> | <u>600</u> |
| | | 2,050 |

Total (each workshop) YR 5,200

The total for seven workshops will be YR 36,400.

Note: Estimate was obtained from Sinaa Store, Sana'a. At official exchange rates this will be \$3,034 at the current market rate this will be about \$1,375. Based on the market rate of exchange, this is a reasonable cost for the supplementary equipment.

¹ Accessories must be compatible with Yanmar diesel welder model YTW-180.

² Accessories must be compatible with AirMec series 300 air compressor.

Appendix G

NOTES ON VISITS TO WATER PROJECTS

Tihama Area

Mojdifiah

Mojdifiah is to the west of the main road near Manirah. The village is served by a water system consisting of a covered dug well pumped with a belt-driven vertical turbine pump. Two engines are set up so that either can drive the pump. Near the well are a ground tank and an elevated concrete tank. The concrete tank is in poor condition with reinforcing bars exposed on all four columns. The villagers are concerned about the collapse of the tank and are reluctant to use it. Both of the engines (Yanmar 16 HP) are in need of overhaul, as indicated by the effort needed to start them.

Hamadiyah

Hamadiyah is the site of a Project 045 water project. The village is served by a solar pump. The Grundfos pump is driven by 35 Arco Solar M-51 modules and delivers water to a ground tank in the village. The pump served about 30 households when it was installed in 1982 or 1983. The well is said to be 25 meters deep. The villagers are preparing now to build an elevated tank to serve a distribution system. They were unaware that the additional elevation of the tank would reduce the amount of water that the pump would deliver. The villagers indicate that there have been no maintenance or repair problems with the pump since it was installed. None of the modules has been damaged.

Mahal Suwaid

There is no cooperative water project in the village. There are about 10 private water systems for irrigation in the area and villagers obtain water from them at no cost. One farmer interviewed indicated that his dug well is at least 50 meters deep and has been in use for 13 years. He explained that the system broke down every four to six months and that a local mechanic (not well trained) made repairs. Spares are expensive but obtainable in Az Zaydiyah, about 10 kilometers away. He said that he pays roughly YR 5,000 to YR 10,000 annually for repairs. He further explained that he spends YR 10,000 to YR 30,000 every couple of years for a complete overhaul.

Southern Mountains

Al Sina

Al Sina is in the Al-Mawasat council district. It is one of the larger water projects in the district. The dispersed population of about 9,000 people in an area of about 75 square kilometers is served by the system. The elevation difference from the wells to the highest tank was estimated to be 500 meters. The system is served by two wells near the main road from Taiz to At-Turbah. Water is pumped to a tank about mid-level in the system and then boosted to the upper tank. The distribution system for the lower portion of the system is fed from the lower tank. There could easily be 50 kilometers of water distribution line in the project. All household connections and standpipe connections are metered. Standpipe connections consist of metered and locked taps for every household served by the standpipe. Water tariffs are YR 9 per 200 liters, with some people paying less if they are known to be poor. The system is operated by a staff of five people. All operating costs are covered by fee collection. The system appears to be operating, although the area is in drought and there are water shortages.

Al Ambo

Al Ambo is a smaller water project located not far from Al Sina. The system consists of a single well pumped by a six-cylinder diesel-driven electric submersible pump. There is only one tank serving a population of about 3,000. The system is currently not operating because the well is dry. People are getting water from farmers or are having water delivered by tanker.

Thuban area

This extensive water project consists of four wells pumping into two separate distribution systems. At present only two of the wells are usable; one well is dry and a second is heavily mineralized. The smaller system, served by one of the operating wells, has only one tank, situated at the high point of the system. The larger system pumps through two booster stations to the highest level. The system is operated by a full-time staff of nine (project manager, financial manager, three pump operators, mechanic, meter reader, and two clerks). The project owns its own vehicle. The monthly budget for the project exceeds YR 70,000. The major problems encountered are water sources and spare parts. Now, during the drought period, the service area is provided with water on a rotational basis. The water quality in the mineralized well improves during wetter periods and is usable. The system is now delivering about half of its normal output (about 400 m³/day is normal). When the service level declines fee collection is harder. Spare parts are available in Yemen. However, for the 100-150 HP Lombardini and Dorman diesels, the parts are only available in Hodeidah (about 400 kilometers away). The distribution system has 1,036 connections in a number of villages, all metered. The water tariff is YR 60 for the first 3,000 liters per

month, YR 20 per 1,000 liters for the next 7,000 liters, and YR 25 per 1,000 liters thereafter. The water project was built cooperatively in 1981. The village provided a substantial sum to construction but was assisted in well construction by the RWSD. Other donors supplied pumping equipment. Two additional wells were drilled by RWSD in 1987. All operation, maintenance, and repair have been performed by the villages served through fees collected. This has included replacement of pumping equipment at at least one site. The project manager would like the government to take over the responsibility for operating the system. He and his staff work hard and finances are always problematic.

Aden

Bir Al-Hussain

Bir Al-Hussain is considered to be a large rural water project. The service area includes 16 villages extended over a large area north of Lahej. Water is pumped from three wells (a fourth is dry). One of these is a submersible pump connected to the electricity main; the other two are shaft-driven vertical turbine pumps driven by three-cylinder Lister/Petter engines. Water is pumped to a 1,000 m³ ground tank at the highest point in the system. The individual villages are served by large-diameter mains from this point. There is a small elevated tank (about 10 m³) at the far end of the system, about 15 kilometers from the main tank. Some of the villages have metered connections. These pay per unit of water delivered. The remainder pay by household. Fees are collected by the Public Authority for Water (PAW). The pump operator and all operation and maintenance costs are paid by PAW. The consultant team's guide indicated that this project was about 10 years old. The engines had been replaced once. Overhauls are performed every two years.

Anad

Anad is a much smaller water project serving only the village of Anad. There are two wells just outside the village limits. Both are pumped with shaft-driven vertical turbine pumps driven by big Lister/Petter multicylinder engines. The engines and pumps appeared to be in good condition, although the pumphouses were dirty. At the time of the team's visit, one of the pumps was delivering water into a series of tanker trucks. The shut-off valve for the fill point needed replacement; the handle could not be used because the shaft had been damaged.

Both of the above visits were to water projects near the main road and close to Aden and its supply of spare parts. Water projects in other areas are probably not in as good condition.

Appendix H

ADEN TRIP REPORT

As a part of the field trip to workshop sites, the opportunity arose to visit Aden in the former PDRY. Three of the sets of workshop tools and equipment were to be transferred to councils in the southern governorates (one to Shabwah, two to Hadramawt). The purpose of the trip was twofold. The first purpose was to track the workshop tools and equipment and to visit a workshop site if possible. The second purpose was to interview personnel active in the rural water sector in the former PDRY to determine how the rural water sector functioned in the southern governorates prior to unification, with particular attention to operation and maintenance practices. The visit to Aden took place on August 13-14, 1991. The following paragraphs provide an overview of the rural water sector and the failure to locate the workshop tools and equipment.

The Rural Water Sector in the Former PDRY

The history of the PDRY is marked by the bloody coup attempt of 1986. Prior to 1986 most of the rural water supply projects were initiated by villages or collections of villages. Money and equipment were provided from remittances from workers in other Arab countries. In many cases villagers had little idea how to design a proper system or size components properly. Engines and pumps were often not suitable for the pumping task and pipes either too small or too large. After the events of 1986 the government, which up to that time had shown little interest in the rural sector, committed 5 million Yemeni Dinars (the Yemeni Dinar was worth roughly \$1.00 at market rates in 1991). Donors have also been more willing to assist with funding from the Arab-Gulf Fund, with Danida being the most prominent. UNICEF and WHO have been active in the rural sector for more than 10 years, and much of the recent bilateral and multilateral support has been administered by them. To date most of the donor assistance has been in the form of materials and equipment.

All water sector activities were under the jurisdiction of the Public Authority for Water (PAW). In urban areas the PAW operated and maintained water systems and charged fees for service. The goal of the PAW was to finance all of its activities through fee collection. According to the current general director, the PAW was able to run a surplus as recently as 1988. The PAW was less interested in water supplies in rural areas because they were expensive to operate and maintain and were a drain on the budget. As a result, the PAW participated with local agencies or citizens of a community by assisting with the design of the system, provision of materials and equipment (from donors), and supervision of construction. The rural systems were then handed over to officials at the governorate level.

Once projects were handed over, they were passed to the local level for operation and maintenance. At the village level, National Defense Committees were apparently very active.

A committee or a subset of the committee would act to operate the water system. When problems occurred, appeals would be made to the governorate level for assistance. Apparently what assistance could be provided often was. The general director of the PAW indicated that with unification, this system will end, as villages must become more responsible for solving their own problems and not rely on government. He felt that many of these projects would fail.

According to the WHO representative the skills of the PAW are good. Professional and engineering training has been obtained in the Soviet Union as well as a number of western and Arab countries. Skills at the technician's level in the PAW are also reputed to be good. However, in rural areas, lack of skilled operators and technicians is cited as one of the major problems, along with spare parts and fee collection. Visits to several projects in Lahej revealed reasonably new equipment in operating order. However, these water projects were being operated directly by the PAW and are near sources of material and spares. Apparently conditions are not good in more remote rural areas.

Workshop Tools and Equipment

According to everyone interviewed, the general director of the PAW oversees all activities related to both urban and rural water supplies. As such, the field team had expectations that he would be aware of the three sets of workshop tools and equipment provided to the southern governorates by USAID through the MLA. When informed about the workshops, he expressed interest and surprise that he had not heard of them. Apparently the PAW has had an interest in establishing workshops in several locations to support water supply projects. A plan drawn up several years ago had not been approved. When asked where such workshops should be located if one were to be in Shabwah and two in Hadramawt, he answered without hesitation Seyoun and Mukallah, in Hadramawt, and Ataq, in Shabwah.

During the team's visit to Aden, no official could be found who knew of the three sets of tools and equipment. The consultants did not have the opportunity to meet with the chairman of the Local People's Council, who may be aware of the transfer of this equipment to the southern governorates. Also, the tools and equipment may have already been transferred directly to the two governorates where the workshops will be sited. In either case, one recommendation is that the whereabouts of the three sets of workshop tools and equipment be determined and that the general director of the PAW be notified of their location.