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FOR HEALTH PROJECT

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**LATRINE CONSTRUCTION WORKSHOP  
FOR HEALTH WORKERS IN  
EL RAHAD, NORTH KORDOFAN  
REPUBLIC OF SUDAN**

**WASH FIELD REPORT NO. 180**

**APRIL 1986**

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

Prepared for  
the USAID Mission to the Republic of Sudan  
WASH Activity No. 207

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by

Frank Carroll

April 1986

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## LIST OF ACRONYMS

PHC	Primary Health Care
TOT	Training of Trainers
RHSP	Rural Health Support Project
LCW	Latrine Construction Workshop
(D)VIP	(Double) Ventilated Improved Pit

## ACKNOWLEDGEMENTS

Many individuals were instrumental in the conduct and success of the workshops in El Rahad, North Kordofan. Of particular note were the efforts of Taha Sid Ahmed, Senior Public Health Inspector, Dr. Jim Sonnemann, RHSP Regional Coordinator, Dr. Margaret McLaughlin, TOT Lead Trainer, and Craig Hafner, WASH Activity Manager in Washington. Their unique blend of sensitivity, understanding and dedication provided immeasurable inspiration. Many of their ideas are included in this report.

The support, interest, and advice of others less directly involved in implementation were key ingredients as well. In Sudan, one cannot overlook the assistance of Dr. Abdel Hamid, Dr. Taha and Awad Mokhtar from the Ministry of Health; Dr. Ahmed Zein, Dr. Haroon and the Health Center staff in El Rahad; Bobby Dean and Mohie El-Din of the RHSP; and Richard Greene of USAID. In Washington, Leo St. Michel and John Austin should be recognized for their roles in bringing about the workshops, and Bud Prince for sharing the wisdom of his experience with the WASH trainers.

Perhaps most importantly, the TOT and LCW participants should be praised for their hard work and patience in following a rigorous schedule. Yezid Mohamed Ahmed and Salah Eldeen Abbaker deserve mention for their extra dedication and effort in acting as co-trainers for the LCW. All have had an experience of which they can be proud, and which, it is hoped will inspire them to make use of what they have learned.

Lastly, the villagers of Biraghiyt who welcomed us into their homes as family and provided many memorable moments of humor and hospitality are to be gratefully thanked and, moreover, commended for their participatory efforts.

## EXECUTIVE SUMMARY

At the request of the USAID Mission in Sudan, the Water and Sanitation for Health (WASP) Project sent a two-person team to North Kordofan from January to February 1986 to assist the Regional Ministry of Health and the Rural Health Support Project (RHSP) in conducting two workshops for ministry staff aimed at improving skills in the following areas:

- training design and delivery.
- practical latrine construction and health education.

The first workshop was a training of trainers (TOT), with 15 district public health officers and civil engineers, led by the two consultant trainers working together with a Sudanese co-trainer. The second, which followed 10 days later, was a latrine construction workshop (LCW) for 15 community health workers and other peripheral health staff. The LCW brought the WASH technical trainer and the original Sudanese co-trainer, together as co-trainers with two TOT graduates who were from the district council where the LCW was conducted (El Rahad Town, Umm Ruwaba District). The co-trainers were responsible for leading the LCW. This report summarizes the LCW activities and assesses its results. (A similar report, WASH Field Report No. 173 focusing on the TOT, was prepared by the TOT lead trainer, Dr. Margaret McLaughlin.)

The consultant's recommendations regarding the latrine construction workshop are summarized as follows:

1. The LCW should be expanded to give participants practice in the construction of different ventilated improved pit (VIP) latrines using alternative materials and techniques. Emphasis should be placed on the maximum use of locally accessible and familiar materials.
2. The LCW schedule should be extended to cover a three-week period (18 work days), with about two-thirds of the time spent on field work and one-third on classroom activities. The pre-workshop preparation period should be extended to two weeks for the primary training staff.
3. The staffing of future LCWs should be complemented by a senior-level workshop coordinator and a construction site foreman.
4. The Sudanese co-trainer for the first TOT and LCW, Taha Sid Ahmed, should provide continuity in future training sessions, part-time during the next LCW (approximately eight to ten days over five weeks).
5. LCW participants should continue to be drawn from all categories of peripheral health staff, but they should meet a minimum experience criterion set by the Regional Ministry. No more than 16 participants should attend any LCW.
6. The Regional Ministry should set as a goal the conduct of seven additional LCWs in different districts of Kordofan by the end of 1986.
7. After conducting an initial survey in their own village, LCW graduates should be provided by the RHSP with a kit of commodities and tools

required to construct a VIP latrine. The RHSP and ministry should agree on the logistics for delivering the kit.

8. The Regional Ministry should give explicit instructions, in the form of itineraries and checklists, to town-based technical staff in order to support the village-based latrine construction projects organized by peripheral health staff. The RHSP and ministry need to assess the financial requirements of this support (such as the supply of fuel, and per diem allowances). The town-based staff should certify the completion of each initial latrine, which would enable the health worker to get additional commodities for an expanded project in the village.
9. The seven LCWs and the individual follow-on projects by workshop graduates should be evaluated by the Regional Ministry and the RHSP in January 1987.



## Chapter 1

### INTRODUCTION

#### 1.1 Background

Discussions were initiated in 1984 between the Regional Ministry of Health in North Kordofan and the USAID Rural Health Support Project (RHSP) about the need to:

- sharpen the skills of ministry staff responsible for training primary health care (PHC) workers at the community/village level.
- provide PHC workers with practical, hands-on training in order to help them initiate and implement health-related projects in their villages.

Because a high percentage of the diseases in Sudan, especially among children, are transmitted through the fecal-oral pathway, the promotion and construction of sanitary latrines were determined to be an appropriate program for training. In this context, improved methods of excreta disposal are included as part of a comprehensive training approach for PHC initiatives being implemented by the Regional Ministry with the assistance of the RHSP. Other training programs with follow-up activities underway include workshops in oral rehydration therapy (ORT) and immunization against childhood diseases (EPI).

The Water and Sanitation for Health (WASH) Project was requested to provide technical assistance to the RHSP in conducting two workshops in El Rahad, Umm Ruwaba District, approximately 70 km. south-east of El Obeid in North Kordofan (see map, Figure 1). The first workshop planned was a training of trainers (TOT) for 15 public health officers and civil engineers from the Kordofan Region (see WASH Field Report No. 173). The second, ten days later, was a latrine construction workshop (LCW) conducted by two participants from the TOT for front-line PHC staff, such as sanitary overseers, mosquito men, community health workers, village nurses, and midwives (see Appendix A for a list of LCW participants). A lead trainer, specializing in adult-learning methodology, and a technical trainer, specializing in environmental health engineering, were provided for the two workshops, which took place between January 9 and February 27 in North Kordofan.

WASH Technical Report No. 25 (A Workshop Design for Latrine Construction. A Training Guide, June 1984) became the training guide, used as the format for the two training sessions. The guide had been introduced in the Dominican Republic and Sierra Leone, but the Sudan workshop was the first time that it had been used by host country staff conducting the day-to-day training.

#### 1.2 Goals of the Latrine Construction Workshop (LCW)

The LCW was to be conducted in Arabic by a team of co-trainers, led by participants of the preceding TOT workshop. The goals corresponded to those noted in the training guide:

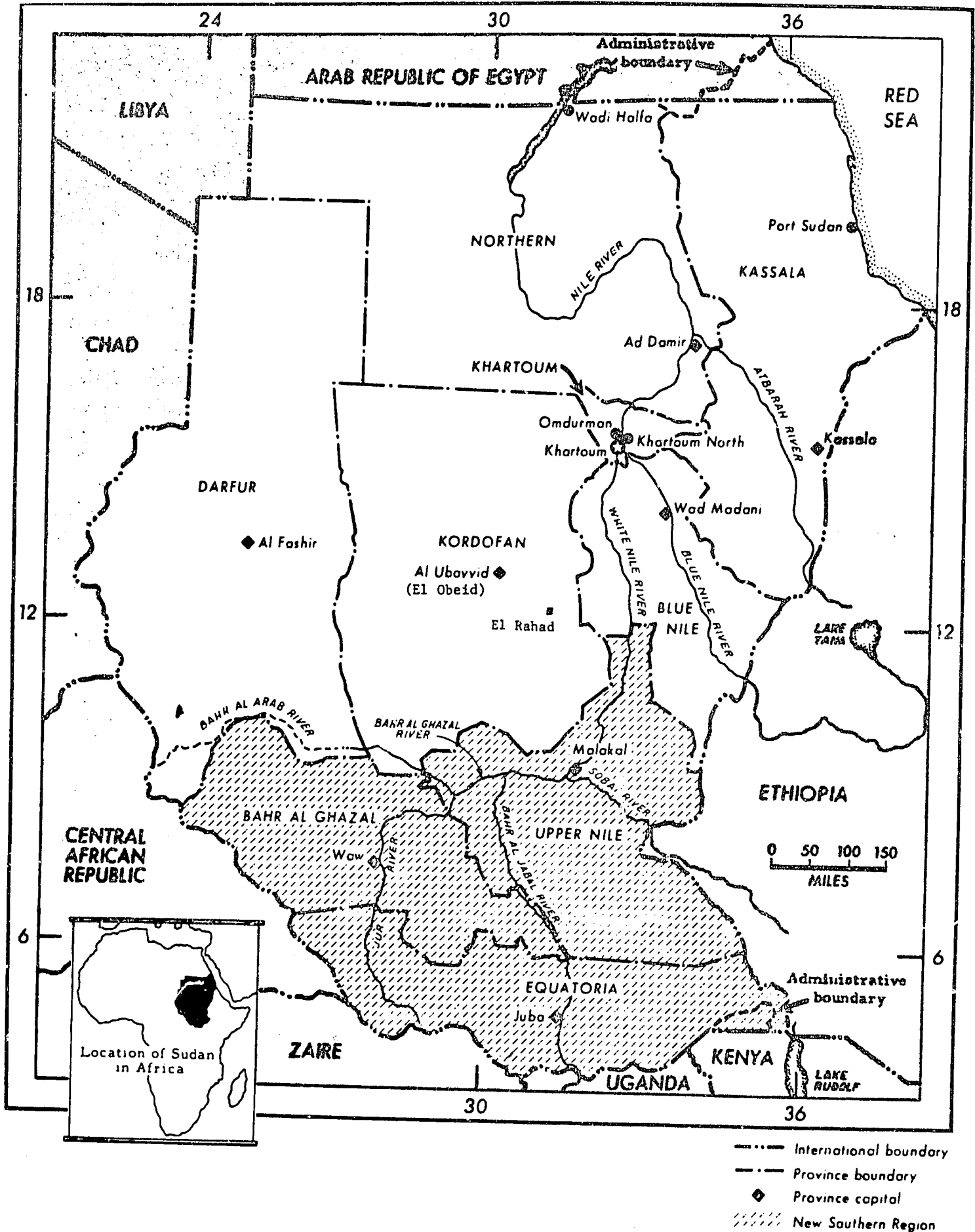


Figure 1. The Democratic Republic of Sudan

- Define sanitation and understand the impact of latrines.
- Understand the impact of sanitary waste disposal on the spread of disease.
- Develop strategies and approaches for educating communities about latrines and related sanitation issues.
- Understand and identify critical steps for mobilizing a community for any latrine project.
- Identify community factors related to the construction, acceptance, and use of latrines.
- Assess local physical conditions relating to improved sanitation.
- Identify human and material resources needed to construct latrines and determine their availability.
- Develop strategies to help the community to make an appropriate choice among alternative types of latrines.
- Develop a plan for a latrine project.
- Construct a latrine appropriate for a community.
- Identify strategies for the continued operation, maintenance, repair, and replacement of latrines.
- Develop a plan to implement a latrine project back home.

### 1.3 Consultant Trainers' Activities and Logistics

After individual preparations, the TOT lead trainer, Dr. Margaret McLaughlin, and the technical trainer, Frank Carroll, met in Washington for a planning meeting from January 6 to 8, 1986. They arrived in Khartoum on January 9. Following two days of briefings, they flew to El Obeid on January 12 and began a one-week staff planning session for the TOT with the Sudanese co-trainer, Taha Sid Ahmed, senior public health inspector. The planning included a day trip on January 14 to El Rahad, site of the workshops, to arrange for supplies and accommodations. During the TOT from January 18 to 30, 1986, the consultants divided responsibility. The lead trainer was primarily engaged with organizing and conducting the classroom sessions, focusing on adult learning theory and practice. The technical trainer was primarily concerned with site engineering. The Sudanese co-trainer was involved in both aspects, and his tireless efforts were an essential ingredient to success.

At the conclusion of the TOT, the lead trainer departed, and the co-trainer and technical trainer spent one week in El Obeid, and two days in El Rahad, preparing for the latrine construction workshop, February 10 to 23. During this workshop, the technical trainer served as an advisor to the training team, which included two participants from the TOT who were responsible for leading the day-to-day sessions, using the training guide. Again, the co-trainer played a major role in all aspects of this workshop.

## Chapter 2

### PLANNING FOR THE LATRINE CONSTRUCTION WORKSHOP

#### 2.1 Pre-TOT Planning

In preparation for the latrine construction workshop (LCW), numerous discussions were held with those concerned both in Washington and Sudan. (The principal contacts are listed in Appendix B.) Some of the briefings are noted in detail in WASH Field Report No. 173. The primary technical considerations included the following:

- availability of construction materials, and the logistics for moving them to the site.
- identification of personnel responsible for procurement and site coordination.
- general site preparations, such as the choice of communities for the TOT and LCW.
- detailed site preparations, such as latrine siting and pit excavation.
- timing construction activities over the course of the workshop.
- construction experience of the TOT and LCW participants.
- availability of hired labor to complement that of participants.
- relevance of the detailed technical options in the training guide to the resources in El Rahad.
- determination of the specific VIP latrine types to be constructed.
- design innovations or modifications to the guide as necessary.
- preparation of lectures and demonstrations for key construction activities.

Most of these issues were addressed, if not resolved, during the week prior to the TOT, when the trainers arrived in El Obeid and made a reconnaissance trip to El Rahad. The general locale for field work had been previously determined and a procurement/logistics officer appointed. All other preparations relating to construction remained to be worked out. Certain tools and supplies were in short supply but primary commodities (such as cement) were available. The staff originally designated for procurement required help, and both the efforts of the co-trainer, Taha Sid Ahmed, and the diligence of the RHSP regional coordinator, Dr. Jim Sonnemann, limited the delays to manageable proportions. Bobby Dean, RHSP logistics advisor, spent considerable time on-site during the TOT and LCW to help prepare procurement checklists for workshops and projects (see Appendix C).

## 2.2 Planning for the LCW During the TOT

Most of the technical planning questions could only be resolved during the implementation of the TOT itself.

At that time, the Regional Ministry of Health made an additional request of the workshop plan -- a permanent double ventilated improved pit (DVIP) latrine to be constructed at the Rahad Health Center, the local sponsor of the workshops. The purpose was to demonstrate sanitation alternatives appropriate to densely populated areas and to recognize the continued assistance offered to the RHSP by the health center staff. An ambitious task in conjunction with the other workshop goals, this DVIP unit proved to be both a valuable training tool and a test of available resources for latrine construction. The single VIP latrine built for the staff at the primary school in GOZ, a remote quarter of El Rahad, served as the main training model for TOT participants, however. It also proved to be useful for the LCW by furnishing information to:

- estimate quantities, local costs, timing and logistic requirements for village work.
- produce written exercises for LCW participants.
- develop an appropriate design for rural vent pipes using local materials.

(See Appendix D for bills with quantities and costs for the two TOT latrines. It should be noted that the labor costs were higher than normal because of idle time necessitated by the TOT training schedule.)

## 2.3 Post-TOT Planning

During the course of the TOT, several points affected the implementation of the LCW. Key subjects in the training guide needed to be condensed, simplified, adapted to Sudanese conditions, and translated into Arabic. More emphasis had to be placed on designs that minimized costs and made maximum use of materials readily available to villagers. The workshop schedule had to be extended to a more realistic time frame for sessions than those in the training guide.

The co-trainer and technical trainer focused intensively on adapting the guide during the interim between the TOT and LCW. One week was spent in El Obeid producing a practical guide in Arabic that covered the important aspects of latrine construction. Drawings were simplified, some design changes were made, and new material was added. Attention was devoted to wooden slab construction, which had not been treated in the TOT fieldwork. One to two open days were added to the workshop schedule in the original guide. In El Rahad, the two TOT graduates who were to lead the LCW training, surveyed the LCW village site, reviewed the guide and prepared visual aids. An additional two days were spent by the entire team in El Rahad immediately prior to the LCW in order to ready the supplies, set mutual norms, review the Arabic reference manual and map out the detailed training strategy.

## Chapter 3

### LATRINE CONSTRUCTION WORKSHOP IMPLEMENTATION

#### 3.1 Adaptation of Training Guide

The Arabic reference manual\* produced for the LCW in El Rahad was a 50-page text using the training guide as the basic resource. Some guide handouts were translated directly, others were modified to suit Sudanese conditions. Some new items were added -- such as instructions for making an inexpensive drop-hole fly trap, and a latrine maintenance and monitoring checklist for community health workers. The emphasis of the manual was on practical aspects of latrine construction. It considers various alternatives in component design, such as concrete or wood-cement mortar slabs, and brick or wood pit lining.) To convey the reasons and a context for latrine construction, some details regarding the disease cycle and the project planning cycle are included. Such a manual is an important information resource for LCW participants and is needed to help them plan and construct a VIP latrine back home.

#### 3.2 Training Personnel and Division of Responsibility

The principal co-trainers for the LCW were TOT participants, Yezid Mohamed Ahmed, public health inspector, Umm Ruwaba, and Salah Eldeen Abbaker Muzzmil, town council engineer of El Rahad. They were assisted by Taha Sid Ahmed, senior public health inspector in El Obeid, and Frank Carroll, the WASH technical trainer. The two co-trainers assumed responsibility for planning and leading the classroom sessions for initial contacts with the community, and organization of construction teams. Frank Carroll assisted in the design and construction of the LCW latrines. Taha Sid Ahmed was involved in all phases of the workshop in an organizational and leadership role. The training team coordinated its classroom and practical work through frequent evening meetings.

#### 3.3 Complementary Inputs

##### 3.3.1 Context of LCW in Local Council Development

A village four kilometers from El Rahad, Biraghiyt (population approximately 300), was chosen as the rural site for workshop VIP latrine construction. The village was selected because of its proximity to El Rahad, although no improved services are available. Collection of water involves an approximate three-kilometer round trip. Only one mud-plastered brick structure stands in the village, a small shop adjacent to the sheikh's house. All other structures are of wood pole framing, covered with sorghum straw, local reeds, or thin branches. The community was introduced to the project by the co-trainers one week prior to the LCW, and four homes were chosen by the village to receive the four latrines, apparently on the basis of household size. The villagers

\*Available at the WASH Library.

asked for other support, such as milk and blankets, but once the nature of the LCW was understood, the community gratefully accepted the proposal and mobilized to participate. In fact, by the conclusion of the LCW, one extra VIP latrine had been constructed by a villager with the assistance of workshop volunteers, and several more pits were being excavated. A representative from a neighboring village who heard about the project also visited the site to request assistance. The "latecomers" were referred to the LCW participants responsible for the area for potential follow-on projects. In general, villagers' in-kind contributions were valued at from 20 to 50 percent of the total VIP latrine cost, including pit excavation, all materials for shelter construction, and wood materials for base and lining as appropriate. Additional labor was contributed in shelter finishing, assembly of wood linings and water collection. Households also graciously provided numerous meals for LCW staff and participants.

### 3.3.2 Commodity and Labor Support

The RHSP provided funds for the purchase of necessary tools and commodities for both the TOT and the LCW. Vehicles and fuel were also made available. Additional funds were used to hire skilled and unskilled labor to supplement the TOT and LCW participant workforce in key phases of construction. Skilled labor was needed primarily for masonry and secondarily for carpentry. Although the final accounting of expenditures has not yet been completed, the estimated cost of the TOT and LCW is a total of fS 25,000\* to 26,000, including over fS 4,000 for the construction of the unanticipated DVIP latrine for the Rahad Health Center (see Appendix D). Approximately 60 percent of the total cost was for the TOT, 40 percent for the LCW. Procurement checklists compiled by the RHSP logistics advisor for future LCWs and projects are shown in Appendix C.

### 3.4 Methodology

The LCW methodology paralleled the lecture/group discussion/demonstration/fieldwork model of the training guide. The most lively classroom sessions involved role playing. The Experiential Learning Cycle paradigm applied during the TOT involving feedback and generalization, was only applied to a limited extent during the LCW, however. Co-trainers exhibited a tendency to return to comfortable and familiar didactic techniques. In the field, construction teams were organized in groups of four, each responsible for one latrine. In practice, different teams had a chance to participate or observe unique details of each model.

### 3.5 Participants

The selection strategy was to include representatives from all categories of peripheral health care workers -- sanitary overseers, assistant sanitary overseers, mosquito control men, medical assistants, village nurses, and midwives. Only the medical assistant category was not represented, due to conflicting demands on their time. The group usefully included one technician.

\*fS2.50 = US\$1.00 on 2/5/86

The selection strategy was based on the premise that latrine construction in villages should be a potential activity for whatever health care staff is available, considering the shortages in all categories. A wide variation in experience among the Rahad LCW participants was evident as a result of the limited pool available within the Rural Council. (Later workshops will draw on participants from larger district-wide areas.) Two of the original sixteen invitees did not appear, and one was replaced by an alternate selection, making a total of fifteen. One woman (midwife) participated, and an attempt to include a second was not successful. Altogether, the group represented 12 villages and two town councils.

### 3.6 Training Sessions

#### 3.6.1 Schedule

As the result of a unanimous recommendation during the TOT, the LCW schedule was extended by one day (from 11 to 12 work days over two full weeks.) The extra day was inserted as a make-up day on day seven. Participants were given two free weekend days, but wage labor was required on both days to maintain the pace. The basic training guide schedule is shown in Appendix E. The schedule of sessions as implemented is presented in Appendix F, covering 14 days of activities. Participants worked long and hard during the fieldwork, often returning at sunset to engage in evening sessions.

#### 3.6.2 Relationship to Training Guide Format

Due to the extra length of some sessions (mostly in construction), adjustments to the timing, combination and sequencing of activities in the guide were inevitably required. In general, however, it was possible to maintain a logical progression by means of daily review and planning. In response to needs expressed by TOT participants, a session on construction of fly traps for drop-holes was added. The TOT consensus differed from a major premise of the training guide, which takes the position that teaching one technology well (i.e., concrete slab) is better than confusing LCW participants with numerous alternatives for component design. But, the strongly expressed opinion was that learners should be introduced to various techniques, so that when back in their villages, they would be able to deal more flexibly with the materials actually available, instead of having to rely on external inputs. In order to accommodate this need, the LCW schedule was expanded accordingly and included the following component alternatives:

- Pit excavation - square and round.
- Pit lining - open brickwork, wood pole, no lining.
- Base - brick and cement mortar only.
- Slab - steel reinforced concrete, wood/cement mortar.
- Vent pipe - green (unfired) brick/mud mortar/mud-dung plaster; bisque-fired clay pottery sections/cement mortar; bamboo-palm mat frame or bamboo-local reed frame plastered with mud-dung mortar or cement mortar.
- Shelter - wood pole frame only, double and single-pitched roof framing alternatives.



### 3.6.3 Technology Options

The alternative components were combined in such a manner as to demonstrate four unique VIP latrines using different construction methods. The four originally planned units ranged in total cost from £S 350 to £S 420 (including in-kind contributions by beneficiaries). A fifth latrine costing £S 240 (without lining) was constructed toward the end of the workshop at the request of a highly motivated beneficiary. The five latrines are ranked from the most to least expensive as follows:

- square pit, brick lining, RCC slab, bamboo/mud-dung vent pipe.
- round pit, wood lining, RCC slab, brick/mud vent pipe.
- round pit, brick lining, wood/cement slab, clay bisque/cement vent pipe.
- square pit, wood lining, wood/cement slab, clay bisque/cement vent pipe.
- round pit, no lining, wood/cement slab, bamboo/mud-dung vent pipe.

Bills showing quantities and itemized costs for each type are presented in Appendix G. There is no significant cost difference between the second and third alternatives (less than three percent.) The difference would have been even less had not corrective action been required on the second unit to narrow the dimensions of the base adequately to support the RCC slab; erosion of pit walls at ground level had enlarged the opening beyond the size of the pre-cast slab. Particularly in sandy soils, this Type II combination -- Appendix G -- of lining and slab presents a high-risk quality control problem in future LCWs and latrine projects.

The LCW costs for the five VIP latrines ranged from £S 140 to £S 340, corresponding closely to the ranking for total costs. Costs to beneficiaries -- all as non-cash contributions -- varied from £S 80 to £S 165, with the amounts approximately following in inverse relationship to total costs. Beneficiary contributions ranged from 19 percent to 47 percent, the lowest proportion for the most expensive unit.

The average total cost for the five latrines constructed during the LCW was about £S 350, with two-thirds in cash cost to the project and one-third as in-kind cost borne by the beneficiary.

On a component basis, experience during both the TOT and LCW (seven units total) indicates the following approximate costs for the El Rahad area:

- Excavation (sandy soils)
  - 1.1 m diameter circular pit : 10 £S/m depth
  - 1.1 m square pit : 12 £S/m depth
- Pit Lining
  - Open brickwork
  - Circular pit : £S 25/m depth  
(incl. 100 bricks, 1/3 safiyha cement,<sup>1</sup> 2 safiyha sand per meter)<sup>1</sup>

- Square pit	:	£S 32/m depth (incl. 150 bricks, 1/2 safiyha cement, 3 safiyha sand per meter)
- Wood poles		
- Circular pit	:	£S 12/m depth (3/4 bundle motarak/m)
- Square pit	:	£S 16/m depth (1 bundle motarak/m)
● Base (brickwork)	:	£S 40 (100 bricks, 1 safiyha cement, 6 saf. sand)
● Slab		
- RRC (1:2:4)	:	£S 100 (2 safiyha cement, 4 safiyha sand, 8 saf. gravel, 12 m - 6 mm rebar)
- Wood/cement mortar	:	£S 60 (1 safiyha cement, 6 safiyha sand, 4 m palm log)
● Vent Pipe (all 2.5 m)		
- Asbestos-cement (150 mm)	:	£S 100
- Bisque-fired clay/cement mortar	:	£S 50
- Green brick/mud mortar/mud-dung plaster	:	£S 40
- Bamboo-palm mat/cement plaster	:	£S 40
- Bamboo-palm mat/mud-dung plaster	:	£S 30
● Shelter (pole frame/straw)	:	£S 50

<sup>1</sup>There are approximately 57 safiyha in one cubic meter.

The following observations regarding component design are noted:

- Although pits using wood/cement mortar slabs do not require a brick base, the psychological effect on the beneficiary had a positive impact on acceptance of and demand for the latrine.
- LCW participants were polled regarding the appropriateness of the RCC slab vs. the wood/cement mortar slab in their own villages. There was a unanimous preference for the wood/cement mortar slab based upon ease of construction, the proportion of locally available materials, and lower capital cost. Even when it was pointed out that from the standpoint of durability -- estimated 30 years for RCC vs. 5 to 7 years for wood/mortar -- the annualized cost of the RCC is less, the other criteria were deemed more important by participants.
- During the TOT and LCW, an effort was made to develop an inexpensive vent pipe design suitable for rural use. Depending on the availability of materials and workmanship in a particular locale, some options noted above may be appropriate. The bamboo/mud-dung plaster is perhaps the easiest in terms of materials, whereas the green brick may be the simplest to construct. The bisque-fired clay should only be considered when produced close to the point of installation.

### 3.7 Goal Achievement

Although the participants were not tested in the classical fashion, all said that they learned a great deal and shared novel experiences -- particularly with respect to construction -- that they felt would help them implement follow-on projects. In general, the group brought to the LCW a stronger background in community relations and mobilization than in construction practices. The questions asked by participants indicated that their community relations experience would be valuable in planning and executing a latrine project. For the approximately 40 percent that demonstrated some manual dexterity at the beginning of the workshop, their skills in latrine construction improved noticeably. Another 20 percent were observed to have developed some manual skills they had not shown at the beginning of the workshop. The goal of constructing four single VIP latrines was exceeded by one, and at the close of the LCW, several more excavations were in progress entirely through the initiative of villagers.

## Chapter 4

### CONCLUSIONS

The latrine construction workshop (LCW) successfully attained all the objectives listed in paragraph 1.2. The goals for latrine construction were exceeded by one both during the TOT (DVIP latrine at the Rahad Health Center) and during the LCW as well, for a grand total of seven units.

All LCW participants proved to be hard and patient workers, especially in the practical field work. All gained experience necessary, if not sufficient, to implement follow-on latrine projects in their villages. The hands-on practice was essential to understanding the subject matter. In general, participants said that the field work proved to be more interesting than the classroom material.

The staff estimated that approximately 60 percent of the El Rahad LCW participants will follow up with latrine projects in their villages, provided that they receive adequate material and technical support from the district or town. One workshop, no matter how successful, cannot be expected to provide participants with all the resources they need for self-sufficiency, especially for those for whom the subject is new and/or whose village is remote from a municipal center.

The choice of participants from all categories of peripheral health staff virtually ensures that a wide range of experience and technical skills will be represented at the LCW. This situation will provide some difficulties for inexperienced trainers. In light of the shortages of peripheral health staff throughout Sudan, however, the selection strategy is sound. Moreover, all participants at the El Rahad LCW were believed to have benefited from the curriculum, regardless of their background.

LCW co-trainers and LCW graduates from town and district centers -- who possess relatively more skills and experience than village health workers -- are the most appropriate individuals to provide the necessary technical advice and encouragement for village latrine projects. This support will only occur to the extent that the town and district staff both follow a pre-determined itinerary for visiting villages in their area and refer to a technical checklist.

The timing of the workshop schedule, as presented in the training guide, is too tightly programmed, considering both the needs in Sudan for consideration of alternative latrine designs and the staffing available to organize and conduct the LCW. (For example, classroom sessions begun in the evening, after a full day in the field, will not receive the attention they merit.) Preparation for the workshop must be realistically limited to the period immediately preceding it, no matter how far in advance the training is planned. The ten days allocated for detailed groundwork for the El Rahad LCW did not allow the TOT graduate co-trainers sufficient time to review the training guide. Although the workshop was completed in 12 days of participant time (plus two days using hired labor on weekends), even a 14-day schedule of activities will be inadequate if the experience of the LCW training staff is limited.

Without the participation of a senior-level coordinator/manager and a technical advisor (present during the El Rahad LCW), the remaining staff will be hard-pressed to meet the goals in future workshops. The TOT graduate co-trainers have a full-time task in organizing and conducting the classroom sessions, with little spare time for detailed planning and oversight of field demonstrations and construction.

Mid-level staff should not be expected at the conclusion of one TOT to be able to apply diligently the principles of good training during an LCW. A person becomes a good trainer through experience over time, rather than by consuming a quantity of training. Patience is a key element. The apprenticeship that TOT graduates will receive in leading LCWs, therefore, is important for their long-range development.

Senior-level support -- an intangible combination of sensitivity, understanding and patience derived from experience -- will be essential to the smooth conduct of future workshops. Without taking a prominent leadership role, such a member of the training team should be available for regular counsel during daily planning meetings and for problem-solving at the construction sites.

To ensure even progress in the fieldwork, trainers in future workshops should pay particular attention to planning several days ahead for the construction of latrine components. Planning must consider both labor and materials, with appreciation for the importance of details. The actual construction phase requires constant monitoring and supervision for quality control, hence for accurate training demonstrations.

Logistically, it was not difficult to conduct the field work portion of the training in a village with limited services and located several kilometers from the main training site. One large pick-up truck (Ford Ranger), which consumed about 80 to 85 U.S. gallons during the two weeks, proved adequate for moving people and commodities.

Villagers, when they understand the nature of the project, can be expected to make significant contributions to building their own latrines and cooperating with the project. For the five VIP latrines constructed during the LCW, villages provided between 20 and 50 percent of total costs. Nevertheless, beneficiaries may be expected to test the project's level of support, and extra time may be necessary to work out the exact details of participation.

VIP latrines by themselves -- in the absence of other services -- can be an effective development initiative in villages where the community mobilizes itself to participate with outside support and proves self-reliant in improving the local quality of life. Whether a latrine project is relevant in comparison with other village priorities depends more on the manner in which it is planned and implemented than on its intrinsic nature.

VIP latrines that maximize the use of materials easily available to rural Sudan villagers can be constructed for less than US \$100, including the shelter and in-kind contributions from the household, not counting supervision costs. Several technically appropriate options for rural vent pipes can be constructed for the equivalent of about US\$ 10.

Because materials vary among places and over time, latrine construction workshops should examine several alternatives in component design. By demonstrating flexibility yet sound technology choices, the LCW will encourage a health worker to make best use of materials and techniques in his or her particular situation. Rather than confusing the participant with too many alternatives, this approach will help them to be more effective if a preferred material or method is not readily at hand.

In cognizance of actual training needs, the context, and the background of participants, considerable adaptation and simplification of the training guide has been required. The comprehensive Arabic reference manual\* produced between the TOT and LCW has now been tried once and appears to have the balance between detail and simplicity appropriate to a workshop audience. Small modifications are now being made, and more may be required after wider use. The current length (50 pages), however, is believed to be adequate. Major additions should not be necessary.

## Chapter 5

### RECOMMENDATIONS

The latrine construction workshop (LCW) should be extended from a 13 day time frame (as recommended in the training guide) to a 20-day span, including two free weekend days (see proposed schedule, Appendix H). Most of the extra time is required for field work, in order to demonstrate alternative latrine designs at four construction sites in the workshop village. The proposed schedule assumes 11 1/2 days of field work and 6 1/2 days of classroom activities.

Field work days should be spaced with enough flexibility to allow for delays in preparatory activities which are beyond workshop staff control. For example, extra time may be required to make available in-kind contributions by village beneficiaries. The team should include the following:

- A workshop coordinator; a senior-level public health official -- who has participated in at least one TOT -- to provide overall management and support for co-trainers; to assist both in giving feedback from classroom activities and to work with the villagers in scheduling of construction.
- A construction site foreman; a practical, hands-on technician -- who has participated in at least one LCW -- to ensure the orderly flow of the construction sequence and to give demonstrations in masonry and other skills.
- A public health co-trainer; a mid-level local district official -- who has participated in at least one TOT -- to work with an engineering co-trainer in guiding the classroom sessions of the LCW and coordinating those sessions with construction at the village sites.
- An engineering co-trainer, mid-level local district official -- who has participated in at least one TOT -- to work with the public health co-trainer in guiding the classroom sessions of the LCW and coordinating those sessions with construction at the village sites.

The first two positions are new; they were in part informally assumed during the first LCW by the senior public health officer organizing the training, Taha Sid Ahmed, and the WASH technical trainer. The other two positions are the same as those assumed for the first LCW by the Umm Ruwaba District TOT graduates. (In addition to this primary staff, the normal complement of support personnel will be required, such as cooks, drivers, guards, and most importantly, someone who can get supplies.)

The coordinator for the first LCW, Taha Sid Ahmed, should be involved in the next LCW, so that continuity from his valuable experience will be established. His participation will be important during the four days on-site immediately preceding the LCW, and one or two times for two days each during its course.

As more coordinators gain LCW experience, they should also be available to support new staff with primary LCW responsibilities.

The district-level staff for the LCW needs an uninterrupted period of two full weeks to prepare for the training. At least one full week is required to review the guide and the Arabic reference manual for participants. A minimum of three visits to the workshop village is necessary; one to introduce the project and encourage community participation, one to select the pit sites of beneficiaries chosen by the community, and at least one to check progress on pit excavation, which should commence one week prior to the workshop. The staff must also make arrangements for accommodation, feeding and other support (such as vehicles) with the local town council where the training center is located. One large pick-up truck will be the minimum. The district staff should review their logistic plans with the site coordinator over a two-day period at least four days prior to the opening of the LCW.

The workshop coordinator and construction site foreman will require one week of preparation and at least four days at the location for final planning.

The training staff needs a site-planning calendar, so that details essential to the timely flow of events can be taken care of in advance. The technical trainer is working with the RHSP logistics advisor to assist the Regional Ministry of Health in preparing such a schedule by the next LCW.

The content of the LCW should be expanded to include several technical variants of latrine components, relying on materials accessible in villages and commensurate with the technical skills of beneficiaries and LCW graduates. (The LCW schedule is proposed to be extended in part to accommodate this need, Appendix H.) At a minimum, the alternatives should include:

- Slab - reinforced concrete; wood-and-mortar
- Lining - brick and mortar; wooden pole; partial (to 1 meter) or full in each case
- Pit - square; circular
- Vent pipe - bamboo frame/mud-dung mortar; bamboo frame/cement mortar; brick; bisque-fired clay (if locally produced)
- Shelter roofing - plastic bag and straw; palm mat and mud-dung plaster; woven wood or bamboo and straw

The LCW should compare the quantity billed for each variant so that local costs, which may vary, can be easily computed.

The slab base is recommended as a two-course brick/cement mortar square structure in all cases, despite of the technical appropriateness of wooden bases. The positive psychological impact on beneficiaries and potential effect on community interest in an expanded latrine project justifies this limitation.

Shelter should be framed with the most common locally used alternative. Variants in framing that improve local designs, however, should be demonstrated (such as the double-pitched roof cornuk with back-wall cross-bracing and roof trusses to eliminate the need for a center pole).



The technical variants should be embodied in four latrines to be constructed by LCW participants. In unstable soils, these alternatives should include:

- Reinforced concrete (RCC) slab - brick lining
- Wood - mortar slab - brick lining
- Wood - mortar slab - wood lining

(For stable soils, no lining or a shallow collar need be added.) The combination of RCC slab and wood lining in unstable soils -- demonstrated in the first LCW -- should be eliminated due to quality control problems in exact pit dimensions.

A session on the construction of inexpensive fly traps for slab drop-holes should be added to the curriculum. (Instructions and drawings have already been added to the Arabic reference manual. The fly traps (approximate cost of \$S 10 including labor) should be provided by the LCW to beneficiaries after construction and integrated with the sessions on user education. (Sessions 14 and 16 of the guide.)

The workshop schedule should afford enough flexibility during the final week to allow some time to construct additional latrines desired by "latecomers" -- villagers who, as a result of the initial efforts, want to construct their own with limited technical guidance. Such additional units may be taken on by LCW volunteers, an activity that would serve as a valuable repeat exercise with less direction by the training staff.

The district-level co-trainers should agree with the workshop coordinator on a structured schedule for moving among the four construction sites the evening prior to each day in the field. Regular nightly meetings, even if only for a few minutes, should be held by the four staff to review and plan. The proposed LCW schedule should be lengthened to avoid classes during the evenings of construction days, but feedback sessions on the day's activities should be held as soon as possible after returning from the field.

As recommended in the guide, groups of four participants should be assigned to each of the four latrine models. Enough alternate participants should be selected to ensure a workshop size of 16, an ideal number.

Following a lecture, each new construction activity should first be demonstrated at one or two of the four sites before groups separate to work individually. Demonstrations would therefore be comprised of one group or two groups of eight participants.

A minimum level of on-the-job experience, determined by the training staff should be a pre-condition for the participants chosen to attend LCWs at the district level. Participants should include all categories of peripheral health care staff, who would be required to implement a small VIP latrine project upon return to their communities. This strategy should be evaluated by the Ministry and RHSP after one year, to assess the effectiveness with which different categories of LCW graduates carry out their projects, if such differentiation is possible. A minimum of two female participants should be selected for each workshop.

It is recommended that, in most cases, only one participant from a single village be selected. Although two participants per village, if available, might encourage mutual support, such a policy would have a bias against small villages with less than two health care staff. Fewer villages would be reached. With appropriate district and town-level technical support, plus community participation, a significant percentage of LCW graduates should be able to implement a small VIP latrine project by themselves. For this reason, a few key participants, such as civil technicians and sanitary overseers based in larger towns, should also be selected for rural LCWs.

A complete set of tools (as specified in a checklist -- Appendix C -- developed by the RHSP logistics advisor) should be provided to each of the four LCW construction teams. Furthermore, as part of the training, team leaders should inventory all tools and commodities at their sites at the end of each day. Tool sets should be retained at the district center for future workshops.

To select the LCW sites, no criteria with regard to existing village services are required beyond proximity to the classroom site and a reasonably accessible water supply. "Reasonably accessible" should be defined by the willingness of beneficiaries to provide all water necessary for the construction activities.

The Regional Ministry of Health and the RHSP should aim for an average of one LCW per month during the remainder of 1986. Given that seven district workshops were discussed and planned during the TOT, this schedule would imply completion sometime near the end of the calendar year, allowing for some slack. Whereas the original expectation was that seven workshops would all be held by mid-1986, the extended schedule for each LCW and the limited availability of senior staff to act as coordinators may preclude most of the workshops from being held simultaneously. The proposed timetable should be viewed as an ambitious effort, considering all the constraints.

As proposed during a planning session at the close of the TOT, LCWs should culminate with each graduate returning to his or her community and implementing a small VIP latrine project, that is, the construction of one unit. Such an activity would be expected to lead in some cases to community-wide projects. Recommendations concerning post-workshop activities include the following:

- The Regional Ministry should develop a village-visit procedure and schedule then for town and district technical support staff who have participated in at least one TOT or LCW. The middle level of management and supervision must be able to provide materials, technical advice and encouragement to peripheral health care workers, who are relatively inexperienced in latrine construction, if the initial projects are to have broad success.
- The site for the initial VIP latrine in the village should be chosen by village authorities, following the promotional work by the LCW graduate.

- Where there is more than one LCW participant per village, the individuals should work together on constructing one VIP latrine each.
- Prior to construction, each LCW participant should conduct a sanitary survey and prepare a short report on his or her promotional work, submitted to the appropriate staff. An adequate sanitary survey form already exists, but the regional training staff must still develop a report format.
- A construction kit comprised of tools and equipment sufficient to build one latrine should be delivered to the peripheral health worker, after approval of the survey and report. The Regional Ministry in collaboration with the RHSP must arrange for the provision of the kit.
- The district staff should certify the completion of each VIP latrine, using a quality control checklist, that must be developed by the Regional Ministry with RHSP assistance.
- The LCW graduates should utilize the monitoring and maintenance checklist provided in the LCW Arabic reference manual for periodic reporting on the unit(s) they have constructed.
- Expendable commodities, (such as cement and bricks) for additional VIP latrines should be furnished for up to five units at a time following the successful completion of the initial unit. In such cases, the peripheral health workers should propose a general plan to be detailed and approved by the district staff.

A mini-workshop was to be held in El Obeid from March 1 to 3 to assess progress to date and develop an action plan for the following LCWs. Some proposals for the content of this workshop follow:

- The recommendations of this report, and that submitted by the TOT lead trainer, should be reviewed and discussed.
- The district co-trainers for the LCW just concluded should lead a discussion on each phase of the sessions as implemented and consider to the proposed extended schedule in Appendix H.
- All participants should review the Arabic reference manual produced for the first LCW and understand its relationship to the training guide.
- Participants should develop a realistic schedule for implementing the next seven LCWs in light of staffing and fiscal constraints. A reasonable target completion date would be December 1986.
- Participants should develop a plan for evaluating the outcomes of both the LCWs and the follow-up VIP latrine construction projects implemented by LCW graduates. The evaluation could be conducted in January 1987.

## APPENDIX A

### LATRINE CONSTRUCTION WORKSHOP PARTICIPANTS

Bashir Khamis Fadel Elseed	Sanitary Overseer, Umm Ruwaba Town
Moutasim Mohamed Abdel Rahman	Sanitary Overseer, El Rahad Town
Idris Ahmed Adam	Asst. Sanitary Overseer, Simeh
Zakariyah Hassan Arbab	Asst. Sanitary Overseer, Simeh
Abdel Rahim Ali Abdel Rahim	Community Health Worker, Aradeba
Omar Mohamed Adam	Community Health Worker, Goz/Bishara
El Fadel Mohamed Ahmed	Community Health Worker, Karashona
Ahmed Elgadal Ahmed	Community Health Worker, Agri
Seida Adam Mohamed	Midwife, Aradeba
Abdullah Khalil	Nurse, Umm Seriha
Eldoma Ahmed Eldoma	Nurse, Fangoga
Tarig Ibrahim Ebaid	Mosquito Man, Umm Ruwaba/Umm Aish
Ibrahim Mohamed El Safi	Mosquito Man, Umm Ruwaba/Umm Suwaimah
Ibrahim Ziyada Sati	Civil Technician, Umm Ruwaba Town
Adam Ibrahim Ebaid	Community Health Worker, Nawa

APPENDIX B

LIST OF PRINCIPAL CONTACTS

Ministry of Health - Khartoum

Dr. Abdel Hamid	Director General, Primary Health Care
Dr. Taj El Sir	Chief of Training
Mr. Mohamed Hassan Salih	Principal, School for Sanitary Overseers

Kordofan Regional Ministry of Health - El Obeid

Dr. Taha Abdel Hamid	Asst. Director of Health Services
Mr. Awad Mokhtar	Chief Public Health Inspector
Mr. Taha Sid Ahmed	Senior Public Health Inspector

Rural Health Support Project - Khartoum

Mr. A. Bruce Strassburger	Chief of Party
Mr. Mohie El-Din	Administrator

Rural Health Support Project - El Obeid

Dr. Jim Sonnemann	Regional Coordinator
Dr. Amal	MCH Officer
Mr. Bobby Dean	Logistics Advisor

District/Town Staff - El Rahad

Dr. Ahmed Zein	District Medical Officer (Outgoing)
Dr. Haroon	District Medical Officer
Mr. Yezid Mohamed Ahmed	TOT Graduate/LCW Co-Trainer (PH Inspector)
Mr. Salah Eldeen Abbaker Muzzmil	TOT Graduate/LCW Co-Trainer (Town Engineer)

USAID

Dr. James Sarn	Chief, Health/Population Office, Khartoum
Mr. Richard Greene	Health Project Officer, Khartoum
Mr. John Austin	WASH Project Coordinator, Washington

CDM/WASH - Washington

Mr. Craig Hafner	Activity Manager (207)
Mr. Leo A. St. Michel	WASH Project Director

One America - Washington

Dr. Bud Prince	Advisor to RHSP
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## Appendix C Procurement Checklists

<u>TOOLS</u>	Workshop Kit	Project Kit
Item		
Trowel	4	1
Concrete smoother (wood)	1	1
"Atala" or pick	2	1
Tape measure	16	1
Claw hammer	1	1
Paintbrush	2	2
Hand saw	2	1
Shovel	4	1
44-gallon drums	6	2
Mixing pan	4	1
Buckets	4	2
Carpenter's level, large	4	1
Pliers	4	1
Ladder	2	1
Notebook	16	1
Pencil	16	2
Hacksaw, extra blades	2	1
Tin snips	4	1
Cooking oil tin ("sofiha"); includes one perforated with many holes to be used for washing gravel	8	2
Anvil or old lorry differential casing	1	1
Sledge hammer, small, or heavy ballpeen hammer	1	1
Plumb line	4	1
T square (optional)	4	1
Stakes, wood	32	8
Large hole (for removing dirt from pit)	4	1
Knife	4	1
Sand sifter	1	1
Rope	4	1
Rake	4	1

PROCUREMENT CHECKLIST

Appendix C (cont.)

MATERIALS

Item	Workshop Kit	Project Kit
Lumber: boards 1"x8" x 4 m	1	1
Nails, 2 in., (# kg)	2	1/2
Sandpaper		
reinforcement bar, (#3), 6mm x 6 m	5	3
Portland Cement (sacks)	12	3
Metal sheet, 1.2 m x 2.4 m	1	1
Galvanized wire (kg)	10	2
Water (as needed)		
Used motor oil (gal)	10	2
Straw sacks (burlap bags or "shawals")	12	3
Strain (bundle)	2	1
Bricks	lining	700
	no lining	500
Gravel (coarse aggregate) (safiyha)	20	10
Sand (fine aggregate) (safiyha)	1 truckload	30
Metal mesh, 1.5mm (meters)	4	1
Lock & key for tool shed	1	1
Bolts with nuts, _____ mm		
Bamboo poles or straight, stout sticks (2.5 m)	50	10
Flexible material or branches for vent pipe (found locally as needed)		
→ <sup>Palm</sup> oven mat, 15 m x 3 m (vent pipe & roof)	6	2
One-gallon paint tins	8	2
Health Education display materials		
Hinges	8	2
Covering material for roof		
Metal nails, <del>one</del> large (12 ltr), <del>one</del> small (5ltr)	large	1
	small	4
→ Rubberoid (meters)	8	2
→ Salt (bags)	2	1
Ironing	2	1
Angle Iron		
Black paint (qt)	1	1
Matarik (bundles)	12	5
Palm Logs	6	2
Strong <del>wood</del> poles	2.7 m	10
	2.0 m	24
	1.5 m	24

APPENDIX D

VIP LATRINES CONSTRUCTED DURING TOT  
BILLS OF QUANTITIES AND COSTS

TYPE I (GOZ GIRLS' SCHOOL)

Pit : 1.1 meter diameter circular x 3 meters deep  
 Lining: Open brickwork/cement/mortar  
 Base: Two-courses brick/cement/mortar  
 Slab: 1: 2: 4 RCC as per Training Guide  
 Vent pipe: Bamboo-palm mat frame plastered with cement mortar  
 Shelter: Green (unfired) brick, mud mortar, mud-dung plaster;  
 Bamboo-palm mat roof with mud-dung plaster

Item	Quantity	Cost (£S)
Cement	8 safiyha	120
Sand	36 safiyha	29
Gravel	10 safiyha	16
6mm rebar	12 meters	17
Bricks (red)	500	50
Bricks (green)	1000	70
Bamboo	18 pcs.	18
Palm mat	2 1/2 - 1.5 x 3 m mat	18
Fly trap	1	10
Lumber formwork (incl. labour)		140
SUB-TOTAL MATERIALS		488 say 500
Labor (pro-rated approx.)		400
Additional mat'ls incl. cement for vent pipe dev'tment		100
TOTAL		1000



TYPE II (RAHAD HEALTH CENTER)

Double Ventilated Improved Pit (DVIP) Latrine with Hammam

Pits: 2.5m x 1.0m rectangular x 3.5m deep with 15° sloping walls and red brick/cement mortar dividing wall

Lining: None except for 0.5m deep brick collar

Base: 1: 2: 4 RCC ring beam cast in place

Slabs: 1: 2: 4 RCC squat plate, foundation and emptying hatch covers

Vent pipes: 2 x 3.5m asbestos-cement (AC) pipe, 150mmØ

Shelter: Red brick/cement mortar, iron sheet roof, 60cm glazed tile wainscoating all around

Item	Quantity	Cost (£S)
Cement	34 safiyha	505
Sand	150 safiyha	120
Gravel	60 safiyha	100
6mm rebar	20 pcs.	180
Bricks (red)	2100	210
Formwork (incl. labor)		400
Wooden door	1	65
Vent pipes (incl. losses)	2	360
Tiling (incl. labor)	6.3m <sup>2</sup>	500
Roofing	9m <sup>2</sup>	300
Plumbing		25
Paint	1qt.	25
Misc. (Burlap, wood, nails, wire, etc.)		100
	<b>SUB-TOTAL MATERIALS</b>	<b>2900</b>
Labor (pro-rated approx.)		1350
	<b>TOTAL</b>	<b>4250</b>

- At 30 yrs. life, 10% discount rate, 15 users, annual cost is approximately 30£S/year-capita.

SCHEDULE FOR BASIC WORKSHOP\*

DAY ONE	DAY TWO	DAY THREE	DAY FOUR	DAY FIVE	DAYS SIX AND SEVEN
<ul style="list-style-type: none"> <li>• Introduction to workshop</li> </ul>	<ul style="list-style-type: none"> <li>• Community mobilization and information gathering</li> </ul>	<ul style="list-style-type: none"> <li>• Types and selection of latrines</li> <li>• Planning a latrine construction project</li> </ul>	<ul style="list-style-type: none"> <li>• Latrine slab construction</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	<ul style="list-style-type: none"> <li>• Base construction</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	F  R  E  E
<ul style="list-style-type: none"> <li>• Sanitation, latrines and health</li> </ul>	<ul style="list-style-type: none"> <li>• Conducting a sanitary survey</li> </ul>	<ul style="list-style-type: none"> <li>• Site evaluation and construction project estimating</li> </ul>	L U N C H	<ul style="list-style-type: none"> <li>• Lining the pit</li> </ul>	
DAY EIGHT	DAY NINE	DAY TEN	DAY ELEVEN	DAY TWELVE	DAY THIRTEEN
<ul style="list-style-type: none"> <li>• Project information and development strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Installation of latrine slabs</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	<ul style="list-style-type: none"> <li>• Latrine shelter construction</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	<ul style="list-style-type: none"> <li>• Latrine completion</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	<ul style="list-style-type: none"> <li>• Improving existing latrines</li> </ul> <p><u>Fieldwork</u></p> <p>↓</p>	<ul style="list-style-type: none"> <li>• Planning your latrine project</li> <li>• Workshop evaluation and closure</li> </ul>
<ul style="list-style-type: none"> <li>• Community decision-making</li> </ul>	<ul style="list-style-type: none"> <li>• Repair and maintenance of a latrine</li> <li>• Latrine shelter construction</li> </ul>		<ul style="list-style-type: none"> <li>• Project review</li> </ul>	<ul style="list-style-type: none"> <li>• Community project planning</li> </ul>	
			L U N C H		

\*Based on participants constructing single VIP latrine with concrete slab.

Actual Latrine Construction Workshop Schedule  
El Rahad, 10-23 February 1986

2/10	2/11	2/12	2/13	2/14	2/15	2/16
-Introduction to workshop	-Community mobilization and information gathering	-Conducting a sanitary survey (cont)  -Types and selection of latrines  -Planning a latrine	-Latrine slab construction  <u>Fieldwork</u> ↓	F  R  E  E	-Lining the pit <u>Fieldwork</u>	-Base construction (complete) <u>Fieldwork</u>
-----						
-Sanitation, latrines and health	-Conducting a sanitary survey	-construction project  -Site evaluation and construction project estimating		(Brick lining construction)	-Base construction (begin) <u>Fieldwork</u>	-Vent pipe construction (start) <u>Fieldwork</u>
-----						
2/17	2/18	2/19	2/20	2/21	2/22	2/23
-Project information and development strategies	-Installation of latrine slabs, vent pipe construction <u>Fieldwork</u>	-Fly trap construction  -Latrine shelter construction <u>Fieldwork</u>	-Repair and maintenance of a latrine  -Latrine completion, including vent pipe construction <u>Fieldwork</u>	-Field visit to 2 TOT latrines  -Base construction (new latrine) Vent pipe Construction	-Project review  -Vent pipe completion <u>Fieldwork</u>	-Community project planning  -Planning your latrine project  -Workshop evaluation
-----						
-Community Decision-making	-Planning your own project (begin)			F  R  E  E	-Improving existing latrines <u>Fieldwork</u>	-Closure

APPENDIX G

BIRAGHIYT VIP LATRINES BILLS OF QUANTITIES  
AND COSTS

TYPE I (IBRAHIM REZIK)

Pit: 1.1 meter square x 3 meters deep  
Lining: Open brickwork/cement mortar  
Base: Two courses brick/cement mortar  
Slab: 1: 2: 4 RCC as per Training Guide  
Vent pipe: Bamboo-palm mat frame plastered with mud-dung mix  
Shelter: Wood pole frame covered with straw

Item	Quantity	Cost (£S)
<u>Project:</u>		
Cement	7 safiyha*	105
Sand	34 safiyha	27
Gravel	8 safiyha	13
6mm rebar	12 meters	17
Bricks	550	55
Bamboo	4 pcs.	4
Palm mat	1/2 - 1.5 x 3m mat	6
Fly trap (incl. labor)	1	10
Misc. (Wire, wood, fly screen, etc.)		5
Labor	( 4 days skilled	60
	( 7 days unskilled	35
	SUB-TOTAL	<u>337</u> say 340
<u>Beneficiary:</u>		
Wood for shelter		17
Straw for shelter		15
Labor (incl. excavation)		45
	SUB-TOTAL	<u>77</u> say 80
	TOTAL	420 £S
	Project:	61%
	Beneficiary:	19%

\* Approx. 57 safiyha = 1 cubic meter

TYPE II (HUSSEIN EL TOR)

Pit: 1.1 meter diameter circular x 4 meters deep

Lining: Thin poles (motarak)

Base: Wood (Deleb) and brick/cemnt mortar

Slab: 1: 2: 4 RCC as per Training Guide

Vent pipe: Green (unfired) brick, mud mortar, mud-dung plaster

Shelter: Wood pole frame covered with straw

Item	Quantity	Cost (£S)
<u>Project:</u>		
Cement	4.5 safiyha	68
Sand	20 safiyha	16
Gravel	8 safiyha	28
6mm rebar	12 meters	17
Bricks (red)	100	10
Heavy timber (base)	5 meters	8
Bricks (green)	210	15
Fly trap (incl. labor)	1	10
Misc.		5
Labor	(3 days skilled (5 days unskilled)	45 25
	SUB-TOTAL	297 say 250
<u>Beneficiary:</u>		
Wood for lining (motarak)	3 bundles	45
Wood for shelter		17
Straw for shelter		15
Labor (incl excavation)		50
	SUB-TOTAL	127 say 130
	TOTAL	£S 330

Project: 66%  
Beneficiary: 34%

TYPE III (IBRAHIM MOKHTAR)

Pit: 1.1 meter diameter circular x 4 meters deep  
 Lining: Open brickwork/cement mortar  
 Base: Two courses brick/cement mortar  
 Slab: Wood-cement mortar  
 Vent pipe: Bisque-fired clay cylinders/cement mortar  
 Shelter: Wood pole frame covered with straw

Item	Quantity	Cost (£S)
<u>Project:</u>		
Cement	4.5 safiya	68
Sand	27 safiyha	22
Bricks	470	47
Palm log (Deleb)	5 meters	10
Rubberoid mat	2 sq.m.	12
Bisque-ware (incl. transport)		35
Fly trap (incl. labor)	1	10
Misc.		10
Labor	( 3 days skilled	45
	( 3 days unskilled	15
	SUB-TOTAL	274 say 275
<u>Beneficiary:</u>		
Wood for slab		15
Wood for shelter		17
Straw for shelter		15
Labor (incl. excavation)		45
	SUB-TOTAL	92 say 95
	TOTAL	£S 370
	Project:	72%
	Beneficiary	28%

TYPE IV (HUSSEIN EL TABAKH)

Pit: 1.1 meter square x 4 meters deep  
 Lining: Thin poles (motarak)  
 Base: Two courses brick/cement mortar  
 Slab: Wood-cement mortar  
 Vent pipe: Bisque-fired clay cylinders/cement mortar  
 Shelter: Wood pole frame covered with straw

Item	Quantity	Cost (£S)
<u>Project:</u>		
Cement	3 safiyha	45
Sand	18 safiyha	15
Bricks	100	10
Rubberoid mat	2 sq.m.	12
Palm log (Deleb)	5 m	10
Bisque-ware (incl. transport)		35
Fly trap	1	10
Misc.		5
Labor	( 2 days skilled ( 2 days unskilled	30 10
	SUB-TOTAL	182 say 185
<u>Beneficiary:</u>		
Wood for lining (motarak)	4 bundles	60
Wood for shelter		17
Straw for shelter		15
Wood for slab		15
Labor (incl. excavation)		55
	SUB-TOTAL	162 say 165
	TOTAL	350
	Project:	53%
	Beneficiary:	47%

TYPE V (YAHZIN)

Pit: 1.1 meter diameter circular x 3.7 meters deep

Lining: None

Base: Two courses brick/cement mortar

Slab: Wood-cement mortar

Vent pipe: Bamboo-palm mat frame plastered with mud-dung mix

Shelter: Wood pole frame covered with straw

Item	Quantity	Cost (£S)
<u>Project:</u>		
Cement	2.5 safiyha	38
Sand	15 safiyha	12
Bricks	100	10
Palm log (Deleb)	5 meters	10
Bamboo	4 pcs.	4
Palm mat	1/2 x 1.5 x 3m mat	6
Fly trap (incl. labor)	1	10
Misc.		5
Labor	(2 days skilled	30
	(2 days unskilled	10
	SUB-TOTAL	135 say 140
<u>Beneficiary:</u>		
Wood for slab		15
Wood for shelter		17
Straw for shelter		15
Labor (incl. excavation)		50
	SUB-TOTAL	97 say 100
	TOTAL	240
	Project: 58%	
	Beneficiary: 42%	



## Combined Total for Five Latrines:

Item	£\$ <sub>AVG</sub>	% avg.
Project Cost	238	67
Beneficiary Cost	114	33
Total Cost	<u>352</u>	<u>100</u>

Total Cost does not include:

- Transport, unless specified
- Supervision of construction
- Non-expendable equipment (tools, etc.)
- Promotion, planning and siting
- Maintenance, monitoring and user education

Proposed Expanded Workshop Schedule

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
-Introduction to workshop	-Community mobilization and information gathering	-Types and selection of latrines  -Planning a latrine construction project	-Concrete latrine slab construction  <u>Fieldwork</u>	-Wood latrine slab construction (start)  <u>Fieldwork</u>	-Pit lining (cont) (Wood and brick) (complete)  <u>Fieldwork</u>	F R E E
-Sanitation latrines and health	-Conducting a sanitary survey ( <u>field</u> )	-Site evaluation (Session 7, #1-5 only-see Day 15) ( <u>Fieldwork</u> )	↓	-Pit lining  <u>Fieldwork</u>	↓	
DAY 8	DAY 9	DAY 10	DAY 11	DAY 12	DAY 13	DAY 14
-Base construction  <u>Fieldwork</u>	-Project information and development strategies	-Installation of latrine slabs (wood and concrete)  <u>Fieldwork</u>	-Repair and maintenance of a latrine  -Fly trap construction	-Latrine shelter construction (start)  <u>Fieldwork</u>	-Vent pipe construction (start)  <u>Fieldwork</u>	F R E E
	-Community decision making		-Latrine shelter construction (introduction classroom)		-Latrine shelter construction (continue)  <u>Fieldwork</u>	
DAY 15	DAY 16	DAY 17	DAY 18	DAY 19	DAY 20	
-Construction project estimating (Session 7 completion)	-Vent pipe completion  <u>Fieldwork</u>	-Latrine completion  <u>Fieldwork</u>	-Improving existing latrines  <u>Fieldwork</u>	-Latrine completion	-Community project planning (excluding case study)  -Planning your latrine project  -Workshop evaluation	
Review and study			Project review		Closure	