Water for the World

Methods of Operation and Maintenance Training

Technical Note No. HR. 3.M

One of the most important steps in establishing a water and sanitation system in a rural community is arranging for efficient operation and maintenance of the facilities. Without proper care, a water and sanitation facility will deteriorate and fail to provide the services for which it was designed and built. A malfunctioning system will almost certainly be improperly used and eventually abandoned by the community. Perhaps even more important, a community may develop a false sense of security in a malfunctioning water and sanitation system they do not realize is harmful. It is imperative that the community understand that without proper operation and maintenance by trained system operators, no water and sanitation facility will continue to function properly and safely. Such proper functioning is essential to gain economic benefits, good health, improved hygiene, lower disease rates, and increased convenience in the community.

Improvements in the health conditions and hygiene habits of community members that can result from a good water and sanitation system are lost when a supply breaks down. A community enthusiastic about water and sanitation improvements may view a breakdown as evidence that their contributions to the system were wasted. Their further cooperation may be difficult to obtain. Adequate provision must be made for proper operation and maintenance of the facilities at the local level and through an action agency back-up located conveniently to the village.

A well-maintained water and sanitation system needs well-trained people to operate it. Technical training in operation and maintenance will give selected individuals the practical skills needed to care for community systems and help to instill respect for the people operating the facilities among the rest of the villagers.

Training needs should be defined for operation and maintenance personnel in order to:

- select a training method,
- develop a training method,
- plan a training program,
- conduct a training program, and
- evaluate operator performance after training.

The most appropriate training method is one that meets training needs and makes the best use of local resources.

The initial step in the training process is to decide who is to coordinate the regional training effort and determine where the trainers will come from. Decisions must be made to carry out training at local, regional or national levels. Often the most economical method is to train trainers at the national level so they can train, at a regional center, the people who will work on local water and sanitation systems. Trainers need to learn how to use the technical notes on operation and maintenance that are part of this series. They must learn how to conduct training programs. People trained at the national level for work at the regional level should help the village water and sanitation committee select candidates for the local operation and maintenance positions and coordinate the training for that job.

Selecting Trainees

Since the continual functioning and upkeep of a rural water and sanitation system is primarily the responsibility of the community, the components of the system should have been designed so they can be operated and maintained by personnel available in the village. It is imperative that provisions for

training begin at the same time as system design, since the design must fit the local people's capability for operation and maintenance. Refer to "Community Participation in Planning Water Supply and Sanitation Programs," HR.2.P, and to the technical notes on design and on operation and maintenance of the system being constructed in the community.

It is important that the operation and maintenance job tasks be considered when selecting technicians for a project, and it is equally important that the qualifications of the selected system operators be considered when developing a training program. The capabilities of local operation and maintenance personnel can be developed if good training and support are provided by the regional office of the action agency.

The method used for selecting operation and maintenance personnel will depend on local circumstances. Several conditions apply to most situations, however. System operators should live in the village so they are available to work the system regularly. They need to be able to work well with the water committee. They should be accepted by, if not chosen or approved by, the village water and sanitation committee and the community as a whole. They must have an ability to perform technical operations and have an interest in improving the water and sanitation conditions in the village.

The number and qualifications of system operators are determined according to the design of the system, the size of the system, the various components of the system (especially any water treatment facilities) and the number of people who will be using the system. Information on the number and qualifications of system operators needed for the particular facilities constructed at the local level should be obtained from the technical notes that relate to that specific system.

In a typical small water supply and sanitation system, the personnel will probably consist of those needed to administer or manage the system and others who operate it technically. If the village committee acted as an administrative staff during construction of the system, they should continue to do so after the system is in use. The committee can oversee system operators, manage the budget, collect user fees and perform all accounting duties.

System operators' duties will be both technical and non-technical. They will be responsible for operating equipment, performing preventive maintenance, making repairs, reading meters, and cleaning the system. They will also be responsible for ordering supplies, groundskeeping (maintaining fences around facilities, clearing blocked drains, checking pipe coverings), and keeping basic records. System operators must keep the village water and sanitation committee informed on the condition of the water and sanitation system and recognize and report major problems as early as possible to the action agency's regional office.

One method of choosing operation and maintenance personnel is to use the construction period to select and train workers who have shown competency and interest in the system during construction. The system operators chosen from the construction crew learn first how the system is put together and how it works. This facilitates understanding and performing the operation and maintenance work.

Women are the primary water users in villages, so equal access to training in system operations should be ensured for them. If women were involved in construction tasks, they are primary candidates for operation and maintenance tasks. Women are less likely to leave the village than men and have a direct influence on the water and sanitation habits of the children. Their employment as system operators may provide more continuity in operation and maintenance. Since women use water systems more than men, they also detect problems earlier. In addition, the children will soon learn that operation and maintenance are very important aspects of the water and sanitation system and will grow up with a positive attitude toward maintaining a system. Introducing these new attitudes and approaches to children will make introducing ideas and systems in new generations much easier.

Often there is an experienced or skilled mechanic in the village who

knows how to use tools similar to those involved in the new system. The village committee should consider hiring such a person for operation and maintenance duties. Other good prospective system operators are water collectors, water vendors, traditional well-diggers, and primary health workers.

Operators who can read and write can make monthly reports and keep other records. However, ability to read and write should not be the deciding factor in chosing system operators. Reports can be made in other ways or special training for writing reports can be incorporated into training.

The village water and sanitation committee should be trained in the needs of operation and maintenance to facilitate good system management and cooperation with system operators. The water committee will be the best liaison between the system operator and the rest of the community. If the committee and the local population develop a sense of pride and ownership in a system, they will demand a smoothly run system which provides the services for which it was designed. In addition, a community which is proud of its system, and understands the importance of its care, is more likely to cooperate with the system operators and properly use their facilities.

In small communities with simple water and sanitation systems, it may be advisable to make one or two people responsible for operation and maintenance tasks. Where systems are larger or more complex, operation and maintenance by a group of system operators may be best. Small water and sanitation systems do not imply small problems or small responsibilities for system operators and the village water and sanitation committee, however. Appropriate training is needed for operation and maintenance of water and sanitation systems of any size.

Methods of Training

There are many ways to conduct training programs. They can be held at national, regional or local levels employing many different teaching styles. The style of the training program will be influenced by the subject matter to be covered, the place the training is conducted, the facilities available, the skills and experience of the trainees, the length of time the trainees can spend at a training site, the length of time trainers can spend with the trainees, the funding that is available, the local conditions under which the operators will have to work, and the back-up support the action agency will provide to local operators. No matter what style of instruction is developed, some principles for training local systems operators should be kept in mind.

1. Training should stress the practical aspects of caring for water and sanitation systems. The trainees should learn the procedures they will need to perform for the community systems by practicing the procedures under the supervision of an experienced trainer. Training cannot be accomplished by lectures, manuals, visual aids and demonstrations alone, although these are acceptable complements to hands-on experience.

2. The training programs must be directly applicable to the facilities the operators will be working on in their own village. If operators are not trained in their villages on the actual equipment to be used, they should practice on identical equipment at the training site. Teach only what is directly useful to the trainees, and limit the amount of extra information.

3. Training programs must be adjusted to fit the individual needs of the people being trained. For example, if the people cannot read and write, their training needs are very different from those who can.

4. The action agency should aid training efforts by arranging refresher courses for systems operators.

5. Resources and dependable back-up support should be available at the action agency's regional office where village system operators can reach them.

6. The success of training will be minimal unless the community and the action agency together create paid positions for operators and are willing to pay a training staff.

7. The training program should

include practical evaluation of system operators to determine if they are able to perform satisfactorily under local conditions.

System operators can be trained in their village or in a training center. On-the-job training in the village under the supervision of an experienced operator may be best for simple systems. No special facilities will be required since system operators can learn tasks using the equipment they will be working on to perform their jobs. On-the-job training is effective with trainees who learn new skills best by doing.

In order to work well, on-the-job programs need skilled and experienced trainers available to travel to job sites. No transportation will be needed to get village trainees to the training site. Trainees are often more likely to attend training sessions in their own villages than in centers to which they must travel. On-the-job training usually costs less than training in a center. It can begin during construction phases and may be supplemented by short courses and refresher courses at the regional training center.

A central training establishment for training can be arranged at the action agency's regional office. Short courses can be based on simulated water and sanitation systems. Trainers would be available to trainees at all times. Other training aids, such as spare parts, printed materials, slides, audio tapes, video and film might be available. Media aids can be adapted to help instruct persons who cannot read. The operation and maintenance technical notes in this series that apply to the system the trainee will operate will be useful training materials.

Self-paced training programs can be developed so that workers at various levels of competence can use materials individually but still have access to trainers when necessary. A trainee can receive one-on-one assistance at a slow or fast pace from the trainer.

Supervised check-ups in the village should follow centralized training. A mobile training unit could come to each village for check-ups and refresher courses.

The disadvantages of centralized training are that transportation must be provided for the trainees from their villages to the training center. Operators are less likely to attend training if they must travel daily. Costs of establishing a central training unit are usually high. Local conditions cannot be taken into account when training takes place in a central spot with a standardized program.

One of the most important aspects of the training process is the attitude of the trainers. Trainers need to be able to encourage operators during training and reward them for performing well. The action agency should develop a basic training course content. A certificate will record the lessons learned and help standardize tasks and training needs between villages.

Efficient operation and maintenance depends on well-trained and paid operators. It is false economy to skimp on either of these items. The absence of a training budget will be as detrimental to operation and maintenance efficiency as the absence of a system for fees collection to cover operation and maintenance costs. Good training needs a good budget.

Summary

If the benefits of water and sanitation programs are to be realized, the systems must operate efficiently and be dependable. Without proper operation and maintenance, systems will fail to operate. Operation and maintenance must be well planned and systems operators must be well trained.

Technical Notes are part of a set of "Water for the World" materials produced under contract to the U.S. Agency for International Development by National Demonstration Water Project, Institute for Rural Water, and National Environmental Health Association. Artwork was done by Redwing Art Service. Technical Notes are intended to provide assistance to a broad range of people with field responsibility for village water supply and sanitation projects in the developing nations. For more detail on the purpose, organization and suggestions for use of Technical Notes, see the introductory Note in the series, titled "Using 'Water for the World' Technical Notes." Other parts of the "Water for the World" series include a comprehensive Program Manual and several Policy Perspectives. Further information on these materials may be obtained from the Development Information Center, Agency for International Development, Washington, D.C., 20523, U.S.A.