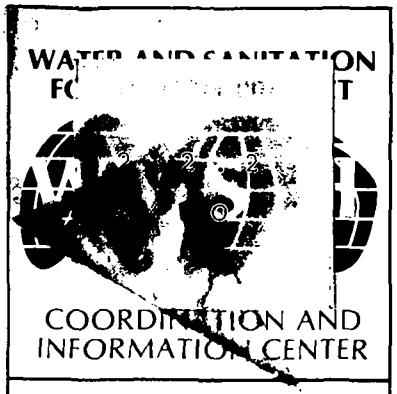

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Telephone: (703) 243-8200
Telex No. WUI 64552
Cable Address WASHAID

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A WORKSHOP ON HANDPUMP INSTALLATION AND MAINTENANCE IN RIOBAMBA, ECUADOR OCTOBER 17-27, 1983

WASH FIELD REPORT NO. 110

JANUARY 1984

Prepared for:
USAID Mission to the Republic of Ecuador
Order of Technical Direction No. 82
232.2-84WO-921

WATER AND SANITATION FOR HEALTH PROJECT

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at Chapel Hill;
stitute of Tech-
ngineering Experi-
n.

January 3, 1984

Orlando Llenza
USAID Mission
Quito, Ecuador

Attention: Ken Farr

Dear Mr. Llenza:

On behalf of the WASH Project I am pleased to provide you with 5 (five) copies of a report on a workshop on handpump installation and maintenance.

This is the final report by Andrea Jones and Alan Pashkevich and is based on their trip to Ecuador from October 3 to November 2, 1983.

This assistance is the result of requests by the Mission on February 15 and August 17, 1983. The work was undertaken by the WASH Project under Order of Technical Direction No. 82, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner

Dennis B. Warner, Ph.D., P.E.
Director
WASH Project

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

DBW:ybw

WASH FIELD REPORT NO. 110

A WORKSHOP ON HANDPUMP INSTALLATION AND MAINTENANCE IN RIOBAMBA, ECUADOR

OCTOBER 17-27, 1983

Prepared for the USAID Mission to the Republic of Ecuador
Under Order of Technical Direction No. 32

Prepared by:

Andrea L. Jones

and

Alan Pashkevich

January 1984

Water and Sanitation for Health Project
Contract No. AID/DSPE-C-0080, Project No. 931-1176
is sponsored by the Office of Health, Bureau for Science and Technology
U.S. Agency for International Development
Washington, DC 20523

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EXECUTIVE SUMMARY

A workshop on handpump installation and maintenance was held in Riobamba, Ecuador, October 17 to 27, 1983, for 16 participants. Eleven of the participants were Peace Corps Volunteers. Five worked as engineers in regional offices of the Instituto Ecuatoriano de Obras Sanitarias (IEOS),* four worked as promoters in regional offices of IEOS, and two were assigned to Ecuador's Ministry of Agriculture. In addition, five participants were health educators and practitioners who worked in the community development division of the La Voz de los Andes mission. The overall purpose of the handpump workshop was not only to give participants necessary technical skills and knowledge, but also to give them skills to plan, implement, and follow up village level handpump projects. The workshop was conducted by a two-person team, one person skilled in handpump installation, maintenance, and repair and the other in workshop design and delivery.

The workshop goals represented a balance between the technical areas and the planning and educational skills needed to conduct a successful handpump project. The training methodology was highly participatory. The emphasis was on practical aspects, and participants were actively involved in all field and classroom sessions. The participants carried out such tasks as troubleshooting and repairing broken pumps, constructing two well aprons, installing a deep well pump, carrying out a community project feasibility assessment, and analyzing the data, creating a project work plan, and designing and practicing training for caretakers and users.

The participants felt that they achieved the learning objectives of the workshop. They cited the following as the most important aspects of the workshop:

- the hands-on experience of constructing an apron and installing and repairing a handpump,
- the opportunity to share their experiences with and learn from other participants, and
- practice in the use of tools and construction materials.

A number of participants commented that they would have found useful some hands-on experience with lining a well. Another recurring theme during the workshop was how institutional support for handpump installation and maintenance could be organized.

Regarding workshop follow-up, the WASH team recommended the following:

1. Individual follow-up and support to help participants identify how they can become involved in handpump projects in their present work assignments. This step is critical if participants are not to lose the skills they have gained.

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* IEOS, the Ecuadoran Institute for Sanitary Works, is an agency of the Ecuadorian government.

2. Further training in the area of well lining/relining for participants who will be working directly on the installation of handpumps.

3. Regional meetings of workshop participants six months after the workshop to allow continued exchange of learning, joint problem-solving, and general support.

ACKNOWLEDGEMENTS

Conducting a workshop such as the one described in this report requires a high degree of involvement and commitment by many individuals and organizations. Herb Caudill at AID and Jon Sevall at La Voz de los Andes mission provided critical back-up support for the training project. In addition, Jon enriched the training sessions by sharing his extensive Ecuador handpump experience with trainers and participants.

At the IEOS office in Riobamba, Engineer Milton Silva Mejia provided unflagging support in efforts to resolve the complicated logsitical, materials, and equipment problems we encountered. His leadership of a small band in a Sunday climb up the volcano, Chimborazo, was only on example of the great vitality he lent the work.

The Asociacion Indigena Evangelica de Chimborazo in Colta provided a convenient site for technical sessions, as well as excellent access to the local communities in which the project work was carried out. Special thanks are due to Basilio Malan, Lorenzo Naula, Pablo Yuquilema, and Julian Chiciza for their generous and expert support of project activities.

A special word of thanks goes to the Voz de Los Andes staff member who opened her home as well as her kitchen to the training group, thus contributing immeasurably to a productive climate for learning.

Claudia Liebler, who prepared the training materials with Alan Pashkevich, also made an important contribution. Her care and professionalism helped produce the instructional materials which were being piloted during the workshop.

Finally, the participants must be thanked for their active participation in the workshop. Their enthusiasm was essential.

Chapter 1

INTRODUCTION

In February 1983 the WASH Project was requested to conduct a workshop for 15 to 20 participants on handpump installation and maintenance in Ecuador. The participants were to include Peace Corps Volunteers working in water development projects as well as community health workers from other Private Voluntary Organizations (PVOs) (five people from the Voz de Los Andes mission attended the course after several scheduling delays had been encountered). The workshop was conducted from October 17 to 27, 1983.

Based on a visit to Ecuador by John Austin, Office of Health, U.S. Agency for International Development, and subsequent phone conversations between WASH and USAID/Ecuador, it was decided that the training needed in Ecuador would provide an appropriate opportunity to pilot test the newly completed handpump installation and maintenance trainers guide developed by the Water and Sanitation for Health (WASH) Project. Such a pilot test would provide feedback to the developers of the trainers guide so that it could be modified for subsequent application in other settings.

The overall purpose of the workshop was to give participants skills in planning and supervising village level handpump projects. The focus was not only on training them in the required technical skills but also on using that technical knowlege and skills to plan and implememt projects within a community context.

This assignment was carried out under Order of Technical Direction No. 82 which provided for technical assistance in the manufacturing, installation, and maintenance of the AID Handpump in Ecuador.

Chapter 2

PLANNING

2.1 Integrated Rural Health Delivery System: Water Supply and Sanitation

The water supply and sanitation component of AID/Ecuador's Integrated Rural Health Delivery System has the objective of increasing access to water and sanitation facilities and promoting the adoption of low cost technologies, particularly wells with handpumps. The project paper, written in 1981, projected the installation of 700 handpumps in three areas of Ecuador. The workshop on handpump installation and maintenance was requested by the AID Mission as a way to build the capacity of provincial offices of the Ecuadorian Institute for Sanitary Works (IEOS) to engage in this work. Those sent to the workshop from IEOS were Peace Corps volunteers whose role it would be to initiate handpump projects and eventually transfer the technology to their IEOS counterparts.

2.2 Initial Planning

Based on several phone calls and correspondence between WASH and AID/ Ecuador, a list of tasks leading up to the workshop was developed. The AID mission staff in Quito was responsible for such tasks as informing participants, identifying a training site and wells to be worked on, procuring tools and materials, and arranging transport. WASH's primary task was to prepare all necessary training materials and to provide the trainers for the workshop. In addition, it was agreed that WASH would provide a small budget for purchases of supplies and equipment that could not be covered by the AID project.

The AID mission identified Chimborazo province as a suitable site for the training program because of the presence of an on-going handpump program being run by the Asociacion Indigene Evangelica de Chimborazo (Evangelical Indigenous Association of Chimborazo Province, referred to below as Quechua Association) and because of the large number of available wells. The headquarters for the Quechua Association is located in the Colta region 20 kilometers outside of Riobamba, the provincial capital of Chimborazo. Quechua Association staff members were to provide assistance in locating well sites for the course as well as technical and construction support. Because there were not any accomodations in the Colta Region lodging was planned for participants in hotels in the city of Riobamba.

Because tools and materials are relatively easy to secure in Ecuador, mission personnel decided to wait for the arrival of the two WASH trainers, two weeks before the planned start of the workshop. This meant that the two WASH trainers, upon their arrival in Ecuador, took full charge of supervising the procuring of tools and materials, locating a training site, identifying communities to be visited and wells to be developed, and arranging for food and transportation for course participants.

2.3 Materials Preparation

The training materials used for this workshop were developed by two WASH consultants, Claudia Liebler and Alan Pashkevich, the latter serving as one of the two trainers in this program. The materials were developed to provide a generic model for handpump training and, as such, were based on the two consultants' experiences in many different countries. The training program described in this report provided a rigorous pilot testing of these training materials so that they could be modified as necessary for field conditions. The purpose of this materials development is so that other countries with similar training needs in the area of handpump installation and maintenance can benefit from a well-crafted training package.

2.4 Preparation in Riobamba

The training team arrived in Ecuador two weeks before the start of the workshop. After a productive briefing at the AID mission and a meeting with the Peace Corps Country Director, the consultants traveled to the handpump factory in Ambato and then to Riobamba to prepare for the course. Since few prior arrangements had been made, there was much to do in those two weeks. Two days were spent in the field looking for wells that could be worked on during the training program. Much time was spent in the second week of preparation and in the first week of the course making sure that the process of relining two hand dug wells would be completed in time for participants to work on them. A large portion of the workshop preparation time was also spent working with the IEOS office to ensure that the appropriate tools and materials were being secured and then transported to the Quechua Association in Colta. Other concerns such as locating a suitable meeting place and providing daily transportation and lunch were also addressed during this time.

Chapter 3

WORKSHOP

3.1 Workshop Goals

The overall workshop goals were for participants to:

1. Identify resources necessary for a village handpump project.
2. Conduct an assessment for project feasibility and determine next steps.
3. Identify and apply strategies for involving the community in all phases of the handpump projects.
4. Survey, evaluate, and select sites for handpumps including an assessment of the quantity and quality of water needed to warrant installing pumps.
5. Develop a project cost estimate.
6. Develop work plans and logistics necessary for project start-up.
7. Prepare selected sites for receiving handpumps.
8. Install locally available deep well pumps and disinfect the well.
9. Operate, maintain, troubleshoot, and repair handpump.
10. Design a user education strategy.
11. Develop skills for training village caretakers in appropriate maintenance and repair tasks.
12. Identify alternative strategies for solving most common non-techincal problems which develop before, during, and after handpump installation.
13. Monitor and evaluate the effectiveness of the handpump project.
14. Develop an awareness of national and regional handpump program resources.

The workshop goals represented a balance between the more technical aspects of handpump projects and the planning and educational skills needed to put the technical skills into practice. This balanced approach was particularly appropriate in this workshop as the participants would likely be involved in planning and getting communities interested in projects. Most, but not all, of the participants were also likely to become involved in the actual implementation of a handpump project. Thus, it was important to give participants a strong base in the technical skill areas while not neglecting the planning and community development and education component.

3.2 Participants

There were 16 participants in the workshop with the following breakdown:

- 5 Peace Corps Volunteers working as engineers for provincial offices of the Instituto Ecuatoriano de Obras Sanitarias (IEOS)
- 4 Peace Corps Volunteers working as promoters for provincial offices of IEOS
- 2 Peace Corps Volunteers assigned to provincial offices of the Ministry of Agriculture
- 5 members of the Voz de los Andes mission who were either health educators or health practicioners.

A list of the participants' names and locations is included as Appendix A.

The participants represented a diversity of experiences and education. Six of the Peace Corps Volunteers were engineers; two of the Voz de los Andes staff were nurses. All of the Voz de los Andes staff had experience and training in health education. One of the Voz de los Andes participants and one Peace Corps Volunteer had significant handpump installation and repair experience. Another participant had strong general construction skills. The design of the workshop captalized on these strengths as much as possible by having participants serve as resources to one another.

3.3 Training Staff

The staff consisted of two individuals, one an engineer knowledgeable in handpumps (technical trainer) and the other a trainer skilled in workshop design and delivery (trainer). The technical trainer had the advantage of having worked previously in Ecuador in providing technical assistance to a foundry manufacturing the AID handpump. He took lead responsibility for the apron construction and pump installation as well as the other technical sessions. The training specialist took a lead role in the community organization and education sessions as well as providing overall coordination for the workshop.

In addition to the core training staff, three water technicians from the Quechua Association assisted in the construction aspects and, as part of the Quechua Association's regular program, were responsible for follow-up user education and maintenance of the two handpump sites worked on during the course. As the installation of a handpump is, of necessity, only one step of an on-going community development project and requires follow-up maintenance and education, the presence of an institution like the Quechua Association was essential to the success of this kind of course. Before the course started and during the first week of the course, the technicians worked with the community to finish the lining of the wells. This made it possible for participants to begin their work with apron construction. At the end of the course, the technicians also worked with the community to do some finishing work on one

site and to pour the apron and install the pump on the second site. Without this kind of back-up support the demands of the construction and installation activities would have been overwhelming for the trainers and the participants.

3.4 Logistics

The training site was located on the compound of the Quechua Association in Colta. It was there that the construction materials, pumps, and tools were stored and many of the technical sessions were held. The two wells were located close to one another, one kilometer away from the training site at the Quechua Association, in an area called Leonpul. Since participants were staying in hotels in Riobamba, they were transported to Colta every morning, and used the vehicles driven by La Voz de los Andes participants to go back and forth from the well sites to the training site. Classroom facilities were available at the Quechua Association, but due to the cool weather and draftiness of the rooms, classroom meetings were held in the living room of a Voz de los Andes staff member who lived on the Quechua Association compound. Logistics were complicated by the need to coordinate the arrival and transporting of tools and materials, some of which were not obtained until after the course had started. Despite the availability of pickup trucks and drivers from the IEOS office in Riobamba, more than once the schedule was held back by the temporary unavailability of transportation.

The procurement and delivery of materials and tools was a major problem encountered in the workshop. Because there was no one located in Riobamba to supervise this process, both trainers were forced to do it and thus spend time that would otherwise have been productively devoted to the workshop itself. In similar workshops in the future, a full-time logistics or site coordinator should be hired prior to the workshop to take charge of procurement, transportation and other related tasks.

3.5 Schedule

The workshop schedule is presented in Figure 1. This schedule represents what actually occurred, and does not include several sessions that were not pilot tested in this workshop. Sessions were held all day, starting at 8:30 a.m., breaking for lunch, and all through the afternoon until 5:00 or 6:00 p.m.

3.6 Methodology

The training was experiential and participatory in nature. Participants were given opportunities to practice mechanical and construction skills since six pumps were available for practice sessions on barrels, and two actual well sites were worked on. Participants had the opportunity to construct the aprons, tops, and covers for both wells and to install a deep well pump at one of the sites at a depth of 26 meters. This well also served as a model for disinfection procedures. They also had several sessions on planning various aspects of handpump projects including community involvement, estimating resources, education activities, and technical issues. The emphasis throughout was on the practical aspects of handpump projects. Specific activities

WORKSHOP ON HANDPUMP INSTALLATION AND MAINTENANCE

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Oct. 17 DAY ONE	Oct. 18 DAY TWO	Oct. 19 DAY THREE	Oct. 20 DAY FOUR	Oct. 21 DAY FIVE	Oct. 22 DAY SIX
Introduction to the handpump workshop	Determining well recharge rate; Worksite orientation	Constructing the apron (cont.)	Preparing for conducting initial village assessment for project feasibility	Analyzing the project feasibility assessment results	Developing a construction work plan; mid-point workshop evaluation and review
Implementing water supply programs with handpumps	Constructing the apron	Constructing the apron (cont.)	Conducting the the assessment for project feasibility	Field visit: lining a hand-dug well Developing a project cost estimate	Constructing the the apron
Oct. 24 DAY EIGHT	Oct. 25 DAY NINE	Oct. 26 DAY TEN	Oct. 27 DAY ELEVEN		
Installing the handpump (practice)	Installing the handpump and disinfecting the well (field work)	Maintaining and repairing the pump	Developing and implementing user education strategies		
Disinfecting the well	(cont. as above)	Training the caretakers	Evaluating the handpump project Workshop evaluation		

included construction, installation and maintenance practice, trouble shooting, field visits, small group tasks, role-playing, and full group discussions and presentations.

Two aspects of the methodology deserve particular attention. First, several methods were used to teach course content. When practicing handpump installation and maintenance, each step was demonstrated and then performed by the small groups. On the actual well project work, however, demonstration was not used. Instead, the technical trainer gave a short explanation of the various steps involved, including drawings when necessary. Next, participants volunteered to take the responsibility for various tasks, with the criteria that they receive as much experience in as many different parts of the construction process as possible. During the construction and installation processes the technical trainer observed, asked questions, and made suggestions as necessary. After each field session, a short classroom review session was held to discuss participants' problems and to share newly acquired knowledge and experience. Before the participants went out in the field again to complete a given task, they were asked to identify what remained to be done and to plan with the trainer how it would be accomplished.

Second, the workshop emphasized the project approach throughout. Participants were not taught simply what was involved in installing a handpump, but how to carry through a community handpump project. All steps of the project cycle including initial assessments, community involvement, planning, implementation, maintenance, user education, and project evaluation were covered so that the participants would see their roles in the broadest sense and not only in a limited technical way.

Chapter 4

WORKSHOP ASSESSMENT

4.1 Trainer Assessment

4.1.1 Workshop Goals

The workshop goals detailed in Section 3.1 proved for the most part to address the participants' needs. One area not covered by the workshop was the relining or lining of the well, but, because of the importance given this area by participants, trainers compensated for its exclusion by devoting class discussion time to the topic and by visiting a well at several stages of the relining process. Given the shortness of the course and the breadth of the other training goals it was not possible to provide hands-on experience in well relining.

As mentioned earlier in Section 3.5 several of the originally planned sessions were not held. These sessions covered working with the village community, linking up to regional and national efforts, and planning a handpump project. Because these topics had already been treated in other sessions, it was felt that these areas had been covered sufficiently. One of the findings of the pilot was that there were a number of areas in which course sessions overlapped.

4.1.2 Schedule

Due to afternoon rains and occasional transportation problems, the schedule was shifted accordingly. The schedule given in Section 3.5 reflects the actual time spent on sessions and thus shows more time spent on construction and installation activities than originally planned.

Also affecting the order of various sessions or the sequence of steps within a session were availability of transportation and time spent travelling. With some rearrangement of sessions (well recharge, well disinfection) and individual session steps (installation, disinfecting, maintenance and repair) the time spent going between the classroom and the worksite was significantly reduced and the workshop flow improved.

4.1.3 Staff

The combination of a technical specialist and a training specialist was very effective. The technical trainer was responsible for the technical content and assuring that the aprons were being properly constructed and the handpump properly installed while the trainer made sure that each session was well delivered and integrated within the overall flow of the workshop. This constant attention to both content and process is essential in any workshop, and both trainers felt that the team approach worked well in this case. In addition, it was discovered that the trainer provided some assistance with technical questions while the technical trainer was also involved in issues regarding overall design and the conduct of the planning and community development aspects of the workshop.

4.1.4 Methodology

The participants responded well to a participatory training approach, particularly to the ways in which they became involved in identifying problems at the well sites and in working collaboratively to resolve them. The use of small group work was at times highly successful and at other times did not seem always to fit the learning task at hand. Modifications of the specific methods used in certain sessions will result from this pilot test. In general, however, the method of involving participants actively in their own learning worked well and was appreciated by the participants. The group problem-solving approach taken in some of the technical sessions seemed to work quite well in bringing out newly acquired knowledge and skills as they occurred, building on each others' expertise, and providing examples of how technically complex tasks such as handpump installation can be approached effectively. The successful installation of a deep well pump at 26 meters and the completion of two well-designed aprons attest partially to the appropriateness of the training methods used.

4.1.5 Support

Once the trainers had arrived in Ecuador, they received support in locating needed resources for the workshop. Materials, tools and work sites were all located with the help of the IEOS staff in Riobamba, the Quechua Association, and the Voz de los Andes staff. Engineer Milton Silva Mejia of IEOS remained continuously interested in our progress and ready to help with whatever problems we encountered. Although most materials were readily available, our dependence on others for transportation, ordering, and payment created an administrative problem. The amount of coordination and supervision needed to complete all the preparation tasks kept both trainers completely busy for the first two weeks. Even after the workshop had begun, time was taken away from the training by the continuing demands of supervising the procurement and transportation of tools and materials.

Problems were also encountered in making arrangements for lunch and getting some of the other administrative support chores done. Delays in the training resulted from not having these important elements organized and taken care of by someone other than the two trainers. As suggested previously, hiring a full-time site coordinator would alleviate these problems.

4.1.6 Participants

For the workshop to be judged a success, participants will have to become involved with community handpump projects so that they can apply and develop their skills. Unfortunately, at present, only a few of the participants felt that they had clearly defined opportunities to put in practice the skills learned at the workshop. These opportunties will be essential if they are to be able to pass along these skills to Ecuadorian counterparts. The lack of a clear sense of how they would be applying these new skills limited participants' ability to participate in all of the workshop events. Nevertheless, participants did participate actively and seriously in the workshop as a whole.

4.2 Participant Assessment

Participants were asked to evaluate the workshop on both written questionnaires and in oral discussion at the workshop mid-point and at the end of the workshop (see Appendix B). In general their evaluation comments were quite positive, as well as including numerous suggestions on how the course could be improved. Participants expressed confidence that they had learned what they had needed to learn to be able to go out and initiate or support a community handpump project. A summary of their most significant comments is provided below.

4.2.1 Hands-on Experience

For most participants the most significant part of the course was the hands-on experience they got in all stages (except lining) of a handpump project. For many this brought a new understanding of the nature and complexity of such a project that will aid them in determining how they can best support the efforts of community members and others in developing handpump projects. For others it was meaningful practice of work that they themselves will have to perform out in the field.

4.2.2 Well Siting and Lining

Despite the fact that a course description had been sent to all participants, almost all of them arrived at the workshop with the idea that the siting, digging and lining of wells would be among the topics covered. Those participants who expected to be most closely involved in handpump projects urged that those topics be given more complete treatment in future courses. Although these concerns are clearly important ones, full treatment of the topics of siting, digging, and lining would require the development of another complete training course.

4.2.3 Interchange of Ideas

Participants appreciated the open and informal aspect of the training program that allowed a free interchange of ideas with the trainers and with one another. Because the workshop was a pilot test and trainers were adhering closely to a given training design, some participants said that the structuring of certain sessions did not seem appropriate to their particular needs. Some built-in redundancy to the training design provoked the comment that we seemed to "overdiscuss" certain topics. This reaction occurred particularly when the topic under discussion was of a more abstract nature (e.g., what strategies would you use to ensure the commitment of a community to a handpump project? Or what kind of maintenance schedule would be optimal?). As few participants had a back-home context within which to place these more theoretical discussions, the discussions were not as fruitful as they might have been.

4.2.4 Technical Handouts

At the mid-point evaluation, participants noted that they would like more handouts explaining the construction techniques being used. This need was, at least in part, compensated for by the distribution of more handouts in the second week.

4.2.5 Pumps Other Than the AID Pump

A number of the participants find themselves in situations in which they will need to be familiar with the repair, and in some cases the installation, of pumps other than the AID model used in the workshop. They suggested that a small amount of training (i.e. a three to four day workshop) regarding other pumps would be useful. If indeed other pumps will be used, the trainers agreed with this suggestion. In addition, a suggestion was made that the issue of when a handpump project should be undertaken as opposed to another kind of water system (e.g., spring capping/gravity flow, or rainwater catchment) be addressed specifically in the workshop.

4.2.6 Training Program Setting

Many participants commented on the positive value of having held the training at a site where there is an on-going handpump program. Often during the training we were able to turn to the water technicians of the Quechua Association or to the Voz de los Andes staff member who had worked with the Quechua Association handpump projects to learn how they handled specific organizational and technical issues.

4.3 Major Revisions In The Trainer's Guide

The successful experience of the training program showed that the overall focus, goals, and structure of the program were appropriately conceived. The pilot reaffirmed the need for and value of teaching the technical, community, and project development topics in an integrated manner. Several areas for improvement did become apparent during the pilot and are detailed below.

4.3.1 Technical Sessions

The trainer's guide currently instructs the trainer to demonstrate each step in construction and installation for the participants before they take the step. Quickly it became clear that this was not the optimal teaching method, particularly when working out in the field. Instead, the method outlined in Section 3.6 was used and the manual should be revised to reflect this approach. This method uses little if any demonstration, but instead asks participants to work in teams to carry out tasks and solve problems as they arise, with appropriate supervision from the trainers.

4.3.2 Well Lining

The session on well relining in the trainer's guide needs to be modified to provide information on well digging and well lining techniques. No hands-on work is recommended because it would take too much time and is outside the scope of the current trainer's guide.

4.3.3 Session Structure and Order of Sessions

The experience of the pilot program suggested ways some individual sessions could be revised to improve the ease of delivery as well as session effectiveness. In addition, it was noted that certain sessions might be more productively moved into the first week and others moved back in time. For example, some of the mechanical work with handpumps should begin earlier to give participants more familiarity with the pump before they install it. It also appeared that for hand-dug wells more time would be needed than was planned for apron construction.

4.3.4 Consolidation of Community Development and Education Sessions

Certain areas of overlap of community development and education sessions were discovered. Suggested revisions include consolidating certain pieces into one session and making clearer how each session builds on a previous session.

4.4 Recommendations for Follow-up to The Workshop

The major issue in workshop follow-up will be to identify ways in which participants are able to use the skills they have learned. At the end of the workshop few were able to project or plan for how they would work with handpump projects because of the lack of a clearly defined handpump project in which they would operate.

For participants who do become directly involved in the construction phases of handpump projects, further training in the area of well lining or relining may become important.

In addition, it was felt by training staff and participants that the process of mutual support and resource sharing was important. Since participants are scattered throughout Ecuador, periodic regional meetings would provide a good forum for participants to exchange information about experiences and help each other solve technical and non-technical problems.

Finally, to meet AID/Ecuador's goal of transferring these skills to Ecuadorians through the work of the eleven Peace Corps participants, some further support may be required. This follow-up support will need to be defined as the program develops.

APPENDIX A

List of Participants

Peace Corps Volunteers:

Mickey McGowan	Promoter	IEOS Ibarra, Imbabura
Jose Pena		Ministry of Agriculture Portoviejo, Manabi
Tom Pearson	Promoter	IEOS Tena, Napo
Joe Narkevic	Engineer	IOES Cuenca
Hugo Gillis	Engineer	IOES Latacunga
Shaun McGuckin	Promoter	IEOS Puyo
Jeff Dunlap	Engineer	IEOS Ambato
Rick McDonald	Engineer	IEOS Ambato
Jim Huddleston		Ministry of Agriculture Ibarra, Imbabura
John Kenyan	Promoter	IEOS Riobamba, Chimborazo
Rita Nothaft	Engineer	IEOS Riobamba, Chimborazo

Voz de los Andes Community Development Workers:

Glenn Lafitte	Latacunga
Jon Sevall	Quito
Miriam Gebb	Shell
Mary Neidlinger	Yaupi
Martha Craymer	Guaranda, Bolivar

APPENDIX B

Handout

Mid-Point Evaluation

1. Do you feel capable of accomplishing all of the session objectives covered so far? If not, which ones present the most problems (specify session and objectives).

2. What are the things you have learned from the first half of the workshop that you did not know before? Place a checkmark next to those which are most useful to you in your work.

3. In general, what are the problems you encountered during the first half of the workshop? What do you think should be done to resolve them?

(Handout)

Evaluation Form Handpump Workshop

(Please do not sign your name)

A. Goal Attainment: Please circle the appropriate number to indicate the degree to which the workshop goals have been achieved.

1. Identify resources necessary for a village handpump project.

1	2	3	4	5
Low				High

2. Conduct an assessment for project feasibility and determine next steps.

1	2	3	4	5
Low				High

3. Identify and apply strategies for involving the community in all phases of the handpump project.

1	2	3	4	5
Low				High

4. Survey, evaluate, and select sites for handpumps including an assessment of the quantity and quality of water needed to warrant installation.

1	2	3	4	5
Low				High

5. Facilitate the formation and functioning of a water committee or other appropriate village body.

1	2	3	4	5
Low				High

6. Develop a project cost estimate.

1	2	3	4	5
Low				High

7. Develop and implement with appropriate village body work plans and logistics necessary for project start-up.

1	2	3	4	5
Low				High

8. Coordinate and monitor construction activities and the procurement and delivery of materials.

1	2	3	4	5
Low				High

9. Prepare selected sites for receiving handpumps.

1	2	3	4	5
Low				High

10. Install locally available shallow or deep well pump.

1	2	3	4	5
Low				High

11. Operate, maintain, trouble shoot and repair handpump.

1	2	3	4	5
Low				High

12. Design a user education strategy.

1	2	3	4	5
Low				High

13. Train village caretakers in appropriate maintenance and repair tasks.

1	2	3	4	5
Low				High

14. Identify alternative strategies for solving most common non-technical problems which develop before, during and after handpump installation.

1	2	3	4	5
Low				High

15. Monitor and evaluate the effectiveness of the handpump project.

1	2	3	4	5
Low				High

16. Develop and awareness of national and regional handpump program resources.

1	2	3	4	5
Low				High

B. Workshop Feedback and Learning: Please answer the following questions as fully as possible so that the trainers can learn how effective the workshop methodology was.

1. What have been the most positive things about this workshop? Comments:

2. What have been the most negative things about this workshop? Comments:

3. What one things stands out as important to you in this workshop? Comments:

4. What things have you learned that you did not know before? Comments:

C. Workshop Organization and Training

1. What comments do you have about the way the workshop was planned and organized?

2. What can be done in the future to improve a workshop like this?

3. What specific steps in developing a handpump project do you feel you will need to learn more about in order to successfully promote and develop a project in the future?

4. What comments do you have about the trainers?