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WATER AND SANITATION
FOR HEALTH PROJECT

TRAINING WORKSHOP IN OPERATIONS AND MAINTENANCE FOR RURAL POTABLE WATER SYSTEMS IN BOLIVIA

Operated by
CDM and Associates

Sponsored by the U.S. Agency
for International Development

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WASH FIELD REPORT NO. 194

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Prepared for
the USAID Mission to Bolivia
WASH Activity No. 228

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FOR RURAL POTABLE WATER SYSTEMS IN BOLIVIA**

Prepared for the USAID Mission to Bolivia
under WASH Activity No. 228

by

Daniel B. Edwards

August 1986

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EXECUTIVE SUMMARY

At the request of USAID/Bolivia, a three week operations and maintenance (O&M) workshop for rural potable water systems was conducted for the Department of Environmental Sanitation (DSA) of the Ministry of Health from May 26 to June 13, 1986. This workshop was the first installment in a four-part activity for the Water and Sanitation for Health (WASH) Project. The participants consisted of 21 rural sanitation technicians who supervise the promotion and construction of village-level systems. The instructors consisted of two WASH consultants, one USAID advisor, and two DSA engineers responsible for O&M.

The training methodology was designed to provide practical skills training with a balance of technical, administrative, and community involvement subject areas. The workshop goals addressed a general orientation to O&M, with particular attention paid to making a pilot O&M system for DSA operational.

The outcomes of the workshop resulted in increased skills in defining O&M problems and setting up O&M procedures in community systems. Additional benefits included a heightened awareness of the importance and value of maintaining systems and the launching of a new pilot program in O&M systems in two departments of DSA in Bolivia. All participants and DSA officials were enthusiastic about the course. Evaluation ratings on a 1-to-5 point scale indicate that the participants felt that all course goals were achieved in a highly satisfactory manner (all goals were rated well above 4).

It is recommended that USAID/Bolivia continue to support the development of O&M systems for DSA and provide the support necessary to ensure that the progress made at this workshop is reinforced with the commodities for the pilot O&M program and detailed work planning for O&M in the pilot areas. Within the next several months, USAID/Bolivia should strongly consider the feasibility of a follow-on O&M and institutional strengthening project to sustain the investment made in constructed systems. The current project could be strengthened considerably by offering team building and management and supervisory training for all DSA managerial staff.

This workshop has provided a sound foundation for O&M; the key to its long-range success, however, will be the follow-up provided.

Chapter 1

INTRODUCTION

1.1 Scope of Work

A request was made by USAID/Bolivia to the Water and Sanitation for Health (WASH) Project to assist the Rural Sanitation Department (Departamento de Sanamiento Ambiental-DSA) in the Ministry of Public Health in providing training in operations and maintenance (O&M) to 25 technicians who serve in supervisory and promotional capacities for rural village drinking water systems. Authorized by AID's Office of Health, Bureau for Science and Technology, the WASH Project will undertake this assistance by way of a four-part activity. The specific activity described in this report is for the first part of this assistance, which is a workshop providing a general introduction to O&M systems.

The second activity is a workshop in pump maintenance for the same participants. This workshop will focus on the maintenance of a variety of pumps. The third activity will be to develop a course for training community operators in basic operations and maintenance of a water supply system and to conduct a training-of-trainers' workshop for 10 to 12 of the DSA technicians to deliver the community operator course. The final WASH activity is to supervise the pilot testing of the community operator course for 25 participants. After the pilot, the DSA technicians will train 125 community operators and continue to implement the O&M system established in DSA in conjunction with these activities.

1.2 Overview of Major Activities

The development and delivery of the general O&M workshop was divided into two general phases. A needs assessment and preliminary course design phase was conducted from February 25 to March 14, 1986. These activities have been described in an interim report prepared for the USAID/Bolivia Mission on March 12, 1986. At the end of this first activity, a working course design was agreed upon after conducting interviews and meetings with DSA officials and prospective course participants. A work plan for completing the detailed design of the course and making all logistical arrangements was developed at this time. It was determined during this preparation that the training team would produce an instructor's manual while conducting the O&M workshop so that the DSA could replicate the general O&M course, as needed, after the WASH consultants had developed it. This manual (in Spanish) is available from the WASH library.

The second general phase consisted of one week of final design, course preparation, and practice training for the training team. This phase was followed by three weeks of course implementation. During the week of final preparation, the WASH consultants conducted an intensive training of instructors and team preparation process which served to bring all elements of the course delivery together and prepare the five-person instructional team for consistency in training methodology. The agreements (how to develop the instructor's manual, how to increase instructor training skills, and so forth) made during this

team planning process were monitored throughout implementation of the workshop.

1.3 Training Staff

A team of five instructors conducted the training. The national coordinator of the course was Ing. Raul Bascon (USAID advisor), who also conducted sessions in information systems, logistical components, financial resources, and levels of O&M. The technical content coordinator was Ing. Oscar Larrea (WASH consultant), who led sessions in basic concepts of operations and maintenance, evaluation and follow-up, and co-instructed all other technical sessions. The team leader and coordinator of instructional methodology was Daniel Edwards (WASH consultant), who conducted sessions in staff selection, supervision of operators, training of operators and technology transfer, role and responsibilities of technicians, and planning for follow-up after the course. Two instructors from DSA participated full time: Ing. Jorge Henrich, National Director of Operations and Maintenance and Ing. Javier Pino, Regional Director of Operations and Maintenance. They conducted sessions using local case studies and were responsible for the following content areas: characteristics of sound operations and maintenance; preventive, corrective, and emergency O&M; relation of design to O&M; transition from construction to O&M; and tariffs. A guest instructor, Lic. Fernando Dias Romero (USAID advisor), conducted sessions in community participation, water use and user education, and the formation of water user associations.

1.4 Participants

The participants consisted of 21 technicians (paraprofessionals in rural water supply) who will implement the O&M system now under development by DSA. A pilot program for the O&M system is planned for the regions of Cochabamba and Chuquisaca. Consequently, nine technicians were selected from the Cochabamba Region and six from the Chuquisaca Region. Three technicians were selected from CARE and one each from the regions of La Paz, Oruru, and Potosi. The participants were secondary school graduates with further training in rural water supply and sanitation. Their job is to promote, manage, and supervise the construction of village water supply systems. In addition, they are responsible for setting up water user associations. Following the course, the technicians will also be responsible for operations and maintenance of the systems. None had any prior training in operations and maintenance.

Chapter 2

COURSE DESIGN

2.1 Methodology

The workshop followed a consistent and carefully monitored training methodology, which was designed to provide a maximum of participant involvement in practical exercises and tasks (with field work and in-class work integrated) and a minimum of theory and lecture. Most sessions consisted of the following elements:

- Presentation of theme (interactive presentation and or discussion)
- Group exercise (individual or small group task)
- Full group discussion and generalizations
- Application (field task)
- Field tasks debriefing and conclusions.

The training sessions were predesigned in written form with all lecture material, flipcharts, exercises, questions to the group, and participant handouts prepared in advance. After each session was implemented, the training design was corrected and or improved and produced in final form for inclusion in the future instructor's manual. The sessions were conducted using the facilities of a vocational technical school in Cochabamba (Instituto de Fomo).

2.2 Goals

The course was designed to establish a balance between technical skills and administrative and management skills and working with and supervising community water boards and system operators. The workshop goals were as follows:

Module I General Introduction to O&M

To familiarize the participants with the general concepts, tasks, and interrelationships among operations, preventive maintenance, corrective maintenance, and emergency maintenance.

To describe and analyze the proposed national O&M system in its central, regional, and local levels.

Module II Components of O&M

To describe the characteristics and the specific components of successful operations and successful preventive, corrective, and emergency maintenance systems.

- Module III Administration
- To describe basic concepts of the administrative systems which support successful O&M systems: financial resources, staff selection, staff supervision, and information-reporting systems.
- To become familiar with the logistical support requirements and procedures involved in transportation, spare parts, and materials and stores and supplies.
- Module IV Human Resources
- To define and clarify the roles of all DSA personnel who will play a part in implementing the O&M system: community operators and boards, technicians, and regional and national staff.
- To define interrelationships and interactions between the O&M division and other divisions of DSA.
- Module V The Relationship of O&M to Design and Construction Activities
- To define the relationship of O&M to design and construction. To describe the transition process from stage to stage and the responsibilities of the O&M Division in receiving completed works.
- Module VI Training
- To learn training concepts related to skills transfer for community boards and operators and to be able to use practical training methods, such as demonstration and coaching.
- Module VII Community Responsibilities
- To learn skills and concepts for communicating those responsibilities which lie with the community in operating and maintaining local schemes: local operations, tariffs, water use, and how to develop board associations.
- Module VIII Evaluation, Supervision, and Follow-up
- To familiarize participants with the techniques of technical supervision and O&M management.

2.3 Workshop Content and Schedule

The workshop was designed to be the first step in implementing an O&M system for DSA Bolivia. In part, the workshop curriculum provided an opportunity for the participants to have input into the design of the new system as well as to learn all of its components. The general sequence of learning activities was structured to build a foundation of general knowledge and skills, followed by increasingly technical objectives in understanding how to operate and maintain systems with and through community operators. The focus of the last part of the course was on application: planning how to start up and implement the new O&M system.

The workshop was structured into major learning segments (called modules). Each module contained from two to seven sessions. Each session contained specific training objectives that related to the goals of the module. The training schedule contained the following general sequence of activities:

- Day 1
 - Workshop opening: goals, expectations, introductions
 - Introduction to concepts of O&M & national levels of O&M
- Day 2
 - Characteristics of sound operations
 - Characteristics of effective preventive maintenance
 - Characteristics of effective corrective maintenance
- Day 3
 - Emergency maintenance
 - Field application exercise for days 1 through 3
- Day 4
 - Financial resources
 - Selection and hiring of O&M staff
 - Supervision and performance monitoring
- Day 5
 - Information systems
- Day 6
 - Components of logistical support
- Day 7
 - Roles and functions in O&M
- Day 8
 - Decisions in design and construction in relation to O&M
 - Field work application of days 4 through 8
- Day 9
 - Transition from construction to O&M
 - Introduction to training operators
- Day 10
 - Training application
- Day 11
 - Participation and responsibilities of the community
 - Tariffs and the community
- Day 12
 - Water use and user education
 - Water board associations
- Day 13
 - Technical supervision and follow-up

- Day 14
 - Disinfection of systems
 - Tariffs in more detail
 - Training design in more detail

- Day 15
 - Work planning for the national O&M system
 - Work planning for regional O&M systems
 - Individual application planning
 - Workshop evaluation

- Day 16
 - Closing ceremony and graduation/banquet.

Chapter 2

OUTCOMES

3.1 Qualitative Outcomes

It was the observation of the WASH consultants that prior to this workshop the primary focus of the USAID project and the work of DSA, particularly the technical promotional staff, was on the construction of community water systems. Support, planning, and enthusiasm for operating and maintaining systems was almost nonexistent. One major contribution of the activities leading up to and during the workshop was the generation of enthusiasm and attention throughout DSA on the importance of O&M.

During the needs assessment phase for the workshop, the WASH consultants conducted a one-day meeting in La Paz, which brought together USAID and top DSA staff to define the goals and structure of the O&M system. This meeting helped to develop a consensus on what O&M is and should be within DSA. During implementation of the O&M workshop, one day was devoted to a team-building activity between the technicians and top and regional DSA staff. The primary outcome of that day was to specifically define and gain agreement on the functions and responsibilities of the technicians and regional and national divisions of O&M in operating and maintaining systems. Participants exchanged expectations and reached agreement regarding the functions of other divisions in DSA (promotion, design, and construction) in relation to the O&M function.

As the workshop progressed, it became apparent that the technicians gained increasing respect for and dedication to O&M. It was clear to the instructors that the participants were learning how to set up and manage O&M systems; skills were increasing in such areas as how to diagnose O&M deficiencies (as demonstrated by field work), how to develop a plan for corrective maintenance (rehabilitation of existing systems), and how to determine a local water board's administrative deficiencies and take corrective action.

3.2 O&M Systems Development

Prior to the workshop, a preliminary plan for developing a pilot O&M system for DSA in two regions had been drafted by the USAID project advisor. It had neither a large measure of acceptance nor a great deal of input from DSA regional and national leadership or field staff. During the workshop, input was solicited from the field staff for the plan, and the national and regional directors of O&M began to rework and modify the draft plan. By the end of the workshop, the national and regional O&M staff were actively developing detailed implementation plans, together with the field staff, for the start-up and first year of the O&M system. This planning was presented to the national director of DSA and USAID the week following the workshop. The workshop served as a vehicle to gain consensus on directions and launch the pilot program for the development of an O&M system.

3.3 Evaluation Results

During the final day of instruction, an evaluation questionnaire was administered to all participants (refer to Appendix C for detailed responses). Participants were asked to rate goal achievement for each session using a 1-to-5 ranking scheme (1= goal not achieved, 5= goal achieved extremely well). All sessions were ranked, on average, well above 4. The lowest session was ranked 4.38 (promotion of community systems) and the highest were ranked 4.95 (introduction to O&M) and 4.90 (characteristics of good maintenance and corrective maintenance). By most standards of end-of-course evaluation, this workshop was ranked extremely high by the participants. Table 1 provides the participant ratings for all the course objectives.

In the section of the evaluation which asked open-ended questions, participants responded as follows:

- A strength of the course was its highly practical and applied approach and method.
- The most effective methods were field tasks and interactive methods, such as discussion and role play.
- The most outstanding sessions were how to define O&M deficiencies and how to train.
- The most important thing that participants learned was the importance and necessity of O&M.
- The one thing the course could have done to improve was to arrange for better lunches.
- The written materials and handouts were considered to be very useful and helpful.
- In order to carry out O&M, the participants felt they needed a course on pumps (scheduled following this course) and more field practice and follow-up on the job.

Table 1
Evaluation Results

<u>Objective</u>	<u>Score</u>
<u>General introduction to O&M</u>	
Familiarize participants with basic concepts of operation	4.86
Familiarize participants with basic concepts of maintenance	4.95
Describe maintenance and analyze proposed national O&M system at all levels	4.60
<u>Components of O&M</u>	
Describe characteristics of successful operation of a system	4.86
Describe characteristics of successful preventive maintenance	4.90
Utilize criteria for a corrective maintenance program	4.90
Describe characteristics of emergency maintenance	4.86
<u>Administration</u>	
Become familiar with financing of community-level O&M	4.60
Learn importance of selecting O&M staff	4.80
Learn to supervise water user associations and community operators	4.86
Become familiar with basic information-reporting systems	4.57
Become familiar with the logistic requirements of an O&M system	4.40
<u>Human Resources</u>	
Define roles of DSA personnel in implementing an O&M system	4.60
Define relationships between the O&M division and other divisions of DSA	4.40
<u>Relationship of O&M to Design and Construction</u>	
Define relationship of O&M to design and construction	4.52
Describe transition process from completed work to O&M	4.70
<u>Training</u>	
Learn concepts and skills of training	4.76
<u>Community Responsibilities</u>	
Learn skills of motivating communities for O&M	4.38
Develop skills in administration and calculation of user fees	4.40
Train in water use	4.66
Familiarize participants with the responsibilities of water user association	4.40
<u>Evaluation, Supervision, and Follow-up</u>	
Become familiar with the techniques of supervision and O&M management	4.60

Note: 1-5 scale with 1 being the lowest and 5 the highest.

Chapter 4

RECOMMENDATIONS

4.1 Recommendations for Course Follow-up

The following recommendations are made to ensure that the positive effects and momentum begun in this workshop are not lost:

- The draft work plans developed at the workshop to implement the O&M system and apply skills learned in the course will need to be reviewed after the first three months and developed into detailed planning charts and monitored by the regional supervisors of O&M. These should be reviewed and monitored at the national level as well.
- USAID/Bolivia should ensure that the commodities that are projected to support the O&M pilot project are secured and delivered in a timely manner. The expectations of the technicians are high at this point and they could easily be discouraged by seeing no supportive action for several months.
- After nine months, USAID Bolivia should seriously evaluate and determine whether a follow-on project for long-term O&M is feasible and desirable within DSA. It is clear that a pilot effort will not go far in protecting the considerable investment made in constructing systems over the past several years.
- The skills and knowledge established in this workshop are only a beginning. If the O&M effort is not properly supported and if skills are not reinforced and followed up, they could be lost over time. USAID/Bolivia and DSA should conduct a refresher course within a year to keep the momentum going and reinforce skills.

The following recommendation is made to improve overall project implementation:

- It was observed by the WASH consultants that the administrative structure of DSA has been under considerable change in months prior to this workshop. Supervisors have changed, new systems are being set up, and new faces were on the scene. The WASH consultants feel that there is a strong need for team building and management or supervisory training within DSA.

Team building should be carried not as a one-time intervention but over a six-month to one-year period, with organization development consulting skills brought to bear on such areas as conflict management, role and responsibility clarification, agreement on forward goals, increasing communications, and consensus development.

Management supervisory training should be provided for all national and regional managerial staff to establish management norms and skills for motivating and holding staff accountable for results. It is believed that this will greatly enhance the setting up and sustaining of O&M systems and will provide a needed element of institutional development not currently addressed under the USAID project.

4.2 Conclusion

The first installment in the series of activities provided by WASH to USAID/Bolivia and DSA has provided a necessary introduction to addressing an important area of need. The workshop was successful, and the participants and instructors have reason to feel proud of the efforts they have put forth in making it a success. DSA provided excellent support as did the USAID/Bolivia Mission. The positive results will, however, only be sustained by careful follow-through and a long-term, sustained effort to establish an operations and maintenance system for rural community water systems that is self-sufficient and economically viable.

APPENDIX A
Detailed Scope of Work

SCOPE OF WORK

Bolivia: Operations and Maintenance

General O&M Course

Background

USAID/Bolivia has requested WASH to assist the Rural Sanitation Department in the Ministry of Public Health in providing training in operations and maintenance to 25 supervisors and 150 community operators. The supervisors have a high school level of education and the community operators have approximately 6-8 years of school.

The supervisors will participate in two three-week courses. The first will be on general operations and maintenance and include such topics as record keeping, maintenance management, supervision, and preventive maintenance. The second will focus on maintenance of a variety of pumps including centrifugal, turbine, jet, diesel, and hand pumps. Following the supervisor courses, those supervisors who will conduct the community operator courses will go through a training of trainers workshop.

The community operators course will be three weeks long and cover such topics as the components of a rural water supply system, water use, disinfection, maintenance of gravity systems and pumps, operation of pumping and distribution systems, basic masonry, and latrine construction, WASH will assist in developing this course and piloting it with 25 community operators. Subsequently, the supervisors will train the other 125 community operators, using the same course materials.

A tentative timetable for the training activities is as follows:

26 February - 12 March	Needs assessment and design for general O&M course for supervisors.
19 May - 7 June	Delivery of general O&M course
14 - 26 April	Needs assessment and design of pump maintenance course for supervisors
23 June - 12 July	Delivery of pump maintenance course
6 - 25 October (tentative)	Needs assessment and design of community operators course
10 - 21 November (tentative)	Training of trainers workshop for supervisors
January (tentative)	Pilot of community operator course

Responsibilities (General O&M Course only)

1. Carry out a needs assessment to determine the needs for the general O&M course.
2. Design with DSA staff a two to three-week course on general O&M for the supervisors
3. Develop, in conjunction with DSA staff, a work plan which details all tasks that must be done in preparation for the workshop.
4. Prepare any necessary workshop materials.
5. Conduct the workshop.
6. Evaluate the results of the workshop and write a final report, including the workshop design which may eventually serve as the basis for a WASH training guide.
7. Participate in a debriefing as requested by WASH.

Timing

26 February - 12 March, 1986	Needs assessment and course design
19 May - 7 June, 1986	Workshop delivery

Personnel

Two consultants are needed, both with fluent Spanish and experience in Latin America. One should be a training specialist skilled in course design and delivery. The other should be an engineer experienced in operations and maintenance of rural water supply and sanitation systems, preferably with some familiarity with Bolivia.

APPENDIX B
Participant List

PRIMER CURSO - TALLER

OPERACION Y MANTENIMIENTO

PARTICIPANTES

1.- LA PAZ

Roberto Lucio Luna E.

2.- ORURO

Juvenal Maidana

3.- POTOSI

Humberto Zambrana

4.- CHUQUISACA

Nestor Pérez
Raúl Moore
Jaime Reyes
Edgar Flores V.
Fernando Cuellar
Napoleón Flores

5.- COCHABAMBA

Freddy Gamboa
Guido Ramallo
José Díaz
Simon Nogales
Jesús Siles
Freddy Mendez
Avelino Salinas
Efrain Molina
José Olguín

6.- CARE

Jaime Vasquez (POTOSI)
Hugo Juanez (ORURO)
Vicente Díaz (TARIJA)

7.- INSTRUCTORES

Lic. Daniel Edwards (WASH)
Ing. Oscar Larrea (WASH)
Ing. Raúl Bascón (AID/DSA)
Ing. Jorge Henrich (DSA)
Ing. Javier Pino (DSA)
Ing. Fernando Díaz Romero (AID/DSA)

APPENDIX C

Evaluation Form and Results

EVALUACION

CURSOS DE OPERACIONES Y MANTENIMIENTO

AGUA POTABLE RURAL

I. Evaluación de metas del curso: Indique el grado de alcance de las metas detallado abajo. Ponga un círculo en el número indicado: 1 = Meta no alcanzada, 3 = Regular, 5 = Muy bien.

A. Introducción Global

1.- Conceptos sobre Operación: Familiarizar a los participantes con las acciones que se deben realizar para que los sistemas rurales entregue agua de acuerdo a los diseños en Cantidad y Calidad adecuados.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.86

2.- Conceptos sobre Mantenimiento: Familiarizar a los participantes, con las acciones de mantenimiento que se deben realizar para que los sistemas funcionen de acuerdo a su diseño.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.95

3.- Niveles de Operación y Mantenimiento: Capacitar a Participantes en el manejo gerencial eficiente de las actividades a los niveles de O y M: Nacional, Regional y Distrital.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.60

B. Componentes y Características de O y M

1.- Características de una Buena Operación:

Conocer los requisitos que se debe tener en cuenta para conseguir el buen funcionamiento de un sistema de agua rural.

No alcanzado			Regular		Muy bien	
1	2	3	4	5	4.86	

2.- Características de un Buen Mantenimiento: Capacitar

A los participantes en la serie de acciones que se debe cumplir para realizar un buen mantenimiento - preventivo.

No alcanzado			Regular		Muy bien	
1	2	3	4	5	4.90	

3.- Mantenimiento Correctivo:

Aprender a utilizar una serie de criterios que garanticen un buen mantenimiento correctivo.

No alcanzado			Regular		Muy bien	
1	2	3	4	5	4.90	

4. Mantenimiento de Emergencia

Capacitar a los participantes en las acciones a cumplir para realizar un buen mantenimiento de emergencia.

No alcanzado			Regular		Muy bien	
1	2	3	4	5	4.86	

C. Administración

1.- Recursos Financieros

Familiarizarse con los aspectos relacionados con el financiamiento para O y M de los sistemas de agua en el medio rural.

No alcanzado			Regular		Muy bien	
1	2	3	4	5	4.60	

X 2.- Selección y Asignación de personal

Aprender criterios y conocer la importancia de la selección y asignación de personal de operación y mantenimiento para sistemas de agua potable rural.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.80

X 3.- Supervisión y Acciones Correctivas

Aprender las responsabilidades y destrezas correspondientes a la supervisión a la Junta Administrativa y el operador del sistema de agua potable.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.26

4.- Sistemas de Información:

Familiarizarse con la información básica para una red de información que se debe tener de los sistemas de agua rural para hacer O y M.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.57

5.- Componentes de Apoyo Logístico, Transporte, Materiales y Repuestos; talleres y Almacenes :

Familiarizarse con los componentes de apoyo logístico para coadyuvar O y M, como ser:

Las características de un sistema de transporte de O y M.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.40

D. Recursos Humanos

1.- Papeles y Funciones en Operación y Mantenimiento:

y Aclarar los papeles de todos los actores con funciones en operaciones y mantenimiento.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.60

x 2.- Papeles y Expectativas entre la División de O y M y Otras Divisiones:

Aclarar expectativas y papeles entre la división de O y M con respecto a las divisiones de diseño, promoción y construcción.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.40

E. Relaciones entre Diseño, Construcción y Operación y Mantenimiento:

1.- Efectos de Diseño y Construcción en Relación con O y M:

Capacitar a los participantes en la interpretación correcta de los planos de construcción para que los sistemas de agua rural construídos estén en acuerdo al diseño.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.52

2.- Transición de Construcciones a O y M:

Los participantes aprenderán a interpretar toda la documentación que construcción debe entregar a O y M.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.70

F. Capacitación de Personal y Tranferencia de Tecnología

x 1.- Introducción a Conceptos de Capacitación

- x Aprender conceptos y destrezas básicas de entrenamiento aplicable a la capacitación a personal de Operaciones y Mantenimiento.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	476

G. Participación y Responsabilidades de la Comunidad:

1.- Promoción y Funciones de la Comunidad:

Capacitar a los participantes sobre aspectos de motivación, promoción, concientización de la comunidad para una eficiente operación y mantenimiento del sistema de agua rural.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.38

2.- Tarifas y la Comunidad:

Capacitar a los participantes en el manejo y cálculo de tarifas de acuerdo al nivel socio-económico de la comunidad.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.40

3.- Uso del Agua y Educación del Usuario:

Capacitar a los participantes sobre el uso adecuado del agua que se debe efectuar en la comunidad y la educación respectiva.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.66

4.- Asociación de Juntas:

Familiarizar a los participantes sobre el funcionamiento y responsabilidades de las asociaciones de Juntas Administradoras de Sistema de Agua Rural.

No alcanzado		Regular		Muy bien	
1	2	3	4	5	4.40

H. Evaluación Supervisión y Seguimiento

1.- Supervisión y Seguimiento:

Familiarizar a los participantes con las técnicas de supervisión y gerenciamiento de los procesos de operación y mantenimiento de los sistemas de agua potable rural.

No alcanzado

1

2

Regular

3

4

Muy bien

5

4.60

II - Evaluación de la Metodología del Curso

A. Favor de escribir sus observaciones sobre la efectividad de la metodología del curso para los siguientes puntos:

1. Cuan práctico y aplicable fue el adiestramiento?

Observaciones: very applicable

practical nature of course was a strength

2. Cuales fueron los métodos más efectivos del curso (ejemplos: visitas al campo, estudios de caso, dramatizaciones, exposición de tema, charlas interactivas, etc.)?

Observaciones:

1. field trips

2. role plays

3. interactive discussions

4. lectures

3. Entre todas las sesiones. Cuales fueron sobresalientes en el adiestramiento y cuales fueron menos efectivas?

Observaciones:

Outstanding: Introduction to O&M systems;
How to determine O&M problems,
training

Least effective: Community promotion

4. Favor de indicar la más importante que se ha aprendido en este curso:

Observaciones:

The importance of O&M

5. Que deberíamos hacer para mejorar el curso la próxima vez que se lo dé?

Observaciones:

Provide better lunches

6. Favor de presentar sus observaciones sobre los entrenadores:

A. Ing. Pino:

B. Ing. Henrich:

C. Ing. Bascón:

D. Ing. Larrea:

E. Lic. Edwards

F. Lic. Díaz Romero

7. Cuan útiles fueron los materiales didácticos, - utilizados (boletines, folletos, etc.)?

Observaciones:

All materials and hand-outs were very useful.

8. Para llevar el trabajo de Operaciones y Mantenimiento bien en el futuro. Cuales informaciones y destrezas de faltaría a usted ahora?

Observaciones:

- learn more about pumps
- more field experience and follow-up