

WATER AND SANITATION  
FOR HEALTH PROJECT



COORDINATION AND  
INFORMATION CENTER

Operated by The CDM  
Associates  
Sponsored by the U. S. Agency  
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# WASH PROJECT

## TWO-AND-A-HALF-YEAR CONTRACT SUMMARY

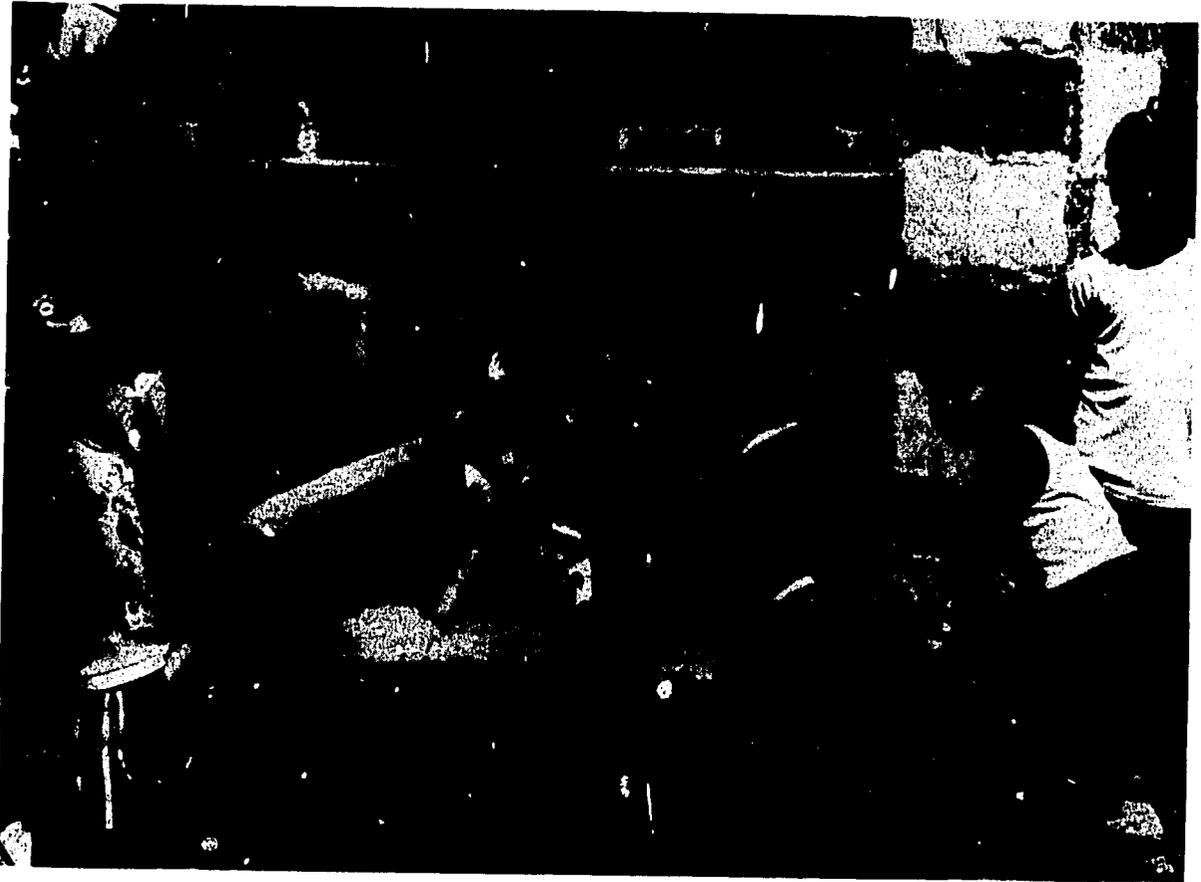
### WASH PROGRESS REPORT NO. 5

MARCH 31, 1983

The WASH Project is managed by Camp Dresser & McKee Incorporated. Principal Cooperating Institutions and Subcontractors are: International Science and Technology Institute, Research Triangle Institute, University of North Carolina at Chapel Hill, Georgia Institute of Technology, Engineering Experiment Station.

PRE-CDM CONTRACT ACTIVITIES  
SUMMARY OF ASSIGNED TASKS  
November 1, 1979 - March 31, 1983

CDM CONTRACT ACTIVITIES  
SUMMARY OF ORDERS OF TECHNICAL DIRECTION  
August 29, 1980 - March 31, 1983



*A handpump is the device by which about 25 percent of the world's population obtains adequate quantities of safe drinking water near their home. This simple fact is a key element in improving and maintaining the user's health.*

*A handpump that works can be the focal point for a community's health and economic development. One that does not work is a drain on the economic resources of the community.*

*(This is the AID handpump as manufactured and used in the Phillipines. Photo by Alan Pashkevich, Georgia Institute of Technology for OTD No. 40.)*

# **WASH PROJECT: TWO-AND-A-HALF-YEAR CONTRACT SUMMARY**

**WASH Project Report No. 5, March 31, 1983**

**Pre-CDM Contract Activities  
Summary of Assigned Tasks  
November 1, 1979 - March 31, 1983**

**CDM Contract Activities  
Summary of Orders of Technical Direction  
August 29, 1980 - March 31, 1983**

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Water and Sanitation for Health Project  
Contract No. AID/DSPE-C-0080, Project No. 931-1176  
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Washington, DC 20523

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**WASH PROJECT:  
TWO-AND-A-HALF-YEAR CONTRACT SUMMARY, MARCH 31, 1983  
SUMMARIES OF ASSIGNED TASKS AND ORDERS OF TECHNICAL DIRECTION  
FROM OFFICE OF HEALTH, BUREAU FOR SCIENCE AND TECHNOLOGY, AID**

**INTRODUCTION**

As one looks back to the WASH beginnings in September, 1980 and compares what was then a mere dream for a handful of people with what is today an operational reality, one is struck with the remarkable foresight of those who planned the WASH Project. Two major themes were dominant in the early planning: rapid response to requests from Missions and Bureaus of AID and a readily available interdisciplinary resource base. After 147 formal Orders of Technical Direction, nearly 400 preliminary or exploratory tasks, and innumerable information requests, these two concepts have been put to a severe test. Testimonies of AID officers, PVO and contractor personnel, and many host country officials, attest to overwhelming success in fulfilling these objectives.

It is therefore with a sense of pride that the participants in the WASH Project - the staff of the Coordination and Information Center, the associated institutions, subcontractors, and consultants - look back upon the past two and a half years of water supply and sanitation work with the Agency for International Development. The current contract having been awarded in August, 1980 to Camp, Dresser and McKee, major activities were underway by October 1. Camp, Dresser and McKee has been assisted in this work from the beginning by the International Science and Technology Institute, the Research Triangle Institute, and the University of North Carolina at Chapel Hill, and more recently by the Georgia Institute of Technology.

The success achieved over the past two-and-a-half years has been characterized by growth and accomplishment for WASH as a concept, as a practical mechanism of delivering of water supply and sanitation assistance with the Agency for International Development, and as an effective contractor-operated project. WASH is an innovative concept, intended to bring together the broad range of technical assistance resources necessary to provide help to sector programs throughout the Agency.

**WASH as a Concept**

An important part of the original dream was that of an interdisciplinary team of individuals managing assistance efforts in water supply and sanitation for the Agency and its client organizations. To a great extent WASH work bears the mark of this concept. Teams of engineers and trainers, engineers and social scientists, and engineers and health scientists, to name some of the examples, have been able to mold assistance packages that carry the influence of each discipline. The

WASH Information Center with its library and international referral network also presents a broad range of inter-disciplinary material and contacts with varying approaches to water supply and sanitation among rural and urban fringe populations in the developing world. Suffusing the entire Coordination and Information Center is a spirit of peer relationships and collegiality that makes interdisciplinary work possible and enjoyable.

**WASH as a Mechanism**

The rapidity and specificity of response have been mentioned earlier. Some tasks have been turned around in two weeks or less. Seldom has the consultant been inappropriate to the task. Given that availability is the primary determinant of who the consultants are, this result is all the more remarkable. In the sections that follow the major tasks that WASH has performed will be described in some detail. The mass of this work will demonstrate that the mechanism has been largely effective in meeting Agency requests.

In a larger sense WASH has also served as a mechanism for bringing the water supply and sanitation agenda into the forefront of Agency thinking. Attendance at all four Regional Health Officers' Conferences, participation in strategy statement development, and the production of key technical documents have broadened recognition of these issues.

**WASH as a Project**

As a contractor operated project WASH has demonstrated that several contractors can work together to form a coordinated resource, that a contractor can in fact extend the work of the Agency several fold, and that innovative mechanisms for service delivery and task management can be developed within existing contract guidelines. The task management system, the consultant registry, and the computerized information storage and retrieval system all represent contractor operated innovations.

Progress is notable on several fronts that were identified in early project planning:

- Training
- Technology transfer
- Community participation
- Health outcomes
- Intersectoral work

**Training**

WASH Project planners foresaw a great need for training activities within project technical assistance. They also foresaw a great deal of resistance or

indifference to the type of training needed for water supply and sanitation, namely training that is performance or competency-based as opposed to didactic only.

Slowly the training capability of the Project has grown to its present level, greatly aided by the appointment of a Senior Training Officer in November 1981. At the same time requests for training assistance have increased commensurately, making it a challenge to keep up with the demand.

In performance of its mandate to develop instructional materials and technical manuals, the WASH Project has produced, or is preparing, over fifteen training aids for use by operational level personnel in developing countries. Subjects addressed include well drilling, spring capping, and rainwater catchment; selection of potable water pumping technologies; handpump manufacturing, acceptance testing, installation, operation and maintenance; diesel engine selection, operation and maintenance for water supply systems; latrine design, operation and maintenance; and assembly, operation, maintenance and troubleshooting instructions for engineers and technicians, and an operator's manual, for the AID Mobile Emergency Water Treatment and Disinfection Unit for use in disaster situations.

These diversified training materials include guides for instructors, discussion leaders and speakers; participants' manuals; task performance or job aids; task-related reference material collections; and curricula and training methodological outlines. The material is designed for trainers-of-trainers as well as for trainees themselves. It is directed towards technical audiences and those involved in community education and participation and institution building.

### **Technology Transfer**

Work done hand-in-hand with training and staff engineers from Georgia Tech and elsewhere is evolving a concept and practice of technology transfer that is more than mere manufacture of devices and spare parts. It includes quality control, marketing, installation, maintenance, and financing of technology transfer. Manuals and guidelines in these subjects are aimed directly at facilitating the transfer process. Workshops have been held to stimulate involvement in these and larger issues. A workshop on technology transfer in water supply and sanitation is planned for April, 1983, in Arlington, Virginia.

### **Community Participation**

The Project has gained a reputation as a resource in this area. WASH has participated in an international advisory group meeting at the International Reference Center for Community Water Supply and Sanitation (The Hague) and is at work on a directory of organizations and centers throughout the world who are producing educational materials for promoting participation. A paper to guide community participation planners in the Africa Bureau has been prepared.

### **Health Outcomes**

Although not constituting a theme in the forefront of Project activity, the group of questions surrounding health outcomes of water supply and sanitation projects has been addressed through papers, presentations, and guidance to projects in evaluation design.

### **Intersectoral Work**

The future of expanded water supply and sanitation activities lies with incorporating these program elements into the projects of other sectors, principally agriculture/rural development, housing/urban development, and primary health care. Work is already underway in several countries on sanitation options for low cost housing programs. Work will soon begin on domestic water use in irrigation projects. Work has also been carried out in collaboration with oral rehydration programs and nutrition projects.

The foregoing would make it seem that progress has excluded the more classical engineering aspects of water supply and sanitation. In a sense that is true. Many classical engineering approaches have little application to the problems of rural and urban fringe populations of developing countries, but the need for engineering assistance in the sense of problem-solving and systematization of planning is, if anything, greater in LDCs. Coupled with social and health scientists, trainers, statisticians and planners, engineers have enhanced and multiplied the value of these needed methodological skills.

The sections which follow include a capsule description of the WASH Project services and explanatory comments on the broad scope and nature of WASH Project assignments.

### **BRIEF DESCRIPTION OF WASH PROJECT SERVICES**

The areas of support available from WASH are primarily focussed on rural and urban-fringe water supply and sanitation improvement and include: general technical assistance, technology transfer, human resource development and training, and technical and development information.

WASH services are available to AID Missions, Regional Bureaus and central offices through the Office of Health. Missions and Regional Bureaus may request WASH assistance on behalf of:

- Mission programs
- Host government organizations
- Other host country organizations
- Peace Corps
- International/multilateral programs
- Private voluntary organizations

All requests for technical assistance must be approved, requested and sponsored by AID organizations in the field or by AID/Washington.

Requests for information may be sent directly to the WASH Information Director. However, AID Missions and AID supported institutions will receive priority in responding to requests. For details see the WASH Brochure or contact WASH.

**COMMENTS ON WASH PROJECT ASSIGNMENTS**

WASH Project activities for AID have occurred in two phases. The first phase began in November, 1979, and was for the period before the WASH Project contract was awarded to Camp Dresser & McKee (CDM). The second, current phase, began on August 29, 1980, with the signing of the AID-CDM contract. The five tasks initiated by the Office of Health before the CDM contract are outlined in the table and section following. The scope and general procedural arrangements for the work done by The CDM Associates are outlined here. The CDM Associates consist of Camp, Dresser and McKee, the International Science and Technology Institute, the Research Triangle Institute, and the University of North Carolina.

Aside from routine office administrative activities, there are two major categories of work or tasks performed by the WASH Project Coordination and Information Center (CIC). The first is 'Orders of Technical Direction' (OTDs), which are formal, written specific statements of work to be done by the WASH Project CIC, CDM Associates, or other outside contractors or consultants to the WASH CIC. OTDs are issued to the WASH CIC by the AID Office of Health (S&T/H/WS) Project Manager in numbered sequence.

The second category of work is called a 'CIC Task'. These are smaller, less formal and usually short-term tasks that may be requested verbally or in writing by the Office of Health, Missions or Bureaus. Other CIC tasks may be initiated by the WASH Project Staff. CIC-type tasks also may be preliminary phases of work that later

become Orders of Technical Direction.

The kinds of work done under CIC tasks have included: reproduction of documents for distribution to Missions and Bureaus; literature searches; preparation of bibliographies and assembly of information materials, catalogs, etc. for Missions and Bureaus, e.g., windmill data for Morocco; acquisition of specific sets of information: ASTM Design Standards, EPA Materials, American Water Well Association documents, etc.; synthesis of evaluation methods and approaches to community water supply and sanitation; WASH Project planning in specific subjects; training, women's issues in water and sanitation, etc.

From August 29, 1980, through March 31, 1983, the WASH Project Coordination and Information Center received 147 Orders of Technical Direction from the Office of Health. The work content of these OTD's broadly falls into five categories: general technical assistance, training, transfer of appropriate technology, information and international coordination. Each OTD has involved work in two or more categories or sub-categories. General technical assistance has been broken down into four sub-categories: local manufacturing, water supply and sanitation (WS&S) engineering, health and community participation, and planning and procedures.

The number of OTD's having work done in the various categories follows:

General Technical Assistance		135
Local manufacturing	28	
WS&S engineering	110	
Health and community participation	91	
Planning and procedures	94	
Training		86
Transfer of Appropriate Technology		55
Information		82
International Coordination		20

The geographic breakdown of WASH Project Orders of Technical Direction by number and by country is as follows:

<b>Latin America</b>	<b>Near East</b>	<b>Africa</b>	<b>Asia</b>
Bolivia - 93	Egypt - 62, 77	Benin - 45	Bangladesh - 28
Brazil - 66	Jordan - 31, 55, 59	Botswana - 95	India - 28
Costa Rica - 98	Lebanon - 20, 124, 134	Burundi - 36, 137	Indonesia - 25, 44, 73,
Dominican Republic	Morocco - 61, 111	Cameroon - 108,	79, 113, 117, 133, 136
1, 21, 48, 58, 84, 97,	Tunisia - 15, 63, 92,	118,	Philippines - 11, 40,
99, 103, 113, 132, 143	120, 146	Central African	43, 113, 119
Ecuador - 14, 24, 71,	Yemen - 39	Republic - 106	Sri Lanka-Pre-CDM,
82, 96, 102, 105		Kenya - 104	113, 138
El Salvador - 17		Lesotho - 88	Thailand - 38, 123, 139
Guatemala - 30, 76		Mali - 64	
Haiti - 9, 46, 129, 140		Malawi - 144	
Honduras - 29, 85, 94,		Mauritania - 16	
101, 113, 115, 126, 135		Niger - 27	
Peru - 18, 74, 114		Senegal - 78, 127, 147	
		Sudan - 60	
		Swaziland - 131	
		Tanzania - 26, 75, 142	
		Togo - 45, 91, 116, 145	
		Zaire - 47, 100, 141	

In addition, CIC-type work has been done in Africa for Benin, Burundi, Cameroon, Gambia, Ghana, Kenya, Lesotho, Liberia, Mali, Malawi, Senegal, Somalia, Sudan, Swaziland, Tanzania, Togo, Uganda, Upper Volta, Zaire and Zambia; in Asia for Indonesia, Sri Lanka and Thailand; in Latin America for Dominican Republic, Chile and Peru; and in the Near East for Egypt, Morocco and Tunisia.

Thus far the WASH Project has worked for or in 49 of some 66 AID Missions or Offices. Requests for information have been received from additional AID assisted countries.

The table which follows indicates the work content of pre-CDM WASH assignments and WASH Orders of Technical Direction in support of AID requests for technical assistance by categories. It illustrates the complex and multidisciplinary aspects of WASH activities.

The remainder of the report includes summaries of the work listed in the table, summaries of selected CIC Tasks, and an Appendix which lists by title, subject and country the 19 Technical Reports and 79 Field Reports published to date by WASH.

**WORK CONTENT OF PRE-CDM WASH PROJECT ASSIGNMENTS  
FROM THE OFFICE OF HEALTH-A.I.D.  
NOVEMBER 1, 1979 - MARCH 31, 1983**

General Technical Assistance

Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
Water Supply and Sanitation Planning (Work done by American Public Health Association)	C	USAID/Thailand		X	X	X	X	X	X	
Assistance in Development of National Drinking Water Supply and Sanitation Decade Plan (Work done by American Public Health Association)	C	USAID/Sri Lanka	X	X	X	X	X	X	X	
Rural Water Supply and Sanitation Program Planning (Work done by American Public Health Association)	C	USAID/Ecuador		X	X	X	X	X	X	
Local Manufacture of AID Handpumps and Robo-Devices (see OTD 63) (Work done by Georgia Institute of Technology)	C	USAID/Tunisia	X	X	X	X	X	X	X	
Local Manufacture of AID Handpumps and Robo-Devices (see OTD 82) (Work done by Georgia Institute of Technology)	O	USAID/Ecuador	X	X	X	X	X	X	X	

**Work Status Key- C=completed O=ongoing \*=cancelled**

**WORK CONTENT OF ORDERS OF TECHNICAL DIRECTION  
FROM THE OFFICE OF HEALTH-A.I.D. TO THE WASH PROJECT COORDINATION AND INFORMATION CENTER  
AUGUST 29, 1980 - MARCH 31, 1983**

General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T1	Hand Pump Manufacturing (Field Report No.20)**	C	USAID/Dominican Republic	X					X		
T2	American Public Health Association Meeting - Exhibition of AID Appropriate Technology WS&S Devices	C	DS/HEA								
T3	Project Design Manual References Development	C	NE/TECH/HN				X			X	X
T4	Competency Based Training/ Planning for Agency	C	DS/HEA AID/W							X	
T5	UNICEF / Pan American Health Organization WS&S Workshop and Discussion of WASH Services (Field Report No.30)**	C	PAHO DS/HEA					X		X	
T6	Social Science Analysis for WS&S AID Administrator Bennett Project (Field Report No.1)**	C	PPC/E			X				X	X
T7	Oral Rehydration Therapy Review Discussion of Need for Using Potable Water ORT Solutions (Technical Report No.2)**	C	DS/HEA DS/POP			X				X	
T8	Pan American Health Organization/ Caribbean Community WS&S Planning Meeting in Barbados	C	PAHO DS/HEA							X	
T9	Rural Water Supply System Review (Field Report No.2)**	C	USAID/Haiti		X		X	X		X	X
T10	Regional Health Officers Conference Participation for West Africa	*	REDSO/WA AFR/DR			X				X	

**Work Status Key- C=completed O=ongoing \*=cancelled**

\*\*If a WASH Technical Report (TR) or Field Report (FR) was published under an OTD, the number of the Report is indicated. All reports and their titles are printed in numerical sequence in the List of WASH Publications in the Appendix.

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FROM THE OFFICE OF HEALTH-A.I.D. TO THE WASH PROJECT COORDINATION AND INFORMATION CENTER  
AUGUST 29, 1980 - MARCH 31, 1983**

General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T11	Local Manufacture of WS&S Devices (Field Report No.3)**	C	USAID/ Philippines	X	X		X		X		
T12	R&D - Prototype WS&S Devices	C	Inter-Regional DS/HEA	X	X				X		
T13	Italian Earthquake Relief Assistance (Field Report No.25)**	C	AID/OFDAX		X	X			X	X	X
T14	Peri-Urban and Rural WS&S Program Review and Project Development (Field Report Nos.9 and 12)**	C	USAID/Ecuador	X	X		X	X	X		
7 T15	Well Drilling Equipment Specifications and Procedures (Field Report No.4)**	C	USAID/Tunisia		X				X	X	
T16	Water Supplies from Rural Land Reclamation (Field Report No.11)**	C	USAID/Mauritania		X	X	X				
T17	Review of Appropriate Water Supply Technologies, Implementation Planning, Local Manufacturing & Training (Field Report No.26)**	C	USAID/EI Salvador	X	X	X	X	X	X	X	
T18	WS&S Implementation Plan Design for Rural Water Project (Field Report No.6)**	C	USAID/Peru	X	X	X	X	X	X	X	
T19	Food Wastage Project Expert Panel Review (Technical Report No.12)**	C	PPC/E DS/HEA			X				X	

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AUGUST 29, 1980 - MARCH 31, 1983**

General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T20	Small Wastewater Stabilization Pond Design and Analysis (Field Report No.10)**	C	USAID/Lebanon		X			X	X	X	
T21	Latrine and Water Container Design Analysis, and Planning of Evaluations of Health Materials (Field Report Nos.5, 21 & 23)**	C	USAID/Dominican Republic	X	X	X	X	X	X	X	
T22	Review of Testing Prediction Sanitation Model Project	*	DS/HEA		X		X				
T23	Preparation of Guidelines for WS&S Project Design and Implementation- Interregional	O	DS/HEA	X	X	X	X	X	X	X	
T24	Rural WS&S System Design for AID Project Paper (Field Report No.13)**	C	USAID/Ecuador		X	X	X	X	X	X	
T25	Rural Sanitation Manpower Development (RSMD): Workshop and Program Assistance (Field Report No.16)**	C	USAID/Indonesia		X	X	X	X	X	X	
T26	Project Design Assistance for Health and Environmental Monitoring Project (HEMP) and Water Supply and Sanitation Manpower Training (Field Report Nos.7 & 8)**	C	USAID/Tanzania		X	X	X	X	X	X	
T27	Evaluation of Rural Health Project	C	USAID/Niger		X	X	X	X			

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OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T28	Representative of DS/HEA and WASH at Conference of World Federation of Public Health Associations, Calcutta, India, 23-26 February 1981 (Field Report No. 14)**	C	DS/HEAX		X	X			X	X	X
T29	Development of Local Capability to Fabricate Hand Pumps and Well Screens	O	USAID/Honduras	X	X		X	X	X	X	
T30	Participation in XII Central American Congress of Sanitary Engineering Meeting, 16-20 March 1981 (Field Report No. 15)**	C	USAID/Guatemala ROCAP		X	X				X	X
T31	Wastewater Treatment Design Review and Guide-line Preparation (Field Report No. 17)**	C	USAID/Jordan		X		X		X	X	
T32	Coordination of WASH Information Activities and Exchange with International Information Centers (Field Report Nos. 18, 48 and 64)**	O	DS/HEA							X	X
T33	Development of Testing Protocol for Mobile Water Treatment and Disinfection Units in Disaster Situations	C	DS/HEA; OFDA		X	X	X				
T34	Coordination and Facilitation of Use of WASH Technical Assistance Services in Africa	O	AFR/DR; DS/HEA	X	X	X	X	X	X	X	

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OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T35	Participation in the AWWA meeting, St. Louis, 8-12 June, 1981 (Technical Report No.6)**	C	DS/ENGR; DS/HEAI			X		X	X	X	X
T36	Evaluation of Rural Water Supply Project (Field Report No.24)**	C	USAID/Burundi		X	X	X	X			
T37	Participation in Session on Water, Sanitation and Health Education, UNICEF New York 22-23 April, 1981 (Field Report No.31)**	C	DS/HEA		X	X	X	X			
T38	Further Development of Rural Water and Sanitation Project (Field Report No. 19)**	C	USAID/Thailand		X	X	X				X
T39	Evaluation of the Water Supply Systems Management Project for the National Water and Sewage Authority (NWSA) (Field Report No.22)**	C	USAID/Yemen		X		X	X			
T40	AID Handpump Manufacture (Field Report No.54)**	C	USAID/Philippines	X	X		X	X	X	X	
T41	Technical Assistance of Cultural Anthropologist in Peace Corps Training Program in Areas of Community Development and Participation in Water Supply and Sanitation	C	DS/HEA; Peace Corps		X	X	X	X	X	X	X
T42	Technical Assistance to AID Office of Foreign Disaster Assistance (OFDA) (Field Report Nos. 25, 41, 66, 74 and 79)	O	OFDA; DS/HEA		X	X	X	X		X	
T43	Technical Assistance for the Barangay Water Program (Field Report No.57)**	C	USAID/Philippines	X	X		X	X	X	X	

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T44	Training and Technical Assistance for Technical Development and Dissemination in Water and Sanitation for Rural Sanitation Manpower Project (Field Report No.28)**	C	USAID/Indonesia	X	X	X	X	X	X	X	
T45	Village Health Education and Training: Program Planning, Implementation and Evaluation (Field Report Nos.27 & 51)**	C	USAID/Togo-Benin				X	X	X	X	
T46	AID Handpump Installation, Maintenance and Training Project	O	USAID/Haiti	X	X	X	X	X	X	X	
T47	Technical Assistance in Review of Rural Primary Health Care Project Paper	C	USAID/Zaire			X	X	X			
T48	Technical Assistance in Handpump Maintenance and Plastic Valve and Faucet Manufacture	O	USAID/Dominican Republic	X	X		X	X	X	X	
T49	Survey of Potential Subcontractors for Human Resources Development Support	C	S&T/HEA				X	X		X	
T50	Technical Assistance in Technology Transfer Including Development and Testing (Lab and Field) of Low Cost Technology for Developing Countries	O	S&T/HEA	X	X			X	X	X	
T51	Implementation of Workshop on Excreta Disposal in Non-Sewered Areas	C	NE/TECH		X				X	X	

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T52	Participation in Workshop on Primary Health Care, 31 August to 3 September, 1981 in Sousse, Tunisia (Technical Report No.8 and Field Report No.29)**	C	NE/TECH/HPN			X	X	X		X	
T53	Participation in AID Health Officers Workshop in Lome, Togo, 15-20 November, 1981 (Technical Report No.13)**	C	AFR/H		X	X	X	X		X	
T54	Participation in AID Health Officers Workshop in Chiang Mai, Thailand, 8-14 November, 1981	C	ASIA/TR		X	X	X	X		X	
T55	Analysis of Human Resources Development Needs for the Hashemite Kingdom of Jordan (Field Report No.34)**	C	USAID/Jordan		X	X	X	X		X	
T56	WASH Participation in International Reference Center (IRC) Advisory Group on Community Education and Participation	C	S&T/HEA			X	X			X	X
T57	Technical Assistance to national Council for International Health for the Development and Implementation of a Water and Sanitation Workshop for PVO's (Technical Report No.14)**	C	S&T/HEA		X	X	X	X	X	X	X
T58	Technical Assistance to Develop Scope of Work for Impact Evaluation of Health Sector USAID/Dominican (Field Report No.35)**	C	Republic		X	X	X	X		X	

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T59	Technical Assistance for Water Conservation Seminar (Field Report No.36)**	C	USAID/Jordan		X		X	X		X	
T60	Technical Assistance in Water Supply and Sanitation Planning and Training (Field Report No.37)**	C	USAID/Sudan		X	X	X	X		X	
T61	Technical Assistance in Operation and Maintenance of Water Pumping Systems (Field Report No.43)**	C	USAID/Morocco		X		X	X		X	
T62	Technical Assistance with Health Sector Assessment (Field Report No.33)**	C	USAID/Egypt		X	X	X			X	
T63	Technical Assistance in Local Handpump Manufacture and Maintenance	O	USAID/Tunisia	X	X	X	X	X	X	X	
T64	Technical Assistance for Well Siting (Field Report No.32)**	C	USAID/Mali		X	X					
T65	Collaborative Technical Assistance with International Reference Center (The Hague) on 'Directory of Resources for Community Participation in Water Supply and Sanitation for Developing Countries'	O	S&T/HEA; IRC			X				X	X
T66	Technical Assistance in Well Drilling for PVO Fundacao Esperanca in Amazon Basin (Field Report No.40)**	C	USAID/Brazil		X		X		X		

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T67	Preparation of Manual on the Installation, Operation and Maintenance of a Portable Packaged Water Treatment and Disinfection System	O	S&T/HEA; OFDA		X			X		X	
T68	Analysis, Design, Prototype Development, and Demonstration System Construction and Operation of PAHO 'Pumpless Pump'	O	S&T/HEA		X				X	X	
T69	Design and Implementation for AID Handpump Testing Program	O	S&T/HEA	X	X				X	X	
T70	Technical Assistance for Seminar on Handpumps for Community Water Supply in Developing Countries	C	S&T/HEA		X				X	X	
T71	Design and Implementation of Robo Valve Testing Program	O	USAID/Ecuador	X	X				X	X	
T72	Laboratory Assessment and Testing of AID Handpump	O	S&T/HEA	X	X				X	X	X
T73	Technical Assistance in Revision of CARE Water Supply and Sanitation Project (Field Report No.39)**	C	USAID/Indonesia				X		X		
T74	Evaluation, Planning and Training Assistance to Rural Water Supply and Sanitation Project (Field Report No.38)**	C	USAID/Peru		X	X	X	X			

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of appropriate Technology	Information	International Coordination
T75	Development of The National Sanitation Environmental Education Master Plan (Field Report No.58)**	C	USAID/Tanzania			X	X	X			
T76	Small Water Supply Systems: Training Program Design and Implementation with Agua del Pueblo (Field Report No.56)**	C	USAID/Guatemala		X	X	X	X	X	X	
T77	Planning for Improved Excreta and Waste-Water Pilot Demonstrations (Field Report No.52)**	C	USAID/Egypt		X	X	X	X	X	X	
T78	Training of Sanitarians (Field Report No.44)**	C	USAID/Senegal		X	X	X	X	X	X	
T79	Technical Assistance in Planning Diarrheal Disease Control Sub-project (Field Report No.42)**	C	USAID/Indonesia		X	X	X	X			
T80	Training of Trainers Workshop for AID Hand-pump Technology Transfer Personnel (Field Report No.45)**	C	S&T/HEA		X	X		X	X	X	
T81	Collection and Analysis of AID Program Data for Interregional Planning in Water Supply and Sanitation	O	S&T/HEA				X			X	
T82	Local Manufacture of AID Handpumps	O	USAID/Ecuador	X	X	X		X	X	X	
T83	Testing of Office of Foreign Disaster Assistance Portable Water Purification Units (Field Report No.41)**	C	OFDA; S&T/HEA		X					X	

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T84	Technical Assistance in Project Identification for Water Supply, Sewage and Health Sector Loan Project	C	USAID/Dominican Republic		X	X	X	X			
T85	Technical Assistance in Field Installation, Training, Testing and Evaluation of Handpumps	O	USAID/Honduras	X	X	X		X	X	X	
T86	Attendance of WASH Training Officer at Meeting of Interagency Task Force on Human Resources Development; U.N. Water Decade Geneva	C	S&T/HEA			X		X			
16 T87	Participation in AIDIS : PAHO Regional Symposiums on Human Resources for the Water Decade, Panama, July 26-August 3, 1982	C	S&T/HEA		X			X			X
T88	Feasibility Analysis and Design Study of Effluent Reuse and Night Soil Disposal for Maseru - Lesotho (Field Report No.55)**	C	USAID/Lesotho		X	X	X				X
T89	Preparation of a Manual on 'Practical Water Treatment for Communities in Developing Countries'	O	S&T/HEA		X	X	X	X	X		X
T90	Second Trainer of Trainers Workshop for AID Handpump Technology Transfer Personnel, September 15-17, 1982 (Field Report No. 60)	C	S&T/HEA		X	X		X	X		X
T91	Planning Assistance for Rural and Village Health Activities	C	USAID/Togo		X	X	X	X			

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T92	Technical Assistance for Workshop on Water Supply and Sanitation for Rural Dispersed Populations (Field Report No. 67)	O	USAID/Tunisia		X	X	X	X	X	X	X
T93	Technical Assistance in Administration of Rural Sanitation Project (Field Report No.47)**	C	USAID/Bolivia				X			X	
T94	Review of Design Standards, Specifications and Costs for Water Supply and Sanitation Systems for Low Income Housing (Field Report No.46)**	C	USAID/Honduras		X		X	X	X	X	
T95	Kanye Village Sewerage and Sanitation Feasibility Study	O	USAID/Botswana		X	X	X	X	X	X	
T96	Monitoring and Evaluation of Community Health Promoter Training Course (Field Report No.49)**	C	USAID/Ecuador			X	X	X			
T97	Technical Assistance in Well Siting and Drilling (Field Report No.50)**	C	USAID/Dominican Republic		X		X			X	
T98	Training Assistance on Groundwater Contamination and Quality	*	USAID/Costa Rica		X			X		X	
T99	Health Information System Development: Micro-computer Demonstration	O	USAID/Dominican Republic			X	X			X	
T100	Technical Assistance in Training of Trainers for Public Health Nurse Supervisors and in Training for Spring Cappers (Field Report Nos. 62 and 73)	O	USAID/Zaire		X	X		X		X	

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OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T101	Evaluation Assistance for Rural Water and Sanitation Project (Field Report No. 69)	C	USAID/Honduras		X	X	X				
T102	Technical Assistance on Appropriate Well Drilling Equipment (Field Report No. 59)	C	USAID/Ecuador	X	X	X	X	X	X	X	
T103	Health Information System Development: Assessment and System Design Study	O	USAID/Dominican Republic			X	X			X	
T104	Investigation of Appropriate Water and Sanitation Systems for Low Cost Housing	O	USAID/Kenya		X		X		X		
T105	Technical Assistance in Lecture Workshop on Sanitary Engineering Design for Developing Countries (Field Report No. 63)	C	USAID/Ecuador		X			X	X		
T106	Technical Assistance in Developing a National Drinking Water Supply and Sanitation Plan (Field Report No.53 and 72)**	O	USAID/Central African Republic	X	X	X	X	X	X		
T107	Technical Assistance in Development of Inter-Sectoral Water Supply and Sanitation Strategy Paper for the Africa Bureau (Technical Report No. 19)	O	AFR/TR/HNP		X	X	X	X		X	
T108	Training Assistance to the Assistant Sanitary Technician Schools	O	USAID/Cameroon		X	X		X		X	

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T109	Technical Assistance to Peace Corps Water Supply and Sanitation Sector	O	S&T/H/WS		X	X	X	X			
T110	Coordination/Collaboration on LDC Training with the International Water Supply Association (IWSA)	C	S&T/H/WS				X	X			
T111	In-service Training for Peace Corps Volunteers in Rural Potable Water Supply Project (Field Report No. 61)	C	USAID/Morocco		X	X	X	X			
T112	Participation in Practice of Management Seminar	C	S&T/H/WS				X	X			
T113	Technical/Managerial Review of the AID Hand-pump Technology Transfer Program in Sri Lanka, Philippines, Indonesia, Honduras, and Dominican Republic (Field Report No. 76)	O	S&T/H/WS	X	X	X	X	X	X		
T114	Assessment and Evaluation of the Feasibility of Local Manufacturing of the AID Handpump	O	USAID/Peru	X	X		X				
T115	Technical Assistance in Design of Well Drilling Programs (Field Report No. 65)	C	USAID/Honduras		X		X				
T116	Technical Assistance in Training Social Promotion Agents in Spring Capping and Rainwater Harvesting	O	USAID/Togo		X	X		X			

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OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T117	Technical Assistance in Evaluation of Foster Parents Plan Water Projects (Field Report No. 71)	C	USAID/Indonesia		X	X	X				
T118	Technical Assistance in Assessing and Planning CARE Water Supply and Sanitation Projects (Field Report No. 75)	C	USAID/Cameroon		X	X	X				
T119	Technical Assistance in Planning the Evaluation of Water Supply, Sanitation and Health Projects	O	USAID/Philippines		X	X	X				
T120	Technical Assistance in Evaluation of Water Supply, Sanitation and Health Aspects of Spring-fed Irrigation Project	O	USAID/Tunisia		X	X	X				
T121	Technical Assistance for Training-of-TrainersPeace Corps Workshop for Peace Corps (Field Report No. 70)	C	S&T/H/WS		X			X			
T122	Technical Assistance in Design and Delivery of Training Models for Peace Corps Use in Handpumps and Sanitation Projects in LDCs	O	Peace Corps S&T/H/WS		X	X		X		X	
T123	Technical Assistance in Design and Delivery of a Training Workshop on Management Team Building (Field Report No. 68)	C	USAID/Thailand				X	X			

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T124	Technical Assistance to Assess Solid Waste, Wastewater and Water Supply Situation and Requirements (Field Report No. 66)	O	USAID/Lebanon		X		X				
T125	Technical Assistance in Staffing AID/WASH Exhibition Booth at APHA Annual Meeting, Montreal, November 13-19, 1982	C	S&T/H/WS			X				X	X
T126	Review of Water-Seal Latrine Field Acceptance and Possible Local Manufacture	O	USAID/Honduras	X	X	X			X		
21 T127	Reconnaissance Visit in Preparation for Sanitation Workshop	O	USAID/Senegal		X	X		X			
T128	Coordination/Collaboration on Water and Sanitation in Asia	O	S&T/H/WS		X					X	X
T129	PVO Seminar on Rural Potable Water and Sanitation Systems (Field Report No. 77)	O	USAID/Haiti		X	X	X	X	X		
T130	Comparative Life Cycle Cost Analysis of AID and Moyno Design Handpumps	O	LAC/DR S&T/H/WS	X	X				X		
T131	Technical Assistance to Improve Management Structure and Systems of Public Health Inspectorate	O	USAID/Swaziland			X	X	X		X	
T132	Planning of Latrine Construction Workshop and Determination of Training Needs in Water Supply and Sanitation	O	USAID/ Dominican Republic		X	X		X			

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T133	Feasibility Study and Planning of Water Supply and Sanitation Systems for Private Volunteer USAID/ Organizations	O	Indonesia		X	X	X				
T134	Development of Solid Waste Disposal Plan for Beirut and Other Areas in Lebanon (Field Report No. 79)	O	USAID/Lebanon		X	X	X				
T135	Revision of Plan for Rural Water Supply and Sanitation Project	O	USAID/Honduras		X	X	X		X		
T136	Preparation of Scope of Work for Evaluation of CARE Rural Water Project	O	USAID/Indonesia		X	X	X				
T137	Development of Comprehensive Training Plan for Rural Spring Capping Project (Field Report No. 78)	O	USAID/Burundi		X	X	X	X			
T138	Technical, Training and Management Assistance to the National Water Supply and Drainage Board	O	USAID/Sri Lanka		X	X	X	X			
T139	Technical Assistance with Design of a Rural Water Supply Project	O	USAID/Thailand		X		X	X			
T140	Engineering Evaluation of Foster Parents Plan Water Projects	O	USAID/Haiti		X	X	X				
T141	Rural Health Workers Training	O	USAID/Zaire		X	X	X	X			

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General Technical Assistance

OTD No.	Title	Work Status	Requesting Agent	Local Manufacturing	WS&S Engineering	Health & Community Part.	Policy & Procedure	Training	Transfer of Appropriate Technology	Information	International Coordination
T142	Public Health Education for Low-cost Sanitation	O	USAID/Tanzania		X	X	X	X			
T143	Design and Delivery of Two Workshops on Latrine Construction	O	USAID/Dominican Republic		X	X		X			
T144	Design and Delivery of Three Training-of-Trainers Workshops on Community Participation in Water Supply Projects	O	USAID/Malawi		X	X	X	X			
T145	Assistance in Evaluation of Rural Supply Project	O	USAID/Togo		X	X	X	X			
T146	Design of Research/Action Demonstration Study on Community Participation	O	USAID/Tunisia		X	X	X				
T147	Design and Delivery of Workshop on Latrine Construction, Solid Wastes Disposal, and Wastewater Disposal for Rural Areas	O	USAID/Senegal		X	X		X			

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## SUMMARIES OF PRE-CDM WASH PROJECT ASSIGNMENTS

**November 2, 1979: Completed**

### WATER SUPPLY AND SANITATION PLANNING - THAILAND

This task was assigned to the American Public Health Association (APHA) by the Office of Health. It had four major objectives:

1. Assessment of AID experience in water supply and sanitation in poorer villages with populations of less than 1,000 in the 20 provinces included in the Primary Health Care Project in Thailand.
2. Assessment of the basic levels of social and economic development affected by improvements in water supply and sanitation.
3. Development of rural water supply and sanitation strategy by identifying positive changes effected in the past and by making recommendations for future programs in those fields.
4. Identification of targets of opportunity for projects that can be considered for funding with special emphasis on USAID participation in the International Drinking Water Supply and Sanitation Decade.

**February 28, 1980: Completed**

### ASSISTANCE IN DEVELOPMENT OF NATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE PLAN - SRI LANKA

In February 1980 USAID/Colombo requested, through the Office of Health, the expert services of an individual well versed in national planning of drinking water and sanitation programs to identify the number of individuals and disciplines needed to formulate a detailed Decade Water Supply and Sanitation Plan for the country, including annual investment programs.

These services were provided through an AID agreement with APHA. The assignment resulted in a report: 'Scope of Work for Assistance in Preparation of a Comprehensive Plan for the International Decade for Drinking Water and Sanitation in Sri Lanka, March 1980.' The report recommended a seven man team for a total of 40 person weeks to assist the Government of Sri Lanka in developing the Decade Plan.

A unique methodology was used in developing the Decade Plan. The APHA team worked exclusively with and under the guidance of the designated representative of the Government of Sri Lanka. Findings were based on extensive meetings and consultations with him and others of the government.

Team members visited 74 villages to observe on-the-ground conditions and needs with the villagers as background for developing the Decade Plan. The Plan was reviewed with appropriate authorities and representatives of USAID/Sri Lanka as work progressed, and the Final Decade Plan was issued in September, 1980.

The National Water Decade Plan of the Ministry of Local Government, Housing and Construction included the following topics:

1. Definition of the overall problems.
2. Statement of the Government of Sri Lanka policy.
3. Definition of Decade Plan goals, objectives and priorities.
4. Socio-economic analysis.
5. Selection criteria.
6. Statement of strategy.
  - a. Determination of input requirements
  - b. Technology selection including development of in-country manufacture of equipment required for the Plan
  - c. Methods of approach
  - d. Institutional framework
  - e. Resource analysis
  - f. Constraints analysis
7. Two year investment projections.
8. Projection of levels of activity and financing required for subsequent years to achieve Decade goal.

The Executive Summary of the Decade Plan was presented, by the two Sri Lankan officials with whom the team had worked in Sri Lanka, to the United Nations General Assembly in New York on November 10, 1980, as part of the official launching of the International Drinking Water Supply and Sanitation Decade.

**April 11, 1980: Completed**

### RURAL WATER SUPPLY AND SANITATION PROGRAM PLANNING - ECUADOR

Technical support for this task was supplied by the APHA. The Work included three tasks:

1. To conceptualize a program of rural water supply and sanitation appropriate to Ecuador's resources and needs.
2. To strategize how that program might be developed to identify targets of opportunity for the Ministry of Health and USAID/Ecuador to consider.
3. To develop a Project Identification Document for the Mission in rural water supply and sanitation.

**August 26, 1980: Completed**

### **LOCAL MANUFACTURE OF AID HANDPUMPS AND ROBO-DEVICES - TUNISIA**

Prior to this contract, Georgia Tech had conducted a feasibility study for the local manufacture of AID handpumps and Robo-devices in Tunisia. Based on this study and with authorization to USAID/Tunisia from DS/HEA to obligate funds, a contract was signed by USAID with Georgia Tech for technical assistance for local manufacture and testing of this equipment.

The objectives of the contract were for Georgia Tech to provide technical assistance to the Government of Tunisia and USAID/Tunisia in: locally manufacturing handpumps and the larger Robovalves, in developing no less than ten sanitary wells and upper structures, installing handpumps, disinfecting the well water and performing chemical analysis on well water for chlorine residual and other tests as necessary, as well as monitoring and evaluating the performance of the hand pumps.

In the spring of 1981, 40 AID pumps, produced under contract with Les Fonderies Reunies, were installed in the field after pre-selected open wells had been capped. Installation was a joint effort of Georgia Tech, CARE and the Ministry of Agriculture (Genie Rural). Related work is being done by Georgia Tech under Order of Technical Direction No. 63 (See below).

**September 12, 1980: On-going**

### **LOCAL MANUFACTURE OF AID HANDPUMPS AND ROBO-DEVICES - ECUADOR**

Under an earlier contract with Georgia Tech, a determination was made that it was feasible to manufacture the AID Handpump and Robo-devices in Ecuador. Subsequently a contract was signed with Georgia Tech and USAID/Ecuador under funding authorization from DS/HEA. The initial contract provides for technical assistance in local manufacturing of 110 AID Handpumps, 2,000 Robovalves and 1,000 feet of Roboscreen as well as for assurance of their appropriateness for introduction into bilateral projects which include water supply components. The project will also train the recipient private and public organizations in proper sanitary preparation of wells, installation of handpumps and Robo-devices, disinfection of water where necessary, bacteriological analysis of water, and maintenance and repair of AID Handpumps.

Georgia Tech later signed a contract with the Escuela Politecnica Nacional for the manufacture of 110 AID Handpumps and with Industries IEPESA (Ecuadorian plastics manufacturer) for 2,000 Robovalves and 1,000 feet of Roboscreens with two inch inside diameter.

In the fall of 1981 AID Handpumps and the Robo-devices were installed in rural areas of Ecuador by Peace Corps, the Vozandes, and the Ecuadorian Institute of Sanitary Works (IEOS) of the Ministry of Health, with appropriate training by Georgia Tech personnel. This contract will be completed in August 1983 and related work is being done by Georgia Tech under Order of Technical Direction No. 82 (See below).

**SUMMARIES OF ORDERS OF TECHNICAL DIRECTIONS TO THE WASH PROJECT  
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Numbers 1 - 147**

**OTD #1** **September 23, 1980: Completed**  
**HANDPUMP MANUFACTURING - DOMINICAN  
REPUBLIC**

The AID Health Sector Loan Project for manufacturing AID handpumps in the Dominican Republic was having trouble with quality control, materials processing and testing in the foundry operation, in-shop techniques of assembly, and in the organization of larger scale production activities, hence the request for WASH Project Assistance from the Mission.

A consultant from the University of Maryland well versed in AID handpumps and in manufacturing was sent to the Dominican Republic in October and November 1980 to assess the situation. The consultant identified casting, design and dimensional errors in several materials which would make pump assembly and maintenance difficult, if not impossible. These problems have been solved and the possible use of locally manufactured PVC deep well cylinders is being considered. A summary of work under this OTD may be found in WASH Field Report No. 20.

*For further information, contact Dr. D. Warner.*

**OTD #2** **September 30, 1980: Completed**  
**AMERICAN PUBLIC HEALTH ASSOCIATION  
MEETING - EXHIBIT OF AID APPROPRIATE  
TECHNOLOGY WS&S DEVICES - DETROIT,  
MICHIGAN - DS/HEA**

The purpose of this exhibit, held 17-23 October 1980 in Detroit, was to show interested health professionals from the United States and foreign countries appropriate water supply technologies developed under AID auspices. The devices shown were: 1) the AID handpump; 2) the Robometer (a low-cost, household, user activated, CO<sub>2</sub> cartridge powered device to release measured volumes of water); 3) the Robovalve (a PVC heavy duty, essentially leak proof, faucet/valve for use on public and private water hydrants); and 4) the Roboscreen (a low-cost PVC slotted pipe to screen out gravel and sand in well pipes). The booth was manned by two consultants who had participated in the design and field testing of the equipment--one from Georgia Tech and the other from the University of Maryland.

The AID booth was of special interest to health professionals concerned with developing countries and improving their water supplies. Over two hundred

visitors stopped at the booth over the four-day period. Numerous inquiries have been followed up with technical information.

*For further information, contact Mr. J. Beverly.*

**OTD #3** **October 6, 1980: Completed**  
**PROJECT DESIGN MANUAL REFERENCES  
DEVELOPMENT - NEAR EAST BUREAU**

The Near East Bureau developed a manual to assist USAID staff in identifying and describing water supply and sanitation projects in the field. An important component of the WS&S PID Manual is its 'reference library' consisting of seventeen texts, papers and reports, some unpublished, which was supplied by WASH under this OTD. Similar 'library sets' and bibliographies on relevant water supply and sanitation themes will be developed on request from Missions and Bureaus.

*For further information, contact Mr. J. Beverly.*

**OTD #4** **October 16, 1980: Completed**  
**COMPETENCY-BASED TRAINING/PLANNING  
FOR AGENCY - DS/HEA; AID/W**

The purpose of this OTD was to collect and analyze information about training in past and present AID projects involving water and sanitation components. The results of this analysis will be used by WASH in responding to training assistance requests from Missions and Bureaus and in planning training conferences, workshops and seminars. This process is aimed at developing appropriate strategies and guidelines for the training aspects of water supply and sanitation project design, implementation, and evaluation at all levels in developing countries.

*For further information, contact Mr. C. Hafner.*

**OTD #5** **October 16, 1980: Completed**  
**UNICEF/PAN AMERICAN HEALTH ORGANI-  
ZATION WS&S WORKSHOP AND DISCUS-  
SION OF WASH SERVICES, LIMA, PERU -  
PAHO; DS/HEA**

This meeting was one of six held by UNICEF in its several regions for the purpose of defining UNICEF's activities during the International Drinking Water Supply and Sanitation Decade, 1981-1990. It was held in Lima, Peru 17-22 November 1980.

The purposes of having a representative of the WASH Project present were: 1) to learn more about UNICEF's and PAHO's plans and programs for the Water Decade; 2) to explain the WASH Project and how its work could be coordinated with the others; and 3) to meet LDC people active in water supply and sanitation. Sixty people participated in the Workshop from twelve countries. The program included 'position papers' by UNICEF and PAHO, papers on health education and development of human resources (training), case studies from Paraguay and Peru, and discussions of possible financial patterns for water supply and low-cost sanitation in slums and rural areas.

The International Reference Center for Community Water Supply of the Hague presented a description of its POETRI-Program on Exchange and Transfer of Information--which involved some sixteen countries as of June 1980 and is expected to include more in the future. PAHO also described its Latin American Information and Documentation Network in Sanitary Engineering and Environmental Sciences. The WASH Project will work closely with these networks on information generation and exchange. Mr. Chanlett, the WASH consultant, made a flip-chart presentation of the WASH Project objectives and procedures.

These presentations were followed by workshops to design check-lists for use in developing water supply and sanitation projects in slum and rural areas.

The workshop achieved its objectives and highlighted two pressing needs for water supplies in Latin America--training of water supply workers and maintenance of water supply systems. Participants learned about the WASH Project and the AID mission in Peru became especially well informed about WASH through Mr. Chanlett's several visits. See WASH Field Report No. 30.

*For further information, contact Dr. R. Isely.*

**OTD #6** **October 27, 1980: Completed**  
**SOCIAL SCIENCE ANALYSIS FOR WS&S: AID ADMINISTRATOR BENNET PROJECT EVALUATION - PPC/EI**

As part of its program of impact evaluation of rural projects, the Bureau for Program and Policy Coordination (PPC) requested social science expertise on Peru from the WASH Project.

A qualified social scientist was needed to do a document search and data analysis on health, socio-economic, institutional and demographic indicators for the provinces of Ancash and Libertad, Peru. Corresponding information was needed describing the broader characteristics of the sierra region and the nation.

The consultant reviewed documents made available by PPC and prepared summary briefs, tables, charts and graphs relating directly to the geographic and topical areas noted above. The information was submitted in draft form to PPC to be used as background information by the impact evaluation team.

An anthropologist with field experience in Peru, Dr. Charlotte Miller, was engaged for this OTD. For a summary of her work see WASH Field Report No. 1.

*For further information, contact Dr. R. Isely.*

**OTD #7** **November 3, 1980: Completed**  
**ORAL REHYDRATION THERAPY: REVIEW DISCUSSION OF NEED FOR USING POTABLE WATER IN ORT SOLUTIONS - DS/HEA; DS/POP**

The purpose of this OTD was to obtain the professional counsel of Dr. Lincoln Chen of the Harvard University School of Public Health for a meeting held in AID on November 13, 1980. Major issues discussed were the effects of oral rehydration solutions made with contaminated water and how the provision of potable drinking water might improve health and have a desirable effect on morbidity, mortality and fertility rates, and on nutrition.

The major conclusion, given what is now known, was that there did not seem to be much support for including a disinfectant in oral rehydration solution packets, although a shift in this opinion might be warranted when further research has been done. It was suggested that further studies be conducted for the provision of safe household water supplies and for 'rethinking' the whole water supply and health model.

The results of this meeting, which includes a limited literature search on oral rehydration fluids and disinfection, may be found in WASH Technical Report No. 2.

*For further information, contact Dr. R. Isely.*

**OTD #8** **November 4, 1980: Completed**  
**PAN AMERICAN HEALTH ORGANIZATION/CARIBBEAN COMMUNITY WS&S PLANNING MEETING IN BARBADOS - PAHO; DS/HEA**

The purpose of this international meeting, sponsored by the Pan American Health Organization and the Caribbean community, was to discuss: 1) proposed national environmental health activities in the Caribbean to improve programming 2) the International Drinking Water Supply and Sanitation Decade; and 3) the new AID Water and Sanitation for Health Project (WASH) which began operating in September, 1980. Twenty senior

environmental, health project and engineering officers from Caribbean countries and international agencies attended the meeting.

The wide-ranging discussions covered most of the water supply and sanitation spectrum of the Caribbean area with emphasis on accelerating implementation of funded projects being held up by paper work, on the need for technical training, sanitation education for the population, improved water quality control, and up-dated environmental legislation from its 1932 and prior year bases. A significant concern was for the necessity of national commitment for Water Decade goals by the entire cabinet of each country in addition to the Ministry of Health.

A major recommendation was that the concepts, manuals, guidelines and personnel of the Caribbean Basin Water Management Project be replicated with appropriate modifications elsewhere in the world as a proven methodology to train the personnel so urgently needed for the success of Water Decade Programs.

The presentation of the WASH Project was made by consultant Mr. Charles Pineo, who emphasized that the principles, policies and programs of both the Water Decade and the WASH Project must be explained and reinforced by extensive person-to-person contact if their collective goals are to be reached.

*For further information, contact Dr. R. Isely.*

**OTD #9** **November 9, 1980: Completed**  
**RURAL WATER SUPPLY REVIEW - HAITI**

AID has supported the CARE and other PVO rural water supply projects in Haiti for several years with good results but with much room for improvement and expansion. The services of the WASH Project Director, James Arbutnot, were made available to the AID Mission for two weeks to review the existing situation and make suggestions for improvements in WS&S planning, operations, maintenance and training.

Fourteen rural water systems were visited. Significant problems observed included use of PVC pipe in exposed, above ground placements with risk of damage and unauthorized diversion of water (metal pipe would minimize these hazards); lack of proper attention to the drainage requirements of new water fountains with consequent mosquito breeding; and absence of formal provision for system maintenance, including training. Equipment, such as portable kits for field testing of water for coliforms, and for laboratories, is also needed.

Since a dozen or more PVOs are active in Haiti's water supply and sanitation development, a major recommendation is that WASH support a practical workshop for all local PVO's and others concerned with water supply and sanitation in Haiti. The workshop could be built

around case histories of local PVO successes and failures and would provide a basis for better planning, control and training. See WASH Field Report No. 2 and OTD Nos. 129 and 140.

*For further information, contact Dr. D. Warner.*

**OTD #10** **November 21, 1980: Cancelled**  
**REGIONAL HEALTH OFFICERS CONFERENCE PARTICIPATION FOR WEST AFRICA - REDSO/WA; AFR/DR**

After the WASH Project staff had spent several days organizing a presentation and procuring documents for distribution at this Conference, scheduled for 7-13 December 1980 at Abidjan, Ivory Coast, a decision was made by the Africa Bureau to delete the subject of water and sanitation from the agenda.

However, the documents on water supply and sanitation that were to have been distributed at the Conference were mailed to the participants at their missions.

*For further information, contact Mr. J. Beverly.*

**OTD #11** **November 21, 1980: Completed**  
**LOCAL MANUFACTURING FOR WATER SUPPLY AND SANITATION DEVICES - PHILIPPINES**

The AID offices of Capital Development and Engineering in Manila have programmed the local manufacture of AID handpumps and Roboscreens, which are used in wells and infiltration galleries to screen out sand. They requested WASH Project assistance in laying out the scope of work for the procurement, supervision and production of this equipment and of complete wind-powered water pumping system/facilities.

A WASH consultant from Georgia Institute of Technology spent a week in the Philippines with the AID Mission, inspected local manufacturing facilities, and drafted a proposed scope of work for a local manufacturing program to produce 250 shallow-well handpumps, 250 deep-well handpumps, and spare parts over a 24 month period. The draft program also includes four pilot projects of communal water systems/facilities powered by wind energy to be designed, procured, installed and operated during an 18-month period.

The draft scope of work was reviewed by the Mission and has resulted in OTD #40. See below and WASH Field Report No. 3.

*For further information, contact Dr. D. Warner.*

**OTD #12** **November 21, 1980: Completed**  
**RESEARCH AND DEVELOPMENT: PROTO-  
TYPE WS&S DEVICES - DS/HEA**

The purpose of this OTD was to review options, prepare recommendations to DS/HEA for discussion, and develop a subcontract with an organization having highly innovative, inventive industrial and mechanical engineering professionals with demonstrated expertise in going from concept to operational prototype in short periods of time. Subcontractor should have a well-fitted mechanical shop with equipment capable of working with a wide variety of metals and plastics. A suitable testing laboratory should also be available.

The selected subcontractor may be working on a variety of non-proprietary devices ranging from water meters to windmills over the next several years. Work on these devices would be initiated by OTD's.

Subcontractor could have more than one facility, but at least one facility in the Washington, D.C. area is necessary so that international donor personnel and WASH staff can participate in product development and trouble shooting/ design of devices. Georgia Tech Research Institute was selected to provide these R&D services. Georgia Tech in turn has a subcontract with the University of Maryland for joint use of the latter's International Rural Water Resources Development Laboratory at College Park, Maryland in addition to its own R&D facilities in Atlanta, Georgia.

*For further information, contact Dr. D. Warner.*

**OTD #13** **December 1, 1980: Completed**  
**ITALIAN EARTHQUAKE RELIEF ASSISTANCE  
OFDA (OFFICE OF FOREIGN DISASTER  
ASSISTANCE)**

Following a visit to the disaster areas near Naples by an AID representative in early December 1980, the WASH Project Staff was requested to identify and contact United States and European sources of suitable sanitation equipment that was available for shipment to the disaster area. Estimates of the homeless population ranged from 50,000 to over 150,000 people.

In a four day period WASH staff, by telephone and cable, identified some 19 sources of commercial excreta disposal facilities, individual home water supply treatment equipment and chemicals, individual laundry and shower facilities and chlorine residual comparator test kits for public water supplies. A variety of alternative construction, installation and operational modes for communal facilities were described and rough cost estimates prepared. These ranged from locally constructed latrines and showers to the use of field-erected and prefabricated sanitary and laundry units from foreign suppliers.

A twenty-five page report (plus technical appendices) outlining twelve alternative solutions to the community water supply and sanitation situation was dispatched by courier to Naples on December 13, 1980, for use by the local U.S. Disaster Relief Team. See WASH Field Report No. 25 and OTD No. 42 below.

*For further information, contact Dr. D. Warner.*

**OTD #14** **December 11, 1980: Completed**  
**PERI-URBAN AND RURAL WATER SUPPLY  
AND SANITATION PROGRAM REVIEW AND  
PROJECT DEVELOPMENT - ECUADOR**

This task for USAID/Ecuador had two distinct parts: peri-urban and rural. The peri-urban review and assessment involves working with an Ecuadorian private volunteer organization (Fundacion Natura) and local municipal sewerage companies in Quito, Guayaquil and other cities. The work included analyzing environmental sanitation and sewerage problems, plans and constraints, suggesting alternative strategies, identifying high priority projects, and making over-all recommendations. Constraints of concern were high-cost inappropriate technologies, lack of trained manpower and funding, and absence of policy direction.

The technical analysis in selected rural towns is of integrated approaches that include low-cost housing, water, sewerage and related infrastructure, social services and employment generation/training activities. This task has provided AID with a unique opportunity for on-the-job training. Under the experienced guidance of Mr Charles Pineo, a young U.S.-educated sanitary engineer gained hands-on exposure to developing country situations by assisting in data collection, interviewing and drafting reports. While developing countries have shortages of trained water supply and sanitation personnel, developed countries like the United States have a shortage of professionals who are qualified by field experience to be effective in developing countries. The WASH Project is an effective mechanism for the United States and AID to increase the supply of water supply and sanitation professionals experienced in developing country work. See WASH Field Report Nos. 9 and 12.

*For further information, contact Dr. D. Warner.*

**OTD #15** **December 12, 1980: Completed**  
**WELL DRILLING EQUIPMENT SPECIFICA-  
TIONS AND PROCEDURES - TUNISIA**

As part of its rural potable water subproject, the AID Mission in Tunisia is examining the use of low-cost technology for drilling relatively shallow wells (maximum 200 meters) having low to moderate yields. The government of Tunisia is experienced in drilling larger and deeper wells for irrigation water and needed

assistance in preparing a suitable invitation for bidders for the purchase of a smaller, less expensive drilling rig. The Mission was also interested in the use of PVC in well casing and screens.

An experienced well driller visited Tunisia in December 1980, conferred with AID and Tunisian officials, and drafted bid specifications and the personnel specifications for a well drilling adviser to train Tunisians in the use of top head drive rotary drills.

The consultant provided technical information and guidance on the use of PVC well casing and screens, but recommended that steel casing and screening be used initially. Later on PVC could be used in areas where drilling is relatively uncomplicated and straightforward and the crews are more experienced with the new drilling rig.

There are two Tunisian government agencies interested in using the proposed technology. One has had considerable experience with operating and maintaining heavy equipment. If the other agency is assigned the technology, an intensive training program will be required. See WASH Field Report No. 4.

*For further information, contact Dr. D. Warner.*

**OTD #16** **December 15, 1980: Completed**  
**WATER SUPPLIES FOR RURAL LAND RECLAMATION -MAURITANIA**

The AID Mission in Mauritania needed assistance with a Project paper for rural land reclamation intended to improve the traditional construction of 'barrages' (dams). The dams retain rainwater runoff for recessional agriculture in the dry-land interior of the country, e.g., earth/rock dams are broken in October and the moist soil behind the dam (70-150 hectares) is used for agriculture. The dams are later patched up for the next rainy season.

The centuries old practice of recessional agriculture commonly induces water related diseases - schistosomiasis, malaria and parasitic infections especially when the communities around the temporary ponds use them for drinking water, watering livestock and bathing. Shallow wells dug nearby also become contaminated by human and animal wastes.

The Mission requested short-term technical assistance in sanitary engineering and tropical disease control to better identify key issues in this complex environment and to suggest alternative courses of action to deal with them. Ideas suggested to the Mission included establishing schistosomiasis surveillance and control teams; a pilot project in one dam area to chemically control urinary schistosomiasis; to disturb snail growth and kill mosquito larvae by fluctuating the water level behind the dams; and to provide better wells for human and animal

use. See WASH Field Report No. 11.

*For further information, contact Dr. R. Isely.*

**OTD #17** **December 23, 1980: Completed**  
**REVIEW OF APPROPRIATE WATER SUPPLY TECHNOLOGIES, IMPLEMENTATION PLANNING, LOCAL MANUFACTURING AND TRAINING - EL SALVADOR**

This OTD was to provide support for one component of a larger potable water supply and sanitation project in El Salvador. WASH consulting services were requested to provide guidance in: 1) field investigations to select sites; 2) review and selection of appropriate technologies; 3) development of manuals describing installation, operation, and maintenance of the technologies; and 4) training in same.

Technologies to be considered for use in five to ten localities included: solar, wind, or hydraulic energized pumps; storage tanks; homemade filters; utilization of rain water through dams or cisterns; and disinfecting systems. The technologies should be easily operated and maintained, low cost, durable and appropriate to the locality.

The WASH Project Manager in the Office of Health realized that it was difficult, if not impossible, to find one person having the necessary knowledge and skills and suggested that two people be used. One would be an internationally experienced rural water supply and sanitation engineer and the other would be well versed in the practices of appropriate technology adaptation, implantation, manufacturing and marketing. The mission concurred and the WASH project was prepared to send qualified people to El Salvador when the political situation shifted. The Mission requested that technical assistance support be temporarily postponed. A brief review and bibliography of appropriate technology for rural water supply and sanitation suitable for El Salvador was prepared as WASH Field Report No. 26.

*For further information, contact Dr. D. Warner.*

**OTD#18** **December 24, 1980: Completed**  
**WS&S IMPLEMENTATION PLAN DESIGN FOR RURAL WATER PROJECT - PERU**

The purpose of this AID Project in Peru was to provide potable water systems, latrines and health education to 420 communities of about 500 inhabitants each in selected regions of the sierra and high jungle over a five year period. The eight million dollar project (five million from AID) will integrate these activities into the primary health programs of those communities and simultaneously strengthen the administrative and technical capacity of the Peruvian Regional Health Office involved in the project.

As the Directorate of Sanitary Engineering of the Peruvian Ministry of Health was experiencing difficulties in getting the Project moving, the AID Mission requested the WASH Project to provide a highly qualified professional, Mr. Harold Shipman, to expedite matters and give general guidance for the Project.

After discussion and review of the Project with AID and Peruvian officials, the WASH consultant left a list of suggestions and recommended revision of the implementation plan, procedures and schedules. His review included observations that the price of locally produced PVC (polyvinyl chloride) plastic pipe and fittings might be higher than imported pipe, and that the foundry industry in Peru could probably manufacture handpumps, an AID supported activity underway in several other developing countries.

Follow-up support by the WASH consultant and other specialists continued after the Directorate of Sanitary Engineering carried out the first round of implementation recommendations. See WASH Field Report No. 6, OTD No. 74 below and WASH Field Report No. 38.

*For further information, contact Dr. D. Warner.*

**OTD#19** **January 14, 1981: Completed**  
**FOOD WASTAGE PROJECT: EXPERT PANEL REVIEW - PPC/E; DS/HEA**

The purpose of this OTD was to coordinate the development of a comprehensive, in-depth review of the Food Wastage/Sanitation Cost-Benefit Methodology Project carried on from 1972-1976 by the University of North Carolina at Chapel Hill and the Institute of Nutrition of Central America and Panama (INCAP). Many questions had been raised about the validity of the conclusions drawn from this project. The hypothetical underpinnings, research design, and statistical inferences, as well as other methodological aspects of the project, were examined in detail.

A panel of outstanding experts in relevant disciplines was assembled and met in February and May at the WASH Coordination and Information Center. Its final report is on file as WASH Technical Report No. 12.

*For further information, contact Dr. R. Isely.*

**OTD#20** **January 16, 1981: Completed**  
**SMALL WASTEWATER STABILIZATION POND DESIGN AND ANALYSIS - LEBANON**

Under an Environmental Sub-project, AID was supporting the American University in Beirut, Lebanon, and the Ministry of Public Health in the design, construction and testing of small wastewater stabilization ponds to treat sewage from small towns. The Mission requested technical advice on design alternatives to minimize construction costs.

After reviewing the situation, plans, sites, operation, budgets and schedules with AID and Lebanese officials, the WASH consultant developed recommendations on the most appropriate and acceptable approaches to small wastewater stabilization pond utilization. See WASH Field Report No. 10.

*For further information, contact Dr. D. Warner.*

**OTD#21** **January 26, 1981: Completed**  
**LATRINE AND WATER CONTAINER DESIGN ANALYSIS, AND PLANNING OF EVALUATIONS AND OF HEALTH MATERIALS - DOMINICAN REPUBLIC**

Under Health Sector Loan II, AID is assisting the Secretariat of Health in the Dominican Republic to provide water supply, latrines and health education in 500 rural villages having 26,500 homes. The Mission requested technical assistance in: 1) designing and carrying out evaluation plans for Health Sector Loan II; 2) providing information on waterseal latrines; 3) preparing specifications for household water containers and water treatment; and 4) designing health education materials for potable water and sewage disposal activities.

As a result of an on-site visit and discussions with AID, government officials and several manufacturing firms, WASH Staff designed evaluation plans and educational materials and prepared alternative specifications for plastic container manufacturers in Santo Domingo. See WASH Field Reports Nos. 5, 21 and 23.

*For further information, contact Mr. P. Howard.*

**OTD#22** **January 26, 1981: Cancelled**  
**REVIEW OF TESTING PREDICTION SANITATION MODEL PROJECT - DS/HEA**

Cancelled due to conflict of schedule of consultant.

**OTD#23** **January 26, 1982: On-going**  
**PREPARATION OF GUIDELINES FOR WATER SUPPLY AND SANITATION PROJECT DESIGN AND IMPLEMENTATION, INTER-REGIONAL - DS/HEA**

Many missions and several AID Bureau have expressed a need for guidelines of this kind. The WASH staff reviewed relevant AID work and reports on this subject and developed realistic and useful guidelines for water supply and sanitation project design and implementation to be used for and in developing countries. The WASH draft is under review by the Office of Health.

*For further information, contact Dr. D. Warner.*

**OTD#24**

**January 30, 1981: Completed**

**RURAL WS&S SYSTEM DESIGN FOR AID PROJECT PAPER - ECUADOR**

Mission required technical assistance in two areas: rural sanitation delivery systems, and engineering analysis of proposed water supply systems. The IEOS (Ecuadorian Institute of Sanitation Work) needed guidance in determining specific numbers of persons to be trained, person-months and types of technical assistance to be provided, vehicle requirements, and inter-governmental agency organizational restructuring.

The engineering analysis was of preliminary water system designs for a dozen communities of 200-2,000 inhabitants. It included review of cost estimates and technical design appropriateness, handpump quantities, need for additional small systems and assessment of appropriate excreta disposal systems. Recommendations also contained suggestions for community involvement in planning, design, operation and maintenance of water and sanitation systems. See WASH Field Report No. 13.

*For further information, contact Dr. D. Warner.*

**OTD #25**

**February 12, 1981: Completed**

**RURAL SANITATION MANPOWER DEVELOPMENT (RSMD): WORKSHOP AND PROGRAM ASSISTANCE--INDONESIA**

The Government of Indonesia, with AID support, was in final planning stages of its Rural Sanitation Manpower Development (RSMD) Project, and requested WASH guidance on the project and for a training workshop starting February 24, 1981.

The scope of work for this OTD included:

1. Presentation at the workshop of latest water supply and sanitation appropriate technology (AT) alternatives. Content of workshop was designed to guide AT development programs in ten Indonesian regional training centers.
2. Formulation and servicing of plans for technological research and development.
3. Consultation with groups or individuals engaged in work related to development of systems and practices for effective wide-scale application of appropriate techniques and methods.
4. Consultation on incorporating recent techniques and methods into the training of sanitation personnel, specifically for the training of trainers.
5. Consultation on curriculum development for in-service training and/or retraining of existing sanitation personnel.
6. Review and comment on approximately 12 proposals for research already submitted by RSMD staff in

Regional Centers.

See WASH Field Report No. 16.

*For further information, contact Dr. R. Isely.*

**OTD #26**

**February 13, 1981: Completed**

**PROJECT DESIGN ASSISTANCE FOR HEALTH AND ENVIRONMENTAL MONITORING PROJECT (HEMP) AND WATER SUPPLY AND SANITATION MANPOWER TRAINING--TANZANIA**

USAID Mission Dar es Salaam requested project design support for work with the Ministry of Lands, Housing and Urban Development (ARHDI) on training, and with the Muhimbili Medical Center (MMC) in the Department of Community Medicine, University of Dar es Salaam, on the Health and Environmental Monitoring Project (HEMP).

The work in training with ARHDI concerned development of a sanitation education master plan and the possible creation of new facilities. Facilitation will involve public health engineering curricula at the University, technician training at the ARHDI Institute, health officer training at three regional centers, health educator training at Muhimbili Hospital, and health assistant training. This work will provide background information for a Project Identification Document (PID).

A PID has been completed for the HEMP Project but specific assistance is needed to prepare the scope of work and identify design team composition for the HEMP Project Paper. As now envisaged, HEMP has four phases spread over a five year period: planning, baseline and environmental assessment (including sanitation education and construction of appropriate sanitation devices); follow-up monitoring and assessment of sanitation interventions; and final analysis of data and publication of results. See WASH Field Report Nos. 7 and 8

*For further information, contact Dr. D. Warner.*

**OTD #27**

**February 13, 1981: Completed**

**EVALUATION OF RURAL HEALTH PROJECT - NIGER**

USAID/Niger requested two French speaking consultants to participate in a four-man evaluation team and visit Niger 14 March or earlier. Desired skills provided were in development economics and rural water supply and sanitation. The Evaluation team was headed by Dr. Donald Ferguson, DS/HEA.

Components of the project to be evaluated included: public health administration (epidemiology, logistics, supplies distribution, cold chain, construction of dispensaries); training (curriculum development at the certified

and state level nursing schools); supervision and management of rural health teams; rural sanitation and water supply; and cost control.

*For further information, contact Dr. R. Isely.*

**OTD #28** **February 19, 1981: Completed**  
**REPRESENTATION OF DS/HEA AND WASH AT CONFERENCE OF WORLD FEDERATION OF PUBLIC HEALTH ASSOCIATIONS, CALCUTTA, INDIA, 23-26 FEBRUARY 1981 - DS/HEA**

Dr. Isely's purpose in Calcutta was to set-up and man an AID/WASH display, participate in the conference as an international health expert, as appropriate and requested, and explain the WASH Project to all concerned. A folding graphic and photographic display of WASH functions was prepared and sample AID Robovalves and Roboscreens were taken for exhibition, along with relevant descriptive information for distribution. Dr. Isely also visited the National Environmental Engineering Research Institute (NEERI) at Nagpur, India, to discuss the WASH Project and possible modes of collaboration. See WASH Field Report No. 14.

*For further information, contact Dr. R. Isely.*

**OTD #29** **February 19, 1981: On-going**  
**DEVELOPMENT OF LOCAL CAPABILITY TO FABRICATE HANDPUMPS AND WELL SCREENS - HONDURAS**

USAID Mission/Honduras requested WASH assistance in local manufacture of the AID Handpump and Roboscreen. WASH sub-contractor, Georgia Institute of Technology, has worked with a local foundry to manufacture the AID Handpump. Frequent supervision of the foundry operation was provided by personnel of the Central American Research Institute for Industry (ICAITI) in nearby Guatemala, and, in March 1982, Georgia Tech personnel conducted final acceptance inspection of 150 Honduran/AID handpumps. Sites were selected for installing 30 of these pumps as well as 10 Dempster pumps, 10 Moyno pumps and 10 locally-manufactured SANDPAR pumps in order to compare their performance. Installation of the handpumps and assistance in developing a program and manuals for their operation and maintenance will be conducted under WASH OTD No. 85.

*For further information, contact Mr. D. Donaldson.*

**OTD #30** **March 2, 1981: Completed**  
**PARTICIPATION IN XIII CENTRAL AMERICAN CONGRESS OF SANITARY ENGINEERING MEETING, 16-20 MARCH 1981, GUATEMALA CITY - GUATEMALA**

USAID/Guatemala and ROCAP indicated that this meeting would be a good opportunity to present the WASH Project and its capabilities to Latin American engineers who were assembling to discuss Central American cooperation during the U.N. International Drinking Water Supply and Sanitation Decade.

The WASH consultant, Mr. Charles Pineo, briefed the AID Mission and ROCAP on WASH, and became part of the program of the Congress. See WASH Field Report No. 15.

*For further information, contact Dr. D. Warner.*

**OTD #31** **March 11, 1981: Completed**  
**WASTEWATER TREATMENT DESIGN REVIEW AND GUIDELINE PREPARATION - JORDAN**

USAID/Amman and the National Planning Commission had reviewed the need and value of the 'standardization' of design, construction, operation and maintenance of wastewater treatment processes and plants in the cities and rural towns of Jordan. The number of projects and feasibility studies underway and planned (over a dozen) merited the development of a set of wastewater treatment guidelines for the use of all concerned, hence this Order of Technical Direction.

The WASH consultant 1) analyzed and evaluated the feasibility studies and designs for all wastewater treatment plants and processes under review in Jordan, including plant visits for consideration of appropriateness and of effluent quality, standards, and self-purification of receiving waters as a function of treatment; 2) participated in a round-table conference on design review and discussion of guideline scope and contents with Jordanian and AID officials and consultants; and 3) prepared an outline of guidelines and recommendations for the National Planning Commission. See WASH Field Report No. 17.

*For further information, contact Dr. D. Warner.*

**OTD #32** **March 16, 1981: On-going**  
**COORDINATION OF WASH INFORMATION ACTIVITIES AND EXCHANGE WITH INTERNATIONAL INFORMATION CENTERS - DS/HEA**

The purpose of the WASH Project Information Center is to provide information gathering synthesis, reproduction, dissemination and follow-up services, including WS&S

guideline development, to AID field Missions, Regional Geographic Bureaus and other offices of AID. The Information Center is a clearinghouse information retrieval facility which stores and disseminates WS&S information on request.

To further the development of WASH Project international information capabilities, the WASH Information Director is authorized to visit specified information organizations and centers in Europe, Asia, and Latin America. These organizations are cooperating with the International Reference Center for Community Water Supply and Sanitation (IRC), The Hague, and its Program on Exchange and Transfer of Information (POETRI) under WHO auspices for the UN Water Decade.

These visits are intended to establish sound, long-term working relationships on WS&S matters concerning information exchange and various modes of collaboration on information development, acquisition, analysis and dissemination. In addition, possible cooperative interactions on WS&S training, technical assistance, and technology transfer/adaptation will be explored. To date, coordinating visits have been made to the IRC, the Intermediate Technology Development Group (London), the Appropriate Health Resources and Technologies Group (London), the Ross Institute (London), the Water Research Center (Stevenage, U.K.), the TOOL Foundation (Amsterdam), the Pan American Center for Sanitary Engineering and Environmental Science - CEPIS (Lima, Peru), the Asian Institute of Technology and its Environmental Sanitation Information Center (AIT-ENSIC) in Bangkok, and the World Health Organization (WHO) in Geneva. See WASH Field Reports Nos. 18, 48 and 64.

*For further information, contact Mr. J. Beverly.*

**OTD #33** **April 6, 1981: Completed**  
**DEVELOPMENT OF TESTING PROTOCOL FOR MOBILE WATER TREATMENT AND DISINFECTION UNITS IN DISASTER SITUATIONS - DS/HEA; OFDA**

A sanitary engineer with background in development and coordination of testing experimental design and protocols for water treatment and disinfection devices was supplied by WASH to act as facilitator between AID/Office of Disaster Assistance, the U.S. EPA (Office of Registration) and the U.S. Army Medical Research and Development Laboratory (Ft. Detrick, MD) in development of chemical, biological and virological testing protocols for mobile water treatment and disinfection units.

*For further information, contact Dr. D. Warner.*

**OTD #34** **April 6, 1981: On-going**  
**COORDINATION AND FACILITATION OF USE OF WASH TECHNICAL ASSISTANCE SERVICE IN AFRICA - AFR/DR; DS/HEA**

The Africa Bureau has requested the services of a Technical Assistance coordinator to work with the AFR Bureau and the field missions for increased utilization and awareness of WASH technical services in water and sanitation. Mr. Craig Hafner, WASH Senior Project Officer, acting in this capacity, is coordinating directly with DS/HEA and AFR/DR officials, desk officers and other personnel as necessary. He has made two trips to Africa and has visited Botswana, Cameroon, Ivory Coast, Kenya, Lesotho, Swaziland and Zaire. So far, five OTDs have resulted from these trips.

*For further information, contact Mr. C. Hafner.*

**OTD #35** **April 6, 1981: Completed**  
**PARTICIPATION IN THE AWWA MEETING, ST. LOUIS, 8-12 JUNE, 1981 DS/ENGR; DS/HEA**

The American Waterworks Association International Affairs Committee(AWWA) extended an invitation to Dr. Mary Elmendorf, WASH consultant, to address the Conference on the general subject of 'Acceptance of Public Water Supply in Developing Countries'. This was also an opportunity to describe the WASH Project to that body.

Coordination was made through Mr. F. Montanari, DS/ENGR, the conference panel chairman. Copies of her paper were prepared for dissemination to interested parties and are available from WASH as Technical Report No. 6, 'Women, Water and the Decade'.

*For further information, contact Dr. R. Isely.*

**OTD #36** **April 6, 1981: Completed**  
**EVALUATION OF RURAL WATER SUPPLY PROJECT - BURUNDI**

WASH assistance was sought through the AID Representative to evaluate an on-going rural water supply project in Burundi. The WASH team assessed the impact of this UNICEF project, investigated other opportunities to increase the accessibility of rural populations to safe water and suggested further means of fostering community health/sanitation education.

The request was for a rural water specialist with technical public health/ sanitation background and a cultural anthropologist with background in rural water supply and sanitation. The team developed criteria for evaluating spring captation, conducted a brief evaluation by visiting representative cross sections of the com-

munes, and reviewed other donor gravity fed water projects to assist in obtaining the most cost-effective systems. See WASH Field Report No. 24.

*For further information, contact Dr. D. Warner.*

**OTD #37** **April 6, 1981: Completed**  
**PARTICIPATION IN SESSION ON WATER, SANITATION AND HEALTH EDUCATION, UNICEF, NEW YORK, 22-23 APRIL 1981 - DS/HEA**

A session involving UNICEF headquarters and field staff plus invited experts from other institutions addressed the complexities of water supply and sanitation, its impact upon health, and the critical mix of interventions which might assure or increase such benefits. Also on the agenda was a discussion of the role of sanitation/health education in water programs. Dr. R. Isely and Mr. C. Pineo were invited by UNICEF to attend the meeting. See WASH Field Report No. 31.

*For further information, contact Dr. R. Isely.*

**OTD #38** **April 8 & 21, 1981: Completed**  
**FURTHER DEVELOPMENT OF RURAL WATER AND SANITATION PROJECT - THAILAND**

WASH pre-project design work assistance was provided for preliminary assessment of technical and economic feasibility of providing clean water to small communities or rural population concentrations of 2,000 or less using piped water systems. Appropriate non-piped alternative supply systems were identified and assessed for certain areas of northeast Thailand. Scopes of work for design and feasibility studies of the above and related matters were also prepared. See WASH Field Report No. 19.

*For further information, contact Dr. D. Warner.*

**OTD #39** **May 5, 1981: Completed**  
**EVALUATION OF THE WATER SUPPLY SYSTEMS MANAGEMENT PROJECT FOR THE NATIONAL WATER AND SEWAGE AUTHORITY (NWSA) - YEMEN**

WASH assistance was sought to evaluate the on-going Water Supply Systems Management project in the Yemen Arab Republic. The project evaluation included:

1. Evaluation of progress towards attainment of project objectives and goals.
2. Recommended revision of project objectives and goals as appropriate and recommended project modifications/reductions if appropriate.
3. Identification and evaluation of problems or conditions which may impede progress towards those objectives.

4. Assessment of steps that can be taken to overcome or minimize those problems.

The request was for a two-person team consisting of a senior expert in water and sewage operations and administration in developing countries, and a training/personnel advisor with water and sewage experience. The team, among other tasks, reviewed all relevant projects, contracts and contractor documents; examined status, capabilities and effectiveness of NWSA's plans, policies, organization, procedures and operations; and made appropriate recommendations towards achievement of project objectives and its goal. See WASH Field Report No. 22.

*For further information, contact Dr. D. Warner.*

**OTD #40** **May 14, 1981: Completed**  
**AID HANDPUMP MANUFACTURE - PHILIPPINES**

As part of the Barangay Water Program (BWP), AID/Philippines requested technical assistance for local manufacture and installation of the AID handpump and training BWP engineers and technicians in well siting, construction and pump installation, operation and maintenance. The WASH sub-contractor (Georgia Institute of Technology) assisted a local foundry in manufacturing the AID handpump and conducted final acceptance inspection of the pumps in March 1982. Georgia Tech has prepared an extensive manual for use by the BWP engineers in well construction and pump installation, operation and maintenance. A week-long seminar was held in April 1982 to train BWP engineers and technicians in the content of and use of the manual. See WASH Field Report No. 54.

*For further information, contact Mr. P. Howard.*

**OTD #41** **June 1, 1981: Completed**  
**TECHNICAL ASSISTANCE OF CULTURAL ANTHROPOLOGIST IN PEACE CORPS TRAINING PROGRAM IN AREAS OF COMMUNITY DEVELOPMENT AND PARTICIPATION IN WATER SUPPLY AND SANITATION - PEACE CORPS; DS/HEA**

The Peace Corps Water and Sanitation Sector organized an intensive 'training-for-trainers' program in New Mexico for 30 'trainers-to-be' May 31 to July 3, 1981, in conjunction with the U.S. Indian Health Service. The trainers were preparing for work in Kenya, Guatemala, Togo, Yemen, Lesotho and Tonga.

The purpose of the training program was to prepare the trainees with basic skills and knowledge in the following areas: the role of the volunteer in development, construction skills, water systems (springs, wells, pumps, hydrology, surveying, system design, etc.), waste disposal, health education and group participation training techniques. In the training program, an

emphasis was placed on the relationship of water and sanitation technologies to community development activities.

WASH provided a cultural anthropologist who provided specific expertise and training capabilities in: 1) the role of the family (with an in-depth look at women's, men's, children's and old person's roles) in community based water/ sanitation projects; 2) community dynamics, that is, what is a community, how are decisions made, what are the leadership patterns, what constitutes group involvement in village projects, etc.; 3) present water/sanitation patterns and habits in the community; 4) individual attitudes, and taboos regarding water supply and waste disposal; and 5) the organization of operations and maintenance activities to support water/sanitation facilities.

*For further information, contact Mr. C. Hafner.*

**OTD #42** **June 12, 1981: On-going**  
**TECHNICAL ASSISTANCE TO AID OFFICE  
OF FOREIGN DISASTER ASSISTANCE  
(OFDA)DS/HEA**

WASH was requested by DS/HEA and OFDA to develop, and to maintain on a stand-by basis, a team of qualified disaster assistance personnel. The team includes experienced water supply and sanitation engineers to provide disaster assessment and coordination services plus technical personnel to operate emergency water purification plants in or near disaster areas. Team members have been selected and trained in advance and are available for short-term overseas assignments on short notice.

WASH disaster teams were deployed for emergency water supply duties in flooded areas of Tunisia in November, 1982, and in Ecuador in January, 1983. See WASH Field Reports 25, 41 and 74.

*For further information, contact Dr. D. Warner.*

**OTD #43** **June 17, 1981: Completed**  
**TECHNICAL ASSISTANCE FOR THE BARAN-  
GAY WATER PROGRAM - PHILIPPINES**

The Barangay Water Program (BWP) is designed to provide potable water via small systems of public faucets or individual house connections, including household storage facilities, to small rural farming and fishing communities.

AID/Manila requested technical assistance from WASH for the start-up, delivery, performance testing and post-completion training, as well as recommendations for improving the SAPANAG BATO water system. Other assistance was desired in refining designs, revising the

post-completion manual, and improving local manufacture of BWP system components. The consultant also inspected each operational BWP 'Level II-A' system, made appropriate recommendations, and produced a set of 35mm color slides of these systems for training, orientation and debriefing purposes. See WASH Field Report No. 57.

*For further information, contact Dr. D. Warner.*

**OTD #44** **June 26, 1981: Completed**  
**TRAINING AND TECHNICAL ASSISTANCE  
FOR TECHNOLOGY DEVELOPMENT AND  
DISSEMINATION IN WATER AND SANITA-  
TION FOR RURAL SANITATION MANPOWER  
PROJECT - INDONESIA**

The Center for Education and Training (PUSDIKLAT) of the Indonesian Ministry of Health is the implementing agency for the Rural Sanitation Manpower Development Project. It requested support from USAID/Jakarta in the design of a program of training and technical assistance in the development and dissemination of appropriate technology in water and sanitation. Specific assistance was needed to refine the proposed design and to identify required program inputs. This work was a follow-on to OTD #25, in which WASH consultants participated in a planning workshop in Batu-Malang, East Java, in March, 1981, on the Rural Sanitation and Manpower Development Project (RMSD). See WASH Field Report No. 28.

*For further information, contact Dr. R. Isely.*

**OTD #45** **July 2, 1981: Completed**  
**VILLAGE HEALTH EDUCATION AND TRAIN-  
ING:PROGRAM PLANNING, IMPLEMENTA-  
TION AND EVALUATION - BENIN AND TOGO**

AID Missions in Benin and Togo requested WASH assistance in village health education and training for program planning, implementation and evaluation. The initial work under this OTD was to assist in the development of a comprehensive three-and-a-half-year plan for providing health education and sanitation services to the Rural Water Supply and Sanitation Projects in Togo and Benin.

Specifically, this included developing the overall strategy and sequencing of events; determining who needs to be trained to do what; designing and implementing training of trainer workshops; developing job aids; and developing management, evaluation and performance analysis procedures and instruments.

In addition, the WASH consultant developed procedures for coordination among groups in Togo and groups outside of Togo, through WASH; assisted in the training

of Togo Peace Corps Volunteers and their co-workers; supported the Peace Corps Associate Director in various planning tasks; and assisted the Benin Peace Corps Director in designing health education training materials. See WASH Field Reports Nos. 27 and 51 and OTD No. 91 below.

*For further information, contact Mr. C. Hafner.*

**OTD #46** **July 7, 1981: On-going**  
**AID HANDPUMP INSTALLATION, MAINTENANCE AND TRAINING PROJECT - HAITI**

AID/Port-au-Prince requested WASH technical assistance in securing and installing AID handpumps and in training suitable public or private agencies, including PVOs, in installation, operation and maintenance of the pumps. The WASH sub-contractor, Georgia Institute of Technology, has obtained AID handpumps from the Dominican Republic, has selected some sites and is installing the handpumps at Camp Perrin and La Gonave. Georgia Tech is also developing an operation and maintenance plan for the pumps being installed. In addition to the Dominican Republic/AID handpumps, some Moyno deep well handpumps and a prototype AID Hand pump manufactured at Fonderie Nationale in Haiti are being installed. Observation of the performance of the latter pumps will provide useful information concerning the feasibility of manufacturing the AID handpump in Haiti.

*For further information, contact Mr. D. Donaldson.*

**OTD #47** **July 24, 1981: Completed**  
**TECHNICAL ASSISTANCE IN REVIEW OF RURAL PRIMARY HEALTH CARE PROJECT PAPER - ZAIRE**

AID/Zaire requested the services of WASH Associate Director, Dr. Ray Isely, to review the Rural Primary Health Care Project Paper with the Mission and Ministry of Health officials. Dr. Isely visited Kinshasa on his return trip to the U.S. from Burundi, where he had been working on OTD #36 - Evaluation of Rural Water Supply Project.

*For further information, contact Dr. R. Isely.*

**OTD #48** **July 24, 1981: On-going**  
**TECHNICAL ASSISTANCE IN HANDPUMP MAINTENANCE AND PLASTIC VALVE AND FAUCET MANUFACTURE - DOMINICAN REPUBLIC**

AID/Santo Domingo requested WASH technical assistance in support of its Health Sector Loan II Project in two areas: handpump quality control and maintenance

and local manufacture of a plastic foot valve and water container faucets. The WASH consultant is making recommendations for a quality control program at the local foundry, the content and format of handpump service manuals being prepared by the Ministry of Health, planning and organizing handpump maintenance programs at regional and community levels, logistical planning for spare parts, and preventive maintenance guidelines and schedules. He is also working with a local firm on the manufacture of the plastic valves and faucets.

*For further information, contact Mr. D. Donaldson.*

**OTD #49** **August 27, 1981: Completed**  
**SURVEY OF POTENTIAL SUBCONTRACTORS FOR HUMAN RESOURCES DEVELOPMENT SUPPORT - S&T/HEA**

The Office of Health requested WASH to survey potential human resources development (HRD) subcontractors with demonstrated effectiveness and proficiency in innovative approaches to the analysis of human resource needs, training system development and implementation, and training system evaluation to support HRD activities.

Relevant selection criteria included knowledge of subject matter in key areas, e.g., operation and maintenance of small water supply systems; language capability in English, Arabic, French, and Spanish; LDC experience; availability; experience in use of performance based systems in solving problems in knowledge, skill and attitudinal areas of performance, demonstrated capability to work in human resource needs assessment and evaluation, personnel and training policy development of job descriptions, task analysis, performance problem solving, training material development, training of trainers, training system development, implementation of training and development of job aids.

*Subcontractors should have competence in a variety of media (print, audio, slides, overhead transparencies, flip charts, etc.), and have production facilities or ready, timely access to such facilities.*

*For further information, contact Mr. Craig Hafner.*

**OTD #50** **September 11, 1981: On-going**  
**TECHNICAL ASSISTANCE IN TECHNOLOGY TRANSFER INCLUDING DEVELOPMENT AND TESTING (LAB AND FIELD) OF LOW COST TECHNOLOGY FOR DEVELOPING COUNTRIES - S&T/HEA**

WASH was requested to provide technical assistance and information to S&T/HEA in the development, adaptation and testing of certain low cost technologies

in water supply and sanitation for developing countries. The scope of this work includes six related sub-tasks:

1. Collection and analysis of technical information on flow limiters, family water purification units, hydraulic rams, 'package' water treatment plants, sewerless excreta disposal units, and alternatives to reciprocating handpumps.
2. Activation and preparation of product development, testing and demonstration facilities under current contracts with Georgia Tech and the University of Maryland.
3. Establishment of a steering committee of experts inside and outside AID, and the planning, organizing and conducting of a seminar on WS&S technology appropriate for manufacture in LDCs over the next several years. The seminar is planned for April, 1983.
4. Review and analysis of simple, low cost appropriate well drilling technologies.
5. Review, analysis and conceptual modification or replacement of Moyno type deep well handpump design to substantially reduce costs and render suitable for LDC manufacture.
6. Provision of professional services of additional consultants as required to perform above sub-tasks.

*For further information, contact Mr. J. Beverly.*

**OTD #51** **August 20, 1981: Completed**  
**IMPLEMENTATION OF WORKSHOP ON EXCRETA DISPOSAL IN NON-SEWERED AREAS - NE/TECH**

The Near East Bureau requested WASH assistance in developing and implementing the above workshop. This included:

1. Contacting speakers and participants in consultation with NE/TECH.
2. Preparing workshop agenda.
3. Arranging for workshop site.
4. Arranging for instructional materials.
5. Taping workshop.
6. Preparing workshop proceedings.

The workshop was held on September 10 in the Conference room of the International Science and Technology Institute (ISTI).

*For further information, contact Mr. Craig Hafner.*

**OTD #52** **August 27, 1981: Completed**  
**PARTICIPATION IN WORKSHOP ON PRIMARY HEALTH CARE, 31 AUGUST TO 3 SEPTEMBER, 1981 IN SOUSSE, TUNISIA - NE/TECH/HPN**

WASH was requested to provide consultant services to NE/TECH/HPN for the above workshop. The purpose of

this workshop was to bring together key health representatives of Near East nations, A.I.D. and other institutions to share their experience with primary health care programs and to discuss the technical, institutional and operational aspects of primary health care programs and their component parts.

The WASH consultant, Dr. Ray Isely, participated in the entire workshop and acted as a leader and resource person for a working session which addressed the role of water supply and sanitation in primary health care programs. Special attention was focussed on the need for water supply and sanitation facilities to serve as models in all health facilities, especially in peri-urban and rural areas. See WASH Technical Report No. 8 and Field Report No. 29.

*For further information, contact Dr. R. Isely.*

**OTD #53** **August 27, 1981: Completed**  
**PARTICIPATION IN AID HEALTH OFFICERS WORKSHOP IN LOME, TOGO, 15-20 NOVEMBER, 1981 - AFR/H**

WASH design and implementation assistance for the above workshop was requested by the Africa Bureau. WASH prepared the agenda and educational materials for that portion of the workshop dealing with water supply and sanitation in relation to the proper planning and implementation of primary health care programs. The remainder of the agenda was planned by the American Public Health Association (APHA).

WASH worked closely with the APHA to ensure that the content of the WASH material met APHA standards for continuing education credits for physicians. Materials were prepared in both French and English. See WASH Technical Report No. 13.

*For further information, contact Dr. R. Isely.*

**OTD #54** **August 27, 1981: Completed**  
**PARTICIPATION IN AID HEALTH OFFICERS WORKSHOP IN CHIANG MAI, THAILAND, 8-14 NOVEMBER, 1981 - ASIA/TR**

WASH participation in the above workshop was requested by the Asia Bureau in order to plan and facilitate discussions of Bureau policy on water supply and sanitation. WASH had earlier provided a draft policy paper. The WASH consultant served as a resource person during workshop sessions and was available to participants for consultation. The American Public Health Association was responsible for the overall organization of the workshop.

*For further information, contact Dr. R. Isely.*

**OTD #55** **September 12, 1981: Completed**  
**ANALYSIS OF HUMAN RESOURCES DEVELOPMENT NEEDS FOR THE HASHEMITE KINGDOM OF JORDAN - JORDAN**

The AID Mission in Amman, Jordan, requested two consultants to assist in developing a national water resources training program. Following intensive preparation in the U.S., the field work included review of human resources development (HRD) in Jordan with AID and relevant agencies, visiting agencies and facilities, reviewing documentation and preparing a preliminary HRD plan, program and schedule. These were discussed with Mission staff and government officials and modified appropriately before formal presentation to the concerned institutions. See WASH Field Report No. 34.

*For further information, contact Mr. Craig Hainer.*

**OTD #56** **September 4, 1981: Completed**  
**WASH PARTICIPATION IN INTERNATIONAL REFERENCE CENTER (IRC) ADVISORY GROUP ON COMMUNITY EDUCATION AND PARTICIPATION (CEP) - IRC; S&T/HEA**

The International Reference Center for Community Water Supply and Sanitation, the Hague, requested, through AID's Office of Health, that WASH provide a working member to serve on the above Advisory Group and to participate in the first meeting of the Group that fall.

The terms of reference of the Advisory Group were:

1. To provide overall guidance to the CEP Programme and coordination with other relevant international activities.
2. To review and evaluate, from a scientific and technical standpoint, the content, scope and dimension of the programme.
3. To recommend priorities for technical cooperation activities, studies and services of the CEP Programme.
4. To provide the Steering Committee for Cooperation Action, donor organizations, banks, and Governments with a continuous independent assessment of the CEP Programme and related activities.
5. To recommend joint plans and actions for the further development of the CEP Programme and other relevant international activities.

See OTD No. 65 below.

*For further information, contact Dr. R. Isely.*

**OTD #57** **September 14, 1981: Completed**  
**TECHNICAL ASSISTANCE TO THE NATIONAL COUNCIL FOR INTERNATIONAL HEALTH (NCIH) FOR THE DEVELOPMENT AND IMPLEMENTATION OF A WATER AND SANITATION WORKSHOP FOR PVOs - S&T/HEA**

WASH was requested to supply technical assistance to the Office of Health in the development, implementation, preparation of proceedings and evaluation of a Workshop on Water Supply and Sanitation for PVOs in collaboration with the National Council for International Health (NCIH). The activities included:

1. Designing and forming the workshop incorporating results of survey of PVOs,
  2. Identifying and selecting speakers with survey input from the planning committee,
  3. Compiling bibliography and supplying selected materials for workshop participants,
  4. Supervising the dress rehearsal of sessions that needed to be rehearsed,
  5. Identifying possible exhibitors for poster sessions, commodity or equipment displays,
  6. Preparing background papers for the workshop,
  7. Assisting with workshop implementation the first week of December 1981, and
  8. Providing technical editing of the proceedings.
- See WASH Technical Report No. 14 and OTD No. 70 below.

*For further information, contact Dr. R. Isely.*

**OTD #58** **October 5, 1981: Completed**  
**TECHNICAL ASSISTANCE TO DEVELOP SCOPE OF WORK FOR IMPACT EVALUATION OF HEALTH SECTOR - DOMINICAN REPUBLIC**

WASH was requested to assist USAID/Dominican Republic in preparing a cost estimate and scope of work for implementing the evaluation plan for Health Sector Loan II. The loan is to provide water, latrines and health education in 500 rural communities. Mortality and anthropometric data for the evaluation will be gathered by local health promoters in 100 communities. The evaluation plan includes sections on sample design; data collection, monitoring, processing and analysis; personnel requirements and qualifications; and a contract schedule with estimated costs by task. See WASH Field Report No. 35.

*For further information, contact Mr. P. Howard.*

**OTD #59** **October 5, 1981: Completed**  
**TECHNICAL ASSISTANCE FOR WATER CONSERVATION SEMINAR - JORDAN**

WASH was requested to support USAID/Jordan in planning and conducting a day-and-a-half water conservation seminar for Jordan's water supply institutions. The work for this task included consultant preparation in the U.S.; discussions with relevant officials in Jordan; orientation visits to water supply/conservation areas in Jordan; planning and implementing the seminar; and preparing a report on the seminar and recommendations to improve water conservation practices in Jordan. See WASH Field Report No. 36.

*For further information, contact Dr. R. Isely.*

**OTD #60** **October 6, 1981: Completed**  
**TECHNICAL ASSISTANCE IN WATER SUPPLY AND SANITATION PLANNING AND TRAINING - SUDAN**

WASH was requested to supply technical assistance in assessing and making recommendations in relation to USAID/Sudan planning efforts in water supply and sanitation in six project areas. These were:

1. Northern Primary Health Care Project - a regional project to construct new health centers in North and South Kordofan Provinces.
2. Rural Health Support - a national dispensary and school construction project contracted to the African Medical Research Foundation of Nairobi.
3. Reafforestation Program - provision of potable water to farmers in this program in conjunction with CARE.
4. Refugee camps on three borders of Sudan - WS&S requirements.
5. Port Sudan Refugee Water Supply Project - in conjunction with CARE.
6. Darfor Region - study of allocation of water for domestic, livestock and agricultural uses.

See WASH Field Report No. 37.

*For further information, contact Dr. R. Isely.*

**OTD #61** **October 5, 1981: Completed**  
**TECHNICAL ASSISTANCE IN OPERATION AND MAINTENANCE OF WATER PUMPING SYSTEMS - MOROCCO**

WASH was requested to provide training for fifteen Peace Corps volunteers in Morocco in the installation, maintenance and repair of selected water pumping systems. The scope of work included collection and preparation of training materials; briefings with Peace Corps staff in the U.S. and Morocco; detailed planning of a four-week training course; conducting training; and

preparing a final report. See WASH Field Report No. 43.

*For further information, contact Mr. D. Donaldson.*

**OTD #62** **October 6, 1981: Completed**  
**TECHNICAL ASSISTANCE WITH HEALTH SECTOR ASSESSMENT - EGYPT**

WASH was requested to provide technical assistance with the health sector assessment in Egypt and preparation of an environmental health working paper. The scope of work included preparation and briefing of WASH consultants at AID/W; in-country travel and briefings with AID/Egypt and government officials; review and analysis of relevant available documents and data; and preparation of a final report. The report reviewed and summarized existing data on environmental determinants of health status in Egypt; identified important gaps in existing data; discussed priority problems, changes and trends; identified institutions and individuals to be involved in further work; discussed interrelationships between health status and AID's assistance to the water, sewage, housing, industrial and agricultural sectors; and concluded with a set of recommendations for AID action. See WASH Field Report No. 33.

*For further information, contact Dr. D. Warner.*

**OTD #63** **October 19, 1981: On-going**  
**TECHNICAL ASSISTANCE IN LOCAL HAND-PUMP MANUFACTURE AND MAINTENANCE - TUNISIA**

AID/Tunisia requested WASH technical assistance in local manufacture, field monitoring and adaptation of the AID Handpump in support of an on-going program. The scope of work includes improving quality control of pump manufacturing at the foundry, assuring that pump designs are properly adapted to conditions in rural Tunisia, and planning and managing an integrated field installation, reinstallation, repair, maintenance, monitoring and training program. WASH subcontractor Georgia Institute of Technology is coordinating activities with AID/ Tunisia, government officials, manufacturing companies and suppliers, and the Ecole Nationale d'Ingenieurs de Tunis (ENIT) which is installing the pumps.

*For further information, contact Mr. D. Donaldson.*

**OTD #64** **October 20, 1981: Completed**  
**TECHNICAL ASSISTANCE FOR WELL SITING - MALI**

USAID/Mali requested technical assistance for recommending siting of twenty-nine wells in twenty-five villages of the First Region of Mali (Yalimane Circle). The WASH consultant was a hydrogeologist with experience in

siting hand-dug and borehole wells using aerial photography, soil resistivity tests and investigative drilling. This work included reviewing aerial photographs in Bamako, working closely with regional and local government officials and technicians, visiting all well site areas, and consulting with the local water committee in Yelimane. See WASH Field Report No. 32.

*For further information, contact Dr. R. Isely.*

**OTD #67**

**November 17, 1981: On-going**

**PREPARATION OF MANUAL ON THE INSTALLATION, OPERATION AND MAINTENANCE OF A PORTABLE PACKAGED WATER TREATMENT AND DISINFECTION SYSTEM - S&T/HEA; OFDA**

WASH assistance was requested by S&T/HEA and the Office of Foreign Disaster Assistance (OFDA) to prepare a manual on the installation, operation and maintenance of a portable packaged water treatment and disinfection system. An instructional manual is needed for use anywhere in the world when the system is sent to disaster areas. The manual, which is being prepared by Camp Dresser & McKee's Operation and Maintenance Group, is designed for ease of comprehension and use by people of diverse cultural backgrounds who may have little formal education or mechanical training. Simple graphics and photos that are culturally neutral are being used where appropriate.

*For further information, contact Mr. F. Rosensweig.*

**OTD #65**

**November 10, 1981: On-going**

**COLLABORATIVE TECHNICAL ASSISTANCE WITH THE INTERNATIONAL REFERENCE CENTER (THE HAGUE) ON 'DIRECTORY OF RESOURCES FOR COMMUNITY PARTICIPATION IN WATER SUPPLY AND SANITATION FOR DEVELOPING COUNTRIES' - IRC**

The Office of Health requested WASH technical support in jointly developing, printing and disseminating a 'Directory of Resources for Community Participation in Water Supply and Sanitation for Developing Countries'. The Directory will be based on existing descriptions of institutions in WASH and IRC files supplemented by information from a questionnaire sent to European and American NGOs, PVOs, bilateral agencies, and other organizations and researchers in community education and participation, and relevant LDC organizations. The Directory will be an essential tool for everyone involved in the Water Decade to facilitate the exchange and transfer of information and guidance on community education and participation. See OTD No. 56 above.

*For further information, contact Dr. R. Isely.*

**OTD #68**

**November 17, 1981: On-going**

**ANALYSIS, DESIGN, PROTOTYPE DEVELOPMENT, AND DEMONSTRATION SYSTEM CONSTRUCTION AND OPERATION OF PAHO 'PUMPLESS PUMP'**

WASH was requested to provide technical assistance to S&T/HEA in the design, testing and demonstration of the PAHO 'pumpless pump' system. The scope of work includes engineering analysis and mathematical modeling of the system, design and construction of a prototype operational model and a field operable system capable of serving a community of 5,000 persons, and the preparation of a user application manual suitable for use in developing countries. Also required is the planning of an information dissemination and demonstration program to alert development officials throughout the world of the operational feasibility of this technology.

*For further information, contact Mr. D. Donaldson.*

**OTD #66**

**November 10, 1981: Completed**

**TECHNICAL ASSISTANCE IN WELL DRILLING FOR PVO FUNDACAO ESPERANCA IN AMAZON BASIN - BRAZIL**

USAID/Brazil requested WASH technical assistance in preparing a proposal for the AID supported PVO Fundacao Esperanca, in Santarem, Para, Brazil. The Foundation needed technical advice in deep well drilling in the highland villages it serves. WASH consultant Dr. William Turner prepared a report which Esperanca will use to obtain funding for its program. See WASH Field Report No. 40.

*For further information, contact Mr. P. Howard.*

**OTD #69**

**November 19, 1981: On-going**

**DESIGN AND IMPLEMENTATION FOR AID HANDPUMP TESTING PROGRAM DOMINICAN REPUBLIC, ECUADOR, HONDURAS, PHILIPPINES AND TUNISIA - S&T/HEA**

WASH was requested by S&T/HEA to design and implement a testing program for the AID Handpump being manufactured in the Dominican Republic, Ecuador, Honduras, Philippines and Tunisia. The scope of work includes shipment of pumps from the countries to the Georgia Institute of Technology, design and execution of a time-stress component testing program, procurement

of test equipment and material, documentation of test procedures and results, redesign and testing of components and systems as appropriate, and preparation of test reports and recommendations.

*For further information, contact Mr. D. Donaldson.*

**OTD #70** **November 19, 1981: Completed**  
**TECHNICAL ASSISTANCE FOR SEMINAR ON HANDPUMPS FOR COMMUNITY WATER SUPPLY IN DEVELOPING COUNTRIES - S&T/HEA**

WASH was requested to supply technical support and information materials for a half-day seminar on handpumps sponsored by S&T/HEA. The seminar was conducted on December 1, 1981, in conjunction with the National Council for International Health (NCIH) Workshop for Private Volunteer Organizations held December 2-4, 1981 (OTD 57).

*For further information, contact Mr. C. Hafner.*

**OTD #71** **November 19, 1981: On-going**  
**DESIGN AND IMPLEMENTATION OF ROBOVALVE TESTING PROGRAM - ECUADOR; S&T/HEA**

WASH was requested to design and implement a testing program for the Robovalves being manufactured in Ecuador. The scope of work includes acquisition and time-stress testing of seventy Ecuadorian-made Robovalves for a continuous day-in and day-out period of three months to determine design, material and fabrication flaws. The work is being done at the International Rural Water Resources Development Laboratory of the University of Maryland.

*For further information, contact Mr. D. Donaldson.*

**OTD #72** **December 7, 1981: On-going**  
**LABORATORY ASSESSMENT AND TESTING OF AID HANDPUMP - S&T/HEA**

WASH was requested by S&T/HEA to provide it with results of a laboratory assessment and testing of the AID Handpump. The results will be based on the World Bank/UNDP approved testing protocol which is being applied by the Consumers Association (CA) of the United Kingdom to some thirty different pumps from all over the world. WASH supplied two AID deep well handpumps manufactured in a developing country to the CA Harpenden Rise Laboratory in Hertfordshire, England, for testing over a twenty month period.

*For further information, contact Mr. D. Donaldson.*

**OTD #73** **December 7, 1981: Completed**  
**TECHNICAL ASSISTANCE IN REVISION OF CARE WATER SUPPLY AND SANITATION PROJECT - INDONESIA**

AID/Indonesia requested WASH technical assistance in reviewing and refining the scope of work of an AID-funded CARE water and sanitation project. Specific assistance was desired to integrate a health education component into the project including the assessment. Plans were formulated for training CARE field staff in health education methods including the use of supportive materials with an emphasis on community participation. See WASH Field Report No. 39.

*For further information, contact Dr. R. Isely.*

**OTD #74** **December 15, 1981: Completed**  
**EVALUATION, PLANNING AND TRAINING ASSISTANCE TO RURAL WATER SUPPLY AND SANITATION PROJECT (RWSS) - PERU**

AID/Peru requested WASH technical assistance for the Rural Water Supply and Sanitation Project (RWSS) in several areas. The work included an evaluation of thirty gravity water system plans to assure that they are of the most appropriate design; assistance to the Ministry of Health's National Directorate of Sanitary Engineering (DSE) in developing a training seminar to encourage closer coordination of RWSS activities; assistance to the DSE in analyzing future technical assistance requirements and in drafting scopes of work; and reviewing DSE's local and international procurement plans. See WASH Field Report No. 38.

*For further information, contact Mr. D. Donaldson.*

**OTD #75** **December 23, 1981: Completed**  
**DEVELOPMENT OF THE NATIONAL SANITATION ENVIRONMENTAL EDUCATION MASTER PLAN - TANZANIA**

AID/Tanzania requested WASH technical assistance to develop the plan recommended in WASH Field Report No. 7 of March 9, 1981, 'Tanzania - A National Environmental Sanitation Education Master Plan - A Preliminary Review.' The scope of work includes collection of relevant information on training and on the status of sanitation programs and projects in Tanzania and the development of the Master Plan based on the Field Trip Report. The Plan will outline educational and training objectives, operational strategies, roles of participating institutions, implementation requirements and schedules, evaluation procedures and estimated financial needs. See WASH Field Report No. 58.

*For further information, contact Mr. C. Hafner.*

**OTD #76** **December 29, 1981: Completed**  
**SMALL WATER SUPPLY SYSTEMS: TRAINING PROGRAM DESIGN AND IMPLEMENTATION WITH AGUA DEL PUEBLO - GUATEMALA**

WASH was requested by AID/Guatemala and Agua del Pueblo, a PVO, to provide technical assistance in the design and implementation of a comprehensive workshop on small scale pumped water supply systems. The program was developed in close collaboration with participating organizations. Its objectives included training in technology and design selection; training in the planning, design, construction, operation and maintenance of small scale pumped water supply systems; and the development of organizational capacities to transfer technical knowledge from the engineer level to the para-professional level. The work had five phases: collection of background data, needs assessment, workshop development, workshop implementation, and adaptation of workshop for other program personnel. The workshop took place July 5-30, 1982, with ten Guatemalan engineers participating. See WASH Field Report No. 56.

*For further information, contact Mr. D. Donaldson.*

**OTD #77** **January 8, 1982: Completed**  
**PLANNING FOR IMPROVED EXCRETA AND WASTEWATER PILOT DEMONSTRATIONS - EGYPT**

AID/Egypt requested a WASH Advance Team to prepare an implementation plan for pilot demonstration projects for improved excreta and wastewater disposal methods in selected unsewered areas of Greater Cairo in the Giza Governorate. If approved, the subsequent implementation of this plan will be a component of the on-going Cairo Sewerage Project. The preparation of the overall implementation plan for pilot demonstration projects included establishing preliminary criteria for areas and site selection; developing a preliminary methodology for collection and analysis of information on proposed sites and of alternative waste handling and treatment methods; identifying and securing agreement on roles and responsibilities of organizations to be involved in demonstration activities; and developing preliminary schedules and estimates of levels of effort. In addition, a preliminary investigation was made of administrative requirements and of the availability of consultants, sub-contractors, local labor and facilities that could be used to implement the pilot demonstrations. See WASH Field Report No. 52.

*For further information, contact Dr. D. Warner.*

**OTD #78** **January 19, 1982: Completed**  
**TRAINING OF SANITARIANS - SENEGAL**

AID/Senegal requested WASH assistance in improving the sanitarian training school of the Senegal Rural

Health project. The work included collecting relevant training materials in French and English; assisting in task analysis and performance objective development; suggesting training activities and appropriate evaluation techniques; designing and assisting delivery of a two week program emphasizing hands-on skills; making recommendations for improving the supervision and continuing education of sanitarians; and preparing a final report. The WASH consultant also assisted in preparation and supervision of the construction of latrines, composting sites, and well protection and deepening activities, which are part of the two week practical training program. See WASH Field Report No. 44.

*For further information, contact Dr. R. Isely.*

**OTD #79** **January 25, 1982: Completed**  
**TECHNICAL ASSISTANCE IN PLANNING DIARRHEAL DISEASE CONTROL SUBPROJECT - INDONESIA**

AID/Indonesia requested WASH to assist ACEH Province officials in planning a diarrheal disease control subproject that includes a water supply and sanitation component. This is part of CHIPPS - Comprehensive Health Improvement Project Province Specific. The work included assessing water supply and sanitation facilities in Kabupaten Pidie, reviewing existing training and supervision activities in water supply and sanitation and the community participation situation, and developing recommendations and appropriate interventions which might be used in the subproject. The team contributed to a work plan for the subproject which integrates water supply and sanitation activities with diarrheal disease control, surveillance, treatment, training, and community participation. See WASH Field Report No. 42.

*For further information, contact Dr. R. Isely.*

**OTD #80** **February 4, 1982: Completed**  
**TRAINING OF TRAINERS WORKSHOP FOR AID HANDPUMP TECHNOLOGY TRANSFER PERSONNEL - S&T/HEA**

The Office of Health requested WASH assistance in the design and implementation of a six day Training of Trainers Workshop for selected personnel involved in the transfer of AID handpump technology. Participants in the training came from Georgia Institute of Technology, the University of Maryland, ISTI and S&T/HEA staff. The purpose of the workshop was to upgrade the training skills of the participants so they could more effectively implement the transfer and proper utilization of the AID handpump in their country. The workshop was held February 21-27, 1982, and covered basic principles of adult learning, needs assessment, writing objectives, and designing and delivering training. Participants were trained in task and performance oriented approaches. See WASH field Report No. 45.

*For further information, contact Mr. F. Rosensweig.*

**OTD #81** **February 4, 1982: On-going**  
**COLLECTION AND ANALYSIS OF AID PROGRAM DATA FOR INTERREGIONAL PLANNING IN WATER SUPPLY AND SANITATION - S&T/HEA**

The Office of Health requested WASH to provide consultant and consultant support services for management and analysis of AID water supply and sanitation data from 1973 to the present. The principal data management consultant analyst is collecting relevant AID programmatic and historic project data base materials and then entering, storing, processing and reading out data in desired formats using standard or self-developed computer programs. Training of consultant analyst in set-up, operation, programming, error analysis and simple trouble-shooting of the computer system has been completed. Basic AID waterrelated project data has been entered into an Apple Computer for tabular and graphic presentation and analysis.

*For further information, contact Mr. J. Beverly.*

**OTD #82** **February 4, 1982: On-going**  
**LOCAL MANUFACTURE OF AID HANDPUMPS - ECUADOR**

USAID/Ecuador requested WASH to provide technical assistance to local manufacturers for the production of up to 30 AID Handpumps and required spare parts for testing at 20 different sites. The scope of work also includes preparation of a quality control manual for production processes and an installation, operation and maintenance manual for field use. In addition, the WASH consultant, Georgia Institute of Technology, will locate well sites, install handpumps and Roboscreens, train local people, and set up a monitoring program for the twenty sites in areas readily accessible on a year round basis. A photo graphic record of the above activities is being prepared to supplement the final report. Production began in August 1982 following selection of local foundries.

*For further information, contact Mr. F. Rosensweig.*

**OTD #83** **February 18, 1982: Completed**  
**TESTING OF OFFICE OF FOREIGN DISASTER ASSISTANCE PORTABLE WATER PURIFICATION UNITS - OFDA; S&T/HEA**

WASH assistance was requested by the Office of Health and the Office of Foreign Disaster Assistance (OFDA) to evaluate the quality of the output of OFDA's portable water purification units. Testing consisted of taking the units to a naturally contaminated water source where water ran through the system for a minimum of ten

minutes. Test samples were then taken of water from both the inlet and outlet lines. Samples were sent in sterilized bottles to a commercial testing lab where total bacteria plate count readings were determined. See WASH Field Report No. 41.

*For further information, contact Mr. D. Donaldson.*

**OTD #84** **February 22, 1982: Completed**  
**TECHNICAL ASSISTANCE IN PROJECT IDENTIFICATION FOR WATER SUPPLY, SEWAGE AND HEALTH SECTOR LOAN PROJECT - DOMINICAN REPUBLIC**

AID/Santo Domingo requested WASH technical assistance in the development of data for a Project Identification Document for the water/sewage/health education element under Health Sector Loan III. The work included reviewing status of past and current projects, resource availabilities and existing plans, assisting in identifying the problem and in the determination of project purpose, scope, size, constraints, desired inputs and outputs, relationships with the government and local organizations, and estimated impacts on beneficiaries and the environment.

*For further information, contact Mr. D. Donaldson.*

**OTD #85** **February 22, 1982: On-going**  
**TECHNICAL ASSISTANCE IN FIELD INSTALLATION, TRAINING, TESTING AND EVALUATION OF HANDPUMPS - HONDURAS**

AID/Honduras requested WASH assistance in implementing Stage II of the Honduras Handpump Project. The scope of work includes installation of several types of handpumps in up to fifty sites selected under Stage I (WASH OTD #29), testing and evaluation of their performance, preparation and testing of a handpump manufacturer's quality control training manual and a handpump installation, operation and maintenance manual. Government health promoters will also be trained in pump installation, operation and maintenance and in water quality testing and well disinfection. The Field Report is nearing completion.

*For further information, contact Mr. D. Donaldson.*

**OTD #86** **March 2, 1982: Completed**  
**ATTENDANCE OF WASH TRAINING OFFICER AT MEETING OF INTERAGENCY TASK FORCE ON HUMAN RESOURCES DEVELOPMENT - U.N. WATER DECADE GENEVA - S&T/HEA**

The Office of Health requested that the WASH Training Officer participate in the March 11 - 12, 1982, Geneva

meeting of the U.N. Interagency Task Force on Human Resources Development. This was part of WHO coordination efforts for the International Drinking Water Supply and Sanitation Decade. The agenda of the meeting included a review of U.N. agency and donor countries' development plans, programs and proposals, a discussion of means to achieve a cooperative approach to Decade HRD, and development of a short- and medium-term plan of action. The Training Officer also stopped in London in order to establish linkages with the Industrial Training Service.

*For further information, contact Mr. F. Rosensweig.*

**OTD #87** **March 26, 1982: Completed**  
**PARTICIPATION IN AIDIS/PAHO REGIONAL SYMPOSIUMS ON HUMAN RESOURCES FOR THE WATER DECADE, PANAMA JULY 26 - AUGUST 3, 1982 - S&T/HEA**

The Office of Health requested WASH to participate in and prepare a workshop for two meetings in Panama City, Panama. The first meeting on human resource development aspects of water supply and sanitation, from July 26 - 30, was sponsored by PAHO. WASH worked with PAHO and the Office of Health in planning and implementing a session of 'Training of Trainers' and in designing and coordinating the working group. Fred Rosensweig participated in both of these activities. The second meeting was the XVIII Congress of AIDIS - Interamerican Association of Sanitary Engineers - from August 1 - 7. Its theme was also human resource development aspects of the International Drinking Water Supply and Sanitation Decade in which David Donaldson participated.

*For further information, contact Dr. R. Isely.*

**OTD #88** **April 26, 1982: Completed**  
**FEASIBILITY ANALYSIS AND DESIGN STUDY OF EFFLUENT REUSE AND NIGHT SOIL DISPOSAL FOR MASERU - LESOTHO**

AID/Lesotho requested WASH technical assistance for feasibility analysis and preliminary design work on utilization and disposition of human wastes from the city of Maseru. The scope of work for the first task, effluent re-use from the sewage treatment plant for crop irrigation, includes a feasibility analysis; determination of rough design parameters, cost/benefits, and/or a preliminary pilot plant design; evaluation of health hazards and control requirements; and preparation of a report. The scope of work of the second task, night soil disposal, includes investigation of alternatives, their feasibility and costs, and recommending the most appropriate method of disposal. Consultants Drs. Okun and Briscoe of the University of North Carolina visited Lesotho in July. See WASH Field Report No. 55.

*For further information, contact Mr. Craig Hafner.*

**OTD #89** **April 27, 1982: On-going**  
**PREPARATION OF A MANUAL ON 'PRACTICAL WATER TREATMENT FOR COMMUNITIES IN DEVELOPING COUNTRIES' - S&T/HEA**

WASH was requested by the Office of Health to prepare a manual on 'Practical Water Treatment for Communities in Developing Countries.' In addition to the technical chapters, introductory chapters will discuss possible users of the manual, education and experience requirements of users, purposes and manners of use of the manual, procedures for up-dating the manual, and the kinds and numbers of human resources needed to operate and maintain the processes included in the manual. A draft manual has been prepared by the University of North Carolina and is under review.

*For further information, contact Mr. D. Donaldson.*

**OTD #90** **April 27, 1982: Completed**  
**SECOND TRAINER OF TRAINERS WORKSHOP FOR AID HANDPUMP TECHNOLOGY TRANSFER PERSONNEL, SEPTEMBER 15-17, 1982 - S&T/HEA**

The Office of Health requested WASH to plan and conduct the second 'Trainer of Trainers Workshop for AID Handpump Technology Transfer Personnel,' September 15-17, 1982. This workshop reinforced and expanded on the material covered in the February 1982 Workshop (OTD #80). Among other topics, it reviewed progress, identified training problems, reinforced training design and delivery skills, and provide practice in using training techniques and writing training materials. Participants were from the Georgia Institute of Technology, and staff from the WASH CIC who are involved in technology transfer operations. The participants also attended a one-and-a-half day, September 13-14 session to discuss administrative and technical aspects of AID handpump activities. See WASH Field Report No. 60.

*For further information, contact Mr. F. Rosensweig.*

**OTD #91** **May 4, 1982: Completed**  
**PLANNING ASSISTANCE FOR RURAL AND VILLAGE HEALTH ACTIVITIES - TOGO**

AID/Togo requested WASH technical assistance for planning rural and village level health activities in plateaux and savane regions. The scope of work included review and revision, as appropriate, of base-line medical, hygiene and water usage surveys and procedures; assisting in the planning of management

and implementation strategies to integrate current affaires sociales activities into the proposed water project health program; and exploration of technical possibilities for alternative water resource development strategies in villages where drilled wells have proven unfeasible. The consultant also worked with government officials to outline ways of increasing community participation in village health activities. Draft reports in English and French are under review.

*For further information, contact Dr. R. Isely.*

**OTD #92** **May 4, 1982: On-going**  
**TECHNICAL ASSISTANCE FOR WORKSHOP  
ON WATER SUPPLY AND SANITATION FOR  
RURAL DISPERSED POPULATIONS - TUNISIA**

AID/Tunisia requested WASH planning and implementation support for a Tunisian Workshop on Water Supply and Sanitation for Rural Dispersed Populations in Arid Countries. The purpose of the workshop was to exchange information and experience on rural water services, on technologies for disinfection at water points and in homes, on equipment and fittings for use at water points, including handpumps, and on related activities. Workshop outputs included recommendations for action and training in the format of an execution plan and the creation of a network of professionals in Tunisia and Francophone Africa. The workshop was held in November 1982 in Tunis. See WASH Field Report No. 67.

*For further information, contact Dr. R. Isely.*

**OTD #93** **May 5, 1982: Completed**  
**TECHNICAL ASSISTANCE IN ADMINISTRATION OF RURAL SANITATION PROJECT - BOLIVIA**

AID/Bolivia requested WASH assistance in improving the administration of the Rural Sanitation Project which is being reprogrammed. The purpose of the project was to create an institutional capability within the Ministry of Social Welfare and Public Health and its Division of Environmental Sanitation to provide potable water and sanitation facilities to small Bolivian rural villages of 800 persons or less. In the past, administrative problems arose which indicated a need for a simplified information and accounting system that would control and report expenditure and would also include USAID, counterpart and community contributions. The WASH consultant assisted the Mission and the Division of Environmental Sanitation in establishing such a system and in related reprogramming activities. See WASH Field Report No. 47.

*For further information, contact Mr. D. Donaldson.*

**OTD #94** **May 6, 1982: Completed**  
**REVIEW OF DESIGN STANDARDS, SPECIFICATION AND COSTS FOR WATER SUPPLY AND SANITATION SYSTEMS FOR LOW INCOME HOUSING - HONDURAS**

The Housing Office in AID/Honduras requested WASH technical assistance to develop mechanisms for accelerating the current process of project implementation, to review current design standards, specifications and costs of WS&S infrastructure systems for low income housing and upgrading programs, and to participate in a seminar on appropriate design standards for water and waste disposal in low income shelter projects in Latin America. The WASH consultant worked closely with the two Honduran water authorities and other public and private sector organizations in the course of review and evaluation activities. See WASH Field Report No. 46.

*For further information, contact Mr. D. Donaldson.*

**OTD #95** **May 7, 1982: On-going**  
**KANYE VILLAGE SEWERAGE AND SANITATION FEASIBILITY STUDY - BOTSWANA**

AID/Botswana requested WASH assistance to conduct a feasibility study for sanitation in Kanye Village, which has a population of about 22,000 people. The scope of work includes analysis of the current situation, evaluation of relevant alternative technologies and preparation of appropriate plan of action.

*For further information, contact Mr. D. Donaldson.*

**OTD #96** **May 15, 1982: Completed**  
**MONITORING AND EVALUATION OF COMMUNITY HEALTH PROMOTER TRAINING COURSE - ECUADOR**

AID/Ecuador requested WASH assistance to observe and review a three week classroom and field demonstration training course being held for community health promoters from eighteen provinces in Ecuador. The course was given by the Ecuadorian Institute of Sanitary Works (IEOS) in conjunction with AID. The purpose of the review was to develop insights and recommendations to strengthen future training courses and the IEOS program in rural water supply, sanitation and community participation. See WASH Field Report No. 49.

*For further information, contact Mr. F. Rosensweig.*

**OTD #97** **May 20, 1982: Completed**  
**TECHNICAL ASSISTANCE IN WELL SITING AND DRILLING - DOMINICAN REPUBLIC**

AID/Dominican Republic requested WASH assistance in

the well siting aspects of Health Sector Loan II. The well drilling program resulted in a high incidence of dry holes which required review. The WASH consultant analyzed the situation and made recommendations to improve the productivity of local well drilling companies. He also assisted in revising the well drilling contracting program to minimize the problem of reduced drilling capacity. See WASH Field Report No. 50.

*For further information, contact Mr. P. Howard.*

**OTD #98** **June 1, 1982: Cancelled**  
**TRAINING ASSISTANCE ON GROUNDWATER  
CONTAMINATION AND QUALITY - COSTA  
RICA**

Training under this OTD may take place in late 1983. A new OTD is to be issued at the appropriate time.

**OTD #99** **June 5, 1982: On-going**  
**HEALTH INFORMATION SYSTEM DEVELOP-  
MENT: MICROCOMPUTER DEMONSTRATION-  
DOMINICAN REPUBLIC**

AID/Dominican Republic requested WASH technical assistance to design and present a demonstration of how information generated by the Secretariat of Health (SESPAS) could be processed, analyzed and displayed using a microcomputer system. Some 6,000 SESPAS primary health care workers, or promotores, are each collecting basic health and household data on 100 - 300 families. Methods of efficiently using this information for analytical, planning and management purposes are under consideration and the microcomputer may provide a cost effective method of processing and analysis. The scope of work includes meeting with Mission and SESPAS personnel to determine the characteristics of the data and the data collection system and to determine appropriate uses of processed data. Based on these findings, a preliminary set of file structures, record formats and displays will be established for demonstration to SESPAS and Mission officials. Suggestions will also be made as to possible hardware/software combinations that might be appropriate for later assessment in a feasibility study (see OTD # 103). The demonstration by the Research Triangle Institute team was given in September.

*For further information, contact Dr. R. Isely or Mr. J. Beverly.*

**OTD #100** **June 29, 1982: On-going**  
**TECHNICAL ASSISTANCE IN TRAINING OF  
TRAINERS FOR PUBLIC HEALTH NURSE  
SUPERVISORS AND IN TRAINING FOR  
SPRING CAPPERS - ZAIRE**

AID/Zaire requested technical assistance in two training

tasks: training of trainers (TOT) for fifteen public health nurse supervisors who will work with village health committees, and training of Peace Corps Volunteers (PCVs) in spring capping techniques. The two week training-of-trainers course was conducted in July and August and emphasized adult learning processes, preparation of training objectives, planning of training sessions, and innovative health education approaches. The WASH training consultant drafted TOT instructional materials for the spring capping course. In the two week Peace Corps spring capping course, held in October, the sanitary engineering training consultant assisted the Peace Corps on-site trainer and emphasized practical site assessment, flow measurement, and physical design. This consultant also advised PCVs and Zairians of possible solutions to water flow, drainage and design problems of existing spring boxes in specific areas and prepared a draft spring capping instructional manual. See WASH Filed Report Nos. 62 and 73.

*For further information, contact Mr. C. Hafner.*

**OTD #101** **June 29, 1982: Completed**  
**EVALUATION ASSISTANCE FOR RURAL WA-  
TER AND SANITATION PROJECT - HONDU-  
RAS**

AID/Honduras requested WASH assistance in evaluating the status of a major rural water supply and sanitation project. The project is intended to provide 247,000 families with access to safe water and to adequate human waste disposal facilities primarily by means of a self-help construction program. Since there have been delays in implementing the project, an administrative evaluation was desired to assess the need for mid-course corrections. A detailed scope of work was prepared. See WASH Field Report No. 69.

*For further information, contact Mr. P. Howard.*

**OTD #102** **June 29, 1982: Completed**  
**TECHNICAL ASSISTANCE ON APPROPRIATE  
WELL DRILLING EQUIPMENT - ECUADOR**

AID/Ecuador requested WASH assistance to provide Meals for Millions/Freedom from Hunger Foundation, a U.S. private voluntary organization operating in Ecuador, with technical advice on well drilling equipment appropriate for local use. Meals for Millions has a project to provide water for improvement of the nutritional and health status of the population of the Santa Elena peninsula in Southern Ecuador. The WASH consultant assessed the situation and capabilities of local organizations to procure, and/or manufacture, operate, and maintain various types of well drilling equipment and recommended the appropriate technology. See WASH Field Report No. 59.

*For further information, contact Mr. F. Rosensweig or Mr. D. Donaldson.*

**OTD #103**

**June 29, 1982: On-going**

**HEALTH INFORMATION SYSTEM DEVELOPMENT: ASSESSMENT AND SYSTEM DESIGN STUDY - DOMINICAN REPUBLIC**

AID/Dominican Republic requested WASH technical assistance to make an assessment and system design study of the data collection activities of the Secretariat of Health (SESPAS) under Health Sector Loan II. Data is being collected by about 6,000 SESPAS primary health care workers (promotores) on 100 - 300 families each. Methods of efficiently using the information for analytical, planning and management purposes are under consideration. Accordingly, the scope of work includes review of forms and of data collection procedures, definition of information requirements, information system design, and preparation of manual and computerized system specifications, as appropriate. Recommendations will identify design assumptions and address trade-offs of manual vs. computerized systems with specific attention being given to accuracy, availability, accessibility, flexibility and possible external applications of data and analyses. Work in the Dominican Republic on this OTD by the Research Triangle Institute team began following its microcomputer demonstration in September under OTD #99.

*For further information, contact Dr. R. Isely or Mr. J. Beverly.*

**OTD #104**

**July 2, 1982: On-going**

**INVESTIGATION OF APPROPRIATE WATER AND SANITATION SYSTEMS FOR LOW COST HOUSING - KENYA**

AID/Kenya and the Regional Housing Office, Nairobi, requested WASH technical assistance in investigating appropriate water supply and sanitation systems for low cost housing in Nairobi. Rising construction costs require that suitable alternative technologies be identified and their feasibility assessed on a preliminary basis. The scope of work includes a review of technologies that might be technically, economically, socially and politically acceptable, discussion of these technologies with AID and Kenyan officials, and preparation of a preliminary report on potentially feasible alternatives for low cost housing.

*For further information, contact Dr. Dennis Warner.*

**OTD #105**

**July 18, 1982: Completed**

**TECHNICAL ASSISTANCE IN LECTURE WORKSHOP ON SANITARY ENGINEERING DESIGN FOR DEVELOPING COUNTRIES - ECUADOR**

AID/Ecuador requested WASH assistance in providing a consultant to participate in a week-long training seminar

in August on cost efficiency in the design and implementation of sanitary engineering facilities in developing countries. The Mission was aware of the computerized Low-Cost System Planning Model developed at the University of North Carolina's Department of Environmental Science and Engineering and felt that a presentation of the model would be of interest and use to the Ecuadorian civil engineering society. In addition to demonstrating the model on a minicomputer, the WASH consultant conducted seminars on efficient sanitary engineering design and appropriate technology. See WASH Field Report No. 63.

*For further information, contact Mr. D. Donaldson.*

**OTD #106**

**July 20, 1982: On-going**

**TECHNICAL ASSISTANCE IN DEVELOPING A NATIONAL DRINKING WATER SUPPLY AND SANITATION PLAN - CENTRAL AFRICAN REPUBLIC**

AID/Central African Republic (CAR) requested WASH assistance in developing a national drinking water supply and sanitation plan similar to that prepared for Sri Lanka. The WASH consultant provided preliminary coordination for plan formulation which included discussions with AID and CAR officials of the water supply and sanitation situation, needs and implementation capabilities; review of resources required to design a national plan; and an initial schedule of plan development activities. Recommendations regarding the preparation of a national plan were influenced by CAR efforts to establish an interministerial national Action Committee, expected in August, and by the degree of cooperation available from the donor community. See WASH Field Report Nos. 53 and 72.

*For further information, contact Mr. C. Hafner.*

**OTD #107**

**July 26, 1982: On-going**

**TECHNICAL ASSISTANCE IN DEVELOPMENT OF INTER-SECTORAL WATER SUPPLY AND SANITATION STRATEGY PAPER FOR THE AFRICA BUREAU - AFR/TR/HNP**

The Africa Bureau Health/Nutrition/Population Division requested WASH assistance to develop an inter-sectoral water supply and sanitation (WS&S) strategy statement. WASH consultants have been drafting an Africa WS&S strategy paper primarily from the health sector viewpoint and with an emphasis on human and institutional resource development. In reviewing this paper, the Africa Bureau recognized the need for a broader, more comprehensive inter-sectoral perspective and requested an appropriate revision of the paper.

*For further information, contact Dr. Raymond Isely.*

**OTD #108** **August 16, 1982: Completed**  
**TRAINING ASSISTANCE TO THE ASSISTANT  
SANITARY TECHNICIAN SCHOOLS - CAM-  
EROON**

AID/Cameroon requested WASH training assistance for the Assistant Sanitary Technician Training Schools at Limbe and at Yaounde. Three consultants are required: one French speaking trainer of trainers for Yaounde, an English speaking trainer of trainers for Limbe, and an English speaking sanitarian also for Limbe. The scope of work for Limbe includes preparation of a technician task analysis; preparation of course objectives, syllabi, and training materials; the design, development and introduction of a community participation component in existing training programs; and preparation of evaluation instruments. Also included for both schools is the planning, designing and conducting of ten day training-of-trainers workshops in French and English.

*For further information contact Mr. C. Hafner.*

**OTD #109** **August 20, 1982: On-going**  
**TECHNICAL ASSISTANCE TO PEACE CORPS  
WATER SUPPLY AND SANITATION SECTOR -  
S&T/H/WS**

WASH was requested to assist the Peace Corps in a review of its water supply and sanitation activities to serve as a basis for planning and implementing future operations in the water supply and sanitation sector. The scope of work includes interviewing key Peace Corps staff, collecting and analyzing relevant documentation and data, identifying strategic opportunities, resource requirements, and possible deployments, and preparing a final report. In addition, the consultants will up-date the 1980-1981 Peace Corps Project Summary of Water and Sanitation Projects for 1982-1983.

*For further information, contact Dr. R. Isely.*

**OTD #110** **August 23, 1982: Completed**  
**COORDINATION/COLLABORATION ON LDC  
TRAINING WITH THE INTERNATIONAL WA-  
TER SUPPLY ASSOCIATION (IWSA) - S&  
T/H/WS**

WASH was requested to have Dr. Daniel Okun of the University of North Carolina participate in a planning meeting of the Committee on Waterworks Personnel of the IWSA in Zurich, Switzerland, on September 6, 1982. The agenda of the Committee included: reviewing the minutes of earlier Working Group meetings as well as reports of Regional Conference (1981-India, 1982-Africa); considering papers for the 1984 Tunis Congress; examining arrangements for Post-Congress Seminars in developing countries; and discussing a proposal for a training workshop to be held for developing

countries in 1983. Dr. Okun, in addition to participating in discussions of the agenda items, also prepared a summary report of the meeting on how the IWSA intends to contribute to Water Decade activities.

*For further information, contact Mr. D. Donaldson.*

**OTD #111** **August 24, 1982: Completed**  
**IN-SERVICE TRAINING FOR PEACE CORPS  
VOLUNTEERS IN RURAL POTABLE WATER  
SUPPLY PROJECT - MOROCCO**

AID/Morocco requested WASH for in-service training of approximately 15 Peace Corps Volunteers (PCVs) in the operation and maintenance of water pumping systems for the rural potable water supply project. Since completing initial training under OTD No. 61 in February 1982, PCVs have identified unresolved problems and have expressed a need for technical assistance. The scope of work included reviewing the situation with PCVs, preparing a work plan and material requirements for in-service training of PCVs, conducting in-service training at selected field sites, and providing assistance in the design of a diesel repair trouble shooting course to be given by others. See WASH Field Report No. 61.

*For further information, contact Mr. F. Rosensweig.*

**OTD #112** **September 1, 1982: Completed**  
**PARTICIPATION IN PRACTICE OF MANAGE-  
MENT SEMINAR - S&T/H/WS**

The Office of Health authorized the WASH Senior Training Officer to participate in a seminar on 'The Practice of Management Principles,' October 25-29, 1982, in Rosslyn, Virginia. The seminar was conducted by the Coverdale Organization, an internationally recognized consulting firm specializing in increasing awareness and skills in the human, non-technical 'process' areas of management. Understanding and proficiency in these areas is vital to the achievement of quality organizational results and the personal satisfaction of those involved. It is anticipated that the approaches and techniques demonstrated in the seminar will be applied to future WASH activities in the area of management training.

*For further information, contact Mr. F. Rosensweig.*

**OTD #113** **September 13, 1982: On-going**  
**TECHNICAL/MANAGERIAL REVIEW OF THE  
AID HANDPUMP TECHNOLOGY TRANSFER  
PROGRAM IN SRI LANKA, PHILIPPINES,  
INDONESIA, HONDURAS, AND DOMINICAN  
REPUBLIC S&T/H/WS**

The Office of Health requested that WASH participate in a technical/ managerial review of the AID Handpump

Technology Transfer Program in Sri Lanka, Philippines, Indonesia, Honduras and Dominican Republic. In their review visits and interviews in the countries, the WASH consultants will consider the current and anticipated future status of: handpump manufacturing, handpump marketing, pricing, and distribution, and the supply and delivery of spare parts; field installation effectiveness; and training and community participation effectiveness. The consultants will also ascertain AID Mission perceptions, involvement and posture concerning current and future handpump technology transfer activities within the context of overall development assistance with emphasis on health and human resource development. See WASH Field Report No. 76.

*For further information, contact Mr. D. Donaldson.*

**OTD #114** **September 8, 1982: On-going**  
**ASSESSMENT AND EVALUATION OF THE  
FEASIBILITY OF LOCAL MANUFACTURING  
OF THE AID HANDPUMP - PERU**

WASH was requested by USAID/Peru to make an assessment and evaluation of the feasibility of local manufacturing and marketing of the AID Handpump and Robodevices in Peru. The scope of work includes assessment of need, effective demand and the competitive situation for handpumps and Robodevices in Peru; identifying and contacting enterprises experienced in foundry and plastic operations to determine their interest in these products; evaluating their manufacturing, marketing, logistic support and managerial experience and capabilities; and preparing a report of findings, conclusions and recommendations. Two Honduranmade AID deepwell handpumps will be made available to Peruvian manufacturers for cost estimating purposes.

*For further information, contact Mr. D. Donaldson.*

**OTD #115** **September 15, 1982: Completed**  
**TECHNICAL ASSISTANCE IN DESIGN OF  
WELL DRILLING PROGRAM - HONDURAS**

USAID/Honduras requested WASH assistance to design a well drilling program for western Honduras. An estimated 3,000 shallow wells--no deeper than 165 feet--are to be drilled over the next two years as part of the rural water and sanitation project. The scope of work included inspecting the project area; recommending most likely well-sites; recommending appropriate well-drilling equipment--hand-portable or mountable on small vehicles; developing a welldrilling plan and schedule; and preparing a final report. See WASH Field Report No. 65.

*For further information, contact Mr. P. Howard.*

**OTD #116** **September 15, 1982: On-going**  
**TECHNICAL ASSISTANCE IN TRAINING SO-  
CIAL PROMOTION AGENTS IN SPRING CAP-  
PING AND RAINWATER HARVESTING - TOGO**

USAID/Togo requested WASH assistance in the training of social promotion agents in village level water supply and sanitation system design and construction as part of on-going AID funded projects. The technical and training instruction given to these agents is to prepare them to assist village populations in developing local springs and rainwater harvesting systems. Field construction is to be included in the training program. The training-of-trainers training plan will address preparation, coordination, training sequence, agenda, and types of performance demonstrations in the field. It will also identify controls to insure that the training materials/methodology used for these efforts with the Togo trainees will result in a package of field tested materials and methodology that can be translated and applied in other country/geographic situations.

*For further information, contact Dr. R. Isely.*

**OTD #117** **September 25, 1982: Completed**  
**TECHNICAL ASSISTANCE IN EVALUATION  
OF FOSTER PARENTS PLAN WATER PRO-  
JECTS INDONESIA**

USAID/Indonesia requested WASH assistance with the technical aspects of evaluating the water projects of the private volunteer organization Foster Parents Plan. The social and health aspects were evaluated by the staff of Foster Parents Plan. To-date some 400-600 wells or spring sites have been developed as part of a 2,000 site water supply program. The scope of work included review of relevant project documents; interviews with staff of AID, Foster Parents Plan, and ministries and with village committees; inspection of existing and planned water source sites; and preparation of an evaluation report. The report considered suitability of location and effectiveness of existing wells and gravity systems, appropriateness of planned sites, construction program, technology selection and training, and the strengths and weaknesses of the overall program. See WASH Field Report No. 71.

*For further information, contact Dr. R. Isely.*

**OTD #118** **September 25, 1982: Completed**  
**TECHNICAL ASSISTANCE IN ASSESSING  
AND PLANNING CARE WATER SUPPLY AND  
SANITATION PROJECTS - CAMEROON**

USAID/Cameroon requested WASH assistance in assessing CARE water supply and sanitation programs and in preparing the CARE 1983-1987 Development Plan. The scope of work had two major tasks. The first

was to assess the current status of CARE-managed water supply and sanitation (WS&S) programs in the Northern and Eastern Regions. Research and data gathering from files and from Ministry and CARE personnel provided the basis for a 1982 status report of the CARE WS&S Program. The second task was to assist CARE in making reasonable and feasible projections of WS&S activities for the next five years. Sub-tasks included the development of practical targets and reasonable 'indicators' against which to measure progress and to prepare a draft of relevant sections of CARE's multi-year plan. See WASH Field Report No. 75.

*For further information, contact Mr. C. Hafner.*

**OTD #119** **September 26, 1982: On-going**  
**TECHNICAL ASSISTANCE IN PLANNING THE EVALUATION OF WATER SUPPLY, SANITATION AND HEALTH PROJECTS - PHILIPPINES**

USAID/Philippines requested WASH assistance in planning the evaluation of several projects that have water supply, sanitation, health and community participation components. These include the PUSH Project (Panay Unified Services for Health), the BICOL Integrated Health, Nutrition and Population Project and the second Barangay Water Project. The scope of work includes reviewing relevant documentation, interviewing AID, Philippines government and UNICEF officials, and drafting a report outlining how the evaluation should be undertaken and what resources would be required.

*For further information, contact Dr. R. Isely.*

**OTD #120** **September 25, 1982: On-going**  
**TECHNICAL ASSISTANCE IN EVALUATION OF WATER SUPPLY, SANITATION AND HEALTH ASPECTS OF SPRING-FED IRRIGATION PROJECT - TUNISIA**

USAID/Tunisia requested WASH assistance in conducting an interim evaluation of the water supply, sanitation and health aspects of a spring-fed irrigation project. The evaluation will be undertaken jointly with the Central Tunisia Development Authority and AID. The scope of work includes reviewing relevant documentation, interviewing AID and government officials, visiting sites and preparing an evaluation report and recommendations.

*For further information, contact Dr. R. Isely.*

**OTD #121** **September 26, 1982: Completed**  
**TECHNICAL ASSISTANCE FOR TRAINING-OF-TRAINERS WORKSHOP FOR PEACE CORPS S&T/H/WS**

The Peace Corps requested WASH assistance in the design and delivery of a training-of-trainers (TOT)

workshop for the Indian Health Service in Alaska. The Indian Health Service engineers and sanitarians who participated in the workshop will serve as technical trainers in the continental U.S. of Peace Corps Volunteers for water supply and sanitation projects. The scope of work encompassed the design and delivery of a three-day TOT workshop and the preparation of a final report which included an evaluation and recommendations. See WASH Field Report No. 70.

*For further information, contact Mr. F. Rosensweig.*

**OTD #122** **September 26, 1982: On-going**  
**TECHNICAL ASSISTANCE IN DESIGN AND DELIVERY OF TRAINING MODELS FOR PEACE CORPS USE IN HANDPUMPS AND SANITATION PROJECTS IN LDCs - S&T/H/WS**

The Peace Corps requested WASH to develop training materials and conduct workshops on handpumps and sanitation facilities for use by Peace Corps Volunteers (PCVs) and their counterparts. The focus will be on planning, installation, operation and maintenance of these devices. The scope of work includes identification of participating LDC institutions and relevant background data; design of workshop, training materials and delivery techniques; conducting two in-service workshops for PCVs on handpumps and two on latrines; revising training design, delivery and materials between workshops; and preparation of final training design suitable for replication elsewhere by the donor/user community.

*For further information, contact Mr. F. Rosensweig.*

**OTD #123** **October 5, 1982: Completed**  
**TECHNICAL ASSISTANCE IN DESIGN AND DELIVERY OF A TRAINING WORKSHOP ON MANAGEMENT TEAM BUILDING - THAILAND**

AID/Thailand requested WASH training assistance in designing and delivering a training workshop on management team building for the Provincial Waterwork Authority (PWA) of Thailand. The workshop is seen as a first step in future PWA activities to strengthen its management and its training capability. Most of the workshop was conducted in Thai. Consultant Dan Edwards assisted in the workshop November 1-5, 1982. See WASH Field Report No. 68.

*For further information, contact Mr. F. Rosensweig.*

**OTD #124** **October 24, 1982: On-going**  
**TECHNICAL ASSISTANCE TO ASSESS SOLID WASTE, WASTEWATER AND WATER SUPPLY SITUATION AND REQUIREMENTS - LEBANON**

USAID/Lebanon requested WASH assistance to assess the solid waste, wastewater and water supply situation and requirements in Lebanon with emphasis on Metropolitan Beirut. The scope of work includes contacting public, private and foreign organizations active in these subsectors; reviewing their activities and plans; estimating USAID/Senegal requested WASH services to plan a workshop on latrine construction and solid waste disposal. The workshop will be for nurses working in the Bakel Health Component of the Irrigated Perimeters Project as well as for other participating institutions that provide health personnel for rural areas. The workshop will be held in April 1983 in Bakel, Senegal. The purposes of the planning visit were to review workshop planning to date, assess the proposed workshop site, and investigate the participation of other Senegalese institutions. See OTD No. 147 below.

*For further information, contact Mr. F. Rosensweig.*

**OTD #128** **December 15, 1982: Completed**  
**COORDINATION/COLLABORATION ON WATER AND SANITATION IN ASIA - S&T/H/WS**

WASH was requested by the Office of Health to support the service of Dr. Peter Bourne as keynote speaker at the International Seminar on Human Waste Management for Low-Income Settlements, in Bangkok, Thailand, January 16-22, 1983, sponsored by the Asian Institute of Technology and others. The seminar was attended by water supply, sanitation, health and housing officials from Asian, African, and Latin American Countries who had an excellent opportunity to learn about the WASH Project and how its services may be made available to them through AID Missions.

*For further information, contact Mr. D. Donaldson*

**OTD #129** **January 7, 1983: On-going**  
**PVO SEMINAR ON RURAL POTABLE WATER AND SANITATION SYSTEMS - HAITI**

AID/Haiti requested WASH technical services in the design and implementation of a seminar on rural potable water and sanitation systems for private volunteer organizations (PVOs). The seminar was held January 31 to February 4. Its purpose was to increase the knowledge of decision-makers in the PVOs regarding the alternatives that they should consider in rural water and sanitation programs. A seminar of this kind was recommended by WASH under OTD #9 in November 1981 in WASH Field Report No. 2. See WASH Field

Report No. 77.

*For further information, contact Mr. D. Donaldson.*

**OTD #130** **January 13, 1983: On-going**  
**COMPARATIVE LIFE CYCLE COST ANALYSIS OF AID AND MOYNO DESIGN HANDPUMPS LAC/DR; S&T/H/WS**

WASH was requested by the Latin American Bureau, the Dominican Republic Mission, and the Office of Health to make a comparative life cycle cost analysis of the AID ing the effectiveness of their individual and collective efforts; and determining areas of need and future resource requirements for the subsectors. From this data the WASH consultants will prepare a suggested action plan, schedule and estimates of resource requirements, and other recommendations as considered appropriate. See WASH Field Report No. 66.

*For further information, contact Mr. David Donaldson.*

**OTD #125** **October 28, 1982: Completed**  
**TECHNICAL ASSISTANCE IN STAFFING AID/WASH EXHIBITION BOOTH AT APHA ANNUAL MEETING, MONTREAL, NOVEMBER 13-19, 1982 - S&T/H/WS**

WASH was requested by the Office of Health to provide professional staff for the AID/WASH exhibition booth at the annual meeting of the American Public Health Association in Montreal, Canada, November 13-19, 1982. WASH display panels with photographs was part of the AID exhibit. The WASH section also included an operational AID Handpump and a variety of WASH reports and publications for discussion and distribution to visitors to the booth. A register of visitors was kept and requests for WASH publications and further information were received and recorded for later handling at the WASH CIC.

*For further information, contact Mr. D. Donaldson.*

**OTD #126** **November 10, 1982: On-going**  
**REVIEW OF WATER-SEAL LATRINE FIELD ACCEPTANCE AND POSSIBLE LOCAL MANUFACTURE - HONDURAS**

USAID/Honduras requested WASH assistance in reviewing the current acceptance of recently installed water-seal latrines and in conducting a feasibility study of their possible local manufacture. The current rural water and sanitation project in Honduras has programmed the installation of 18,000 pit latrines and 14,000 water-seal latrines. 3,000 ceramic water-seal latrines made in Colombia have been installed and are apparently well received by the rural populace. If the acceptance can be validated, the feasibility of manufacturing cost-

competitive ceramic water-seal latrines in Honduras will be investigated. A WASH consultant currently in Honduras on another task made a preliminary survey to determine what next steps should be taken.

*For further information, contact Mr. D. Donaldson.*

**OTD #127** **November 9, 1982: On-going**  
**RECONNAISSANCE VISIT IN PREPARATION  
FOR SANITATION WORKSHOP SENEGAL**

and Moyno design handpumps that are used in the Dominican Republic. The AID handpumps are manufactured in the Dominican Republic while the Moyno pumps are imported from the U.S. The cost analysis included annual operational and maintenance cost estimates, sensitivity analyses, and the use of several interest rates. Particular attention was directed towards identifying the vehicular, fuel and labor costs of the long-term maintenance plan. The Field Report should be completed in April.

*For further information, contact Mr. D. Donaldson.*

**OTD #131** **January 27, 1983: On-going**  
**TECHNICAL ASSISTANCE TO IMPROVE  
MANAGEMENT STRUCTURE AND SYSTEMS  
OF PUBLIC HEALTH INSPECTORATE -  
SWAZILAND**

AID/Swaziland requested WASH assistance to strengthen the management structure and systems of the Public Health Inspectorate in the Ministry of Health. The Inspectorate is responsible for latrine construction, spring protection, food inspection and the control of pest and communicable diseases. The scope of work includes evaluation of present level of management skills, identification of key management skills to perform job duties, review of proposed organization structure of the Inspectorate, preparation and delivery of an in-service management training program for health inspectors, and development of a management information system and of other recommendations as appropriate.

*For further information, contact Mr. F. Rosensweig.*

**OTD #132** **February 7, 1983: On-going**  
**PLANNING OF LATRINE CONSTRUCTION  
WORKSHOP AND DETERMINATION OF  
TRAINING NEEDS IN WATER SUPPLY AND  
SANITATION - DOMINICAN REPUBLIC**

AID/Dominican Republic requested WASH technical assistance in planning and implementing a latrine construction workshop for Peace Corps Volunteers and Dominican field personnel working under Health Sector Loan II. The scope of work includes validation of

workshop objectives, collecting information on participants and making all logistical arrangements. Additional assistance is requested to review and discuss short and long term trainings needs in water supply and sanitation within the scope of Health Sector Loan II.

*For further information, contact Mr. F. Rosensweig.*

**OTD #133** **February 7, 1983: On-going**  
**FEASIBILITY STUDY AND PLANNING OF  
WATER SUPPLY AND SANITATION SYSTEMS  
FOR PRIVATE VOLUNTEER ORGANIZATIONS  
- INDONESIA**

AID/Indonesia requested WASH to provide assistance to several private volunteer organizations (PVOs) operating in Irian Jaya, Indonesia. WASH will assist the Mission in making a feasibility study and plan for a PVO Operating Grant project involving 70-80 small scale water systems and the World Relief Corporation in the Minyambou area of Irian Jaya. WASH will also assist the PVO Development Information Service in planning a water supply and sanitation project in the Jaya Paura of Irian Jaya.

*For further information, contact Dr. R. Isely.*

**OTD #134** **February 10, 1983: On-going**  
**DEVELOPMENT OF SOLID WASTE DIS-  
POSAL PLAN FOR BEIRUT AND OTHER  
AREAS IN LEBANON - LEBANON**

AID/Lebanon requested WASH technical assistance in developing, with Mission, Near East Bureau and Lebanon Government staff, an environmentally sound 'Plan of Action' to stop the continuing pollution of the Mediterranean from improper solid waste dumping. The scope of work includes consideration of closing the Normandie dump site, enclosing others, reassigning dump locations to maximize the use of environmentally safe disposal areas, and development of a comprehensive program for the collection and handling of solid waste from Beirut. The Plan will incorporate a description of steps taken, identification of the organizations responsible and sources of funding for each step, and a proposed implementation time table. The Plan is required by AID under the recently authorized Potable Water and Environmental Sanitation Sector Project and will complement the existing National Waste Management Plan. See WASH Field Report No. 79.

*For further information, contact Mr. D. Donaldson.*

**OTD #135** **February 10, 1983: On-going**  
**REVISION OF PLAN FOR RURAL WATER  
SUPPLY AND SANITATION PROJECT - HON-  
DURAS**

AID/Honduras requested WASH technical assistance to

revise the work content and financial plan of the on-going Rural Water Supply and Sanitation Project. Working with the Programa de Saneamiento y Agua Rural (PRASAR), the WASH consultant will review relevant documentation, interview Mission, government and Private Volunteer Organization (PVO) officials, and prepare a revised plan consistent with the time frame of the loan agreement. The consultant also will consider reducing the number of wells and changing their geographical distribution in order to expedite the installation of 1,200 handpumps within the project time frame. In addition, he will also review the possible use of PVOs in pump installation and the merits of alternative well excavation techniques using available or procurable resources.

*For further information, contact Mr. D. Donaldson*

**OTD #136** **February 10, 1983: On-going**  
**PREPARATION OF SCOPE OF WORK FOR  
EVALUATION OF CARE RURAL WATER PRO-  
JECT - INDONESIA**

AID/Indonesia requested WASH technical assistance in preparing the scope of work for the evaluation of the on-going CARE Rural Water Project. Since 1980 CARE has constructed 70 small scale rural water supply systems of 500 wells and numerous gravity flow systems in over 100 villages at a cost of about \$2,500,000. An evaluation of progress to date will enhance future programming by assessing the cost-effectiveness and impact of completed works. The WASH consultant will also assist the Mission in considering a strategy for CARE to leverage its resources for greater impact on government water programs.

*For further information, contact Dr. R. Isely.*

**OTD #137** **February 10, 1983: On-going**  
**DEVELOPMENT OF COMPREHENSIVE  
TRAINING PLAN FOR RURAL SPRING CAP-  
PING PROJECT - BURUNDI**

AID/Burundi requested WASH technical assistance to develop a comprehensive training plan for rural workers involved in the installation and maintenance of capped springs and in the promotion of domestic hygiene and sanitation. This is part of the spring capping program of the Community Water and Sanitation Project. The scope of work includes reviewing current health and sanitation programs of the Ministries of Health and Social Affairs and of UNICEF's spring capping project and assessing the training resources of each Ministry and of the Ministry of Development, which is in charge of the Project. It also includes developing a comprehensive training program aimed at maximizing the health and sanitation benefits of spring capping, providing a list of required equipment and materials, and furnishing guidelines for the Ministries to institutionalize this program in

their long-term plans of operation. See WASH Field Report No. 78.

*For further information, contact Dr. R. Isely.*

**OTD #138** **February 22, 1983: On-going**  
**TECHNICAL, TRAINING AND MANAGEMENT  
ASSISTANCE TO THE NATIONAL WATER  
SUPPLY AND DRAINAGE BOARD - SRI  
LANKA**

AID/Sri Lanka requested that WASH provide technical, training and management assistance to the National Water Supply and Drainage Board (NWSDB) and also to the Ministry of Local Government, Housing and Construction (MLGHCL). Areas needing improvement include training, operations and maintenance, rehabilitation, water quality monitoring, planning, technology evaluation, organizational development and community financing of water supply and sanitation systems. The specific tasks of the WASH consultants are to prepare and conduct a workshop on the management of operations and maintenance activities for the NWSDB and to develop procedures and methods for the maintenance of water supply and sanitation activities.

*For further information, contact Mr. C. Hafner.*

**OTD #139** **February 22, 1983: On-going**  
**TECHNICAL ASSISTANCE WITH DESIGN OF  
A RURAL WATER SUPPLY PROJECT - THAI-  
LAND**

AID/Thailand requested WASH assistance in preparing materials for a project paper for a rural water supply project. The Provincial Water Authority (PWA), which operates some 700 rural piped water systems, seeks to improve its capacity to design, install, manage and maintain these systems. The proposed project is intended to up-grade PWA's technical and management skills and identify measures to reduce capital and operating costs. The WASH consultants, working as members of the project design team, will specifically address requirements for manpower training needs assessments, and the planning and implementation of training delivery systems.

*For further information, contact Mr. D. Donaldson.*

**OTD #140** **March 3, 1983: On-going**  
**ENGINEERING EVALUATION OF FOSTER  
PARENTS PLAN WATER PROJECTS - HAITI**

AID/Haiti requested that WASH provide technical assistance for an engineering evaluation of the private volunteer organization Foster Parents Plan (FPP) water projects. The scope of work includes assessing existing

water supply sources, distribution networks, and maintenance activities; examining the unused filter system and reservoirs near Croix-des-Bouquets to determine costs and feasibility of future use; designing simple drains for public fountain areas and a storage tank for spring water; and making recommendations as appropriate, e.g. rainwater catchments, etc. The WASH consultant will coordinate activities and draft report with the FPP evaluator in Haiti.

*For further information, contact Dr. R. Isely.*

**OTD #141** **March 3, 1983: On-going**  
**RURAL HEALTH WORKERS TRAINING - ZAIRE**

AID/Zaire requested WASH participation in a village health workers workshop, which is part of the Annual Conference of the AID Basic Rural Health Project in Zaire. The scope of work includes identifying and discussing needs for spring capping, rain water harvesting and well construction, development of training strategies to meet the needs, planning regional water-related seminars for 1983-84, and specific seminar planning on rainwater harvesting for two rural health zones seminars in July-August 1983.

*For further information, contact Mr. C. Hafner.*

**OTD #142** **March 3, 1983: On-going**  
**PUBLIC HEALTH EDUCATION FOR LOW-COST SANITATION - TANZANIA**

AID/Tanzania requested WASH to provide a public health educator to assist the Ministry of Lands, Housing and Urban Development (ARDHI) in preparing strategy outlines for health education and promotion in low-cost sanitation for peri-urban areas of Dar es Salaam. The consultant will work with the low-cost sanitation unit, the Institute of Adult Education, the City Council, and other organizations. The scope of work for the strategy outline includes defining objectives; determining personnel and logistic requirements and methods of operation and promotion, identifying teaching/promotion aids needed; designing the monitoring and evaluation process; and estimating program costs.

*For further information, contact Mr. C. Hafner.*

**OTD #143** **March 7, 1983: On-going**  
**DESIGN AND DELIVERY OF TWO WORKSHOPS ON LATRINE CONSTRUCTION - DOMINICAN REPUBLIC**

AID/Dominican Republic requested WASH assistance in designing and delivering two workshops on latrine construction as part of AID Health Sector Loan II activities. The participants will be Peace Corps

Volunteers and Dominican Health Promoters, the latter being responsible for the latrine component and health education activity of Health Sector Loan II. The scope of work includes preparing training materials, organizing the workshops, which will include solid waste disposal and potable water handling in addition to latrine construction, conducting the workshops, and preparing an evaluation and final report.

*For further information, contact Mr. F. Rosensweig.*

**OTD #144** **March 7, 1983: On-going**  
**DESIGN AND DELIVERY OF THREE TRAINING-OF-TRAINERS WORKSHOPS ON COMMUNITY PARTICIPATION IN WATER SUPPLY PROJECTS - MALAWI**

AID/Malawi requested WASH technical assistance in the design and delivery of a training-of-trainers workshop and three three-week-long workshops on community participation in relation to the AID piped water project. Sixty-five Ministry of Health field staff need to be trained in providing health education and sanitation improvements in rural piped water supply areas. Workshop topics include the communication process, adult learning theory, community motivation methods, shared approaches to developing problem-oriented learning programs, community education techniques and materials, and village health committee formation, functions, administration and supervision.

*For further information, contact Mr. C. Hafner.*

**OTD #145** **March 7, 1983: On-going**  
**ASSISTANCE IN EVALUATION OF RURAL SUPPLY PROJECT - TOGO**

AID/Togo requested WASH assistance as member of a team to evaluate the Rural Water Supply Project. The over-all evaluation will assess the effectiveness of the establishment and functioning of wells, village health committees, AID and Togo government project staff, and of pump maintenance systems; and the effectiveness of training village pump mechanics and of micro-project planning in the plateau region. The WASH consultant will specifically address training effectiveness and relationships between villagers and field agents, will identify problems encountered in carrying out project activities at the village level, and will suggest possible solutions.

*For further information, contact Dr. R. Isely.*

**OTD #146** **March 7, 1983: On-going**  
**DESIGN OF RESEARCH/ACTION DEMONSTRATION STUDY ON COMMUNITY PARTICIPATION - TUNISIA**

AID/Tunisia requested WASH planning assistance for

the Central Tunisia Development Authority (CTDA). The WASH consultant will assist CTDA in the detailed planning and budgeting of a study designed to demonstrate the impact of community participation on the attainment of water supply, sanitation, and primary health care program objectives. The initial study concept is to take three different groups of communities with varying degrees of historical community participation and assess relative costs, resource utilizations, effectiveness, and impact of community participation activities on program objectives.

*For further information, contact Dr. R. Isely.*

**OTD #147**

**March 7, 1983: On-going**

**DESIGN AND DELIVERY OF WORKSHOP ON  
LATRINE CONSTRUCTION, SOLID WASTES  
DISPOSAL, AND WASTEWATER DISPOSAL  
FOR RURAL AREAS - SENEGAL**

AID/Senegal requested WASH assistance to design and deliver a sanitation workshop and to provide additional follow-up technical assistance with participants from the Bakel Project. The workshop will cover latrine construction, solid waste disposal and wastewater disposal for rural areas. The scope of work includes planning the workshop for twenty participants, developing the training materials and logistic requirements, conducting the workshop, evaluating the workshop and preparing a final report and recommendations. This follows-up OTD No. 127 above.

*For further information, contact Mr. F. Rosensweig.*

## SUMMARIES OF SELECTED CIC TASKS

As mentioned in the Introduction, CIC Tasks are usually shorter term assignment than Orders of Technical Direction and do not involve overseas travel of WASH staff or consultants. They may be administrative, technical or informational in nature, such as the work involved in preparing this report. Over three hundred and eighty CIC Tasks have been undertaken by WASH since the Project began. A number of these tasks will be continuous through the life of the project, i.e., certain types of administrative or repetitive activity. Others have or will result in WASH Reports, such as those summarized below.

**CIC #2** September 29, 1980: Completed

### **A BRIEF REVIEW OF ORAL REHYDRATION THERAPY**

The purpose of this task was to review the literature on the use of water disinfection in the preparation of oral rehydration solutions. This review was then incorporated into a discussion of related issues and subsequently into a report emanating from that discussion.

The review was performed by Glenn Whaley, a graduate student at UNC under the supervision of Dr. Isely. The discussion was led by Drs. Richard Cash and Lincoln Chen on November 13, 1980.

Several research issues have resulted from the literature search and discussions. Among these are:

What is the effect of adding a disinfectant to ORS (oral rehydration solutions) from different water sources, e.g. with different degrees of contamination?

What is the effect of introducing new innocula of various organisms in individuals already infected?

What can be done to assure safe water in domestic containers and what is the effect on the safety of ORS?

These research issues should be pursued, some under WASH, others through separate funding. See WASH Technical Report No. 2.

*For further information, contact Dr. R. Isely.*

**CIC #3** October 2, 1980: Completed

### **TRIOCIDES QUESTIONS AND ANSWERS - EXECUTIVE SUMMARY**

This document reports the results of an investigation into the suitability of a potable water disinfectant called Triocide for use by the U.S. Agency for International

Development in its overseas programs. The investigation was performed during the month of October 1980 by a WASH consultant. The work focussed upon the safety and effectiveness of the disinfectant itself, but did not examine or field-test entire water treatment systems incorporating Triocide. The investigation involved interviews and correspondence with knowledgeable individuals and organizations as well as a literature review. It did not include additional laboratory field testing beyond that reported by others.

The major conclusions of this investigation are:

1. Triocide disinfection providing a significant iodine residual in treated water appears a safe, simple and effective short-term emergency disinfection technology, with distinct operational advantages over other technologies currently available.
2. The operational advantages of Triocide also make the possibility of medium and long-term use attractive, but the presence of significant iodine residual in the treated water raises questions of possible iodine toxicity. These concerns can be reduced with a reduction in iodine residual but only with a corresponding increase in the risk of pathogen survival in treated water from subsequent recontamination.
3. The question of medium and long-term iodine toxicity is a controversial one with conflicting evidence and opinions as to the existence and magnitude of the risk. Continuous use of water with iodine residual for periods up to three weeks involves no significant hazard by any account, but continuous use for years appears unwise in the face of existing evidence and uncertainty. No exact dividing line currently exists between the above 'short-term' and 'long-term' periods, and decisions about 'medium-term' use should reflect local conditions and the feasibility of alternative means of disinfection.

See WASH Technical Report No. 1

*For further information, contact Dr. R. Isely.*

**CIC #47** December 10, 1980: Completed

### **SYNTHESIS OF EVALUATION METHODS AND APPROACHES TO THE EVALUATION OF COMMUNITY WATER SUPPLY PROGRAMS**

The AID Mission in Malawi is assisting the Government in the design of an evaluation plan for community water supply programs. The Mission requested descriptive material on evaluation work done on developing countries that could be applied in Malawi. This information could also provide useful background for the Government in its selection of its own evaluation specialist.

A consultant from the Research Triangle Institute was contracted to review the literature, discuss the state-of-the-art with evaluation specialists in North Carolina and Washington, D.C., write a synthesis, and prepare a bibliography. See WASH Technical Report No. 4.

*For further information, contact Dr. R. Isely.*

**CIC #139** **July 28, 1981: Completed**  
**PLANNING OF WATER SUPPLY AND SANITATION DEMONSTRATION CENTERS IN LDCS**

At the present time there is no organized facility or program where rural water supply and sanitation (WS&S) staff may observe in operation not only various appropriate technology devices, but also the organization, methodologies and delivery systems used by national, regional and community WS&S organizations. The latter includes the community participation aspects of planning, installing, operating, maintaining and financing WS&S systems.

Regional facilities would provide accessible and common language sites for 'hands-on' observation of operational WS&S systems by government officials, planners, contractors, PVO's, etc. Rural WS&S agencies in a number of developing countries have expressed an interest in a program to establish such sites for training and orientation purposes.

A draft project outline is under review by the Office of Health. Central America was chosen for study purposes as a likely area to benefit from this concept, which could be replicated elsewhere in Latin America and other regions.

*For further information, contact Mr. D. Donaldson.*

**CIC #238** **April 20, 1982: On-going**  
**SYNTHESIS OF A RESOURCE DOCUMENT ON WATER AND SANITATION RELATED HEALTH EDUCATION MATERIALS PROPOSED IN AND FOR DEVELOPING COUNTRIES**

Experience has shown that the installation of water and sanitation facilities alone does not necessarily lead to changes in health related behavior or to expected health benefits. As a result, water and sanitation project designers have begun to recognize the necessity of incorporating health education activities in order to facilitate the necessary individual, institutional and cultural changes. To some extent, however, the development of health education activities in water and sanitation projects has suffered from a lack of information about materials, techniques, and methods that have been developed within and across individual countries and projects. The purpose of this task is to

address that deficiency by collecting relevant materials, especially those indigenously produced, and preparing a resource bibliography of available materials cross-indexed by country, languages, media, content, and setting. The Research Triangle Institute (RTI) is carrying out this task.

*For further information, contact Dr. R. Isely.*

**CIC #253** **April 16, 1982: On-going**  
**DEVELOPMENT OF HANDPUMP PROGRAM TRAINING MATERIALS**

WASH has been active in assisting in the manufacture of the AID Handpump and in training local personnel in pump installation, operation and maintenance techniques and procedures in several developing countries - Ecuador, Honduras, and the Philippines among others. As demand for handpumps is increasing in developing countries in partial response to the UN Water Decade, the requirements for relevant training are also growing.

In response to these needs, WASH has requested Georgia Institute of Technology to develop training aids (job aids) for the manufacture, installation, operation and maintenance of the AID Handpump. These aids will be for use on-the-job and are intended to eliminate or minimize the need for continued outside assistance.

*For further information, contact Mr. F. Rosensweig.*

**CIC #265** **May 10, 1982: On-going**  
**DEVELOPMENT OF GUIDELINES FOR HUMAN RESOURCES DEVELOPMENT PLANNING IN THE WATER SUPPLY AND SANITATION SECTOR**

Experience has demonstrated that favorable government policies and resource allocations can have little impact on water supply and sanitation (WS&S) programs unless effective measures exist to recruit, train, utilize and maintain the skilled labor necessary for successful operations. The purpose of this task is to develop a systematic approach to HRD planning needs assessments and preparing training plans for the water supply and sanitation sector in developing countries. The resulting guidelines can then be used by developing country governments, agencies, and consultants for HRD planning.

The basic structure of the approach is to:

1. Understand as much about the country specific WS&S system as possible (data, people, agencies/organizations, resources, political priorities, etc.) before selecting a given planning approach,
2. Conduct an assessment of HRD skills needs in the WS&S sector, through estimating current and projected employment by occupation and determin-

ing which occupations and job skill needs are high priority for pre-service or in-service education or training.

3. Inventory the existing educational and training delivery system related to WS&S occupations, and identify problems or imbalances in program offerings,
4. Develop an HRD plan for correcting identified problems or imbalances.

*For further information, contact Mr. F. Rosensweig.*

**CIC #304** **July 21, 1982: On-going**  
**SPRING CAPPING TRAINING MATERIALS**

After learning of interest in spring capping projects in several regions of Africa, WASH reviewed existing technical information on spring capping and compiled a draft document which surveys this under-emphasized activity. Then, recognizing the need for, and the low cost of spring improvement technology, WASH undertook the development of this training manual and training program design.

The intended users of this manual are individuals working as extension agents at the zone or regional level who can use this manual to conduct training programs for village extension workers on spring capping technologies. The manual presents a comprehensive training design, suggested procedures, and materials for conducting a workshop in the planning, construction, operation, maintenance and repair of spring capping structures. It includes sessions which develop skills for involving the community in the planning and implementation of spring capping projects and facilitating decision-making by the community leadership, as well as sessions for developing necessary design and construction skills. The training design incorporates a variety of active learning techniques and can be modified to fit the skills and needs of the participants in specific developing countries. The materials were used initially in a spring capping workshop in Togo in November 1982.

*For further information, contact Mr. F. Rosensweig.*

**CIC #308** **August 4, 1982: On-going**  
**DEVELOPMENT OF TRAINING MATERIALS  
FOR THE BAKEL, SENEGAL, SANITATION  
TRAINING WORKSHOP, MARCH 1983**

The workshop design and the instructional materials being developed are for trainers to use in training mid-level nurses in technical skills related to latrine construction and solid waste disposal, as well as in communication and promotional skills related to the organization and support of village health committees. These mid-level nurses would then have to adapt the

materials to use in training community-level workers (secouristes, matrones, and hygienistes).

Also included will be a guide, interviewing instructions, and sample forms for conducting sanitation surveys. The materials will be prepared in French and translation should be useful for training programs in other developing countries.

*For further information, contact Dr. R. Isely.*

**CIC #314** **August 12, 1982: On-going**  
**RAINWATER HARVESTING REVIEW AND  
TRAINING MATERIAL DEVELOPMENT**

Interest in rainwater harvesting (RWH) for water supply in developing countries has expanded as part of the growing interest in supporting locally organized and implemented efforts to meet basic human needs. RWH is an attractive way of increasing the quality of water available for household use in areas with water shortages. Catchments using existing roof structures and surfaces combined with self-built storage containers represent a particularly promising approach.

The WASH Project reviewed existing technical information on rainwater harvesting and has drafted a document which includes a survey of the literature, an annotated bibliography and a summary of useful construction ideas. From this effort the need for a specific training course design for rainwater harvesting was recognized. A course plan, instructor's guide and trainee materials have been developed. The intended users of these materials are individuals working as extension agents who will conduct training programs for village extension workers on rainwater harvesting system design, construction, operation and maintenance. The role of community participation is stressed and the materials are adaptable to differing local community settings.

*For further information, contact Mr. C. Hafner.*

## APPENDIX

### LIST OF WASH PUBLICATIONS: TECHNICAL REPORTS AND FIELD REPORTS

#### SUBJECT CATEGORIES AND COUNTRIES OF WASH TECHNICAL REPORTS (TR) AND WASH FIELD REPORTS (FR)

(By Report Number - see numerical list of titles following)

##### **Bibliographies and Synthesis Documents**

TR: 4; 18; FR: 26; 45; 46; 47; 51; 52; 53; 55;  
58; 60; 66; 67; 69; 70; 71;  
72; 75; 77; 78; 79;

##### **Community Education and Participation (CEP)**

TR: 7; 11; 18; 19; FR: 2; 6; 13; 37; 39; 42; 59;  
62; 69; 75; 77; 78;

##### **Evaluation**

TR: 4; 5; 12; 14; FR: 1; 2; 5; 22; 24; 27; 35;  
44; 49; 57; 65; 71; 76;

##### **Human Resource Development (HRD) (including training)**

TR: 3; 13; 19; FR: 7; 8; 16; 21; 28; 31; 34;  
38; 39; 42; 43; 44; 45; 49;  
50; 51; 56; 58; 60; 61; 62;  
67; 68; 69; 70; 73; 74;

##### **Housing**

FR: 46;

##### **Information**

FR: 18; 26; 28; 48; 64;

##### **Institutional Development**

TR: 3; 4; 5; 7; 8; 19; FR: 6; 8; 12; 13; 19; 21; 22;  
23; 24; 27; 33; 34; 35; 38;  
39; 47; 49; 50; 67; 68; 69;  
72; 76; 79;

##### **Planning**

TR: 9; 10; 14; 19; FR: 5; 7; 8; 9; 11; 14; 18; 27;  
33; 34; 35; 36; 40; 47; 52;  
53; 58; 63; 66; 72; 75; 79;

##### **Private Volunteer Organizations (PVO's)**

FR: 2; 9; 30; 37; 39; 40; 56;  
59; 71; 75; 77;

##### **Public Health**

TR: 1; 2; 5; 8; 12; 16; FR: 1; 7; 8; 11; 23; 29; 31;  
37; 39; 42; 44; 55; 66; 67;  
69; 71; 72; 75; 77; 78; 79;

##### **Sanitation**

TR: 11; 14; 16; 17; 18; FR: 1; 9; 10; 17; 19; 25; 26;  
28; 30; 33; 37; 38; 42; 44;

##### **Technology Transfer (including local manufacturing and R&D)**

FR: 3; 5; 6; 16; 20; 26; 45;  
54; 59; 60; 69; 76;

##### **WASH Contributions to Conference, Seminars, etc.**

TR: 8; 13; 14; 16; 17; FR: 15; 48; 63; 64; 67; 77;

##### **Water Supply (including hydrology)**

TR: 1; 2; 14; 16; 17; 18; FR: 1; 2; 4; 6; 9; 11; 19; 22;  
24; 25; 26; 30; 32; 36; 37;  
38; 40; 41; 42; 43; 45; 46;  
50; 51; 53; 54; 56; 57; 59;  
60; 61; 62; 63; 65; 66; 67;  
68; 69; 70; 71; 72; 73; 74;  
75; 76; 77; 78;

##### **Women in Development**

TR: 6; 11; 17; 18; 19;

##### **Workshops**

TR: 8; 13; FR: 29; 30; 31; 36; 45; 54;  
56; 60; 63; 67; 68; 70;

#### WASH TECHNICAL REPORTS AND FIELD REPORTS BY COUNTRY AND REGIONAL BUREAUS

Bolivia	FR: 47;
Brazil	FR: 40;
Burundi	FR: 24; 78;
Cameroon	TR: 3; 5; FR: 75;
Central African Republic	FR: 53; 72;
Dominican Republic	FR: 5; 20; 21; 23; 35; 50; 76;
El Salvador	FR: 26;
Ecuador	FR: 9; 12; 13; 49; 59; 63; 74;
Egypt	FR: 33; 52;
Guatemala	FR: 56;
Haiti	TR: 12; FR: 2; 77;

Honduras		FR: 46; 65; 69; 76;	Tanzania	FR: 7; 8; 58;
Indonesia		FR: 16; 28; 39; 42; 71;	Thailand	FR: 19; 68;
Jordan		FR: 17; 34; 36;	Togo	TR: 13; FR: 27; 51;
Lebanon		FR: 10; 66; 79;	Tunisia	TR: 8; FR: 4; 67;
Lesotho		FR: 55;	Yemen	FR: 22;
Mali	TR: 4;	FR: 32;	Zaire	FR: 62; 73;
Malawi			AFRICA Bureau	TR: 13; 19;
Mauritania		FR: 11;	ASIA Bureau	TR: 9; FR: 14; 64;
Morocco		FR: 43; 61	LAC Bureau	FR: 15; 30
Peru		FR: 1; 6; 30; 38; 48;	NE Bureau	TR: 8; FR: 29;
Philippines		FR: 3; 54; 57; 76;	Office of Foreign Disaster Assistance:	FR: 25; 41; 66; 74; 79;
Senegal		FR: 44;	Office of Health:	TR: 6; 12; 14; FR: 1; 2; 14; 18; 30; 31; 41
Sri Lanka		FR: 76;		45; 48; 60;
Sudan		FR: 37;		64; 76;

## LIST OF WASH PUBLICATIONS: TECHNICAL AND FIELD REPORTS

### TECHNICAL REPORTS

1. WASH Technical Report 1. *Triocide Questions and Answers*. November, 1980 by Peter Kolsky.
2. WASH Technical Report 2. *Possible Disinfection of Oral Rehydration Solutions*. Notes from November 13, 1980 meeting with Richard Cash and Lincoln Chen, by Raymond B. Isely.
3. WASH Technical Report 3. *Training of Rural Community Development Workers in Health Education, with Special Reference to Water Supply Protection and Use Maintenance of Sanitation Facilities*. March, 1981. Prepared for Mandara Mountains Water Resource Project, USAID Mission, Yaounde Cameroon by Guy Steuart and Carla Rull. C-Task No. 49.
4. WASH Technical Report 4. *Evaluation Methods for Community Rural Water Supply and Sanitation Projects in Developing Countries: A Synthesis of Available Information*. March 31, 1981. Prepared for the USAID Mission, Malawi, by Robert Struba. C-Task No. 47.
5. WASH Technical Report 5. *The Choice of Health Status indicators to Evaluate Water and Sanitation Projects in North Cameroon: A Synthesis of Available Information*. April 9, 1981. Prepared for Mandara Mountains Water Resource Project, USAID Mission to the United Republic of Cameroon, by Robert S. Struba and Raymond B. Isely. C-Task # 49. (Also available in French.)
6. WASH Technical Report 6. *Women, Water and the Decade*. Presented at the International Affairs Session of the American Water Works Association, St. Louis, Missouri, June 9, 1981 by Mary Elmendorf. OTD #35.
7. WASH Technical Report 7. *Facilitation of Community Organization: An Approach to Water and Sanitation Programs in Developing Countries*. June 17, 1981. Prepared by Raymond B. Isely. C-Task #94.
8. WASH Technical Report 8. *Integration de L'Approvisionnement en Eau et de L'Assainissement du Milieu dans les Programmes de Soins Primaires*. Presented in Sousse, Tunisia, August 31, 1981 by Raymond B. Isely. OTD #52.
9. WASH Technical Report 9. *Toward an Asia Bureau Water and Sanitation Policy Statement*. September, 1981. Prepared for the Office of Health, Population and Nutrition of the Asia Bureau, USAID by James Thomson. C-Task #98.
10. WASH Technical Report 10. *Social and Economic Preconditions for Water Supply and Sanitation Programs*. Prepared for AID/PPC by Dennis B. Warner, September, 1981.
11. WASH Technical Report 11. *The Role of Women as Participants and Beneficiaries in Water Supply and Sanitation Programs*. December, 1981. Prepared for the Office of Health by Mary L. Elmendorf and Raymond B. Isely. C-Task #51. (Also available in French and Spanish.)
12. WASH Technical Report 12. *Measuring and Evaluating Diarrhea and Malabsorption in Association with Village Water Supply and Sanitation. A Review of the Food Wastage/ Sanitation Cost Benefit Methodology Project (Guatemala), Contract AID/csd-2959, by an External Panel of Experts*. Prepared for the Office of Health by Branko Cvjetanovic, Lincoln Chen, Richard Kronmal, Charles Rohde, Robert Suskind, Robert Struba and Kenneth McElroy. December, 1981. OTD #19.
13. WASH Technical Report 13. *Participants Manual for Sessions on Water Supply and Sanitation: USAID Workshop on Primary Health Care in Africa, November 15-20, 1981. Lome, Togo*. February, 1982. Prepared for the Africa Bureau, USAID by Raymond B. Isely, Craig R. Hafner, Daniel A. Okun, Morris A. Shiffman, Thomas Talbert and Marjorie L. Kupper. OTD #53. (Also available in French.)
14. WASH Technical Report 14. *Water Supply and Sanitation in Rural Development: Proceedings of a Conference for Private and Voluntary Organizations, December 1-4, 1981*. Sponsored by the National Council for International Health and the WASH Project. OTD #57.
15. WASH Technical Report 15. *Application of Health Education to Water Supply and Sanitation Projects in Africa: A Discussion Paper*. October 1982. Prepared By Raymond B. Isely and Kathleen A. Parker. C-Task #176.
16. WASH Technical Report 16. *Relating Improvements in Water Supply and Sanitation to Nutritional Status*. October 1982. Prepared by Raymond B. Isely. C-Task #309.
17. WASH Technical Report 17. *Water and Sanitation-Related Health Constraints of Women's Contributions to the Economic Development of Communities*. October 1982. Prepared by Mary Elmendorf and Raymond B. Isely. C-Task #310.
18. WASH Technical Report 18. *Community Participation and Women's Role in Water Supply and Sanitation in Developing Countries: A Three-Part Bibliography by Author, Subject and Country*. November 1982. Prepared by Ellen Kendall. C-Task #235.

19. WASH Technical Report #19. *Africa Bureau Domestic Water and Sanitation Strategy Statement*. January, 1983. Prepared by James Thomson. OTD # 107.

#### **FIELD REPORTS**

1. WASH Field Report 1. *Socio-Cultural and Economic Characteristics of Conditions in Ancash and La Libertad, Peru with Special Emphasis on the Callejones de Huaylas and Conchucos: Questions to be Considered in an Evaluation of CARE-Sponsored Water, Sewage and Health Projects*. November, 1980. Prepared by Charlotte D. Miller. OTD #6.
2. WASH Field Report 2. *Review of AID Rural Potable Water Programs - Haiti*. November 16-29, 1980. Prepared by James Arbutnot. OTD #9.
3. WASH Field Report 3. *Feasibility of Local Manufacture of the AID Hand-Operated Water Pump, and other Technology Appropriate for Rural Water Supply Programs in the Philippines*. Prepared for USAID by Phillip W. Potts, Robert Knight and Yaron M. Sternberg. April, 1979. OTD #11.
4. WASH Field Report 4. *Tunisia, Aspects of Well Drilling Rural Potable Water Project - Report on a Field Trip, December 20-27, 1980*. Prepared for USAID by Michael Glaze. OTD #15.
5. WASH Field Report 5. *Dominican Republic Consultations on the Health Sector Loan II*. Report of a Field Trip, January 26-30, 1981. Prepared by Dennis B. Warner. OTD #21.
6. WASH Field Report 6. *Report on the Peru Rural Water Systems and Environmental Sanitation Project*. January 31, 1981. Prepared for USAID by Harold Shipman. OTD #18.
7. WASH Field Report 7. *Tanzania - A National Environmental Sanitation Education Master Plan, A Preliminary Review*. February 22-March 13, 1981. Prepared for USAID by Dennis B. Warner and Kenneth Woolf. OTD #26.
8. WASH Field Report 8. *Tanzania - Health and Environmental Monitoring Project (HEMP): Recommendations for Project Paper Design Team*. February 22-March 13, 1981. Prepared for USAID by Dennis B. Warner and Kenneth Woolf. OTD #26.
9. WASH Field Report 9. *Contaminacion Ambiental en Ecuador*. Prepared for USAID Mission, Ecuador by Paul C. Dreyer. OTD #14.
10. WASH Field Report 10. *Lebanon - Technical Recommendations for Wastewater Treatment Demonstration (Pilot) Plants for Lebanon*. March, 1981. Prepared for USAID Mission, Lebanon, by A.A. Kalinske. OTD #20.
11. WASH Field Report 11. *Mauritania - Public Health Assessment of Proposed Dams, Water-Related Diseases and Community Water Supplies*. March, 1981. Prepared for USAID by Emil Malek and David Goff. OTD #16.
12. WASH Field Report 12. *Ecuador - Institutional Development for IEOS: Instituto Ecuatoriano de Obras Sanitarias*. March, 1981. Prepared for USAID by Charles S. Pineo, Henry Van and Guillermo Orozco. OTD #14.
13. WASH Field Report 13. *Proyecto de Sistema de Entrega de Salud Rural Integrado - Saneamiento Rural*. March, 1981. Prepared for USAID Mission, Ecuador, by Gonzalo Medina. OTD #24.
14. WASH Field Report 14. *Targets of Opportunity for WASH: Report of a Reconnaissance Visit to India and Bangladesh, February 20-March 7, 1981*. Prepared for USAID by Raymond B. Isely. OTD #28.
15. WASH Field Report 15. *Guatemala - XIII Central American Congress of AIDIS, Guatemala City, March 15-20, 1981*. Prepared for USAID by Charles S. Pineo, March, 1981. OTD #30.
16. WASH Field Report 16. *Indonesia - Rural Sanitation and Manpower Development Project (RSMD). The Development of Appropriate Technology and the Improvement of Curricula for Training of Sanitarians*. March, 1981. Prepared for the USAID Mission, Indonesia, by Clarence E. Calbert and Robert A. Gearheart. OTD #25.
17. WASH Field Report 17. *Jordan - Recommended Wastewater Treatment Guidelines for the Hashemite Kingdom of Jordan*. April, 1981. Prepared for the USAID Mission, Jordan, by Harris F. Seidel. OTD # 31.
18. WASH Field Report 18. *Coordination of WASH Information Activities and Exchange with International Information Centers, Holland and England*. April 5-17, 1981. Prepared for USAID Washington by James E. Beverly. OTD #32.
19. WASH Field Report 19. *Village Water Supply and Sanitation in Northeastern Thailand*. July, 1981. Prepared for the USAID Mission, Thailand, by James Arbutnot and Robert H. Thomas. OTD #38.
20. WASH Field Report 20. *Technical Assistance in the Manufacture and Quality Control of the AID/Battelle Handpump in the Dominican Republic*. June, 1981. Prepared for the USAID Mission, Dominican Republic, by Robert Knight. OTD #1.
21. WASH Field Report 21. *Plan for a Health Education Component for the Health Sector II Bilateral Assistance Project in the Dominican Republic*. July,

1981. Prepared for the USAID Mission, Dominican Republic, by Charles Llewellyn. OTD #21.
22. WASH Field Report 22. *Evaluation of Yemen Water Supply Systems Management Project*. August, 1981. Prepared for the USAID Mission, Yemen Arab Republic, by Martin Lang and Clarence Calbert. OTD #39.
  23. WASH Field Report 23. *Plan for the Health Impact Evaluation of the Health Sector II Bilateral Assistance Project in the Dominican Republic*. August, 1981. Prepared for the USAID Mission, Dominican Republic, by Paul Howard and Robert J. Struba. OTD #21.
  24. WASH Field Report 24. *Community Water Supply and Sanitation in Burundi: Report of an Evaluation Team*. October, 1981. Prepared for the USAID Mission, Burundi, by Raymond Isely, David R. Goff and Herbert Blank. OTD #36.
  25. WASH Field Report 25. *Water and Sanitation Alternatives for Southern Italy Disaster Relief*. December, 1980. Prepared for USAID Washington by David R. Goff and Michael A. Kostur. OTD #13.
  26. WASH Field Report 26. *Appropriate Technology for Rural Water Supply and Sanitation in El Salvador: A Brief Review and Bibliography*. September, 1981. Prepared for the USAID Mission, El Salvador, by Charles S. Pineo. OTD #17.
  27. WASH Field Report 27. *Strategy for Implementation and Evaluation of the Togo Rural Wells and Sanitation Project*. October, 1981. Prepared for the USAID Mission, Togo, by Felix Awantang. OTD #45.
  28. WASH Field Report 28. *Rural Sanitation and Manpower Development Project: Appropriate Technology and Information Dissemination*. October, 1981. Prepared for the USAID Mission, Indonesia, by Robert A. Gearheart. OTD #44.
  29. WASH Field Report 29. *Participation in a Workshop on Primary Health Care, August 31-September 3, 1981, Sousse, Tunisia*. October, 1981. Prepared for Bureau of the Near East, USAID, by Raymond B. Isely. OTD #52.
  30. WASH Field Report 30. *UNICEF/PAHO Joint Workshop on Drinking Water and Sanitation in Rural and Urban Slum Areas - Lima, Peru, November 17-22, 1980*. December, 1981. Report of Emil T. Chanlett. OTD #5.
  31. WASH Field Report 31. *Intensive Session on Water Sanitation and Health Education: A Workshop Held at UNICEF Headquarters, New York, April 22-23, 1981*. December, 1981. Prepared by Raymond B. Isely. OTD #37.
  32. WASH Field Report 32. *Hydrogeological Reconnaissance of the Yelimare-Tambacara Area of Mali with Reference to the Village Wells Project*. February, 1982. Prepared by George Taylor. OTD #64.
  33. WASH Field Report 33. *Environmental Health in Egypt: A Sectoral Assessment and Recommendations*. April, 1982. Prepared by Dennis B. Warner and David Donaldson. OTD #62.
  34. WASH Field Report 34. *A Proposed Action Plan for a National Training Program in the Water Sector for the Hashemite Kingdom of Jordan*. September, 1982. Ken Woolf, John Austin, Walter Pinto-Costa. OTD #55.
  35. WASH Field Report 35. *Scope of Work for the Health Outcome Evaluation of the Health Sector II Project in the Dominican Republic*. February, 1982. Prepared by Kenneth McLeroy. OTD #58.
  36. WASH Field Report 36. *Municipal Water Conservation in Jordan: Report of a Seminar*. February, 1982. Prepared by James L. Ogilvie. OTD #59.
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