

FILE

PROJECT TITLE(S) AND NUMBER(S) Water Systems and Services Management (278-0259)		PES NO. 617		MISSILE/ALD/	USAID/Jordan
PROJECT DESCRIPTION To develop and improve the institutional capability of Jordanian private and public organizations in the water sector to conserve and manage water resources; and as part of that effort, extend and improve certain municipal water distribution and wastewater collection facilities.					
AUTHORIZATION DATE AND U.S. LOP FUNDING AMOUNT 8/83. . . \$21.0 Million	PES NUMBER 85-7	PES DATE 2/19/86	PES TYPE 1st Interim Eval.		
ABSTRACT PREPARED BY, DATE Nancy C. Hardy <i>NCH</i> Evaluation Officer			ABSTRACT CLEARED BY, DATE ENG: AAhmad <i>AA</i> DD: RJohnson ENG: LDonnell <i>LD</i> DIR: GGover <i>GG</i> PRM: RBrown <i>RB</i>		<input checked="" type="checkbox"/> Regular <input type="checkbox"/> Other (Specify) <input type="checkbox"/> Special <input type="checkbox"/> Terminal

The First Interim Evaluation was conducted in March 1985 to determine the progress of Jordanian firms in developing improved capabilities to complete sanitary engineering design projects. The Water Systems and Services Management (WSSM) project places special emphasis on technology transfer by requiring that Jordanian firms be prime consultants and contractors with U.S. firms acting in the roles of subconsultants and subcontractors in the design and construction phases of the project. This evaluation was conducted near the end of the design phase to assess technology transfer from three U.S. subconsultant firms to three Jordanian consulting firms, drawing from a baseline survey conducted in February-March 1984. The evaluation team also developed baseline data for technology transfer in construction supervision, as the same three Jordanian design consultants had submitted cost proposals, negotiating discussions were underway, and these consulting firms were likely to be awarded the construction supervision contracts.

When this evaluation was undertaken, the project's design phase was nearly complete. Two of the Jordanian firms (with their two respective U.S. subconsultants) were finishing design of: water distribution systems, sewage collection and wastewater treatment facilities, and stormwater drainage systems for four cities in southern Jordan. The other Jordanian firm --- the largest of the local consulting firms --- was completing design of similar systems and facilities for six cities in northern Jordan. The U.S. personnel associated with the three American subconsultants had returned to the U.S. in early 1985.

On the basis of changes in the Overall Capability Index developed in the baseline survey for each of the three Jordanian firms, the evaluation revealed that all three firms increased their capabilities, indicating evidence of technology transfer. All had:

1. Developed or expanded their reference material libraries.
2. Acquired, or added to existing, general and technical specifications for sanitary work.
3. Acquired, or added to existing, standard details for sanitary design work.
4. Gained experience and confidence in the design of sewage treatment plants.
5. Gained greater appreciation of the needs of projects financed by international lending agencies.

WATER SYSTEMS AND SERVICES MANAGEMENT Cont'd

Virtually everything that was tried to effect technology transfer was successful in varying degrees. The least effective approach was reading or studying outside the normal work environment. The most effective means was via one-on-one working opportunities.

An important conclusion of the WSSM project evaluation is that although short term gains in increased capabilities are real and identifiable, how well technology will be retained and applied will depend on the firms' ability to obtain additional sanitary design work.

Lessons learned from this evaluation which are relevant to design of future technology transfer oriented projects are:

1. Scopes of work for technology transfer activities should be defined showing planned approaches with scheduled milestones and deliverable items.
2. The use of tools such as participatory workshops and seminars, and lectures linked to ongoing project work activities followed by practical application in problem solving should be encouraged.
3. Major technology transfer efforts, especially in non-technical areas should continue to be grant-funded.

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-44

1. PROJECT TITLE Water Systems and Services Management			2. PROJECT NUMBER 278-0259	3. MISSION/AID/W OFFICE USAID/Jordan
4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 85-7			<input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	
5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equipment FY <u>83</u>	B. Final Obligation Expended FY <u>84</u>	C. Final Input Delivery FY <u>85</u>	A. Total \$ 28.5 million B. U.S. \$ 21.0 "	From (month/yr.) <u>8/83</u> To (month/yr.) <u>3/85</u> Date of Evaluation Review <u>6/85</u>

B. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List Decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., slogan, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Disseminate evaluation findings to other interested USAIDs and other donors	AID/W	On-going
2. Begin evaluation process for the construction phase of project	USAID/J ENG office	March-April 1986

8. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT	
<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____	A. <input checked="" type="checkbox"/> Continue Project Without Change	
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify) _____	B. <input type="checkbox"/> Change Project Design and/or	
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C		<input type="checkbox"/> Change Implementation Plan	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P		C. <input type="checkbox"/> Discontinue Project	

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Name and Title) Abdullah Ahmad, Engineer, USAID/Jordan	12. Mission/AID/W Office Director Approval Signature <i>Gerald F. Gower</i> Typed Name Gerald F. Gower Date 20 February 1986
--	--

PROJECT EVALUATION SUMMARY
WATER SYSTEMS AND SERVICES MANAGEMENT (278-0259)
FIRST INTERIM EVALUATION

INTRODUCTION AND BACKGROUND:

The Water Systems and Services Management (WSSM) project began in August, 1983. The project purpose is to develop and improve the institutional capability of public and private organizations in Jordan's water sector to conserve and manage water resources and as part of that effort, to extend and improve certain municipal water distribution and wastewater collection facilities. U.S. life of project funding consists of \$17 million in loan funds and \$4 million in grant funds. The Jordanian implementing agencies are the Water Authority of Jordan (WAJ) and the Ministry of Planning. U.S. project inputs consist of: 1) provision of technical advisory services for water quality monitoring, WAJ training, and public sector managerial skills upgrading; 2) financing the design of water and wastewater systems and construction supervision for ten cities in Jordan; and 3) financing the construction of water and wastewater facilities in Karak and Tafila, two cities in southern Jordan. WSSM places special emphasis on private sector technology transfer. In the design phase of the project, the three Jordanian firms which were contracted for facility and system design for the ten cities were required to form sub contractual relationships with U.S. sanitary engineering design consulting firms. The design of water distribution, sewerage collection and treatment and storm drainage for the ten cities were divided between three associations: Arabtech Consulting Engineers and CH₂M Hill International; Consulting Engineering Center and Black and Veatch International; and Jouzy and Partners Consulting Engineering Bureau and Engineering Science Inc. The design phase of the project ended in mid-1985; the First Interim Evaluation was conducted in February-March 1985, and the evaluation contractor's final report was received by USAID/Jordan in June 1985.

OBJECTIVE:

The objective of the First Interim Evaluation was to determine the progress of the three Jordanian firms in developing improved capabilities to complete sanitary engineering design projects. Secondary objectives were to identify, or indicate, the technology transfer; define and evaluate the mechanisms used in the transfer; and to recommend means of improving the mechanisms for the technology transfer.

Data was obtained through the review of available references. Numerous discussions were held with the Project Managers and project related personnel from the Jordanian firms, the Project Coordinators of the Water Authority of Jordan, the Ministry of Planning, and USAID/Jordan. In addition, there were discussions and/or correspondence with the Project Managers and project related staff from the US firms, after these personnel had returned to the United States.

Y

The evaluation system utilized in the First Interim Evaluation was the system developed and used in the Baseline Survey Evaluation. This was consistent with project design and produced results which were themselves consistent and comparable. The differences in the two evaluations measured improved capabilities and also were indicative of technology transfer during the design phase.

MEANS AND METHODS:

All three of the associations used virtually the same means for the transfer of technology during the design phase of this project. The differences came about more in the degree of application of the methods, the time exposures for transfer and the areas of technology transfer. The transfer for purely technical matters included the use of lectures (in varying degrees of intensity and topics), special seminars by long term and short term US personnel, provision of reference materials, and one-on-one training as the opportunities arose during the design process.

In addition to transfer on purely technical matters, two of the associations undertook the transfer of management technology and techniques. The third association made a conscious decision not to include this area, based on the desires of the Jordanian firm. In the instances where project management issues was addressed, the general approach was strikingly similar for both associations. The U.S. subconsultant was instrumental as the lead in defining and instituting project management organization and philosophy. The lead responsibilities were then shifted to the Jordanian firm. In one case this was done with an informal approach with the US counterpart playing a low key but highly supportive role as needed. In the other case a rigidly defined chain of command was established and scrupulously adhered to in conducting project activities. Both of the Jordanian firms felt comfortable with these two differing approaches. They felt they had learned valuable lessons from these two approaches even though they were different in application.

Each of the associations did something a little different in the technology transfer process. Examples of individual activities which were utilized include: field trips within Jordan to visit existing systems for a better understanding and appreciation of the application of theoretical knowledge, an extensive participatory workshop using a case study and group problem solving approach, lectures and seminars by outside experts, and a combination project review and training trip to the office of the US consultant.

EVIDENCE OF TECHNOLOGY TRANSFER:

All three of the Jordanian firms showed evidence of technology transfer and increased capabilities in the following common elements:

- All developed, or expanded, their library of reference materials such as textbooks, technical publications, periodicals and catalogs.

- All acquired, or added to, existing, general and technical specifications for sanitary work.
- All acquired, or added to, existing, standard details for sanitary design work.
- All gained experience and confidence in the design of sewerage treatment plants.
- All gained a greater appreciation of the needs of project financed by international lending agencies.

INFLUENCES-EFFECTIVITY OF TECHNOLOGY TRANSFER:

The influences can be divided internal and external as follows:

Internal Influences:

Individual desires of the Jordanian project personnel to gain new technology, the commitment levels of the firms and their willingness to provide corporate support for technology transfer, the individual personalities of the Jordanian and US project-related staffs can all be classified as internal influences on technology transfer.

External Influences:

This phase was the change from the Water Supply Corporation (WSC) to the Water Authority of Jordan (WAJ) and the multiplicity of WAJ Project Coordinators. This no doubt actually enhanced technology transfer even though it may have had adverse impacts on scheduling and costs.

Virtually everything that was tried to effect technology transfer was successful, in varying degrees. The field trips, and the participatory workshops and seminars were very effective methods for transferring technology. As might be expected, the most effective means of technology transfer was the one-on-one working opportunities. The least effective approach was reading, or studying, outside the normal work environment. The next least effective method was the lecture approach unless closely tied to the design aspect and immediately followed by hands-on applications.

RECOMMENDATIONS AND COMMENTS:

1. Major technology transfer efforts, especially in non-technical areas, should be continued to be grant funded. It is difficult for a newly developing country to hold to the long view and commit scarce financial resources to training. This may appear to benefit a few in lieu of meeting immediate critical needs of the masses for such essential items as potable water supplies.

b

2. AID should try to obtain agreement from the host country to add the needed funding and manpower to any planned project. This will allow for the technology transfer in addition to the completion of the other project elements. It is possible for a critically tight project schedule to cause adverse effects on the technology transfer activities if they are only an adjunct to the main project activities.
3. Define the Scope of Work for the technology transfer activities and require a planned approach with scheduled milestones and deliverable items.
4. Encourage the use of participatory workshops and seminars as training tools.
5. Continue the requirement for the provision of all lecture, seminar and workshop notes for future reference of the host country personnel. This should be matched with a continued, or increased level of supplies of reference materials and equipment under the contracts. These items will remain and be useful long after the US consultants have departed.
6. Attempt to schedule lectures linked to ongoing project work activities and to be followed by practical application in problem solving.
7. Increased use of field trips on a selective basis within Jordan, the region or to the US. These should be working trips, for qualified personnel, to observe and understand the design and operational concepts as they are applied and practiced. Such training will provide a better appreciation of the relationships between the theory and the practical.
8. The short range gains under this project have been real and identifiable. How well the newly gained technology will be retained and applied by the firms and individuals involved in this project will depend on the ability of the firms to obtain additional sanitary design projects. If additional opportunities are not provided to utilize, reinforce and adapt this new technology, it may be lost. If new sanitary projects are obtained, this new technology will improve and reinforce the capabilities of these Jordanian firms for sanitary design.

CONSTRUCTION SUPERVISION BASELINE:

The project paper envisioned a baseline survey of the construction supervision capabilities of Jordanian firms to be used as the point of reference to identify the increased capabilities and indicate the technology transfer during the construction phase.

The construction supervision contracts had not been finalized at the time the evaluation was prepared, but all three of the

7

above-mentioned Jordanian consulting firms submitted cost proposals and negotiating discussions were underway. Although the project people had not been selected and the agreements with the US subcontractors had not been finalized, it was decided that it would be cost effective to begin the construction supervision evaluation. The objective evaluation was undertaken as part of this study. The subjective evaluations will take place at the time of the baseline evaluation of the Jordanian contractors when all agreements have been signed and the project people are in place.

The objective evaluation is based on a system developed along the same lines as the evaluation format for sanitary design capabilities. The Construction Supervision Development Index (CSDI) also reduces to a single pure number that is a useful indicator of the variance in the capability of a firm in construction supervision over time.

4