

2-Way Memo

Subject: Groundwater Resources Investigation
PES and Abstract

*File Project
Jordan
278-0243*

To : Mr. Steve Freundlich
NE/PD/MENA
Room No. 4440 N.S.
A.I.D.
Washington, D.C. 20523

INSTRUCTIONS

Use routing symbols whenever possible.

SENDER (Originator of message):

Use brief, informal language.

Conserve space.

Forward original and one copy.

RECEIVER (Replier to message):

Reply below the message, keep one copy, return one copy.

DATE OF MESSAGE 12/31/84	ROUTING SYMBOL
SIGNATURE OF ORIGINATOR Nancy A. Hardy	
TITLE OF ORIGINATOR Mission Evaluation Officer	

FOLD

INITIAL MESSAGE

Attached are one original and three copies of subject PES and Abstract. A copy of the latter has been sent to NE/DP/E. At Bill Libby's request, I am also sending you a copy of the PES diskette. Please acknowledge receipt. Thanks.

REPLY MESSAGE

Thanks ~~Steve~~ ^{Nancy} Steve is away for a few weeks attending a training course. The PES will be reviewed by a Bureau committee in accordance with Bureau procedure. I would prefer Steve be here to chair the committee but we may have to proceed in his absence.

Regards,
Don

From

DATE OF REPLY 1/15/85	ROUTING SYMBOL
SIGNATURE OF REPLIER <i>Don Reese</i>	
TITLE OF REPLIER	

LAST EVALUATION ABSTRACT

PROJECT TITLE(S) AND NUMBER(S) Groundwater Resources Investigation - 278-0243		MISSION/aid/office USAID/Jordan	
PROJECT DESCRIPTION Through the provision of U.S. technical assistance, training, and equipment, USAID is assisting the GOJ in developing and carrying out a systematic and comprehensive study of the availability of groundwater in Northern Jordan, and in developing the capability to conduct similar investigations in other areas of the country.			
AUTHORIZATION DATE AND U.S. LOP FUNDING AMOUNT FY 80 US\$5 MILLION	PES NUMBER 84-1	PES DATE 12/19/84	PES TYPE <input checked="" type="checkbox"/> Regular <input type="checkbox"/> Other (Specify)
ABSTRACT PREPARED BY, DATE NANCY CARMICHAEL HARDY MISSION EVALUATION OFFICER DECEMBER 19, 1984	ABSTRACT CLEARED BY, DATE A. Sweis (draft) B. Donnelly, ENG (Draft) R. Brown, PRM 12/26/84 R. Johnson, DD - G. Gower, DIR		

This interim evaluation conducted in October 1984 was undertaken to review implementation progress during the initial years of the project and develop recommendations concerning an additional extension of present PACD. It also examined what specific redesign and/or implementation activities are required to ensure that the project achieves its purposes and has the desired impact on USAID/J's water sector goal.

Although the project experienced implementation delays requiring an initial one year extension of the PACD, substantial progress has been made in achieving project objectives. Utilizing existing and project financed equipment, the Natural Resources Authority, now the Water Authority of Jordan (WAJ), has drilled 36 exploratory wells in the study area. A PDP 11/44 computer system, plus the required accessories and programs, has been installed and is operational. Data collection forms are being used in the field to gather the required water-related information, and large amounts of previously existing and newly collected data are being entered into the computer for storage and retrieval. Key members of the WAJ staff have been trained in the U.S. while other WAJ employees have benefitted from an extensive program of on-the-job training provided by the project's long and short USGS advisors.

The creation of WAJ and the GOJ's reorganization of the management and administration of Jordan's water sector programs in early 1984, while long advocated by USAID, contributed to implementation delays and has increased the responsibilities of the implementing agency's project management staff. WAJ's priority on drilling production wells has not always coincided with the timely completion of the project's R&D activities. A key finding of the evaluation is the need for USAID, WAJ and USGS to jointly review and revise the original Project Implementation Schedule, focusing on:

1. Completing procurement of the remaining project-financed equipment,
2. developing a timetable for additional technical assistance inputs,
3. planning the completion of the drilling program in the study area and
4. scheduling and additional participant training in the U.S. An additional extension of the PACD will probably be required.

Lessons learned from project implementation:

1. Project planners should carefully estimate all lead times for commodity and TA procurement, and
2. Projects of this nature require intensive "hands on" management. If the host country implementing agency is unfamiliar with AID's procedures, USAID must devote the staff time to ensure that project is implemented in a timely manner.

UNCLASSIFIED
CLASSIFICATION

App. 5N, Ch 5, HB 3
(TM 3:26) 8-3-78

PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-44

1. PROJECT TITLE GROUNDWATER RESOURCES INVESTIGATION			2. PROJECT NUMBER 278-0243	3. MISSION/AID/W OFFICE USAID/JORDAN, NE/PD/MENA
			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) 84-1	
			<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-AU or Equivalent FY 80	B. Final Obligation Expected FY 81	C. Final Input Delivery FY 85	A. Total \$ 8,795	From (month/yr.) SEPTEMBER, 1980
			E. U.S. \$ 5,000	To (month/yr.) SEPTEMBER, 1984
			Date of Evaluation Review 11/84	

8. 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., telegram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Review and revise the Project Implementation Schedule including provision of the number and location of exploratory drillholes and the scheduling of equipment and staff needed.	WAJ/USAID	2-1-85
2. Develop and approve detailed Scope of Work for the additional long-term, resident advisor and any other advisors still required by the Project.	WAJ/USAID	12-1-84
3. Complete the development and approval of the equipment specifications for IFB 003 and for the remaining piece of unprocured equipment from IFB 001.	USAID	11-15-84
4. Complete the procurement and delivery of all required Project equipment.	WAJ	6-1-85
5. Complete the training of participant trainees.	WAJ/USAID	9-30-85
6. Complete the drilling of required exploratory wells and the collection of data in the project study area. (This drilling program is to be completed by a combination of GOJ and private sector drilling teams.)	WAJ	to be determined

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

<input type="checkbox"/> Project Paper	<input checked="" type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____
<input checked="" type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	_____
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<input type="checkbox"/> Other (Specify) _____
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	_____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A.	<input type="checkbox"/> Continue Project Without Change
B.	<input type="checkbox"/> Change Project Design and/or
	<input checked="" type="checkbox"/> Change Implementation Plan
C.	<input type="checkbox"/> Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Name and Title)

Aied Sweis, Engineer, USAID
William Libby, General Engineering Advisor, USAID
Bernard Donnelly, General Engineering Officer, USAID
Steve Freundlick, Project Officer NE/PD

12. Mission/AID/W Office Director Approval

Signature Gerald F. Gower
Typed Name **Gerald F. Gower**
Date 31 Dec 1984

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-44

1. PROJECT TITLE GROUNDWATER RESOURCES INVESTIGATION CONTINUED		2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
		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)	
		<input 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-AU or Equivalent FY _____	B. Final Obligation Expected FY _____	C. Final Input Delivery FY _____		A. Total \$ _____	From (month/yr.) _____
			R. U.S. \$ _____	Date of Evaluation Review _____	

8. 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., program, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
7. Complete the entry of the remaining Project data for the study area into the computer system.	WAJ	to be determined
8. Intensify the process of analyzing data gathered as a result of this project.	WAJ	on-going

9. 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 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)	12. Mission/AID/W Office Director Approval
	Signature _____
	Typed Name _____
	Date _____

13. SUMMARY: While, substantial progress has been made in achieving the stated purpose of this project, implementation has taken longer than was anticipated by the project design team. Most of the problems caused by these delays in implementation were successfully resolved during the past year during a USAID-approved, one-year extension of the Project Activity Completion Date (PACD). Nonetheless, the Project will require some additional time in order to resolve the remaining problems and in order to compensate for the delays experienced during the initial period of Project implementation. This additional extension of the PACD should result in the achievement of the original Project Purposes and should insure that the Project will have the intended impact on the Sector Goal.

Some of the delays that have slowed implementation include

- A) The major reorganization of the GOJ implementing agency and the resulting unclear lines of management responsibilities of project personnel,
 - B) Inadequate time estimated for the development, approval and procurement of equipment needed for the project.
 - C) Inadequate time budgeted for the development and approval of appropriate Terms of Reference for the required Technical Assistance Advisors and their recruitment.
 - D) Inappropriate timing of the arrival in-country of the selected advisors. (See B and E, page 6).
 - E) Delays in and/or inability of the GOJ to assign the appropriate, fulltime counterparts to work with the AID-funded Technical Assistance Advisors,
 - F) Delays in the selection, approval, and arrival in the U.S. and return to Jordan of the appropriate participant trainees,
 - G) Confusion concerning the overall research and development (R&D) orientation of the Project which resulted in a failure to establish clear R&D priorities in assigning Project personnel and equipment for the required field work and data collection.
 - H) Difficulties in keeping the GOJ Water Authority, Directorate of Drilling's efforts directed toward data gathering rather than on production well drilling.
14. EVALUATION METHODOLOGY: The PF Evaluation Section tentatively scheduled an "Interim Evaluation" in January of 1983 to review implementation progress during the initial years of the Project. The PF noted that such an evaluation was to "...evaluate progress ...and identify any apparent shortcomings in equipment, human

resources or training which may have inhibited achievement of the Project Purpose." Due to a variety of factors, including a one year extension of the original PACD, the "Interim Evaluation" was rescheduled for October, 1984.

The "Interim Evaluation" actually measured and assessed implementation progress to date so as to develop recommendations concerning;

- A) The validity of a proposed additional extension of the existing PACD; and
- B) What specific redesign and/or implementation activities are required to insure that the Project achieves the stated purposes and has the desired impact on the relevant Sector Goal.

The list of individuals interviewed and their respective agencies follows:

<u>ORGANIZATION</u>	<u>INDIVIDUAL</u> <u>USAID/J</u>	<u>PROJECT RESPONSIBILITY</u>
	Mr. A. Sweis	Project Officer
	Mr. B. Donnelly	Chief Engineer
	Mr. W. Libby	Deputy Chief Engineer
	Mr. S. Stalla	Project Development Officer
	Mr. J. Hanks	Project Development Officer
	Ms. N. Hardy	Mission Evaluation Officer
	Mr. G. Gower	Mission Director
	Mr. J. Fashho	Mission Chief Accountant

<u>ORGANIZATION</u> <u>USGS</u>	<u>INDIVIDUAL</u>	<u>PROJECT RESPONSIBILITY</u>
	Ms. D. Laura	Division Chief, OIH/W
	Mr. V. Guisti	Project Manager, OIH/W
	Mr. L. Holt	Consultant
	Mr. D. Maddy	Computer Advisor, OIH/J

GOJ

Mr. B. Kefayeh	Member of National Planning Council (Water Sector)
Mr. M. Kilani	President, WAJ
Mr. M. Talhouni	Secretary General, WAJ
Mr. A. Kilani	Project Manager, WAJ
Mr. B. Hirzallah	Asst. Project Manager, WAJ
Mr. A. H. Khatib	Chief, Water Quality Division
Mr. S. Tannous	Director of Drilling, WAJ
Mr. H.A. Obeid	Groundwater Engineer, WAJ
Dr. J. Rashdan	Groundwater Engineer, WAJ
Mr. M. Momani	Groundwater Engineer, WAJ
Mr. Z. Hiassat	Systems Analyst, WAJ
Mr. M. Nassar	Systems Analyst, WAJ

Project documents and files were also reviewed. A list of these documents is given in Section 23, Special Comments or Remarks.

15. EXTERNAL FACTORS: During the implementation period of the Project, the GOJ first contemplated and then actually implemented a major reorganization of its agencies with implementation responsibilities for all water related activities. The functions of the Natural Resources Authority (NRA) and the Directorate of Water Resources were shifted to a new implementing agency, the Water Authority of Jordan (WAJ). This reorganization had long been encouraged by the USAID and had been a major plank in the USAID's policy dialogue for a number of years. There can be no doubt that these major reorganizational changes delayed the implementation of the project by (1) overburdening project staff with additional supervisory responsibilities; (2) and obscuring the original R&D activities of the Project's implementing agency with an over-emphasis on the production of additional water resources for the nation.

During the entire reorganization of WAJ there has been a gradual reassignment of most GOJ staffers that were originally involved in the conceptualization and design of this Project. That original staff now has new and/or additional responsibilities, while the newly introduced staff is not fully aware of, or committed to, the achievement of the original purposes of the Project.

Other external factors which have impacted on the Project include:

- A) The unanticipated requirement for a number of special procurement waivers for procurement of essential project equipment;

- B) The requirement to re-bid certain equipment due to the receipt of unresponsive bids from the original IFBs;
- C) The requirement to change the timing of the arrival of specific USGS technical advisors (such changes required, in some cases, that USGS provide several new advisors to the Project); and
- D) The unanticipated requirement to involve the Supply Department of the Ministry of Finance in the procurement of Project-financed equipment rather than merely following the existing regulations of the NRA.

Each of these factors resulted in delays in the implementation of the Project and were the major reasons for the approval of the initial one-year extension of the FACD.

16. INPUTS: Overall there does not appear to be any substantial problem related to the types and amounts of inputs that were originally selected as the means of producing the desired project outputs. The FP logframe indicates that the Project would provide the following inputs:
- A. Capital for drilling, water testing, laboratory and computer equipment.
 - B. Existing Natural Resource Authority (NRA) drilling, water testing and laboratory equipment.
 - C. NRA personnel for work and training under the Project.
 - D. In-country and overseas training for NRA personnel.
 - E. Technical Assistance in hydrological sciences and computer programming.

According to the FP, the following objectively verifiable indicators were to be used as measures of the success of the provision of these inputs;

- a. \$4.153 million for required equipment purchases,
- b. Existing drilling rigs, pumps, vehicles, recorders, gauges, rainfall stations, evaporation stations, streamflow stations, etc.
- c. Current and new NRA employees.
- d. Availability of on-the-job training and training programs in USGS National Training Center in Denver.

- e. Services of: 1 senior computer specialist, 1 drilling specialist, 1 senior hydrologist program manager, 4 hydrologists (64 person months).

As of September 30, 1984 the funding earmarked for commodities totalled \$3.496 million. It is estimated that the equipment included in IFB 003 will cost \$700 to \$800 thousand. The contracts for this equipment will be awarded early in FY 1985. Thus, total Project expenditures for equipment procurement will be approximately \$4.296 million by the end of the Project. This total is slightly higher than the originally budgeted amount. The difference is a result of inflation and cost overruns and is considered a reasonable cost escalation.

To date, approximately \$1.001 million has been obligated to finance required participant training and technical assistance. The USAID anticipates that a minimum of \$256 thousand or a maximum of \$420 thousand in additional funding will be required to finance the technical assistance during the remaining life of the Project. Therefore, the total expenditure for these items will range from a low of \$1.257 million to a high of \$1.421 million. The USAID and the GOJ recently provided funding from another USAID/J project, the Technical Services and Feasibility Studies III Project (278-0238), to complement this project. If the GOJ makes a request for an additional tranche of funding for technical assistance, the USAID will determine if such a requirement is indeed essential for the successful completion of the Project.

The PP also estimated that the GOJ contribution to the Project would be the equivalent of approximately 43% of the total Project cost. At the time of approval of the PP this total GOJ contribution was estimated to be approximately \$3.765 million. A recent review by WAJ of the Government's actual contribution to date indicates that an equivalent of approximately \$5.174 million has already been contributed by the GOJ to the implementation of the Project. (NOTE: a detailed breakout of the GOJ's actual contribution is attached as an Annex to this FES.)

TABLE I
DISBURSEMENT SCHEDULE
(U.S. \$000)

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	TOTAL
<u>A. I. D.</u>							
PP ESTIMATE	\$1,408	\$3,498	\$ 94	\$0	\$0	\$0	\$5,000
ACTUAL	\$0	\$ 108	\$ 357	\$3,097	----	---	\$3,562
<u>G. O. J.</u>							
PP ESTIMATE	\$ 242	\$1,086	\$1,171	\$1,266	\$0	\$0	\$3,765
ACTUAL	\$ 517	\$1,033	\$1,553	\$2,071	----	---	\$5,174

Approximately 75% of the equipment to be financed by the Project has been procured and delivered to the WAJ. The remaining 25% of Project equipment includes one item from IFB 001 and all of IFB 003. The WAJ is in the final phase of approving the specifications for these remaining pieces of equipment and it is estimated that procurement will be completed in early FY 85.

Project records indicate that the reorganization of the GOJ Water Sector activities has caused some minor problems related to the assignment of WAJ staff to the Project. However, this problem appears to have been largely solved at this time. The only staffing-related problem which still remains concerns the overburdening of WAJ project management with responsibilities other than those directly related to the Groundwater Investigation Project. In order to help solve this problem, USAID/J and WAJ are developing the Scope of Work for a resident advisor that will assist the WAJ management team to supervise the daily operations and remaining implementation activities of the Project.

The USGS has to date been able to provide all of the required technical assistance advisors as well as the required U.S. and in-country training. Both of these inputs have, however, not kept up with the original Project Implementation Schedule. The schedule was also in error in that it called for the arrival in Jordan of the computer specialist and the drilling specialist long before the procurement of project financed equipment was to begin.

An analysis of the originally proposed "Work Plan", the Project Paper's Implementation Schedule, reveals that insufficient time was built into the schedule for the provision of these project inputs. No allowances were made for the inevitable delays which resulted from such factors as; (a) changes in equipment specifications, (b) the need for special procurement waivers, (c) the need to re-bid particular items of equipment, and (d) the inevitability of overruns and inflation in the estimated costs for some required equipment and services. For example, sufficient time was not anticipated for the development and approval of the specifications for the required equipment, nor for adequately advertising for, evaluating and selecting the successful bids for equipment, nor was adequate time set aside for actual delivery, installation and testing of the new equipment. Nonetheless, the original PP listing of equipment appears, for the most part, to still be a valid compilation of what was needed to produce the desired outputs during the life of the Project.

In addition, it must be noted that the PP "Work Plan" did not allow sufficient time for the development and approval of the necessary detailed Scopes of Work for the required Technical Advisory services, nor did it allow time for the necessary selection, contracting and mobilization of these advisors or for any required changes in the estimated arrival times of the advisors.

Therefore, although no significant change in the above list of project inputs is being recommended at this time, there are clear indications that a revision of the original FP Implementation Schedule is essential in order to allow the GOJ and USAID/J to establish a realistic and up-to-date timetable for the provision of the required project inputs. In addition, in order to assist the implementing agency to manage the daily operational load of the Project, it has been suggested by both the GOJ and USAID/J that a fulltime advisor to the WAJ be provided under a separate and complementary contract funded under the TSFS III project. An estimate of the cost for such an advisor and the development of a detailed Scope of Work has already been initiated. The GOJ sector management capacity, is for the immediate future, clearly overburdened by its ongoing program. Therefore, any expectation that the GOJ could or would be able to fill such a management and coordination void with the assignment of additional GOJ staffing is unrealistic. USAID-funded contracting for such an additional advisor should insure that the overburdened WAJ management staff will, in the very near future, have available to it the necessary fulltime assistance required to coordinate the remaining Project activities which are to be completed during the life of the Project.

17. OUTPUTS: The original FP indicated that the following outputs would result from the implementation of the Project;
- A. A network of grouped exploratory/observational test wells drilled in all aquifers of Study Area.
 - B. A Water resources information storage and retrieval system established and functioning.
 - C. NRA (now WAJ) personnel trained in well drilling, water resources data collection and computer programming.

The objectively verifiable target indicators of these outputs were the following;

- a. An estimated 85 wells spaced strategically in the Project area.
- b. One installed and operating PDP 11/44 computer system or equivalent, plus required accessories and programs.
- c. Existing and newly collected water resources data converted into computer programs for storage and retrieval.
- d. NRA personnel participating in investigation.

A measurement of actual progress to date indicates that substantial progress has been made in the achievement of these target outputs. The GOJ has drilled 36 new exploratory wells in

the Study Area using existing GOJ equipment as well as the new project-funded drilling equipment. The new Gardner-Denver (G-D) drilling rig arrived in-country in September, 1983 and the new Ingersoll-Rand (I-R) drilling rig arrived in June, 1984. WAJ staff received extensive training in the operation and maintenance of these rigs and to date have completed 4 wells (1,000m) using the I-R rig and 3 wells (1,700m) using the G-D rig. These wells were dug to a variety of depths and at widely dispersed locations in the Study Area. These and other new wells drilled by the GOJ and by Jordanian contractors have provided data which has been added to an existing extensive body of data on the Study Area.

A PDP 11/44 computer system, plus the required accessories and programs, has been installed and is presently being operated by WAJ staff. Key members of the staff have been able to take advantage of training opportunities in the U.S. while other WAJ staff have benefitted from an extensive program of on-the-job training by a variety of USGS advisors. All WAJ data collection forms have been adapted to the requirements of the computer system and are being used in the field to gather the required water-related information. Large amounts of previously existing and newly collected data have been converted into the appropriate formats and are being entered into the computer programs for storage and retrieval. WAJ personnel have continued to participate actively in all aspects of the investigation program and concerned Water Sector officials are convinced of the need to extend this groundwater investigation program to cover all of Jordan as soon as possible.

It must be noted, however, that the Project has not been implemented in keeping with the original implementation schedule. This was in part due to an overly tight Project Implementation Schedule and the fact that, during the implementation of the Project, the GOJ completely reorganized the management and administration of the nation's Water Sector activities, a move long advocated by USAID.

This reorganization, as well as the fact that the original implementing agency experienced a number of management related problems, has caused some significant delays in project implementation. The Project has experienced, and is still experiencing, a continuing series of delays in the completion of necessary GOJ approvals and clearances of equipment specifications and Scopes of Work for the required advisors.

Another element of the WAJ reorganization which has adversely affected the Project has been the vast increase in the overall sector responsibilities of the new implementing agency and the resultant overburdening of the GOJ's project management staff. The new implementing agency has also experienced a slight shift in the primary focus of its activities. This has meant that, at

times, the designation and assignment of appropriate GOJ counterparts to work with advisors, the selection and availability of appropriate project staff, the nomination of participant trainees and assignment of required project equipment have been slower than anticipated. There also appears to be some question, under the new WAJ management, as to the priority of the tasks which remain for completion of the Project. For example, project related field work may, at times, be expected to serve a double function, i.e., drilling exploratory wells which are also expected to serve as production wells. This mixing of priorities appears to have detracted from the generation of the particular field data which is essential to the timely completion of the R&D purposes of the Project.

Therefore, it appears that adjustments in the original Project Implementation Schedule and in the original target Project outputs are essential at this time. Such adjustments are first steps in the process of determining whether AID/W approval of any further extensions to the FACD should be requested. The USAID should organize an appropriate team of GOJ, USAID/J and USGS project personnel to jointly review and revise the existing Project Implementation Schedule and, if necessary, the target Outputs of the original PP. The Team should focus its attention on the following elements:

- A) The steps and the time required to complete procurement of the remaining equipment to be financed under the Project (i.e. I.F.B. 003 and the remaining item from I.F.B. 001);
- B) A realistic timetable for the provision of the additional technical assistance that is required to complete the Project. Such a timetable will also require the development of detailed Scopes of Work for each of the advisors and the assignment of an appropriate GOJ counterpart to the advisors before the advisors arrive in-country;
- C) A plan for the completion of the WAJ supervised drilling program for the collection of the data needed to complete the baseline information on the Project Study Area. Such a Plan should include a rough estimate of the locations and an indication of whether the drilling will be accomplished by the WAJ or by private contractors. The Plan should also estimate the type and source of equipment and personnel required for the completion of each well and any additional data collection efforts that must be completed at existing sites;
- D) A list of any additional participant trainees scheduled to go to the U.S., with an estimation of any in-country training requirements (i.e. English Language), an outline

of their proposed program, and an estimate of the date of the individual's availability; and

- E) A detailed review of the additional technical assistance still required to accomplish the Project purposes. Such a review should result in a revised listing of required advisors, a detailed Scope of Work for each such assignment, and a projection of the date that the advisor will be required in-country.

18. PURPOSE: The approved Project purposes are;

- A) To assist the GOJ in developing and carrying out a systematic and comprehensive study of the availability of groundwater in Northern Jordan.
- B) To assist the NRA (now WAJ) in developing the capability to conduct similar investigations in other areas of the country.

The End of Project Status (EOPS) for these purposes are;

- a) A computerized information bank with a comprehensive set of data on the water resources of Northern Jordan; and
- b) An NRA (now WAJ) staff trained in the techniques of data collection and transfer of data to the computer and capable of conducting similar investigations in other parts of the country.

To date the Project has made substantial progress in the achievement of the EOPS. However, it appears that an additional extension of the PACD will be required if the approved Project purposes and the EOPS are to be fully accomplished.

After some delays caused by an unanticipated requirement for a Procurement Waiver, the appropriate computer terminal and accessories were purchased and arrived in Jordan in late FY 1983. A number of advisors from the USGS assisted in the installation and acceptance testing of this computer and its software and accessories. Some added delays were experienced in the start up and initial use of the computer due to the fact that responsibilities for the Project were shifted from the NRA to the WAJ. This required a physical move of the recently installed computer to a new location in the newly established WAJ. Nonetheless, a number of WAJ staff have completed training in the U.S. in the management and operation of the computer system. These individuals have subsequently assisted USGS advisors in providing on-the-job operational training to the rest of the WAJ computer unit staff with the result that the WAJ now has a functioning computer unit.

A long-term USGS resident advisor assisted the WAJ in revising and adjusting the water collection and use forms. These forms are an essential element of the process which is used to enter data into the computer. Previously available water related data are being entered onto these revised forms and they are now being used in the field by WAJ staff to collect the additional required data on the study area. The USGS advisor estimates that of the data entered into computer storage approximately 95% is from the Study Area. However, he noted that only about 50% of all the required data on the area is actually available at this time. The additional information is scheduled for collection during the remaining life of the Project.

The delay in the collection of the required baseline data was caused by a number of related factors. Primary among these are; a) the incomplete planning of the original Implementation Schedule, b) the unanticipated requirement for procurement waivers, c) problems in contracting for the drilling of wells at various sites in the study area, d) delays in the selection and departure of participant trainees, e) delays in GOJ approval of the specifications for the required equipment and Scopes of Work for the required technical advisors, f) the tendency to use the Project equipment for the drilling of production wells versus strictly for the drilling of wells required for the gathering of Project related data, and g) the overall reorganization of the GOJ's Water Sector activities.

Thus, it appears to USAID that the WAJ project staff is as yet not fully capable of expanding the coverage of the Program to the rest of Jordan without some additional help. Nonetheless, the originally approved Project purposes and EOPS are still considered to be valid and are good descriptions of what will exist when the Project purposes are achieved. However, it appears that an additional extension of the existing FACD will be required if the Project is to fully achieve these purposes. In that the original FACD has already been extended for one year by the USAID, any further extension will require AID/W review and approval. Therefore, it is recommended that the USAID carefully review the existing situation and determine exactly how much additional time will be required for the Project to accomplish these purposes. (NOTE: The previous section of this Project Evaluation Summary (PES) suggests what some of the major elements of such a review and revision process might be).

19. GOAL: The approved Project Goal is "To increase the supply of water to Jordan's growing population and economy to satisfy demands in domestic, agricultural and industrial sectors." Although significant progress has been made in achieving the purposes of the Project and there remains a clear link between the achievement of these purposes and the accomplishment of the Sector Goal, it is clear that the linkages are long-term in nature. Therefore, it is still too early to determine if the Project has had any substantial impact on the accomplishment of the approved Sector Goal.

Various advisory and project staff have indicated that while all required data has not as yet been collected and entered into the computer, the GOJ has already adopted the procedures developed by the Project for the collection of water-related data for the entire country. It is anticipated that eventually a variety of other GOJ agencies will be involved in the analysis of the data and in the revision of the long-term Water Sector program of the Government. Throughout this entire period of time the Government and the private sector will no doubt continue to gradually increase the water that is available in Jordan. However, it is anticipated that this long-range planning and production process will be substantially improved as a result of the information derived from the Project and any similar subsequent nationwide efforts of the GOJ. Such improved GOJ sector planning will have a definite, positive impact upon the GOJ's overall ability to meet its growing water needs. The accomplishment of this long-term sector goal cannot be accurately measured or evaluated at the present time and will require a much more extensive Impact Evaluation at some time in the future.

20. BENEFICIARIES: In that this Project is basically an R&D activity the identification of the Project's beneficiaries is limited to some extent. A major objective of the Project has been to provide the training to GOJ project staff and management personnel so as to insure that the Government will have the capacity to continue to conduct this sort of R&D activity once the Project itself is completed. When adequate experience has been gained in the use of these procedures, it is anticipated that the WAJ will expand the Program to cover the entire country. Therefore, the direct beneficiaries of this particular Project are the staff and managers of the WAJ, the GOJ implementing agency.

To date nine members of the WAJ Project staff have taken part in short-term training programs in the U.S. which have been sponsored and organized by the USGS. At least three other participant trainees are still to be nominated for such USGS training and the GOJ has requested a number of other short-term training slots which are being considered by the USAID. In addition, other project related staff have received on-the-job training from the USGS advisors that have visited Jordan. This on-the-job training included such diverse fields as; computer programming, data entry, data collection and analysis, water quality testing, equipment usage, etc. This training has substantially improved the Government's capacity to conduct this sort of R&D activity. The process, however, is not as yet complete.

It should be noted that problems in approval, scheduling and adequate English language training of the participants have been continuing problems for the Project. In order to minimize such problems in the future, it has been suggested that the proposed Joint Project Review and Implementation Schedule revision focus on the additional training requirements of the Project and that an up-to-date schedule of that training be developed and agreed to by USAID/J, the GOJ and USGS prior to requesting AID/W approval of any further extension of the FACD.

A wide variety of other government and private agencies and organizations involved in activities which utilize water related data will also benefit once the data base and the collection methodology have been fully institutionalized. These other GOJ agencies will be able to call upon the WAJ for the information that is essential to their own activities. They will be in a much better position to make accurate and informed decisions related to a wide variety of water issues.

The indirect beneficiaries of the Project will include the entire population of Jordan. Once the R&D program of the Project has been successfully established as an ongoing activity of the WAJ and expanded to cover the entire country, the WAJ will be in an excellent position to prepare accurate long-range plans for water exploitation and aquifer protection and maintenance throughout Jordan. The information in the computer will enable GOJ planners to make informed decisions concerning the appropriateness of developing and/or using new sources of water without endangering existing sources. During the Interim Evaluation, a number of GOJ officials noted that they consider this Project to be at the very core of Jordan's Water Sector activities for many decades to come. Without it they feel that the continuing pressure to increase the supply of available water may force the Government to make uninformed decisions which may have disastrous effects on the future of Jordan's water resources.

21. UNPLANNED EFFECTS: The only unplanned effect was the Government's decision to reorganize the management and administration of water sector activities. The obvious problems which the Government experienced in implementing this and other water related projects merely increased the GOJ's understanding of the urgent requirement for the reorganization. Even though the reorganization caused some short-term problems, over the long-term it should prove to be advantageous to the Government's overall Water Sector activities. Since this reorganization has increased the overall responsibilities of WAJ, the implementing agency for this project, it appears that a reassessment at some future date along the lines previously suggested would be appropriate. No other changes appear to be necessary at this time.

22. LESSONS LEARNED: The following lessons have been learned from the implementation of this project:
- A) Project planners should carefully estimate all lead times for commodity and TA procurement and then program additional time to cover for contingencies and unforeseen events that might slow down the scheduled implementation of the project.
 - B) Projects of this nature usually require intensive, "hands-on" project management by both the host country and the USAID project managers. Communication between these key managers must be open, forthright and frequent if a reasonable implementation schedule is to be adhered to. If the host country implementing agency does not have a working knowledge of all of AID's complex implementation procedures and requirements, USAID should be prepared to provide whatever staff time it takes to insure that the project is implemented in a timely manner.

23. SPECIAL COMMENTS OR REMARKS: In order to insure that the remaining elements of the original Project are completed in a timely manner, it appears that a fulltime advisor to the WAJ will be required in the very near future. Prior to the selection and contracting of such an advisor it is essential that USAID/J and WAJ jointly review and revise the Project Implementation Schedule along the lines that have been outlined in this FES and then develop a comprehensive Scope of Work for the required fulltime advisor.

A brief listing of some of the documents and files that have been reviewed during this Interim Evaluation follows:

- A. Progress and Planning Report by C.L.R. Holt, USGS dated December 11, 1983.
- B. Project Quarterly Progress Reports by D.V. Maddy, USGS.
- C. A listing of the Master Record forms to be completed by types of sites.
- D. A listing of the Tables Describing Water Data Bank File, Domains and Tables presently in the WAJ Computer System.
- E. An index of Water Data Bank Files.
- F. A compilation of The Number of Records in Water Data Bank Files (by Date).

- G. A group of Sample revised formats for the collection and storage of water related data (5 forms).
- H. USAID/J Project files, including Mission Project Review Memoranda.
- I. Estimate of GOJ actual contribution to the cost of the Project (FY 81 to FY 84).
- J. Map showing all the data collection sites presently being used by the WAJ.

BUDGET FOR NORTH JORDAN GROUNDWATER PROJECT
(AID PROJECT NO. 278-0243)

EXPENSES PAID/INCURRED BY GOJ (JAN. 1, 1981 - SEPT. 30, 1984)
(JD 1.000=\$2.85)

	<u>JORDANIAN</u> <u>DINARS</u>	<u>U.S. DOLLARS</u> <u>(EQUIVALENT)</u>
1. Personnel (Administrative & Technical)	303,221	864,180
2. Drilling of Groundwater Wells (10,500m at 100 JD/m, including drilling, setting casing, cleaning, well development, etc.)	1,050,000	2,992,500
3. Computer Installation,		
a. Site Preparation (NRA)	6,950	
b. Power Supply	8,000	
c. Site Preparation (WAJ)	2,385	
d. Relocation Expense	2,300	
e. Additional Equipment & Supplies		
1. Two Terminal, VT-100 English Display	1,700	
2. Six 80 MF Magnetic Disk Packages	1,056	
3. 10-1600 BPI Magnetic Tape	55	
4. 20 Boxes, Data Forms	187	
Item 3 sub-total	22,633	64,504
4. Artificial Recharge (Wadi Dhulal)		
a. Construction of Earth Fill Dam	167,000	
b. Land Compensation (approximate)	8,485	
c. Water Pumps	50,000	
d. 1,000 M of 8" Diameter Pipe	10,000	
Item 4, sub-total	235,485	671,132

	<u>JORDANIAN</u> <u>DINARS</u>	<u>U.S. DOLLARS</u> <u>(EQUIVALENT)</u>
5. Equipment		
a. Seven Automated Weather Stations (in addition to the 5 stations purchased by AID), including installation	78,400	
b. One Water Level Recorder at Khanna, installed	1,000	
c. 40 Daily Rainfall Gauges	400	
d. Laboratory Equipment (100 Graduated cylinders)	1,000	
e. Site Protection (fences), 8 stations, 20m x 20m area at JD 20m	-----12,800	
Item 5, sub-total	93,600	266,760
6. Services		
a. Re-Survey Project Wells (500 wells at JD 35/each)	17,500	
b. Water Sample Collection and Analysis (3,000 samples at JD 25/each)	75,000	
c. Pump Test (18 tests at JD 1,000/each)	-----18,000	
Item 6, sub-total	110,500	314,925
G R A N D T O T A L	JD1,815,439	\$5,174,001

GOJ EXPENDITURE BY YEAR (U.S. DOLLARS)

<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
517,400	1,032,800	1,553,200	2,070,600

" 2-Way Memo

Subject: (278-0243) Groundwater Resources Investigation

INSTRUCTIONS	
Use routing symbols whenever possible.	
SENDER (Originator of message): Use brief, informal language. Conserve space. Forward original and one copy.	
RECEIVER (Replier to message): Reply below the message, keep one copy, return one copy.	

From : Mr. W. Libby
USAID, Amman
Amman, Jordan

RECEIVED
NE/PD/MENA
11/19/84

↑ File Jordan Project

DATE OF MESSAGE	ROUTING SYMBOL
10/29/84	NE/PD/MENA
SIGNATURE OF ORIGINATOR	
<i>Steve Hardy</i>	
TITLE OF ORIGINATOR	
Project Officer	

FOLO MESSAGE FOLD

Bill,

Please find attached a copy of the PASA Amendment number 6.

Sorry It took so long to get you this copy. The contracting office is a little slow at times. How is the PES finalization coming? Let me know if I can help in any way.

Steve

REPLY

Copy of PASA Amendment No. 6 was received on 11/7/84, Thank you.

One WANG printout of the Groundwater PES with editorial changes and GOJ (WAJ) changes marked in yellow, is attached. The Mission Evaluation Officer, Ms Nancy Hardy, has not yet convened a Project Committee meeting, the first step in finalizing the PES. - The blanks in the attached printout are intentional and will be filled in after the Project Committee meeting. We'll keep you informed, as things develop.

To : Mr. Steven J. Freundlich
NE/PD/MENA, Room 4440, NE
Department of State
Washington, D.C. 20523

DATE OF REPLY	ROUTING SYMBOL
11/8/84	
SIGNATURE OF REPLIER	
<i>William W. Libby</i>	
TITLE OF REPLIER	
Deputy Chief Engineer	

RETURNED TO ORIGINATOR
5027-107

OPTIONAL FORM 37 (Rev. 7-83)
GSA FPMR (41 CFR) 101-11.6
NSN 7540-00-082-2447

PROJECT EVALUATION SUMMARY (PES) - PART I

- 1. Project Title: GROUNDWATER RESOURCES INVESTIGATION
- 2. Project Number: 278-0243
- 3. Mission/AID/W Office: USAID/Jordan, NE/PD/MENA
- 4. Evaluation Number: , X Regular Evaluation.
- 5. Key Project Implementation Dates:
 - A. First Proj. Ag. FY 80.
 - B. Final Obligation Expected FY 81
 - C. Final Input Delivery FY 85
- 6. Estimated Project Funding:
 - A. Total \$8.795
 - B. U.S. \$5.000
- . Period Covered by Evaluation:
From September 1980 to September 1984.
- 8. Action Decisions Approved by Mission or AID/W Office Director:

RECEIVED
NE/PD/MENA
11/19/84
[Signature]

A. List decisions and/or unresolved issues; cite those items needing further study.	B. Name of Officer responsible for action.	C. Date of completion
---	--	-----------------------

- ✓ a) Review and revise the Project Implementation Schedule including provision of the number and location of exploratory drillholes and the scheduling of equipment and staff therefore..
- ✓ b) Develop and approve detailed Scope of Work for the additional long-term, resident advisor and any other advisors still required by the Project.
- c) Request AID/W approval of an additional extension of the FACD. X
- ✓ d) Complete the development and approval of the equipment specifications for IFB 003 and for the remaining piece of unprocured equipment from IFB 001.
- ✓ e) Complete the procurement of the required Project equipment.
- ✓ f) Complete the nomination and training of participant trainees.
- ✓ g) Complete the drilling of required exploratory wells and the collection of data in the Project Study Area. (This drilling program is to be completed by a combination of GOJ and private sector drilling teams.)

- ✓) Complete the entry of the remaining data on the Project Study Area into the computer system.
 - i) Begin the process of analyzing the data.
-

9. Inventory of Documents to be revised per above decisions:

- X Implementation Plan
e.g. CFI Network
 - X Other -- IFB 003 X
 - X Other -- Scope of Work and contract for required long-term resident advisor. X
 - X Other -- Scopes of Work for other technical advisors X
 - X Action Memorandum to the AA/NE and attached justification for an extension of the existing FACD.
-

10. Alternative Decisions on Future of the Project:

E. X Change Implementation Plan

11. Project Officer and Host Country or other ranking Participant as appropriate:

12. Mission Director Approval:

13. SUMMARY: The Project has made substantial progress in achieving the purposes established in the Project Paper (PP). However, a number of unforeseen problems developed which were for the most part related to deficiencies in the original design of the Project. These problems resulted in delays in implementing the Project and in achieving all of the original purposes in a timely manner. Most of these problems have been successfully resolved during the Mission approved, one year extension of the Project Activity Completion Date (FACD). Nonetheless the Project will require some additional time in order to resolve the remaining problems and in order to compensate for the delays experienced during the initial period of Project implementation. This additional extension of the FACD will result in the achievement of the original Project purposes and will insure that the Project will have the intended impact on the Sector Goal.

The major problems which the Project has had to deal with include;

- a) Inadequate allocation of sufficient time for the development and approval of the correct specifications for required equipment,

- b) Inadequate allocation of sufficient time for the procurement of the equipment,
- c) Inadequate allocation of sufficient time for the development and approval of appropriate Terms of Reference for the required Technical Assistance Advisors,
- d) Inappropriate timing of the arrival incountry of the selected advisors.
- e) The reorganization of the GOJ implementing agency and the resulting unclear lines of management responsibilities of project personnel,
- f) Delays in and/or inability to assign the appropriate, fulltime GOJ counterparts to the Technical Assistance Advisors,
- g) The timely selection, approval, and arrival in the U.S. and return to Jordan of the appropriate participant trainees,
- h) Confusion concerning the overall research and development (R&D) orientation of the Project which resulted in a failure to establish clear R&D priorities in assigning Project personnel and equipment for the required field work and data collection.
- i) Difficulties in keeping separation of exploratory and production well drilling.

14. EVALUATION METHODOLOGY: The FP Evaluation Section tentatively scheduled an "Interim Evaluation" in January of 1983 to review implementation progress during the initial years of the Project. The FP noted that such an evaluation was to "...evaluate progress ...and identify any apparent shortcomings in equipment, human resources or training which may have inhibited achievement of the Project Purpose." Due to a variety of factors, including a one year extension of the original PACD, the "Interim Evaluation" was rescheduled for October of 1984.

The "Interim Evaluation" actually measured and assessed implementation progress to-date so as to develop recommendations concerning;

- a) the validity of a proposed additional extension of the existing PACD, and
- b) what specific redesign and/or implementation activities are required to insure that the Project achieves the stated purposes and has the desired impact on the relevant Sector Goal during the life of the project ?

The list of individuals interviewed and their respective agencies follows:

<u>ORGANIZATION</u>	<u>INDIVIDUAL</u>	<u>PROJECT RESPONSIBILITY</u>
<u>USAID/J</u>	Mr. A. Sweis	Project Officer
	Mr. B. Donnelly	Chief Engineer
	Mr. W. Libby	Deputy Chief Engineer
	Mr. S. Stalla	Project Development Officer
	Mr. J. Hanks	Project Development Officer
	Ms. N. Hardy	Mission Evaluation Officer
	Mr. G. Gower	Mission Director

ORGANIZATION
USGS

INDIVIDUAL

PROJECT RESPONSIBILITY

Ms. D. Laura	Division Chief, OIH/W
Mr. V. Guisti	Project Manager, OIH/W
Mr. L. Holt	Consultant
Mr. D. Maddy	Computer Advisor, OIH/J

GOJ

Mr. B. Kefayeh	Member of National Planning Council (Water Sector)
Mr. M. Kilani	President, WAJ
Mr. M. Talhouni	Secretary General, WAJ
Mr. A. Kilani	Project Manager, WAJ
Mr. B. Hirzallah	Asst. Project Manager, WAJ
Mr. A. H. Khatib	Chief, Water Quality Division
Mr. S. Tannous	Director of Drilling, WAJ
Mr. H.A. Obeid	Groundwater Engineer, WAJ
Dr. J. Rashdan	Groundwater Engineer, WAJ
Mr. M. Momani	Groundwater Engineer, WAJ
Mr. Z. Hiassat	Systems Analyst, WAJ
Mr. M. Nassar	Systems Analyst, WAJ

15. EXTERNAL FACTORS: During the implementation of the Project, the GOJ first contemplated and then actually implemented a thorough reorganization of responsibilities within the Water Sector. Major implementation responsibilities for water related activities was shifted from the Natural Resources Authority (NRA) to a new implementing agency, the Water Authority of Jordan (WAJ). This reorganization was favored by the Mission. However, this major change was an external factor related to the project setting that has impacted directly on the Project; by contributed to delays in the originally planned schedule of project implementation, by overburdening project staff with additional supervisory responsibilities and by obscuring the the original R&D activities of the Project's implementing agency with an over emphasis on the production of additional water resources for the nation.

During the entire process of reorganization there has been a gradual reassignment of much of the GOJ staff that was originally involved in the conceptualization and design of the original Project. That original staff now has new and/or additional responsibilities, while the newly introduced staff is not fully aware of, or committed to the original purposes of the Project.

Other external factors having an impact on the Project included;

- a) the unanticipated requirement for a number of special procurement waivers for essential equipment,
- b) the requirement to rebid certain equipment due to the receipt of unresponsive bids for the original IFBs, and
- c) the requirement to change the timing of the arrival of specific USGS technical advisors. Such changes required, in some cases, that USGS provide totally different and new advisors to the Project.

- d) the unanticipated requirement to involve the Supply Department of the Ministry of Finance in the procurement of Project financed equipment rather than merely following the existing regulations of the NRA.

Each of these factors resulted in delays in the implementation of the Project. These delays were the major reasons for the approval of the initial one year extension of the FACD.

16. INPUTS: Overall there does not appear to be any substantial problem related to the types and amounts of inputs that were originally selected as the means of producing the desired project outputs. The FF logframe indicates that the Project would provide the following inputs:

- a. Capital for drilling, water testing, laboratory and computer equipment.
- b. Existing Natural Resource Authority (NRA) drilling, water testing and laboratory equipment.
- c. NRA personnel for work and training under the Project.
- d. Incountry and overseas training for NRA personnel.
- e. Technical Assistance in hydrological sciences and computer programming.

The following objectively verifiable indicators were to be used as measures of the success of the provision of these inputs:

- a. \$4.153 million for required equipment purchases.
- b. Existing drilling rigs, pumps, vehicles, recorders, gauges, rainfall stations, evaporation stations, streamflow stations, etc.
- c. Current and new NRA employees.
- d. Availability of on-the-job training and training programs in USGS National Training Center in Denver.
- e. Senior computer specialist, 1 drilling specialist, 1 senior hydrologist program manager, 4 hydrologists (64 person months).

As of September 30, 1984 the funding committed for commodities totalled \$2,562 million. It is estimated that the equipment included in IFB 003 will cost between \$700 to \$800 thousand. The contracts for this equipment will be awarded early in FY 1985. Thus the total Project expenditure for equipment procurement will be approximately \$4,362 million by the end of the Project. This total is slightly higher than the originally budgetted amount. The difference is a result of inflation and cost overruns.

To date approximately \$660 thousand has been committed to finance required participant training and technical assistance. The Mission anticipates that a minimum of \$256 thousand or a maximum of \$420 thousand in additional funding will be required to finance the technical assistance during the remaining life of the Project. Therefore the total expenditure for these items will range from a low of \$916 thousand to a high of \$1.08 million. An initial tranche of

additional funding for these items was recently provided to the Project from another USAID/J Project, the Technical Services and Feasibility Studies III Project 278-0258. At the time of receiving a GOJ request for an additional tranche of funding for technical assistance, the Mission will determine if such a requirement is indeed essential for the successful completion of the Project and what the source of such funding will be.

The PP also estimated that the GOJ contribution to the Project would be the equivalent of approximately 43% of the total Project cost. At the time of approval of the PP this total GOJ contribution was estimated to be approximately \$3.765 million. A recent review, by the WAJ, of the government's actual contribution to date indicated that an equivalent of approximately \$5.174 million has already been contributed to the implementation of the Project. (NOTE: a detailed breakout of the GOJ's actual contribution is attached as an Annex to the PES.)

TABLE I
DISBURSEMENT SCHEDULE
(U.S. \$000)

	FY_81	FY_82	FY_83	FY_84	FY_85	FY_86	TOTAL
A.I.D.							
PP_ESTIMATE	\$1,408	\$3,498	\$ 94	\$0	\$0	\$0	\$5,000
ACTUAL	\$0	\$ 108	\$ 357	\$3,097	----	---	\$3,562
G.O.J.							
PP_ESTIMATE	\$ 242	\$1,086	\$1,171	\$1,266	\$0	\$0	\$3,765
ACTUAL	\$ 517	\$1,033	\$1,553	\$2,071	----	---	\$5,174

Approximately 75% of the equipment to be financed by the Project has been procured and delivered to the WAJ. The remaining 25% of Project equipment includes one item from IFB 001 and all of IFB 003. The WAJ is in the final phase of approving the specifications for these remaining pieces of equipment and it is estimated that procurement will be completed in early FY 85.

Project records indicate that the reorganization of the GOJ Water Sector activities has caused some minor problems related to the assignment of WAJ staff to the Project. However, this problem appears to have been largely solved at this time. The only staffing related problem which still remains concern the overburdening of WAJ project management with responsibilities other than those directly related to the Groundwater Investigation Project. In order to solve this problem USAID/J and WAJ are developing the Scope of Work for a resident advisor that will assist the WAJ management team to supervise the daily operation and implementation of the Project.

The USGS has to date been able to provide all of the required technical assistance advisors as well as the required U.S. and incountry training. Both of these inputs have however suffered from scheduling delays related to the inadequate and incomplete development of the original Project Implementation Schedule, i.e., The schedule calls for the arrival in Jordan of the Computer specialist and the Drilling specialist long before the procurement of project financed equipment was to begin.

An analysis of the originally proposed "Work Plan", the Project Paper's Implementation Schedule, reveals that insufficient time was allocated for the provision of these project inputs. No allowances were made for the inevitable delays which would result from such factors as; (a) changes in equipment specifications, (b) the need for special procurement waivers, (c) the need to rebid particular items of equipment, and (d) the inevitability of overruns and inflation in the estimated costs for required equipment and services. For example, sufficient time was not set aside for the development and approval of the specifications for the required equipment, nor for adequately advertising for, evaluating and selecting the successful bids for equipment, nor was adequate time set aside for the actual delivery, installation and testing of the new equipment. Nonetheless, the original FP listing of equipment appears, for the most part, to still be a valid compilation of what is required to produce the desired outputs during the life of the Project.

In addition, it must be noted that the PP "Work Plan" did not allow sufficient time for the development and approval of the necessary detailed Scopes of Work for the required Technical Advisory services, nor did it allow time for the necessary selection, contracting and mobilization of these advisors or for any required changes in the estimated arrival times of the advisors.

Therefore, although no significant change in the above list of project inputs is being recommended at this time, there are clear indications that a revision of the original FP Implementation Schedule is essential in order to allow the GOJ and USAID/J to establish a realistic and up-to-date timetable for the provision of the required project inputs. In addition, in order to assist the implementing agency to manage the daily operational load of the Project, it has been suggested by both the GOJ and USAID/J that the Project finance a contract for a fulltime advisor to the WAJ. Funding has already been set aside from the TSFS III project for the estimated cost of such an advisor and the initial step of developing a detailed Scope of Work has already be initiated. The GOJ sector management capacity, is for the immediate future, clearly overburden by its ongoing program. Therefore any expectation that the GOJ could or would be able to fill such a management and coordination void with the assignment of additional GOJ staffing is unrealistic. Contracting for such an additional advisor will insure that the overburdened WAJ management staff will, in the very near future, have available to it a necessary fulltime assistance required to coordinate the remaining Project activities which are to be completed during the life of the Project.

17. OUTPUTS: The original FP indicated that the following outputs would result from the implementation of the Project;

- a. Network of grouped exploratory/observational test wells drilled in all aquifers of Study Area.
- b. Water resources information storage and retrieval system established and functioning.
- c. NRA personnel trained in well drilling, water resources data collection and computer programming.

The objectively verifiable target indicators of these outputs were the following;

- a. An estimated 85 wells spaced strategically in the Project area.
- b. One installed and operating PDP 11/44 computer system or equivalent, plus required accessories and programs.
- c. Existing and newly collected water resources data converted into computer programs for storage and retrieval.
- d. NRA personnel participating in investigation.

A measurement of actual progress to date indicates that substantial progress has been made in the achievement of these target outputs. The GOJ has drilled a number of new exploratory wells in the study area using existing GOJ equipment as well as the new project funded drilling equipment. The new Gardner-Denver (G-D) drilling rig arrived incountry in September of 1983 and the new Ingersoll-Rand (I-R) drilling rig arrived in June of 1984. WAJ staff received extensive training in the operation and maintenance of these rigs and to date have completed 4 wells (1,000m) using the I-R rig and 3 wells (1,700m) using the G-D rig. These wells were at a variety of depths and at a widely disbursed locations in the study area. These new wells and other new wells drilled by the GOJ and under contract with private Jordanian drilling companies have provided data which has been added to an existing extensive body of data on the study area.

A PDP 11/44 computer system, plus the required accessories and programs, has been installed and is presently being operated by WAJ staff. Key members of the staff have been able to take advantage of training opportunities in the U.S. Other WAJ staff have benefitted from an extensive program of on-the-job training by a variety of USGS advisors. All WAJ data collection forms have been adapted to the requirements of the computer system and are being used in the field to gather the required water related information. Large amounts of previously existing and newly collected data has been converted into the appropriate formats and is being entered into the computer programs for storage and retrieval. WAJ personnel have continued to actively participate in all aspects of the investigation program and concerned Water Sector officials are convinced of the need to extend this program to cover the entire nation as soon as possible.

It must be noted however, that the Project has experienced significant delays and that these, to a large extent, have been directly related to two major factors. The first concerns the previously mentioned, poorly developed Project Implementation Schedule. The second concerns the fact that, during the implementation of the Project, the GOJ completely reorganized the management and administration of the nation's Water Sector activities. This reorganization, as well as the fact that the original implementing agency experienced a number of management related problems, was a major cause of the government's poor performance in providing project inputs in a timely manner. The Project experienced and is still experiencing a continuing series of delays in the completion of necessary GOJ approvals and clearances of equipment specifications and Scopes of Work for the required advisors.

Another element of the reorganization which has adversely affected the Project has been the vast increase in the overall sector responsibilities of the new implementing agency and the resultant overburdening of the GOJ's project management staff. The new implementing agency has also experienced a slight shift in the primary focus of its activities. This has meant that, at times, the designation and assignment of appropriate GOJ counterparts for advisors, the selection and availability of appropriate project staff, the nomination of participant trainees, and assignment of required project equipment have been delayed.

There also appears to be some question, under the new organizational plan, as to the priority of tasks which are involved in the completion of the Project. For example, project related field work may, at times, be expected to serve a double function, i.e., drilling exploratory wells which are also expected to serve as production wells. This mixing of priorities appears to have slowed down the generation of field data which is essential to the timely completion of the R&D purposes of the Project.

Therefore, it appears that some adjustments in the original Project Implementation Schedule and in the original target Project outputs is appropriate at this time. Such adjustments are essential first steps in the process of determining whether AID/W approval of any further extensions to the PACD should be requested. The Mission should organize an appropriate team of GOJ, USAID/J and USGS project personnel to jointly review and revise the existing Project Implementation Schedule and, if necessary, the target outputs of the original PP. The Team should focus its attention on the following elements;

- a) the steps and the time required to complete procurement of the remaining equipment to be financed under the Project (i.e. I.F.B. 003 and the remaining item from I.F.B. 001),
- b) a realistic timetable for the provision of the additional technical assistance that is required to complete the Project. Such a timetable will also require the development of detailed Scopes of Work for each of the advisors and the assignment of an appropriate GOJ counterpart to the advisors before the advisor arrives incountry.
- c) a Plan for the completion of the WAJ supervised drilling program needed for the collection of the data required to complete the necessary base-line information on the Project study area. Such a Plan should include a breakout of the new wells that must still be drilled and an indication of whether the drilling will be accomplished by the WAJ or by private contractors. The Plan should also indicate the type and source of equipment and personnel required for the completion of each well and any additional data collection efforts that must be completed at existing sites,
- d) a List of any additional participant trainees scheduled to go to the U.S., with an estimation of any incountry training.

requirements (i.e. English Language), an outline of their proposed program, and an estimate of the date of the individual's availability, and

- a) A detailed review of the additional technical assistance still required to accomplish the Project purposes. Such a review should result in a revised listing of required advisors, a detailed Scope of Work for each such assignment, and a projection of the date that the advisor will be required in country.

18. PURPOSE: The approved Project purposes are;

- a) To assist GOJ in developing and carrying out a systematic and comprehensive study of the availability of groundwater in Northern Jordan.
- b) To assist the NRA (now WAJ) in developing the capability to conduct similar investigations in other areas of the country.

The End of Project Status (EOPS) for these purposes are;

- a) A computerized information bank with a comprehensive set of data on the water resources of Northern Jordan.
- b) An NRA staff trained in the techniques of data collection and transfer of data to the computer and capable of conducting similar investigations in other parts of the country.

To date the Project has made substantial progress in the achievement of the EOPS. However, it appears that an additional extension of the PACD will be required if the approved Project purposes and the EOPS are to be fully accomplished.

To summarize present status; after some delays were caused by an unanticipated requirement for a Waiver, the appropriate computer terminal and accessories were purchased and arrived in country late in FY 83. A number of advisors from the USGS assisted in the installation and acceptance testing of the computer and accessories. Some added delays were experienced in initiating the utilization of the computer due to the fact that responsibilities for the Project were shifted from the NRA to the WAJ. This required a physical move of the recently installed computer to a new location in the newly established WAJ. Nonetheless, a number of WAJ staff have completed training in the U.S. in the management and operation of the computer system. These individuals have subsequently assisted USGS advisors in providing on-the-job operational training to the rest of the WAJ computer unit staff with the result that the WAJ now has a functioning computer unit.

A long-term USGS resident advisor assisted the WAJ in revising and adjusting all of the water collection and use forms. These forms are an essential element of the process which is utilized to enter data into the computer. All previously available water related data has been entered onto these revised forms and they are now being used in the field by WAJ staff to collect the additional required data on the

study area. The USGS advisor estimates that of the data entered into computer storage approximately 95% is from the study area. However, he noted that only about 50% of all the required data on the area is actually available at this time. The additional information is scheduled for collection during the remaining life of the Project. However it is unclear as to whether the existing PACD will allow sufficient time to insure that all this required base-line data is collected.]

The delay in the collection of the required base-line data was caused by a number of related factors. Primary among these are; a) the previously mentioned incomplete planning of the original Implementation Schedule, b) the unanticipated requirement for procurement waivers, c) problems in contracting for the drilling of wells at various sites in the study area, d) delays in the selection and departure of participant trainees, e) delays in GOJ approval of the specifications for the required equipment and Scopes of Work for the required technical advisors, f) the tendency to use the Project equipment for the drilling of production wells versus strictly for the drilling of wells required for the gathering of Project related data, and g) the overall reorganization of the GOJ's Water Sector activities.

Thus it appears that the WAJ project staff is as yet not fully capable of expanding the coverage of the Program to the rest of the country. Nonetheless, the originally approved Project purposes and EOPS are still considered to be valid and are good descriptions of what will exist when the Project purposes are achieved. However, it appears that an additional extension of the existing PACD will be required if the Project is to achieve these purposes. In that the original PACD has already been extended for one year by the Mission, any further extension will require AID/W review and approval. Therefore it is recommended that the Mission carefully review the existing situation and determine exactly how much additional time will be required for the Project to accomplish these purposes. (NOTE: The previous section of this Project Evaluation Summary (PES) suggests what some of the major elements of such a review and revision process might be.)

19. GOAL: The approved Project Goal is "To increase the supply of water to Jordan's growing population and economy to satisfy demands in domestic, agricultural and industrial sectors." Although progress has been made in achieving the purposes of the Project and there remains a clear link between the achievement of these purposes and the accomplishment of the Sector Goal, it is clear that the linkages are long-term in nature. Therefore it is really still too early to determine if the Project has had any substantial impact on the accomplishment of the approved Sector Goal.

Various advisory and project staff have indicated that although all required the data has not as yet been collected and entered into the computer, the GOJ has already adopted the procedures developed by the Project for the collection of water related data for the entire country. It is anticipated that eventually a variety of other GOJ

agencies will be involved in the analysis of the data and in the revision of the long-term Water Sector program of the government. Throughout this entire period of time the government and the private sector will no doubt continue to gradually increase the water that is available in Jordan, however it is anticipated that this long-range planning and production process will be substantially improved as a result of the information derived from the Project and any similar subsequent nationwide efforts of the GOJ. Such improved GOJ sector planning will have a definite positive impact upon the GOJ's overall ability to meet the growing water needs of the country, however the accomplishment of this long-term sector goal cannot be accurately measured or evaluated at the present time and will require a much more extensive Impact Evaluation at some time in the future.

20. BENEFICIARIES: In that this Project is basically an R&D activity the identification of the Project's beneficiaries is limited to some extent. A major objective of the Project has been to provide the training to GOJ project staff and management personnel so as to insure that the government will have the capacity to continue to conduct this sort of R&D activity once the Project itself is completed. Once adequate experience has been gained in the use of these procedures it is anticipated that the WAJ will expand the Program to cover the entire country. Therefore, the direct beneficiaries of this particular Project are the staff and managers of the WAJ, the GOJ implementing agency. It is this core of personnel that is the direct recipient of both U.S. and the incountry training financed by the Project.

To date nine members of the Project staff have taken part in short-term training programs in the U.S. which have been sponsored and organized by the USGS. At least three other participant trainees are still to be nominated for such USGS training and the GOJ has requested a number of other short-term training slots which are being considered by the Mission. In addition, other project related staff has received on-the-job training from the USGS advisors that have been incountry. This on-the-job training included such diverse fields as; computer programming, data entry, data collection and analysis, water quality testing, equipment usage, etc. This training has substantially improved the government's capacity to conduct this sort of R&D activity, however the process is not as yet complete.

It should be noted that problems in approval, scheduling and adequate English language training of the participants have been continuing problems for the Project. In order to minimize such problems in the future, it has been suggested that the proposed joint Project review and Implementation Schedule revision focus on the additional training requirements of the Project and that an up-to-date schedule of that training be developed and agreed to by USAID/J, the GOJ and USGS prior to requesting AID/W approval of any further extension of the PACD.

A wide variety of other government and private agencies and organizations involved in activities which utilize water related data will also benefit once the data base and the collection methodology

has been fully institutionalized. These other GOJ agencies will be able to call upon the WAJ for the information that is essential to their own activities. They will be in a much better position to make accurate and informed decisions related to a wide variety of water related issues.

The indirect beneficiaries of the Project will include the entire population of the country. Once the R&D program of the Project has been successfully established as an ongoing activity of the WAJ and expanded to cover the entire country, the WAJ will be in an excellent position to complete the development of accurate long-range plans for water exploitation and aquifer protection and maintenance throughout the nation. The information in the computer will enable Water Sector planners to make informed decisions concerning the appropriateness of developing new sources of scarce water supplies without endangering already existing sources. During the Interim Evaluation, a number of GOJ officials noted that they consider this Project to be at the very core of Jordan's Water Sector activities for many decades to come. Without it they feel that the continuing pressure to increase the supply of available water may force the government to make uninformed decisions which may have disastrous effect on the nation's future.

21. UNPLANNED EFFECTS: The only unplanned effect that the Project has had relates to the Project's impact on the government's decision to reorganize the management and administration of Water Sector activities. The obvious problems which the government experienced in the early stages of implementing this Project merely increased the GOJ's understanding of the urgent requirement for the reorganization. Even though the reorganization caused some short-term problems, over the long-term it will be advantageous to the government's overall Water Sector activities. In that the reorganization has led to an increase in the overall responsibilities of the government agency charged with the implementation of this Project, it appears that a reassessment along the lines previously suggested would be appropriate. No other changes appear to be necessary at this time.

22. LESSONS LEARNED: The major lesson that can be derived from the implementation of this Project appears to center on the fact that the original design process was never thoroughly completed. A consultant was brought in to assist in the development of the technical aspects of the Project. This effort was extremely successful and was the basis of negotiating the government's initial commitment to the Project concept. However, it appears that the Mission did not take the design process to the next logical step and develop a thorough and detailed schedule of implementation. Therefore the FP never allocated sufficient time to insure that implementation would actually take place in a logical and timely manner.

In addition, it appears that the Mission, although actively involved in urging the GOJ to reorganize their activities in the Water Sector, failed to take the "Bigger Picture" into consideration when they requested approval for this Project. The FP made no mention or provision for the probable reorganization efforts of the government. The result of this omission was that Project implementation continues to be delayed by inadequate GOJ management.

Therefore the major lesson that should be learned from the implementation of this Project is that the design process must always be thoroughly completed prior to approval and that an extremely competent technical consultant may not have the expertise required to finalize all the various components of the PP. This responsibility rests primarily with the Mission, however the AID/W review of the Project must be detailed enough to include an objective analysis of all the various aspects of such a complex undertaking so as to determine if the proposed life of project will be sufficient to allow for completion of the Project purposes.

Another lesson that should be taken from this Project's history is that the USAID and AID/W reviews of proposed project require much more than the establishment of formal committees which due to timing constraints are unable to take an active and creative role in the Project design effort. Such committees must be involved throughout the design process and not only at the final approval stage. These committees must have a broad-based understanding of the entire sector so as to allow for a detailed analysis of all elements of the Project design efforts (i.e., Proposed Implementation Schedule, etc.). They must allow inputs from a variety of individuals and/or offices which do not have direct responsibility for the subject project but do have wide ranging knowledge of the overall programs in that particular development sector. Such a broad gauge project design and review process will insure that factors such as a planned reorganization of the host country implementing agency will be compensated for at an early stage of Project development.

In addition, it should be noted that a project of this nature requires a very intensive hands-on type of Mission management due to the fact that the implementing agency is not in a position to understand all of the various AID procurement/implementation regulations. Therefore in order to insure that overall implementation proceeds in a timely manner, counterparts are assigned, participants are nominated, new staff is hired, IFBs are approved, and advisors are extended the necessary cooperation, USAID should be prepared to provide the necessary intensive support that will be required.

23. SPECIAL COMMENTS OR REMARKS: In order to insure that the remaining elements of the original Project are completed in a timely manner, it appears that a fulltime advisor to the WAJ will be required in the very near future. Prior to the selection and contracting of such an advisor it is essential that USAID/J and WAJ jointly review and revise the Project Implementation Schedule along the lines that have been outlined in this PES and then develop a comprehensive Scope of Work for the required fulltime advisor.

A brief listing of some of the documents and files that have been reviewed during this Interim Evaluation follows:

- a. Progress and Planning Report by C.L.R. Holt, USGS dated December 11, 1983
- b. Project Quarterly Progress Reports by D.V. Maddy, USGS

- c. A listing of the Master Record forms to be completed by types of sites
- d. A listing of the Tables Describing Water Data Bank File, Domains and Tables presently in the WAJ Computer System
- e. An index of Water Data Bank Files
- f. A compilation of The Number of Records in Water Data Bank Files (by Date)
- g. A group of Sample revised formats for the collection and storage of water related data (5 forms)
- h. USAID/J Project files
- i. Estimate of GOJ actual contribution to the cost of the Project (FY 81 to FY 84).
- J. Map showing all the data collection sites presently being used by the WAJ.

BUDGET FOR NORTH JORDAN GROUNDWATER PROJECT
(AID PROJECT NO. 278-0243)

EXPENSES PAID/INCURRED BY GOJ (Jan 1, 1981-Sept. 30, 1984)
(JD 1.000 = \$ 2.85)

	Jordanian Dinars	U.S. Dollars (equivalent)
1. Personnel (Administrative and Technical):	303,221	864,180
2. Drilling of Groundwater Wells (10,500m at 100 JD/m, including drilling, setting casing, cleaning, well development, etc.):	1,050,000	2,992,500
3. Computer Installation,		
a. Site Preparation (HRA):	6,950	
b. Power Supply:	8,000	
c. Site Preparation (WAD):	2,385	
d. Relocation Expense:	2,300	
e. Additional Equipment and Supplies,		
1' Two Terminal VF-100 English Display:	1,700	
2' Six 80 MB Magnetic Disk Packages:	1,056	
3' 10-1600 BPI Magnetic Tape:	55	
4' 20 Boxes, Data Forms:	187	
Item 3 sub total:	<u>22,633</u>	64,504
4. Artificial Recharge (Wadi Dhulal)		
a. Construction of Earth Fill Dam:	167,000	
b. Land Compensation (approximate):	8,485	
c. Water Pumps:	50,000	
d. 1,000 M of 8" Diameter Pipe:	<u>10,000</u>	
Item 4, sub-total:	<u>235,485</u>	671,132
5. Equipment		
a. Seven Automated Weather Stations (in addition to the 5 stations purchased by AID), including installation:	78,400	
b. One Water Level Re-corder at Khanna, installed:	1,000	
c. 40 Daily Rainfall Gauges:	400	
d. Laboratory Equipment, (100 Graduated cylinders):	1,000	
e. Site Protection (Fences), 8 stations, 20m x 20m area at JD 20/m:	<u>12,800</u>	
Item 5, sub-total:	<u>93,600</u>	266,760
6. Services		
a. Re-Survey Project Wells (500 wells at JD 35/each):	17,500	
b. Water Sample Collection and Analysis (3,000 samples at JD 25/each):	75,000	
c. Pump Test (18 tests at JD 1,000/each):	<u>18,000</u>	
Item 6, sub-total:	<u>110,500</u>	314,925
Grand Total:	JD 1,815,439	\$5,174,001

GOJ Expenditure By Year (U.S. Dollars)

1981	1982	1983	1984
517,400	1,032,800	1,553,200	2,070,600