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EVALUATION OF USAID  
WATER RESOURCES PLANNING AND MANAGEMENT  
PROJECT (279-0043),  
YEMEN ARAB REPUBLIC

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FOR USAID/YEMEN

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U.S. GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
OFFICE OF INTERNATIONAL HYDROLOGY

ADMINISTRATIVE REPORT

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EVALUATION OF USAID  
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BACKGROUND

This report is the product of a Participating Agency Service Agreement (PASA YEM-0043-P-IC-1061-00) between USAID and USGS to evaluate the condition of the (Yemen) Water Resources Planning and Management Project approximately mid-way through the first phase of a contract between the U.S. Agency for International Development (USAID) and Sheladia Associates, Inc.

The report includes responses to items of the duties and responsibilities section of the PASA, see Appendix II, and is organized under the general topic headings (rearranged and combined where appropriate) of the Project Evaluation Summary, Part II, supplied by USAID/Yemen. See Appendix III. A preliminary version of the report prepared in Sanaa and dated July 1981 is superseded.

The authors were engaged through the U.S. Geological Survey (USGS), Water Resources Division, Office of International Hydrology. Edward Bradley's services were arranged by the USGS through the International Programs Office, U.S. Department of Agriculture Graduate School, under a memorandum of agreement dated June 8, 1981. Bradley arrived in Yemen June 13 and departed July, 3, 1981. Robert M. Beall was detailed from the USGS Office of International Hydrology to collaborate with Edward Bradley on aspects of the evaluation effort. He arrived in Sanaa June 23 and departed July 6, 1981.

## SUMMARY

The goal of the Water Resources Planning and Management (WRPM) Project (279-0043) is to serve the Yemen Arab Republic (YAR) national interest in the vital field of water resources. The Department of Hydrology (DOH) was established as a division of the Yemen Oil and Mineral Corporation (YOMINCO), a quasi-official Yemen Arab Republic Government (YARG) organization. It is experiencing the growing pains of a new organization struggling to get on its own feet while many established public and private agencies dealing with water resources in one way or another are going separate ways and dealing with their hydrologic data needs independently. Basic hydrologic data are generally lacking in YAR, and those that are being collected are not being assembled efficiently in a central data storage and dissemination system. Surface-water resources are probably being under-utilized locally due to lack of adequate knowledge and understanding. Ground-water resources are being tapped indiscriminately and in a number of places, they are being mined. There is little regard for, or understanding of, the relation between ground and surface water. Thus there is a critical and immediate need for a DOH to serve the national interest.

One of the most urgent needs is to educate top-level national leaders to the fact that the nation's water resources are vital to it's development (economic and social) and health. The leaders must assign a high priority to establishing both reasonable water policies and an organization that can monitor and assess the water resources of the YAR. A significant beginning may have been accomplished by the recent decree which established a High Council for Water Resources.

The WRPM project addresses the need for a hydrologic organization to monitor and assess water resources rather adequately. Its objectives also appear to include the broad subject of water policies on a national scale. Water planning, national water resources policy and related topics were specifically addressed by a team from the Consortium for International Development (project 052) in August and September 1980, at the instigation of the YAR Ministry of Agriculture and USAID. If the recommendations of the CID report receive adequate and timely attention, the role of the DOH will be established and its policymaking objectives will be limited to its own administrative and operational procedures.

 The project's goal to set up a DOH that will serve "to make efficient use of water in support of human, agricultural and industrial program needs" can eventually be achieved but progress toward that goal is currently extremely slow. Reasons for the low rate of progress include inadequate facilities, a lack of aggressive local leadership, and the inability of YOMINCO and the contractor to overcome logistical and administrative problems. Inadequate intra- and inter-agency communications contribute to these problems.

Given the tendency of ambitious and rapidly-growing organizations to become bureaucratic, the top-level leaders in YAR need to impress on the high and intermediate-level leadership of all YARG agencies the importance of working together on water-resources related policies, investigations, and data collection. No agency need lose prestige or importance by cooperating and helping to centralize data storage and dissemination efforts within the DOH or a a DOH-type organization. All of this may be dependent on the reaction of the several YARG agencies to the national water policy act, reportedly promulgated in June 1981.

## BENEFICIARIES

As implied in the ultimate goal statement of the latest project Work Plan (page 7 the May 6, 1981 transmittal), the project should eventually benefit all the nation's citizens through "the efficient use of water in support of human, agricultural and industrial program needs".

Inasmuch as there are many YARG agencies (other than DOH) already working in the water resources field, it is too complicated to identify beneficiaries directly in terms of specific groups or individuals. It is rather evident, however, that if the goal and subgoals of this project are not fulfilled in some way, there is a large potential for waste of surface-water resources, local overdraft of ground-water supplies, unrealistic planning with regard to long-range water utilization in interests of the people of YARG, continued inter-agency rivalry for a leadership position in water resources in the YARG, and a perpetuation of dispersed, disorganized, unstandardized data sources.

The decreed aims of the several water-related YARG agencies are noble. However, the responsibilities for data collection and assessment do overlap naturally, pointing out the need for a central organization which is capable of receiving and managing hydrologic data from the several sources for the use and benefit of all parties and also capable of carrying out national water-resources assessment activities. Undoubtedly, the data-collection operations of some agencies are poorly executed and all could benefit from a proper centralized effort.

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## EVALUATION METHODOLOGY

This project evaluation aims to: (1) assess progress toward attainment of project objectives; (2) identify conditions or problems that impede progress toward the objectives; and (3) assess what can be done to overcome or minimize the problems.

The methods used to accomplish the evaluation were as follows:

1. Observation and study of DOH activities in the office and field (including two field trips); attending classes in ground-water and geophysics given by Bryce Montgomery and in surface water by Gerald LaRue, Sheladia's specialists on instructional TDY assignments.

2. Examination of facilities and equipment including the library. There was little to observe in the new, bare DOH building except a recently-secured equipment storage room and the space being used as a makeshift classroom. Examination, in both DOH and USAID offices, of some files and documents connected with the project and its predecessor, Project 279-0025. A partial list of the more important documents is included as Appendix I. Two reports did not come to our attention while the draft of this report was being prepared in Sanaa: the "Dutch Proposal" by Al-Udaini, Jeurissen and van der Gunn (1980), and the 1980 CID report on Water Policy Initiatives. The report of activities of the former Junior Hydrologist, Albert Armstrong was not seen.

3. Discussions with the Senior Hydrologist, Mohammed Ayub and with Montgomery and LaRue. Brief discussions were also held with USAID officials close to the project, particularly Basharat Ali, and even briefer with the YOMINCO and DOH leadership near the close of our mission. Discussions between the authors, drawing upon their observations locally and experiences with other hydrological organizations.

## EXTERNAL FACTORS

No changes that would have major effects on project objectives are known to exist. Continued involvement of YARG and USAID is assumed and is essential. The need for a national water administration policy and coordination of water resources activities is and will remain critical to public health and growth in Yemen no matter what socio-economic changes occur in the foreseeable future. The interest and support of the Minister of State and Central Planning Organization are necessary to maintain the present organizational structure and focus, however weak it might be. If the principal recommendations of the CID Water Team (September, 1980) are carried out, the functions of a DOH will have been prescribed in a manner consistent with project objectives. Implementation and effective coordination necessary for the orderly establishment of a national structure for water administration may require external guidance from a group as knowledgeable as the CID team.

By letter of March 1, 1981, the Netherlands Embassy Charge' forwarded to USAID a report (Al-Udaini and others, 1980) proposing a YARG/Dutch collaborative program of water-resources assessment which included training, operations, and objectives which, superficially, are quite similar to those of USAID WRPM project 043. Building on experience gained from 043, the authors have proposed some features superior to those written into the WRPM project. Whether these could survive the bureaucratic staging between proposal and implementation is conjectural. More important at present, is the realization that the Dutch Proposal is not a national hydrologic program; it is rather a groundwater assessment effort focussing on two areas, Sa'dah and (perhaps)

Dhamar, where the Dutch have ongoing rural assistance projects. As such, it can contribute to and supplement the nationwide program envisioned for the DOH if it does not divert personnel from the present cadre and if its activities are coordinated with those of DOH. The plan has the potential for increasing the number of Yemeni trained in hydrology, assuming they can be retained in-country. It is specific on long-term out-of-country education but weak on definition of on-the-job training. While the Dutch Proposal is not a substitute for 043, if the two are coordinated properly for several consecutive years, they should become mutually supportive without excessive duplication.

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## PURPOSE, GOALS, AND SUBGOALS

The following quotation is from the Work Plan of Sheladia Associates Inc.  
Contract No. AJD/NE-C-1675:

" The basic purpose of this project is to provide technical advisory services to the Government of the YAR for establishment of a Department of Hydrology (DOH) within the Yemen Oil and Mineral Corporation (YOMINCO). The purpose of the proposed DOH in the YOMINCO is to function as an organization which is capable of performing the management and development of water resources in the YAR in an orderly and planned way and in a way compatible with and responsive to the overall national development goals."

The Work Plan proposed that the Department of Hydrology have four sections-- Ground Water, Surface Water, Water Quality and a Data Storage and Dissemination Section. Some groundwork for this project was laid down in an earlier project, "Water Survey of North Yemen" (USAID Project No. 279-0025), which, in its last phase, had the following three objectives:

1. To provide a broad geologic base in the form of a 1:500,000 LANDSAT geologic map.
2. To conduct a detailed survey and analysis of the Amran and Sanaa Basins with respect to water quantity.
3. To form an institution within the Yemen Arab Republic Government capable enough to conduct basic water measuring activities.

The first two objectives have been fulfilled but the third has yet to be accomplished. It is now the primary goal of the current project (279-0043) being carried out through the Sheladia Associates, Inc., contract.

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Page 7 of the most recent Work Plan for the project (transmitted by letter of May 6, 1981 from the Senior Hydrologist, Mohammed Ayub to USAID) states the ultimate project goal as: "To assist YARG in setting up a fully operational Department of Hydrology (DOH) so as to make efficient use of water in support of human, agricultural and industrial program needs."

A subgoal or "immediate" goal is to have a functioning DOH "Capable of collating, utilizing, storing, and disseminating hydrological information supportive of the country's development priorities", (Work Plan, page 8). The most recent Work Plan includes seven specific objectives as follows:

1. Provide technical assistance to the DOH.
2. Assist in formulating a comprehensive policy statement with detailed rules and regulations in accordance with the pertinent authorization from the Office of the Prime Minister.
3. Design an effective system to run the four different sections of the DOH: Surface Water, Ground Water, Water Quality, Data Analysis, Storage, Retrieval and Dissemination.
4. Provide on-going training to the (DOH) counterpart in planning, management and evaluation of all operations of the DOH.
5. Impart training to personnel in knowledge and skills including use of instruments required to efficiently operate the DOH.
6. Establish a minimum hydrometric network of hydrologic and hydro-geologic stations to cover priority areas of the YAR.
7. Establish a documentation center for data analysis, storage, retrieval and dissemination.

This work plan also describes the activities, outputs and primary participants involved, or actions proposed to accomplish the seven objectives (Work Plan, pages 10-19).

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Progress toward the basic purpose and goal

Progress toward the basic purpose is extremely slow. This should be expected under existing conditions, notably the shortage of adequately backgrounded Yemeni personnel. Many of the DOH staff - even those with college level degrees - are weak in basic mathematics and physics and therefore cannot grasp easily or without repeated drill, the discipline-oriented training (thus far in ground water and surface water) that is being given by TDYs in Yemen. This problem is compounded by a lack of proficiency in English. Maximum benefit from overseas training given in other than the Arabic language will also be reduced. Intensive instruction in English (or whatever the teaching language will be) slanted toward science-- before out-of-country training is recommended. Recruitment of professionals seems to have been mainly from YOMINCO's Geological Survey Board (geology majors). Civil Engineering skills are lacking and are particularly needed in the surface-water aspects. Sanaa University or one of the other ministries are the most likely source for the two or three individuals needed.

Progress toward forming an effective DOH is also slow because of a lack of leadership, both technical and administrative, within DOH itself. The position of DOH Director is critical, and without positive and cooperative leadership, the DOH will probably not achieve the competence and self-sufficiency it needs to succeed or to serve the nation well.

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A complicating and negative factor in the conduct of the project has been the delay in occupying the more-or-less completed but unfurnished DOH building. (Timely completion of the building was a key assumption of the 1-17-79 Project Assistance Paper.) Presently, the personnel are being displaced from their former quarters, while the new building can be used only for rudimentary classroom and storage space. Our brief view of the transition situation was not representative of prior or future conditions.

All DOH personnel should be paid sufficient salary so that per diem for field trips is no longer used as a bonus but can be made on an actual cost basis. As it is now, field trips are sought after as a source of extra money.

Progress toward meeting specific objectives of the Work Plan is considered in the following section.

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## INPUTS AND OUTPUTS - The Project Objectives

Present project status has to be viewed not only on the basis of present contract expectations, but also in consideration of its origins, and events of the interim period when project 025 was phasing out and 043 was in development. Project 025 came to an incomplete conclusion for a variety of reasons, but with the expectation that project 043 would sustain the effort toward establishment of a DOH. When the USGS was unable to staff the planned project manager and technical advisor positions, a year was lost in restructuring the project for privately contracted services, modified in scope. Some assumptions of project design, critical to achievement of project objectives, were not met in the first year of operations. The year's loss of managerial continuity gave 043 a weaker start than it might otherwise have had.

Technical assistance is common to all of the work plan objectives. Two elements which might have been included are: (1) development of a procedure for preservation of existing basic data, and (2) initiation of an operations and management manual in Arabic and English.

It is difficult to evaluate the technical assistance effort provided by the junior hydrologist who departed the post earlier in the year. His report was not available. It seems evident, however, that a small precipitation-gage network and some observation-well rounds were kept in operation. We received the impression that he lacked the broad technical and administrative experience needed for organizational development. One hopeful sign was the initiation of ground water and surface water monitoring programs in the Taizz area. The surface-water program proposed by Byron Aldridge had not been implemented, seemingly lacking engineering guidance for construction and operation after he left.

USAID assistance has however, kept the incipient organization alive,  
sustaining support for the professionals and technicians associated with 025.  
Equipment left over from project 025 had been retrieved, and is being stored  
to the new DOH building. Some of the new equipment had arrived and similarly,  
was being moved to the new storage room. More new equipment apparently  
awaited customs clearance.

The Senior Hydrologist is indicated as principal participant in all the  
activities under objective 2 of the Work Plan (formulating policy). In our  
judgement, other experienced specialists should also be involved in these  
activities. (See EXTERNAL FACTORS and SPECIAL COMMENTS.) If recommendations  
of the the CID Water Team (September 1980) are followed, the role of DOH and  
its relation to the operations of other YARG agencies will be established.  
This will provide a rational basis for formalizing its own administrative and  
operational procedures.

Accompanying early development of the Surface Water, Ground Water and  
Water Quality Section capabilities listed under work plan objective 3, should  
be the creation of the Data Management (Storage and Dissemination) Section.  
Its leader and some staff technicians should have pay scales similar to those  
of the other sections. It should have the responsibility (and credit) for  
publishing periodic hydrologic reports in both English and Arabic and perhaps  
also could function in part as a translating section for DOH technical manuals,  
information bulletins, or publications such as the one recently reproduced by  
YOMINCO (in English only?) titled, AQUIFER TESTS: Considerations and Methods.

The Water Quality Section, an element of objective 3, is the least organized of the three scientifically-oriented sections, but this, in our view, is not serious at present because both ground water and surface water basic data collection programs, supported by the Data Management Section, need to be functioning effectively before the Water Quality Section can be effective. In this respect, it is conceivably desirable to postpone getting a water-quality expert or water-quality laboratory equipment to YAR for DOH until the Surface Water and Ground Water Sections are functioning more effectively than they are now. On the other hand, the YOMINCO Director sees establishment of a laboratory as an immediate priority. This is quite understandable if the laboratory can, in reasonable time, function to serve other projects currently operating in Yemen outside the DOH sphere. This service could create an awareness of the existence and usefulness of DOH and give it a measure of national status and credibility.

Basic problems in the technical services and training exist primarily because many or most DOH staff members lack proficiency in the English language and in addition lack motivation to exert the initiative needed for development of competent operations in ground water, surface water, water quality and data management. These constraints, coupled with administrative disruptions, result in a situation in which Sheladia's Senior Hydrologist appears, out of necessity, to act primarily as an "administrative officer" for DOH--expediting the training, fieldwork and related activities. Without his bilingual competence and practical experience in resolving logistical problems, the training activities both in and outside YAR as well, and the limited ground-water and surface-water field work in progress, would fall apart. This activity detracts from his role in objective 4 of

providing on-going training to the counterpart. We have no feeling for how effective this might have been in the past.

The quality of training (objective 5) by the TDY experts has been excellent, but its effectiveness is reduced by the attitude and work habits of some of the Yemeni staff and by administrative and logistical impediments. Except for the lack of early emphasis on the data management function, the scheduling of instruction by the TDY's and the proposed out-of-country training is well conceived and well balanced but is impeded by the factors noted above. There will be a disruption of the incipient operational programs and in the plans for establishment of a Data Section when the more motivated of the staff members are sent for further training. This disruption can not be avoided in the short time span of the contract's first phase, which points up the need for DOH leadership in order to maintain an organizational focus and operational continuity during these formative years.

Progress toward specific technical assistance and training objectives can be evaluated only as partially successful although the remnants of older programs have been continued or revived and some new ones have been initiated. In quantitative terms, the training can be broken down into: (1) on-the-job training in Yemen (OJT); and (2) outside training. The table below gives the number of hours of OJT in Yemen through May 1981 (which includes most of it since project inception).

Topic Area	Man-Hours of OJT in Yemen			
	Class	Field	Office	Total
Surface Water	3,344	597	3,857	7,798
Ground Water & Geophysical	943	1,127	3,360	5,430

These figures are derived from the hours of instruction by the surface-water and/or ground-water expert, times the number of DOH staff members in attendance in class or in field activities, or in other office work with the discipline experts, the Senior Hydrologist, or the former Journeyman Hydrologist. To make such training more effective, English language instruction has been added but, as yet, it has not been in progress long enough to determine its impact.

In some areas there is a very short retention period, owing to the combined lack of comprehension, motivation and initiative. Personal considerations and feelings sometimes outweigh the desire to learn or to perform effectively. Strong, competent counterpart leadership is needed to improve work practices and provide staff guidance. The problem seems to have become more serious when Mahmood Al-Udaini left for graduate school early in 1981 and, we assume, when the junior hydrologist departed. It will be compounded when the next group of DOH staff members leaves for short-term training in the U.S. The Director General mentioned that a position classification scheme was ready for implementation. This is needed to document duties and responsibilities and to recognize those of the staff who exhibit capability, initiative and interest.

As indicated below, competent leadership in hydrologic field operations (practical knowledge in both ground water and surface water activities) is needed for an extended period to assist an effective counterpart Director.

Most of the equipment required for surface- and ground-water training has been obtained, or is in country (customs difficulties notwithstanding), and some of the equipment for field operations in these subjects

is also on hand. Care and maintenance of the equipment needs to be addressed. The water-quality equipment for training has been ordered but has not yet arrived. Unless there are other overriding considerations, the equipment for a water-quality laboratory (if not completely ordered already) might be deferred until a Water Quality Section's services are needed by effectively operating Ground Water and Surface Water Sections (see also p. 14). The water quality training equipment on order should, of course, be retained. The principal needs in data management are office facilities and supplies.

TDY training experts, such as Gerald LaRue and Bryce Montgomery, come to Yemen primarily to teach, but usefully also help with practical field operations and related DOH work. They find it necessary to design and implement the operation of and instrumentation for basic data networks as programmed under work plan objectives 3 and 6. To some extent these roles substitute for the technical advisor (junior hydrologist) position of early project design. However, by the very nature of the TDY assignments, the guidance is intermittent.

Ideally, the Ground Water Section should have an expatriate, senior-level hydrologist or hydrogeologist in Yemen for 12 to 18 months as an advisor and training officer while the section attains full operational status. Repeated TDY's for program review and advisory service should be considered. As an alternative, some advisory and training services might be obtained from the Dutch technical assistance program. That program will take some time to reach implementation, and momentum will be lost.

For the Surface Water Section, Gerald LaRue should return again, as planned, for one more tour to guide or review the construction and continuous operation of the streamflow and sediment data collection

programs. Then, either he or an equally qualified senior-level surface-water engineer should spend additional time with the DOH, perhaps a year, while the section gains operational experience. Gerald LaRue and Bryce Montgomery's reports of March and June 1981, respectively, provide additional insights and specifics regarding these aspects of the DOH's needs.

Montgomery and LaRue have prepared lists of equipment needed to initiate or continue field operations programs. The scheduling of acquisition will depend on the availability of staff competent to manage the operations.

The documentation center, objective 7, houses the Data Analysis, Storage, Retrieval and Dissemination Section, discussed as a function of objective 3. A more fitting title might be a Data Management and Information Section because the analysis and processing of the raw data should be the responsibility of the field sections collecting the data. Also, the documentation center includes a library function not mentioned under work plan objective 7. One of the early tasks should be the retrieval and organization of previously collected hydrologic data for Yemen.

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SPECIAL COMMENTS - REMARKS

Some brief recommendations have been incorporated in the preceding topic discussions. Additional recommendations with some elaboration, are given in a later section. Significant references are listed in Appendix I.

In general, the location of DOH organizationally, within YOMINCO or elsewhere in the YARG, is not as important as seeing to it that top-level leadership in Yemen is kept aware of the importance and need for a consensus development of national water administration policies and for a coordinated system of hydrologic investigations, data collection and management. Agencies other than YOMINCO however, have special interests and would not be inclined to pay attention to broad national needs. Project 279-0043 considers a DOH within YOMINCO but what is needed ultimately, is a DOH elevated in the YARG hierarchy to about the same level as the YOMINCO itself. Before this can be done however, DOH will have to achieve competence, maturity, and credibility as an operational agency on its own.

Until recently, liaison between USAID and the DOH staff (including the Senior Hydrologist) about project affairs seems to have been less than satisfactory. Monthly, or more frequent meetings where necessary, should be a part of a normal working relationship.

USAID has made consistent and persistent efforts in guiding the YARG toward development of a national water policy and administrative structure. (This is shown by the succession of first-rate advisory missions it has sponsored -- Barbarossa (1977), CID Design Team (1979), Johnson (1979), and CID Water Team (1980)). DOH is a small but necessary element of that

national structure. It is important to prepare it for the role it will be given when other elements of the framework come into being. We doubt that its ultimate destiny or importance are appreciated as yet or that the lower echelon participants are aware of the potential.

Ideally, a governmental hydrologic agency should provide long-term technical and managerial assistance to transfer elements of its experience to a new organization with kindred objectives. Without a compensatory allotment of personnel positions, the U.S. Geological Survey cannot divert personnel on an extended basis from the domestic program although short-term advisory missions can be accommodated. The Dutch proposal does not provide for a broad spectrum of technical assistance.

#### LESSONS LEARNED

Establishing a technical governmental organization in the image of another governmental organization by contracted consulting services is a difficult process. It was dictated by the circumstances of the times. The fragility of relationships inherent in a relatively new national governmental structure and under conditions of changing customs and policies, requires flexibility and patience on the part of USAID in terms of contract progress and completion expectations.

Out-of-country training is difficult to arrange and schedule, particularly with non-academic institutions. Most of the training to be given is a non-routine function of the accommodating organization and is inherently disruptive to ongoing work in both organizations. Hence forbearance is required, and not all desires can be accommodated. The program benefits from the training, of course, but short-term progress is affected adversely.

## RECOMMENDATIONS

Several of the specific recommendations included here may or may not be strategically or politically feasible, but they appear to be worth considering in order to improve the low rate of progress DOH is presently making toward becoming an effective national-level water resources organization.

1. USAID should urge appropriate officials of YARG to take the following actions:

A. Select a Director of DOH based on reasonable criteria such as:  
(1) a complete resume' outlining technical and administrative experience, and educational background, including a demonstrated understanding of basic physical sciences, hydrology, and English, and (2) interviews with as many Yemeni ministers or deputy-level ministers as possible in water-related agencies, naturally starting with the Director General of YOMINCO and the Minister of State.

B. Encourage immediate participation of the DOH Director, the Senior Hydrologist of project 043, and if possible, expatriate TDY hydrologists, in committee work for the newly established High Council for Water Resources. Such committee work should consist mainly in formulating national water-resources administration policies consistent with present beneficial uses. The services of some members of the 1980 CID Water Team would be most desirable in this process.

C. Explore with the YOMINCO Director General and appropriate Dutch officials how selected activities of project 043 and the Dutch proposal might be integrated without duplicating effort and without neglecting ground-water work now underway. The Dutch proposal might contribute primarily in

ground-water training and in studies of new areas. Project 043 should continue with ground-water programs outside the Dutch areas of interest plus the surface water, sediment, water quality, and data management aspects of the national program. Minor revisions in the Work Plan and in the project itself may be desirable pending future negotiations between Dutch representatives, USAID and YOMINCO.

2. Intra-DOH and inter-DOH/USAID communications should be improved by:

A. Use of divided page, or front and back of page, English/Arabic written communications: Probably about 80% of project-related documents, correspondence, monthly or other progress reports excluding, personnel and fiscal or related correspondence (except in case of personnel from outside Yemen, who are coming or going, where and when, etc), should be in both languages each on a half side of each page, or on the front and back of each page.

Translation need not involve additional staff but should be done by existing staff, secretaries, technicians, and professionals waiting for on-the-job training or during unproductive periods while waiting to go to the field, waiting for the telephones to be working properly, waiting for offices to be ready to use, etc.

B. Initially, distribution of dual-language documents should be fairly wide (except for confidential, personnel or fiscal correspondence). Leadership personnel in the project and in USAID should see all but the relatively inconsequential papers. Professionals, technicians, secretaries, clerks, etc., should see such things as monthly progress reports, and items relative to changes in plans or objectives that may affect their tasks.

Granted, it won't be easy to get the translating done fast or well at first, but conceivably the policy itself could work to motivate some personnel to greater efficiency through greater interest in the project's success. Ultimately, therefore, it might result in saving time or in reaching project goals more effectively than at present.

C. The DOH Director should encourage suggestions (in writing) for improvement of operations by any DOH project personnel. Such a practice should help to improve morale, build a sense of pride in the organization and perhaps result in improved operations.

3. Relationships with other agencies making water resources investigations or contributing substantially to them, and with the public.

A. Two-way communication between DOH and other YARG and non-governmental water resources related organizations should be established to exchange data. Although this can begin now, it won't be highly effective until DOH has at least a rudimentary Data Section with facilities and staff and until DOH has competent, imaginative and cooperative leadership. A resourceful DOH leader should be able to convince other YARG agencies involved in water projects to exchange data and information with DOH and to use DOH as a data storage site.

B. A working Data Management (Storage and Dissemination) Section should be established within DOH as soon as possible. Staff members of the Ground Water and Surface Water Sections should be assigned to help establish the Data Section and get it started. In addition to the retrieval and organization of previously collected data, an early goal of the Data Section should be publication of hydrologic data reports in both English and Arabic with simple graphics and maps, perhaps the results of monitoring trips. The reports

should be widely distributed to members of the High Council of Water Resources as well as nongovernmental water-resources related organizations. Appropriate towns, cities, villages and rural development projects should all receive copies.

4. Logistical problems in DOH and recommended increased communication between USAID and DOH:

On pages 6-8 of his monthly report for May 1981, the Senior Hydrologist lists "Anticipated Problems". These would be better called "Existing Problems". They need priority attention from the Director General of YOMINCO. Also, however, USAID should continue to check with both the Senior Hydrologist and Director General of YOMINCO on action being taken to resolve the problems. Because telephone contact between DOH and USAID is difficult to impossible now, and because DOH now has less than satisfactory vehicle service, it is probably necessary for USAID to visit YOMINCO/DOH offices more frequently until some of the problems are rectified.

5. Recommended modifications to the present project and its work plan:

A. Short-term training plans in terms of the present DOH are adequate and reasonable, but competency of present staff members in both language and technical background is inadequate, even in the case of many of those DOH members with prior service and college degrees. Increased training in English with emphasis on physical sciences (over and above the present English classes) is recommended in order to gain from the hydrological training now underway and planned for the future. Implementation and organization of a data management function, and the training of its prospective staff are overdue. It is needed in order to effectively preserve and use current and past data.

B. Long-term plans as presented in the latest Sheladia work plan need to identify reconnaissance and comprehensive water-resource studies of the Amran Valley type (see U.S. Geological Survey open-file report 80-774) and to spell out the funding, staffing and technical assistance needed to carry them out. These should be integrated with plans in the "Dutch proposal".

C. The function and duties of the Senior Hydrologist need to be re-defined because, as noted previously, (page 14), he is currently acting in the capacity of an administrative officer, to the detriment of doing much hydrological advisory work. His role in the "admin" capacity is necessary because of the logistics involved with developing a department, but the Sheladia contract should be revised to reflect that and to include more technical support by qualified discipline experts. (See page 17.)

D. The Sheladia contract does not mention geologic mapping nor determination of elevations for surface-water stations and for wells. Elevations for monitor wells and other wells are important data. Although these activities are not, and do not need to be, included in the 2-year contract with Sheladia, they should be included in the Work Plan objectives because they are essential in the early stages of interpretive water-resources investigations.

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APPENDIX I - REFERENCES

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II. Duties and Responsibilities

In conducting the project evaluation the contractor's tasks shall include the following:

- 1) Review of all project documentation including the Project Paper, Project Grant Agreement, Project Implementation Letters, Consultant Contracts, the Project Work Plan, and Monthly Reports.
- 2) Determine project progress to date in quantitative terms: e.g: person-months of technical assistance, person-months of training received, project equipment procured. Assess the current capacity of the DOH to recruit, train and retain trained personnel.
- 3) Assess project work plans to determine whether or not a) type and quantity of project inputs can achieve project objectives and b) sequencing of project activities is reasonable. Support any recommended modifications.
- 4) Review the DOH's short and long-term staffing and training plans and evaluate their reasonableness in terms of a) requirement for institutional development of the DOH, b) the existing financial, personnel and language limitations, c) the balance among short and long-term, degree and non-degree and U.S., third country and on-the-job training. Assess the effectiveness of project training to date in term of trainees performance, change in responsibility etc.
- 5) Assess the advisability and feasibility of establishing a long-term institutional relationship between the Department of Hydrology and another hydrological organization. To the extent feasible, outline steps to be followed in establishing such a relationship and make relevant recommendations regarding which types of institutional assistance would be useful and available to the DOH.
- 6) Evaluate the impact of the proposed Dutch technical assistance effort of the project objectives. Assess the DOH's organizational capacity to manage and benefit from two TA projects (Dutch and USAID) to be implemented, in future, simultaneously.
- 7) Assess the DOH's capacity to manage the operations of the Department including its ability to observe, collect, and analyze data, make decisions, implement policy, maintain equipment, etc. Make recommendations regarding other types of technical assistance which may be tapped in furtherance of project objectives; identify potential sources of such assistance. Recommend ways which currently provided assistance might be made more effective.
- 8) Review the relationship and coordination between the DOH and other YARG organizations and assess: a) the advisability of locating the DOH within YCMINCO, b) what actions the DOH might undertake to improve its relationship/coordination with other YARG agencies, and c) what actions the DOH might undertake to be more effective as a technical staff to any future Water Resources Council. Support any recommended modifications.
- 9) Review the current list of project commodities and the procurement plan; support any recommended modifications or changes.
- 10) Review the existing data gathering, analysis and storing practices and procedures within the DOH; and propose recommendations to improve their efficiency within the DOH's present resource limitations.
- 11) Make and support such additional recommendations as might promote progress towards achievement of project purposes.