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**The Middle East Water
Data Banks Programme
and the Palestinian Water
Authority**

Report from the EXACT III
Meeting, Aqaba,
Nov. 31. - Dec. 1. 1995

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Abstract: <p>The Middle East Water Data Banks programme and its Implementation Plan, consisting of 39 recommendations for multilateral action and one special programme, Work Package A, for capacity building on the Palestinian side, have several interfaces with the bilateral cooperation between PWA and Norway. Work Package A actions mainly relates to the Water Resources/Hydrological services part of the PWA. It considers capacity building within data collection and storage, field work and laboratory capability.</p> <p>This report, based on discussions at and around the third meeting of EXACT - the Executive Action Team of the Middle East Data Banks Plan, therefore focuses on identifying the interfaces and possible overlaps between these programs and the cooperation between PWA and Norway. It also seeks to give some recommendations on the work on establishing the water data unit and hydrological services of PWA, to the extent that is possible at the present stage of organization planning of the institution.</p>
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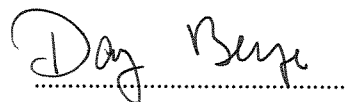
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For the Administration



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The Middle East Water Data Banks Programme and the Palestinian Water Authority

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Preface

The author was called upon to participate in the EXACT (EXecutive ACtion Team) third meeting in Aqaba Nov. 30 - Dec. 1 1995, as technical adviser to the Palestinian Delegation, with focus on the data collection/data base issues. It should be emphasized that the author had no prior knowledge to neither this project nor other activities regarding the Palestinian Water Authority or water issues in the Middle East. This report is thus based on information collected in Norway and at the EXACT meeting in the period Nov. 28 to Dec. 1, and regardless of how much information the parties, especially the Palestinian Delegation, patiently have provided, the report is bound to contain erroneous, inexact and superfluous information, which should only be attributed to the ignorance of the author, and for which overbearance is begged.

Aqaba/Oslo, Dec. 7 1995



Nils Roar Sælthun

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1 SUMMARY

The Middle East Water Data Banks programme and its Implementation Plan, consisting of 39 recommendations for multilateral action and one special programme, Work Package A, for capacity building on the Palestinian side, have several interfaces with the bilateral cooperation between PWA and Norway. The first project in contract is the EU project, where Phase I is scheduled to start by the end of the year. This project has four subprojects which exclusively addresses PWA, that is

- organization
- study tour to Europe
- network analysis
- furniture and computer equipment

The first subproject overlap the PWA/NVE cooperation, and should be modified or closely coordinated with the ongoing work. The last project will bring in necessary hardware and software, and should be closely tailored to the needs of PWA. The EU project will also bring in GIS equipment in the multilateral part. Phase II of the EU project is specified and in the tender, but is not under contract yet. It is important that the Core Parties carefully checks the content of Phase II - if alterations are necessary renegotiations should be started as soon as possible.

Work Package A actions mainly relates to the Water Resources/Hydrological services part of the PWA. It considers capacity building within

- data collection and storage
- field work
- laboratory capability

To make full advantage of the contributions from Work Package A, it will be important that the organization, staffing and structure of PWA, and especially the Hydrological services are established as soon as possible. It will be more fruitful to fit Work Package A into an existing organization plan than *vice versa*. As Work Package A only relates to a part of PWA, it should be avoided that it upsets the organizational balance of PWA. The staffing side and the laboratory strategy has to be given careful consideration, as these constitute heavy items in the running costs of the institution.

The Australian Government proposes to fund the implementation of the HYDSYS hydrological database and application software, including Water Quality and Groundwater/Wells modules. This is a commercial software system, with strong features, especially on the surface water. It also has a couple of drawbacks, the most important being that it is only partially Windows, and not based on a standard data base system. It is a full-fledged multi-user system, though.

It will take time before the Core Parties have evaluated HYDSYS and decided on whether to implement it or not. In the meantime, it is suggest that PWA establishes a basic data handling system based on ACCESS database and EXCEL spreadsheet - software to be provided by the EU project. This is only meant to be a preliminary solution on the water resources side, but could be the permanent basis for an extraction and licence database - that part is not covered by HYDSYS or similar hydrological data systems.

It is recommended that PWA base the computer system of the data unit on PCs in network, and explore the possibilities using the Internet for internal electronic communication between the different office sites, and for regional and international communication.

2 INTRODUCTION

The Middle East Data Banks programme is one of four programmes under the Middle East Multilateral Working Group on Water Resources. It is regional in scope, and has a wider content than its name suggests - in addition to coordination of data storage and exchange, it also concerns hydrometeorological network, field work and laboratory services. The implementation plan consists of 39 recommendations which concern all three Core Parties, and a Work Package A that is specifically aimed at capacity building on the Palestinian side. The total cost of the plan is expected to be around 12-15 mill USD, of which about one third is funded. The Work Package A is estimated to have a cost of around 20 per cent of the total plan.

The programme, and especially Work Package A will have substantial influence on the development of the Palestinian Water Authority - especially the hydrological services in the institution. It is thus important that the projects under Work Package A is coordinated by bilateral cooperation projects, in particular the Norwegian support to the organization and capacity building of PWA. This report, based on discussions at and around the third meeting of EXACT - the Executive Action Team of the Middle East Data Banks Plan, therefore focuses on identifying the interfaces and possible overlaps between these programmes. It also seeks to give some recommendations on the work on establishing the water data unit and hydrological services of PWA, to the extent that is possible at the present stage of organization planning of the institution.

3 THE MIDDLE EAST WATER DATA BANKS PLAN AND THE EXACT COMMITTEE

3.1 The Implementation Plan

The Middle East Water Data Banks project or projects is one of several (four?) programmes under the Middle East Multilateral Working Group on Water Resources. It stems mainly from a workshop in Atlanta in March 1994 on Standards for Water Data Acquisition and Processing, where a number of recommendations for the establishment of regional water data banks were put forth. These were elaborated under a US/EU-led effort, supported by Canada and France, and in cooperation with local interests, i.e. mainly Jordanian, Palestinian and Israeli parties, although other regional parties are also involved in the process. The outcome was an Implementation Plan, dated October 1994, containing 39 recommendations, which can be regarded as project frameworks, with rough cost estimates and an equally rough scheduling. All project are aimed at data collection, storage and exchange, and a main emphasis and goal is on standardization of data collection and storage, and facilitation of data exchange. A rough grouping of the recommendations are:

- inventories of human resources, publications and projects
- review and evaluation of observation networks and data
- standardization and improvement of field data collection
- review, standardization and improvement on the laboratory situation

- efforts aimed at establishing common elements and regional structures on the data bank side

The plan is multilateral in the sense that all recommendations except one notable exception, recommendation 31 (Develop and utilize a general laboratory analytical capability for the Palestinian authority) regard all three core parties, although with varying relevance and importance. The plan per se has no indication of funding sources, and the development so far shows that the funding is not multilateral in the sense that funds are pooled. Some of the projects identified so far also seem to be bilateral or trilateral, although there is an outspoken policy to keep bilateral projects outside this process. There seems to be understood and accepted by all parties that neither individual projects nor the total programme necessarily is evenly distributed to the parties, but that there as a general rule should be something in the implementation of every recommendation for all three parties.

The plan is comprehensive and well structured. It is however a problem that the time schedule and the priorities are only partly relevant for the Palestinian side, as they have more pressing demands of establishing the backbone of an hydrological service. To meet this, a uniquely Palestinian subproject has been defined, the so-called Work Package A - Development of Palestinian water data collection capability and establishment of an Palestinian water data bank.

Till date, only one of the recommendations has been implemented:

- 1) *Establish an Ad Hoc Committee to manage and coordinate the implementation of the Middle East Water Data Banks Plan.*

This committee is known as EXACT (Executive Action Team).

In addition, there has been some action on Recommendation 25 - Purchase and utilize a number of mobile laboratories, as Israel has developed basic specifications for such labs - to be commented on by the other core parties. It is understood that USA is prepared to act on this recommendation as soon as the specifications are complete , i.e., to purchase three trailer type mobile labs. The specifications can to some extent be tailored to the needs of the individual parties.

3.2 The EXACT committee

EXACT is composed of no more than two representatives from each of the Core Parties, and no more than two representatives from the US, EU, Canada and France. US is the gavelholder until alternative arrangements may be decided on by EXACT, and although there is no formal secretariat of EXACT, USGS is operating that function for the time being. Norway is not a member, but has held an observer status on the last two meetings. For the present meeting, Australia was also invited as a result of their offer to finance the eventual implementation of HYDSYS as a water data bank for the Core Parties.

The plan is two arrange EXACT meetings approximately twice a year. The present meeting is the third, referred to as EXACT III, the two former being held in Neve Zohar (at the Dead Sea) in May, and in Amman in June. The next meeting is scheduled to March/April, probably in Canada - combined with presentations and demonstrations of Canadian technology and

practices in this field. This originates in a request from the Core Parties, not an offer from Canada.

The US has engaged Jeffrey Miller from USGS Denver full time as their Technical coordinator. He will spend much time in the region the first half year of 1996, and be resident the second half. Ronald E. Manley, director of Water Resources Associates, acts as coordinator of the EU funded projects.

3.3 Work Package A

The Work package A directly and exclusively addresses the Palestinian needs, and has special relevance for the organization of the Palestinian Water Authority. Thus it is of prime importance to coordinate this effort with the Palestinian/Norwegian efforts in institution and capacity building of the PWA. The work package A is not included in the recommendations of the Implementation Plan, but is identified in chapter 10 (costs) by the statement:

"Also, although not listed in the recommendations, the team estimated that \$ 1 600 000 will be required to assist the Palestinians to develop a waterdata collection capability and build a water bank".

In other contexts it has been estimated that the overall cost of the Implementation Plan recommendations and the Work package A is in the order of 12-14 M USD, with approximately twenty percent required for specific Palestinian needs, i.e., Work package A and recommendation 31.

Being the first donor part to establish funds for the Implementation plan, EU has incorporated parts of Work package A in their projects, together with some of the Recommendations. When PWA reviewed the actual content of this project, it was recognized that it had to be matched by local contributions that had not been funded at that stage. This precipitated the Funding Request from PWA to NORAD in November 1995.

4 THE EXACT III MEETING

EXACT III convened at 11 a.m. on Nov. 30, and adjourned at 2 p.m. Dec. 1. The chairman was Verne R. Schneider of the USGS. The list of participants is reproduced in Annex A, and the agenda in Annex B.

4.1 The EU project

The EU project consists of two phases and following subprojects:

Phase I:

A) Develop Palestinian Water Unit

Recommendation 12: Adopt and implement the use of a single geographical reference system for the region for locating water related site information. (Does probably also contain the implementation of a GIS).

- Recommendation 13: Identify the minimum amount of information that describes a well that is mutually agreed upon, meets local needs, and is consistent regionally.
- Recommendation 14: Identify the minimum amount of information needed to characterize a water quality that is agreed upon, meets local needs, and is consistent regionally.
- Recommendation 15: Identify historic data collection programs and document the data collection, analytical methods, and quality control information for those programs as well as possible. Input historic data into the current databases. (Also phase II).
- Recommendation 16: Adopt and implement the use of published standards for surface water measurements.
- Recommendation 17: Adopt and implement the use of published standards for ground water measurements.
- Recommendation 19: Adopt and implement the use of regional standards of accuracy for all water quality field measurements and identify equipment that could meet the standards.
- Recommendation 20: Adopt and implement the use of regional standards of accuracy for all water quality continuous monitoring equipment and identify equipment that could meet the standards.
- Recommendation 21: Adopt and implement the use of published standards for water quality data collection techniques and develop a comprehensive field manual.
- Recommendation 22: Adopt and implement the use of a standards for the collection, transmission, sensing and data base storage of hydrometeorological data.

Phase II:

- Recommendation 4: Bring hydrologic and hydrometeorologic basic data publications programs up-to-date and publish “current” data reports within six months of the end of the data collection methods.
- Recommendation 6: Prepare and distribute on a periodic basis, a bulletin on the current hydrologic conditions of the region.
- Recommendation 7: Conduct a detailed review and evaluation of the surface water, groundwater, water quality, and hydrometeorologic basic data networks, including a directory.
- Recommendation 15: Identify historic data collection programs and document the data collection, analytical methods, and quality control information for those programs as well as possible. Input historic data into the current databases.

The total economic frame for Phase I and Phase II is in the order of 2 mill ECU. Both phases are tendered together, contract for phase I will be signed on Dec. 6. The contract was won by ATHENA of France with Euroconsult of the Netherlands as a subcontractor. ATHENA is closely connected to BRGM (Bureau de Recherche Geologique and Minéres) of France. The tender process has been very pressed with time to meet the EU deadline for funding, consequently the participation by the Core Parties has been limited. The TOR for the project is detailed, especially on the hardware side, and no specification of the contract sum is given, at least not at this stage. The contract is therefore inflexible and not easy to renegotiate. The project was met with heavy criticism from the Parties on these grounds. The opinion of the author is that it should be reasonable to expect some flexibility from the Contractor on the actual implementation of Phase I, but it will probably be necessary to bring in EU as the

formal contract holder for anything more than marginal changes. It is difficult to understand that it should not be possible to renegotiate the content of Phase II as long as there is no contract signed for this phase.

4.2 Terms of Reference for the US Components

The US delegation put forward TOR for the US contribution. The recommendations addressed by these documents are:

- Recommendation 1: The EXACT committee.
- Recommendation 2: Prepare and distribute a directory identifying the principal water-resources in the region.
- Recommendation 3: Prepare and distribute a bibliography of water-related publications from the region and initiate a formal exchange of new water-related publications among the Parties.
- Recommendation 5: Compile and publish an annual directory identifying significant ongoing water-related projects and studies in the region.
- Recommendation 8: Install a base number of observation wells.
- Recommendation 9: Install a base number of surface water stations and flood warning systems.
- Recommendation 23: Adopt and implement the use of policy statements on original data, data storage and archiving, and data access.
- Recommendation 25: Purchase and utilize a base number of mobile laboratories.
- Recommendation 26: Identify and monitor all laboratories providing data that could be included in data banks.
- Recommendation 27: Adopt and implement the use of internationally accepted analytical methods.
- Recommendation 32: Gain access to a Wide Area Network (Internet)
- Recommendation 33: Develop, document and implement requirements of a data base.
- Recommendation 34: Develop, document and implement a data dictionary for the region.
- Recommendation 35: Define and utilize regional data exchange formats.
- Recommendation 37: Document the quality assurance programs by preparing quality assurance plans for each of the major hydrologic and hydrometeorological agencies, for each of the local data networks, and for each of the laboratories providing analyses to be included in the data banks.
- Recommendation 38: Initiate and maintain a field water quality measurements quality control programs that would include an evaluation of field measurements of pH, specific conductance, and alkalinity.
- Recommendation 39: Initiate and maintain a field technician training program.

For the full description and the scheduling of the subproject see Annex C. Some of the recommendations will be fully funded by the US, some partly. The committed funding is in the order of 2 million USD.

The projects will be implemented under the supervision of technical subcommittees, with one member from each of the Core Parties and an US member.

The EXACT members are to give comments on the Terms of Reference within two weeks. This also includes comments to the Israeli specifications of the mobile labs (Recommendation

25). There are some possible overlaps with ongoing project - especially on a subproject on creating a water atlas. It is somewhat unclear to which recommendation this action relates.

4.3 French contribution

France has indicated interest in contributing to Recommendation 9 (Install a base number of surface water stations and flood warning systems) and 10 (Install a base number of hydrometeorological stations). In addition, France has reacted to an request from PWA on the purchase of geophysical equipment).

4.4 Canadian contribution

Canada indicates that their main contribution would be in the fields of training and human resources development. It should be mentioned that a possible problem is that training for field technicians has to be carried out in Arabic.

4.5 Australian contribution

The Australian Government has proposed to finance the implementation of the hydrological databank and software package HYDSYS with up to eight licenses at each of the core parties. This relates to Recommendations 33 (Develop, document and implement requirements for a data base), 34 (Develop, document and implement a data dictionary for the region), and 35 (Define and utilize regional data formats) - although these recommendations did not contain an actual data base implementation from the start. They would also be prepared to fund modifications to HYDSYS to make it more suited for use in the region.

It was decided at the EXACT meeting to establish an evaluation committee for HYDSYS.

5 WORK PACKAGE A - PALESTINIAN WATER DATA UNIT

Work Package A and the establishment of a Water Data Unit at PWA became a central issue at the EXACT meeting. The water data unit might just as well be identified as the hydrological services or the Water resources department in PWA organization plans. To get an idea of the cost involved, an informal group outlined the cost over a three year period. The frame was three main functions:

- field work capability
- laboratory analytical capability
- data bank capability
- housing

The main items in the rough calculations were:

1)	Housing 400 m2. Rent: USD 1600/month	60	kUSD
2)	Professional staff. 8 persons 15 kUSD/yr	360	
3)	Support staff. 15 persons 10 kUSD/yr	450	
4)	Telephone - 3 lines, 2 cellular	20	
5)	Training	500	
6)	Computers	20	
7)	Cars (2 office a 30 kUSD, 3 field 50 kUSD)	210	
8)	Field equipment	50	
9)	Lab samples 12000/yr a 25 USD	1080	
10)	Furniture	30	
11)	Maintenance, insurance	150	

Total sum: 2930

There is a lot to be said about these estimates, which were worked out only as an illustration and without proper regard to financial or institutional constraints. The car costs are probably too high - two office cars are hardly needed for one department within PWA. On the other hand, three field cars may be too little if PWA is to equip the five or six JSETs with cars. Lab costs are probably on the high side. Full staffing will not be in from day one, and the number of staff is probably overestimated. Training costs are based on a high-cost training profile, and can certainly be reduced substantially. But it illustrates a couple of important facts:

- 1) Staff and lab costs are the heavy items
- 2) The heavy items are also running costs

It is therefore important that the running costs of this unit are carefully considered - especially as these costs are rarely supported by projects.

5.1 Staff

It is important that the staffing is seen in light of the total sustainable staffing of the PWA, and that the hydrological services (which we are considering here) is weighted against the other services the authority shall provide. There will of course be a minimum level for practical operability, and this is mainly set by three work tasks - the data bank, the field work and the lab side. On the other hand, overstaffing could easily cripple PWA - it could deplete the funds for operations. It should be kept in mind that all operation costs after the initial build up phase has to be covered by internal Palestinian funding - in practice it will be impossible to get contributions to these costs from external funding.

The field staffing can not be determined without an overview of the necessary field work. The JSETs alone will in principle require 12 persons if they are manned simultaneously, it is unclear to the author whether this constitutes all field work to be carried out by PWA or not. The JSET staffing should probably not set the standard for the future staffing for the field activities of PWA anyhow - the total number of people engaged seems too high.

It should be considered to what extent staff can be shared between departments in PWA - this goes for field staff as well as data support.

The data bank/data analysis side would typically require three hydrologists/water quality professionals, trained in the use of computers and groundwater models, and with the capability to make own applications, typically ACCESS database, EXCEL spreadsheet and Visual Basic/C++ applications (the use of Microsoft products here is only as an illustration, but Microsoft Office seems to be part of the software package delivered under the EU project). It is also vital to have access to a person that is well experienced in PC and network systems - this person could be in the department, in an other department of PWA or at an external company (typically the HW and SW provider). The important thing is that this person(s) must know the system well and be available on short notice.

5.2 Analytic capability

Lab analytical capability is by far the most expensive single item in cost estimates for the Water Data Unit, as described above. Although the cost may be exaggerated, it is evident that regardless of solution chosen for this question, it has the potential of becoming one of the main expenditures for PWA. It is therefore clear that the lab analysis program has to be given thorough planning; that

- number of sites
- sampling frequency
- parameters to analyze
- lab strategy

is given due consideration. By lab strategy it is meant that the various options are considered and priced, some possible options are:

- own lab
- use the mobile lab for routine analyzes, set out specialized analyses to external labs
- enter into close cooperation with one external lab
- launch a tender for analysis to the certified laboratories in the region

Most of these options are not definitive, with the exception of the “own lab” option. A fairly safe strategy is therefore to chose one of the other options, and plan for an in-house lab in the future. The author suggests that a task force is formed to look into lab questions - a couple of members from PWA and possibly other Palestinian water organizations, and for instance Haakon Thaulow (he is director of the largest analytical water lab in Norway), and Jeff Miller as external participants.

It should be decided how far PWAs responsibilities stretches on water quality - whether it is restricted to the quality of the raw water, or if it also covers the bacteriological status of delivered water.

5.3 EXACT contributions

The EU project contribution

The author has only briefly seen the TOR for the EU project. As mentioned above, the contributions to Work package A is only one part of this projects. This contribution seems to contain four subprojects:

- 1) Infrastructure and organization;
- 2) Study tour to Europe;
- 3) Network evaluation;
- 4) PC hardware and office furniture;

Item 1) to a large extent duplicates the ongoing PWA/NVE cooperation, and should be converted to other activities - or at least closely coordinated with the Norwegian contribution. The author has no opinion on item 2). As for item 3, it seems that many of these projects has some network evaluation aspects - PWA should assume a strong coordinating position in these - otherwise the EU project will have to deliver more shelves under item 4.

It is of course a drawback that the terms of reference are very detailed on item 4) - it is to be hoped that PWA can have some influence on the final selection of hardware. The most pressing issue here is to get the contractor to accept that all purchases should be made locally. That would help strengthening local expertise, and it will be important for PWA to have one or two local providers of computer equipment with expertise on networking, distributed systems and electronic communication. The other important point is that the PC system provided satisfies the basic needs for a startup system. It seems from the TOR that the system is based on four standalone PCs. I would recommend PWA to go for a networked system from the start, based on Windows NT/Windows 95. A networked system would not need one laserprinter per PC - on the other hand a colour printer would be very useful. The detailed specification of the PCs is not too important as long as they are modern high-end PC - a minimum recommendation would be 90 MHz Pentiums, 16 MB memory and 500 MB harddisk. At least one CD-rom in the system, and preferably 17" monitors. The PCs should be on a UPS system, and it would be an advantage if one of the PCs were upgraded to a network server.

It should be mentioned that two of the other EU subprojects also have impact on the Water Data Unit (or whatever we should call it). The project on Geographical Information Systems seems to bring two PC workstations, digitizers, plotters and a GIS. R Manley did not remember which system - hopefully it is ArcInfo/ArcView. This equipment is of course not necessarily placed in the same administrative division as the data bank, but the author would strongly recommend it - at least it should be at the same location and in network with the data bank. The reasons for this is that the GIS and the data bank to a large extent will use common basic data, and that the data collection system probably will need access to digitizers.

The EU project does also have a subproject on publishing that will bring in a couple of PCs and peripherals. It is less evident that this should be located together with the data bank.

US project contributions

The US team has indicated that they could contribute to work package A. They can not support typical running costs like salaries or housing rent, but have showed an interest in training and the laboratory side. US will be financing a mobile laboratory.

French contribution

France is responding to an request from PWA on geophysical equipment.

Norwegian contribution

Norway will be contributing to Work Package A, especially on salaries and infrastructure in the build-up phase. To what extent the Norwegian contribution is to be seen as a part of Work Package A or a part of the overall support to PWA is not clear yet.

6 AUSTRALIAN DATA BASE OFFER - HYDSYS

The Australian Government has proposed to finance the implementation of the hydrological databank and software package HYDSYS with up to eight licenses at each of the core parties. HYDSYS has many good qualities, and is in the opinion of the author the most comprehensive DOS based software available in this field today. An important and strong point of HYDSYS is that it is a true multi-user system, another that it incorporates water quality and bore hole information, although the last part, which is probably the weakest part of the package, is very important to PWA. The HYDSYS will be probably be properly evaluated by the Core Parties in the EXACT framework. This author will only put forth a few preliminary observations from the demonstrations and the discussions with Peter Heweston (director of HYDSYS) at the EXACT meeting:

Advantages:

- Comprehensive (surface water, water quality, ground water);
- Very strong on surface water;
- Multi-user capabilities, can reside on server
- Fairly transparent file system (dbase type);
- Graphical, map based interface built in;
- Open ended on variables and parameters (no fixed set);
- Forms and multiparameter data entry capability;
- Strong and capable developer group

Drawbacks:

- DOS, not Windows (yet);
- Will probably need development on groundwater module to satisfy PWA needs;
- Not built on a standard database;

The last point is probably the most critical. PWA will certainly have a GIS system, and will need data bases for uses that are not included in HYDSYS, for instance extractions, permits, effluents, plants etc. Without a standardize multi-user DBMS in bottom, it will be difficult to integrate these functions seamlessly with HYDSYS. It should be noted, however, that a DBMS like Oracle increases the complexity of the systems, makes them less robust, and requires a high level of competence at system administration level.

It should also be mentioned that HYDSYS does not have any functionality for handling permits and other information related to the licensing process.

It was decided at the EXACT meeting to establish an evaluation committee for the database issue.

7 HYCOS-MED

HYCOS is a global surface water monitoring system using satellite transmission from stage/discharge stations, initiated and coordinated by the World Meteorological Organization - WMO. The World Bank and EU has entered into a cooperation to establish a regional

Mediterranean subnet, HYCOS-MED. As the Palestinian territories are not a member of WMO, they have not got an invitation to participate, but Karen Assaf has signaled an interest in participating.

As explained by Ron Manley at the EXACT meeting, the deal is that EU/World Bank will finance the river stations, satellite sender and satellite transmission cost. Station maintenance has to be funded by the participating parties. Shmuel Kessler had asked whether a satellite receiving station would be funded, and the answer was something like “maybe”. He indicated that it was doubtful whether they would participate, as the equipment was incompatible with their existing satellite transmission system.

HYCOS is primarily of interest in the case of transboundary rivers, and may be vehicle for establishing or contributing to a regional flood warning system. It would not be the first choice for a local or national system. The Jordan river would be an obvious choice for a HYCOS station in the region, but it would not make much sense for PWA to maintain a HYCOS station without a receiving system.

8 WHAT DATA TO STORE, AND HOW TO STORE THEM

The main data sources for the data unit at PWA will be data collected by the JSETs, data from own stations, and historical data from the West Bank Water Utility and the Israeli Hydrological Services. It will take time to select and implement a data base system for PWA, and in the meantime data must be stored in paper files - which is perfectly acceptable for archiving purposes. This will anyhow be the main raw data medium for manually observed and collected data.

To get an early start on computerized data storage and analysis, the author will recommend that a preliminary ACCESS database is established for new data, and for receiving a limited number of data series in digital form from the Israeli Hydrological Services. In addition to providing a preliminary data bank and give good possibilities for flexible reporting, it would also be a good training exercise for the new data bank staff. It would be easy to export data from Access to a future data base system. Another option for storing groundwater data is the UNDDSMS software “Groundwater for Windows”.

The suggestions of this author is that:

1. PWA should participate actively in the evaluation of HYDSYS and other possible candidates for data base management and data analysis.
2. A preliminary data system is based on ACCESS and spreadsheet operations. The actual development work put into this system should be kept on a low profile - it should be clearly stated and kept in mind that this is a preliminary system - at least on the hydrological side. More effort could be put into the permit/licensing part.
3. The data entered into this system should be:
 - new field and laboratory data
 - some historical data
 - licencing information for a limited geographical area
4. Proper safe storage and backup routines should be established from day one - this applies both to electronical and paper data media.

Bulk data entry of water license information should not be started before the data system is well tried and the actual form and amount of data to be stored at PWA is decided on.

9 COMPUTER SYSTEM FOR PWA

It is recommended that the computer system at the Water Data Unit is based on networked PCs, connected by thin ethernet or twisted pair, and with a standard network operating system, Windows NT or Novell. The PC operating system should be Windows for Workgroups or Windows 95, when the latter has overcome its infant diseases. To run a network system properly, one of the PCs need to be dedicated as a server, preferably with 32 MB RAM and at least 2 GB harddisk, and a connected or internal DAT tapedrive for backup purposes. The number of printers can be reduced in a networked system. It is vital that some expertise on PC networks is available.

Proper backup routines should be established from the start, and it is important to keep in mind that DAT tapes, although very convenient, are not very robust as a backup medium. It is important that safe storage is set up for in-house and external backup sets.

Proper antivirus checking routines should be established - there will be a lot of people bringing in their own diskettes. A state-of-art virus protection system, should be used routinely to OK all diskettes brought in. The most important element in a virus protection scheme is anyhow good backup routines.

With a wide international and regional contact net, and the institution spread on several location, internet connection should be high on the priority list. It should be checked whether it is possible to get internet access through the universities, otherwise a commercial internet service provider should be used. A email connection from each of the different location of PWA should be the first step - this would, in addition to external communication, provide basic interinstitution communication and enable electronic document and data transfer.

To provide wide area network access, like internet, each of the office locations should have three telephone lines - telephone, telefax and modem. It would be a great advantage if the two Ramallah locations were connected by a private, fixed cable.

10 POINTS FOR IMMEDIATE OR NEAR FUTURE ACTION

Apart from the actions decided upon by the EXACT meeting, the following issues concerning the data collection should be addressed as soon as possible:

a) Preparations of the new premises
Ducts, cabling (ethernet and UPS supported mains for computers), computer room, fire safe cabinet or vault, telephone lines (preferably three) etc.

b) Clarify responsibilities and interfaces with other institutions
It is important that the areas of responsibility for PWA and the interfaces with other governmental and non-governmental institutions and organizations is sorted out as soon as possible. Before that is done, it is difficult to overlook what data that will be PWAs

responsibility. Without this information it will be difficult to plan and implement an efficient data bank structure.

c) Data bank staff

Plans for near future employment of a basic number of data bank staff should be worked out as soon as the organizational plan is ready.

d) Plan for field activities in 1996

A document describing a realistic level for field activities and necessary staffing in 1996 should be prepared. The document should describe site activities, number of sites to be visited, and frequency of visits. The JSET activities and the coordination between these and other field activities should be addressed.

e) Analytical capability in 1996 and lab strategy

A small task force should work out a document describing a minimum water quality sampling program for 1996, arrange for lab analysis at an existing lab, and work out a lab strategy for PWA.

f) Data transfer from the Hydrological Services of Israel

A list over a small set of important data series should be worked out, to be transferred to PWA on diskettes in an agreed format as an initial transfer. The format should allow easy import into spreadsheet files and ACCESS databases. The format should be worked out in cooperation with the Israeli counterpart in this bilateral process. There is no need to await the multilateral exchange formats to be worked out by the EXACT projects.

Annex A: Participants in the EXACT meeting

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Executive Action Team III

November 30 - December 1, 1995

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Annex B: EXACT III agenda

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EXACT III

Agenda

1. Introductions (9 a.m. - 9:10 a.m.)
2. Additions or Modifications to Agenda (9:10 a.m.)
3. Status report on work plan implementation since the last EXACT meeting (Decisions by EXACT I and EXACT II to initiate specific recommendations)

a. Exact I U.S. Report (9:15 a.m. - 9:30 a.m.)

- 1). Recommendations 2, 3, and 5
- 2). Recommendation 25
- 3). Recommendation 26
- 4). Recommendation 27

Exact I EU/Canadian/Palestinian Report (9:30 - 10 a.m.)

- 1). Palestinian organizational structure (EU/Canada)

Break 10 a.m. - 10:15 a.m.)

b. Exact II

- 1). EU funding process (10:15 a.m. - 10:45 a.m.)

c. Work Package A - Development of Palestinian water data collection capability and establishment of Palestinian water data bank.

- 1). Review status of plan for implementation of the water data bank and necessary infrastructure of the Palestinian National Water Authority. (10:45 - 11 a.m.)
- 2). EU contribution (11 a.m. - 11:30 a.m.)
- 3). Palestinian request to France (11:30 - 12 noon)
- 4). Palestinian request to Norway (12 - 12:30 p.m.)
- 5). Future/immediate needs (12:30 p.m. - 1 p.m.)

1 p.m. - 2 p.m. Lunch

d. Plans for implementation of general recommendations

- 1). Develop a work plan that provides for a practical and workable implementation sequence for all recommendations (2 p.m. - 3:30 p.m.)
- 2). Identify recommendations for which Donors have offered funding. (3:30 p.m. - 4:30 p.m.)

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December 1, 1995

- 3). Considering 1) and 2) above, review and modify as appropriate past and future implementation commitments 9 a.m. - 11 a.m.

Break (11 a.m. - 11:15 a.m.)

- 4). Review TOR's for each recommendation in sequence according to established priority and funding. Assess the need for project/technical sub-committee assistance in carrying out the work of specific projects. discussion at the appropriate time. (11:15 a.m. - 1 p.m.)

Lunch (1 p.m. - 2 p.m.)

4. Exact report for the Water Working Group steering committee. (2 - 3 p.m.)
5. Date/venue for EXACT III (3 p.m. - 3:15 p.m.)
6. Potpourri (3:15 p.m. to adjournment)

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Annex C: Status of the Middle East Water Banks Implementation Plan

NUMBER	RECOMMENDATION	EXACT ENFORCEMENT		DONOR FINANCING COMMITMENT		PROGRESS
		EXACT	ENDORCEMENT	COMMITMENT	PROPOSED	
A	Develop Palestinian Water Unit	EXACT I	EU Phase 1 U.S.A. France		Norway	EU TOR Under Consideration EXACT is actively working
1	Establish an Ad Hoc Committee to manage and coordinate the implementation of the Middle East Water Data Banks Plan	EXACT formed in January 1995	U.S.A.			In contracts
2	Prepare and distribute a directory identifying the principal water-resources professionals in the region.	EXACT selected for action in April 1995	U.S.A.			In contracts
3	Prepare (update) and distribute a bibliography of water-related publications from the region and initiate a formal exchange of new water-related publications among the Parties.	EXACT selected for action in April 1995	U.S.A.			In contracts
4	Bring hydrologic and hydrometeorologic basic data publications programs up-to-date and publish "current" data reports within six months of the end of the data collection period.	EU proposed approach accepted			EU Phase II	EU TOR

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENDORCEMENT</u>	<u>DONOR FINANCING COMMITMENT</u>	<u>PROPOSED</u>	<u>PROGRESS</u>
5	Compile and publish an annual directory identifying significant ongoing water-related projects and studies in the region.	EXACT selected for action in April 1995	U.S.A.		In contracts
6	Prepare and distribute on a periodic basis, a bulletin on the current hydrologic conditions of the region.	EU proposed approach accepted	EU Phase II	EU TOR	
7	Conduct a detailed review and evaluation of the surface water, ground water, water quality, and hydrometeorologic basic data networks, including an inventory of hydrometric equipment.	EU proposed approach accepted	EU Phase II	EU TOR	
8	Install a base number of critical observation wells.	No action	U.S.A. partial funding	U.S.A. Draft TOR	
9	NEED NETWORK ANALYSIS (NNA) Install a base number of critical surface water stations and flood warning systems.	No action	U.S.A. partial funding	U.S.A. Draft TOR	
10	(NNA) Install a base number of hydrometeorologic stations.	No action			

NUMBER	RECOMMENDATION	DONOR FINANCING		PROGRESS
		EXACT ENFORCEMENT	COMMITMENT	
			PROPOSED	
11	Develop and maintain a system for each Party to store information on data collection, processing, and analytical methods and quality control activities.	No action		Need to evaluate HYDSYS data base capabilities
12	Adopt and implement (develop software transformations for the existing systems) the use of a single geographical reference system for the region for locating water-related site information.	EU proposed approach accepted	EU Phase I	EU TOR
13	Identify the minimum amount of information that describes a well that is mutually agreed upon, meets local needs, and is consistent regionally. Consistency may be achieved by adopting a standard form.	EU proposed approach accepted	EU Phase I	EU TOR
14	Identify the minimum amount of information needed to characterize a water quality sample that is mutually agreed upon, meets local needs, and is consistent regionally. Consistency may be achieved by adopting a standard form.	EU proposed approach accepted	EU Phase I	EU TOR

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENDORCEMENT</u>	<u>DONOR FINANCING</u>		<u>PROGRESS</u>
			<u>COMMITMENT</u>	<u>PROPOSED</u>	
15	Identify historic data collection programs and document the data collection, analytical methods, and quality control information for those programs as well as possible. Input historic data into the current databases.	EU proposed approach accepted	EU Phase I	EU Phase II	EU TOR
16	Adopt and implement the use of published standards for surface water measurements.	EU proposed approach accepted	EU Phase I		EU TOR
17	Adopt and implement the use of published standards for ground water measurements.	EU proposed approach accepted	EU Phase I		EU TOR
18	Purchase a borehole logger with water-related tools and nuclear magnetic resonance equipment for regional use.	No action			
19	Adopt and implement the use of regional standards of accuracy for all water quality field measurements and identify equipment that could meet the standards.	EU proposed approach accepted	EU Phase I		EU TOR

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENFORCEMENT</u>	<u>DONOR FINANCING COMMITMENT</u>	<u>PROPOSED</u>	<u>PROGRESS</u>
20	Adopt and implement the use of regional standards of accuracy for all water quality continuous monitoring equipment and identify equipment that could meet the standards.	EU proposed approach accepted	EU Phase I		EU TOR
21	Adopt and implement the use of published standards for water quality data collection techniques and develop a comprehensive water quality field techniques manual.	EU proposed approach accepted	EU Phase I		EU TOR
22	Adopt and implement the use of standards for the collection, transmission, sensing, and data base storage of hydrometeorologic data.	EU proposed approach accepted	EU Phase I		EU TOR
23	Adopt and implement the use of policy statements on original data, data storage and archiving, and data access.	No action		U.S.A.	U.S.A. Draft TOR
24	Purchase a base number of vehicles designed for field use.	No action			
25	Purchase and utilize a base number of mobile laboratories. draft specs	EXACT selected for action in April 1995	U.S.A. partial funding		U.S.A. Draft TOR

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENDORCEMENT</u>	<u>DONOR FINANCING COMMITMENT</u>	<u>PROPOSED</u>	<u>PROGRESS</u>
26	Identify and monitor all laboratories providing data that would be included in data banks.	EXACT selected for action in April 1995	U.S.A.		U.S.A. Draft TOR
27	Adopt and implement the use of internationally accepted analytical methods.	EXACT selected for action in April 1995	U.S.A.		U.S.A. Draft TOR
28	Build (or upgrade) and utilize a laboratory capable of identifying and quantifying a broad suite of organic compounds.	No action			
29	Build (or upgrade) and utilize a laboratory capable of analyzing a broad suite of isotopic and radiochemical determinations.	No action			
30	Purchase an ICP-MS (inductively coupled plasma-mass spectrograph) and upgrade a facility to develop the "clean" work environment required to properly utilize the instrument.	No action			
31	Develop and utilize a general laboratory analytical capability for the Palestinian authority.	No action			

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENDORSEMENT</u>	<u>DONOR FINANCING COMMITMENT</u>	<u>PROPOSED</u>	<u>PROGRESS</u>
32	Gain access to a Wide Area Network system.	No action	U.S.A. Australia	U.S.A. Draft TOR	
33	Develop, document, and implement requirements for a data base.	No action	U.S.A. Australia	U.S.A. Draft TOR Need to evaluate HYDSYS data base capabilities	
34	Develop, document, and implement a data dictionary for the region.	No action	U.S.A. Australia	U.S.A. Draft TOR Need to evaluate HYDSYS data base capabilities	
35	Define and utilize regional data exchange formats.	No action	U.S.A. Australia	U.S.A. Draft TOR Need to evaluate HYDSYS data base capabilities	
36	Develop and maintain an applications software library consisting of the methods and algorithms being used by each Party for data processing computations.	No action			

<u>NUMBER</u>	<u>RECOMMENDATION</u>	<u>EXACT ENDORCEMENT</u>	<u>DONOR FINANCING COMMITMENT</u>	<u>PROPOSED</u>	<u>PROGRESS</u>
37	Document the quality assurance programs by preparing quality assurance plans for each of the major hydrologic and hydrometeorologic agencies, for each of the local data networks, and for each of the laboratories providing analyses to be included in the data banks.	No action	U.S.A.	U.S.A. Draft TOR	
38	Initiate and maintain a field water quality measurement quality control program that would include an evaluation of field measurements of pH, specific conductance, and alkalinity.	No action	U.S.A.	U.S.A. Draft TOR	
39	Initiate and maintain a field technician training program.	No action	U.S.A. partial funding Canada	U.S.A. Draft TOR	

Annex D: US projects TOR

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Proposed Terms of Reference for US Components

November 30, 1995

MIDDLE EAST WATER DATA BANKS IMPLEMENTATION PLAN

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1.0 INTRODUCTION

These Terms of Reference (TOR) describe the proposed US component of the Middle East Water Data Banks Plan. It is expected that EXACT will coordinate and monitor project activities sponsored by the US, and that the US experts will work with Core Party water experts throughout the implementation phase. The TOR have been designed to describe a plan of work and a final product for each recommendation proposed for implementation. They also have been developed to complement implementation activities being sponsored by other donor parties and to move forward goals of the Water Data Banks Plan.

The EXACT process provides for the forming of project or technical subcommittees to work on activities related to the recommendations. This Terms of Reference relies on a number of technical subcommittees which, unless otherwise specified, are expected to be composed of one scientist from each of the core parties and one expert from the US. Each core party will propose a candidate and will oversee and direct the efforts of their personnel to accomplish the activities assigned to the project subcommittee. Periodic meetings of the subcommittees will be held, often when the US expert is in the region. Responsibilities for informal hosting of these meetings will be rotated among the core parties. The core parties are expected to assist the process in the following ways.

1. providing qualified candidates
2. providing their personnel with time and resources to work on the activities
3. hosting meetings and providing secretarial assistance to expedite the completion of the minutes and action items discussed in the meeting.

Members of the project subcommittees are expected to be prepared to act on the activities. This may require significant effort obtaining information and direction from their party.

All timelines are described in relationship to the date of EXACT's approval of these Terms of Reference. The recommendations that the US proposes to address are listed below. In some cases the US proposes to fund all aspects of the recommendation. In other cases the US will initiate the effort and then work through EXACT to find other donor parties to complete or add to the US effort. The US expects that EXACT will take account of the accomplishments of other donor projects and systems being used by any of the core parties that can be adopted for regional use to further development of the Middle East Water Data Banks.

1.1 Recommendations to be addressed

Number Recommendations in the order in which they will be initiated.

A. Establish an Ad Hoc Committee to manage and coordinate the implementation of the Middle East Water Data Banks Plan

2. Prepare and distribute a directory identifying the principal water-resources professionals in the region.

3. Prepare (update) and distribute a bibliography of water-related publications from the region and initiate a formal exchange of new water-related publications among the Parties.

5. Compile and publish an annual directory identifying significant ongoing water-related projects and studies in the region.
25. Purchase and utilize a base number of mobile laboratories.
26. Identify and monitor all laboratories providing data that would be included in data banks.
27. Adopt and implement the use of internationally accepted analytical methods.
33. Develop, document, and implement requirements for a data base.
34. Develop, document, and implement a data dictionary for the region.
35. Define and utilize regional data exchange formats.
8. Install a base number of observation wells.
9. Install a base number of surface water stations and flood warning systems.
39. Initiate and maintain a field technician training program.
32. Gain access to a Wide Area Network system.
37. Document the quality assurance programs by preparing quality assurance plans for each of the major hydrologic and hydrometeorologic agencies, for each of the local data networks, and for each of the laboratories providing analyses to be included in the data banks.
38. Initiate and maintain a field water quality measurement quality control program that would include an evaluation of field measurements of pH, specific conductance, and alkalinity.
23. Adopt and implement the use of policy statements on original data, data storage and archiving, and data access.

2.0 RECOMMENDATION 1--SPONSOR COMMITTEE--EXACT

Recommendation 1 is: Establish an Ad Hoc Committee to manage and coordinate the implementation of the Middle East Water Data Banks Plan

A committee called the Executive Action Team (EXACT) was established during the meeting in Amman in January, 1995. A Terms of Reference has been agreed upon.. Through this committee the interested parties collaborate to initiate, implement, and monitor the Middle East Water Data Banks Plan. It is recognized that considerable flexibility will be required in establishing and operating the EXACT, and that its terms of reference may evolve and require periodic updating based upon the success of its endeavors and problems encountered in executing the Water Data Banks Implementation Plan.

The Water Data Banks Implementation Plan is currently US-lead, EU supported with assistance by France and Canada. Where appropriate, a project or technical subcommittee would be constituted by EXACT with donor agencies undertaking one or

more projects under EXACT's implementation plan, and through this subcommittee, the donor representative may be invited to participate in EXACT meetings. The US will continue to sponsor EXACT and function as the gavel holder of EXACT until such time as alternative arrangements are decided by EXACT. Decision-making procedures will use the procedures accepted by the Multilateral Working Group on Water Resources and will meet at least two times per year, and up to four times per year if warranted by the nature and amount of work to be done. EXACT will seek additional sources of funding for the implementation of the Water Data Banks Plan which are independent of existing commitments.

3.0 RECOMMENDATIONS 2, 3, AND 5--DIRECTORY, BIBLIOGRAPHY, AND ONGOING PROJECTS

Recommendation 2 is: Prepare and distribute a directory identifying the principal water-resources professionals in the region.

Recommendation 3 is: Prepare (update) and distribute a bibliography of water-related publications from the region and initiate a formal exchange of new water-related publications among the Parties.

Recommendation 5 is: Compile and publish an annual directory identifying significant ongoing water-related projects and studies in the region.

The US will work with the core parties to identify and list the key water data agencies and professionals, develop a bibliography of water data publications, and identify and describe pertinent and on-going water data projects in the region. This will serve as a basic document for the coordination of EXACT operations and provide basic regionally-integrated information on water data activities in the region.

A project subcommittee consisting of personnel from the core parties will be formed to accomplish recommendations 2, 3, and 5. Each core party will be responsible to provide the information for their party and will be assigned an additional task from the following three: collate and distribute directory, collate and distribute bibliography, and collate and distribute the first annual directory of projects.

The US will issue necessary contracts or grants to acquire services of personnel and work with core party personnel to assure that the activity will be accomplished. This work will be initiated in the first month and should be finished by six months. Specific products from this effort will be a directory, a bibliography, and the first annual directory of projects. Current status of this activity is: the core parties have proposed their candidates and the US has started the contracting process.

For data collection agencies and professionals each core party should provide name, address, telephone number, telefax number, electronic mail address, academic background, position title, brief description of professional duties and responsibilities and professional interests. Examples of the persons that should be included are agency heads, department managers, non-government organization heads, department managers, and principals of water resources research centers. It is expected that each party will list approximately 50 to 100 people.

For the bibliography of water related data reports each core party should provide a description of data collection efforts and listings of water resources data, annual water data reports, data related review papers, and existing bibliographies. One copy of the document or an address where a copy can be obtained should be provided. Include a one

paragraph abstract (3 or 4 sentences or use existing abstract, and provide title, author, publisher, number of pages, agency address, and date of publication.

For the listing of water data projects and studies each core party should provide a one paragraph description of each project and list the agency, agency address, project start and end dates, budget and funding sources, geographic scope, and name, telephone number, telefax number, and address of the principal

investigator or project manager. Any project containing data collection elements related to the fulfillment of the EXACT implementation plan should be listed. These projects should include both internationally supported projects and national projects supported by government agencies or by non-governmental organizations.

4.0 RECOMMENDATION 25--MOBILE LABORATORY

Recommendation 25 is: Purchase and utilize a base number of mobile laboratories.

The mobile laboratory can provide a clean work space and a stable, comfortable environment and is important for those elements whose value change between the field and the laboratory. These elements would be analyzed or stabilized in the field. The specifications will identify the parameters (time-dependent) that will be analyzed and describe the vehicle and equipment to be used.

The Israeli EXACT representatives will initiate a core party exchange and review of specifications. The core parties will each contribute to the description of requirements for three mobile laboratories and will meet to develop a consensus specification. The US will coordinate this effort with the core parties and will assist EXACT representatives in obtaining the vehicles, equipment, and funding required to setup the mobile laboratories. Current status of this activity is: the specifications have been drafted.

5.0 RECOMMENDATIONS 26 and 27--MONITOR LABORATORIES AND ADOPT ACCEPTED ANALYTICAL METHODS

Recommendation 26 is: Identify and monitor all laboratories providing data that would be included in data banks.

Recommendation 27 is: Adopt and implement the use of internationally accepted analytical methods.

A project subcommittee will be established to address the various aspects of recommendations 26 and 27. These individuals should have a chemistry background (preferably analytical) and should have considerable experience in an analytical laboratory. The US will provide a technical expert to work with the subcommittee. This work will be initiated in the first six months and should be finished by one year.

The purpose of recommendation 26 is to initiate a program that will provide environmental water-quality data that are comparable even though produced by different laboratories. The purpose of recommendation 27 is to adopt a set of laboratory standard methods that will be used in the laboratories in the region. These standard methods will enhance comparability of data from certified laboratories.

5.1 Identify Laboratories Providing Data

The subcommittee will identify laboratories that are currently, or have in the past, analyzed water samples for any of the Parties. The laboratories will be visited and the information that should be obtained would include types and number of determinations, methods, analytical ranges, and laboratory quality assurance (QA) practices. In addition, other information, such as time frame in which samples were analyzed, agency to which data were provided, and where data are stored will be obtained. An annual questionnaire could be designed and used to keep laboratory information current.

5.2 Adopt Standard Methods

The subcommittee will review the standard methods presently used in the region (WHO, USEPA, European, etc.) and adopt those that apply. The parameters, accuracy, precision, and detection limits will be identified and the core parties will determine which methods will be adopted.

5.3 Laboratory Approval and Monitoring Process

The following four programs, which constitute the laboratory approval process, will be used to ensure that data comparability is achieved among member laboratories.

- A. Laboratory Quality Assurance Plan
- B. Interlaboratory Evaluation Program
- C. On-site Reviews
- D. Official Approval

5.3.1 Laboratory Quality Assurance Plan

Development of quality assurance plans are described in Recommendation 37. It is recommended that the subcommittee members or their designees review QA manuals from laboratories that wish to provide data to the Parties and then approve the manuals if they meet minimum qualifications. If minimum qualifications are not met, the subcommittee will work with the laboratories to improve the QA document.

5.3.2 Reference Materials and Interlaboratory Evaluation Programs

All laboratories that produce data for Parties involved in the Water Data Banks Plan would participate in an interlaboratory evaluation program. These programs are conducted by several agencies including the U.S. Environmental Protection Agency, U.S. Geological Survey (USGS), and Environment Canada. Although there are operational differences, the general principles of these programs are similar. They are designed to confirm that a laboratory can satisfactorily analyze the samples that are submitted. The results and evaluations of data quality are provided in a report that is generated by the sponsoring agency; consequently, it is possible to determine the quality of results from a laboratory participating in one of these programs.

The USGS would welcome an opportunity to enroll a number of core Party laboratories in this program. It also may be possible for the Parties' laboratories to participate in interlaboratory evaluation programs sponsored by other groups. Since these interlaboratory evaluation programs are well established, it is possible for member laboratories to begin participation at an early date.

It is recommended that the subcommittee consider establishing a program in which a Core Party laboratory would prepare a homogeneous, stable water sample that would be distributed to member laboratories of each Core Party for analysis. This distribution of

reference-type samples would be conducted on a regular basis and that the responsibility for sample preparation be rotated among Core Party laboratories. The subcommittee will be responsible to maintain communication between laboratories. This program could be informal, but it would provide valuable information on the quality and comparability of data and would be useful to all laboratories.

5.3.3 On-site Reviews

The subcommittee will establish a procedure for on-site reviews. Two qualified technical experts from each of the Core Parties would review the technical program of a laboratory to determine if it is capable of producing quality analytical data. Benefits may be realized by including project personnel, who submit samples to the laboratory, in the review process. Misunderstandings concerning sample collection and measurement, analytical measurements, and data entry often can be resolved during the review. Items such as qualifications of key personnel, analytical methods, laboratory facility, instrumentation, and adequacy of the QA program should be reviewed.

The review usually requires one to three days, depending upon the size of the facility and number and type of determinations performed. A debriefing with laboratory personnel is held at the end of the review process including constructive advice from review members that the laboratory can use to improve their operation. It may be desirable to exempt laboratories from the review process if the amount of work performed is small. There are no firm rules on the frequency of laboratory reviews; however, the USGS has found that reviews at three year intervals work well.

5.3.4 Official Approval

Laboratories would be officially approved by the subcommittee. This approval, which should be straightforward and not require much time, should be based on a satisfactory laboratory QA plan, appropriate analytical methods, successful participation in an interlaboratory evaluation program, if possible, and acceptable findings from the onsite review. Such an approval would also specify the determinations that a laboratory is qualified to perform.

6.0 RECOMMENDATIONS 33, 34, AND 35--DATA BASE REQUIREMENTS, DICTIONARY, AND EXCHANGE FORMATS

Recommendation 33 is: Develop, document, and implement requirements for a data base.

Recommendation 34 is: Develop, document, and implement a data dictionary for the region.

Recommendation 35 is: Define and utilize regional data exchange formats.

A project subcommittee will be established to address the various aspects of recommendations 33, 34, and 35. These individuals should have a data analysis, data base, and some hydrologic background. Experience with their parties' data and data bases is recommended. The US will provide a technical expert to work with the subcommittee. After the initial requirements, dictionary, and exchange mechanisms are developed, this subcommittee would continue to meet to review and update the requirements as enhanced technology becomes available and as the level of operational needs increase. This work will be initiated in the first six months and the initial requirements will be finished six months later.

The purpose of recommendation 33 is to define the core parties data base needs to support their water programs. The purpose of recommendation 34 is to establish and maintain a data dictionary that will provide standard terminology and understanding of the data for the local as well as regional parties. Based on the results of recommendations 33 and 34 a common standard format for the exchange of data can be developed.

The Australian Government has offered to contribute the commercial hydrologic data base called Hydsys. The subcommittee will determine if the data base meets their basic needs and if any enhancements are required. EXACT will request that the donor party arrange for enhancements to be completed. Data base requirements and a data dictionary may still be needed, but will be defined in large part by the existing data base. The subcommittee will coordinate the adoption of the data base and develop the capability to share data. The US will work through EXACT to find equipment or funding to provide appropriate computer equipment to support the data base where it is needed. The Water-Data Assessment Team Report of January, 1994 listed the computerized water related systems in the region and can be used as a starting point for determining the need for additional computer equipment.

6.1 Data Base

The US expert will work with the subcommittee to define the data base requirements. The requirements will depend on both local and regional level needs. To avoid trying to address a problem that is too large, the data banks effort may have to be applied to a subset of the total needs for each party. The subcommittee will have to define the local and regional level needs, expectations, applications, and products that will be required to support regional data banks including the capability to share data.

Interviews with each parties' primary users and data base personnel will be required for the subcommittee to define data base requirements. It is estimated that the subcommittee may have to visit as many as three to five organizations for each Party.

6.2 Data Dictionary

As part of the effort to define requirements the subcommittee can begin to develop a data dictionary. The dictionary contains precise definitions of entities, including relationships among the entities, and attributes, including storage formats, units, business rules, sampling and measurement standards for quantitative and qualitative measurements. The subcommittee must decide which subset of each agencies policies, rules, and processes that govern the day-to-day data and functional requirements will be addressed.

6.3 Data Exchange Formats

From the data base requirements and data dictionary the subcommittee can begin to develop exchange formats and mechanisms. This will include the use of a standard reference grid so that locations can be defined. There are a number of ways that data can be shared including distributed data bases, data exchange formats, and world-wide-web capabilities to connect many computers to distributed and centralized archives. The subcommittee will need to determine the exchange mechanisms.

7.0 RECOMMENDATIONS 8 AND 9--OBSERVATION WELLS AND SURFACE WATER STATIONS

Recommendation 8 is: Install a base number of observation wells.

Recommendation 9 is: Install a base number of surface water stations and flood warning systems.

Recommendation 7 is funded by the EU and concerns a review and evaluation of data networks. Normally, observation wells and surface water stations would be installed after the review is completed. However, the core parties are aware of wells and stations that are needed in critical areas as soon as possible.

7.1 Wells and Surface Water Stations

The US will work with the core parties to identify the critical wells and stations. Funding and expertise will be sought through EXACT from other donor parties to develop specifications and install the critical observation wells. In collaboration with the core parties a US expert will help develop specifications for the installation of surface water stations in the region. The surface water stations will collect data needed to determine discharge at the station and possibly other parameters if required by the core parties. This will occur in four months.

Working with core party personnel, the specific sites will be identified and the stations designed and installed. Existing gages may be upgraded to comply with the new specifications. The stations will be installed in the first year. Three critical stations are planned. This may be modified depending on installation costs in the region.

Additional wells and stations will be installed as funding is found. Other donor party contributions of equipment (meeting the specifications) and money can be used by the core parties to install additional wells and stations.

7.2 Water Atlas

The US will work with the core parties to produce an atlas of water data for the region. This atlas would provide an overview of the data available. The atlas will include overviews of the data such as precipitation and surface water flow patterns and groundwater levels. Evaluation of the currently available data would identify gaps where data is needed. The water atlas will be initiated within four months and published a year later.

A project subcommittee will be formed including a US expert to work on this activity. Members of the subcommittee should be scientists with experience in data analysis. The available data will be reviewed and an outline for the atlas will be developed. Each party will then provide the data analysis and text for their part of the atlas. A possible table of contents for the atlas is as follows.

- Introduction
- Review of the available data
- Meteorologic
 - Precipitation
 - Temperature
 - Evaporation
 - etc
- Surface water
 - Gaging stations and individual measurements
 - Long term records
 - Flood flows

Water use
Water quality
Ground water
Observation well network
Long term records
Current water levels
Water use
Water quality
Temporal and spatial patterns and trends
Precipitation
Temperature
Evaporation
Stream flow
Water levels
Water use
Water quality
Data network issues
Conclusions

The report would be co-authored by the individuals from the core parties and the US expert and could be published by the EXACT.

8.0 RECOMMENDATION 39--FIELD TECHNICIAN TRAINING PROGRAM

Recommendation 39 is: Initiate and Maintain a Field Technician Training Program.

The US will work with the core parties and the EU consultant, working on the development of the Palestinian Water Data Unit, to initiate field technician training. Initial training will be held on surface water, ground water, and water quality field techniques. The US will provide expert instructors to work with core party instructors to cover all areas of the training. A lead expert will review the needs and design the program in collaboration with existing training personnel and facilities in the Region. If possible, the training will be designed to provide attendees with recognized technician certification.

The initial needs for training will be determined by reviewing the facilities, staff, and previous training available to the core parties. Available training materials will be reviewed such as those available in the US and Canada. An initial training program will be designed including course outlines and plans. These tasks will be initiated within the first six months and completed two months later.

Instructors will be selected based on the training needs identified and course materials will be developed. In the first year, two-two week classes will be held. These classes will include both classroom and field instruction.

Following the initial training the lead expert will collaborate with the core parties to develop a plan for long term technician training. The long term training will be implemented in the second year. The training recording and management system will be implemented in the second year. This will be done by the core parties working with the lead expert.

9.0 RECOMMENDATION 32--WIDE AREA NETWORK

Recommendation 32 is: Gain access to a wide area network system.

Parts of the region are already connected with the world wide internet network. The US will work with each core party to determine needs for additional connection to the network to support the Water Data Banks. Contacts will be made to acquire access rights for agencies and to work out the logistical details of getting connected.

To support the network connections, centralized facilities, local networks, internal networks, and network software will be reviewed for use by the core parties. Initial setup of hardware and software to support a basic network capability for each of the core parties should be possible with the current equipment available and that to be provided by the EU. If additional hardware and software is required, the US will work with donor parties to meet those requirements. This activity will be accomplished in the first year.

10.0 RECOMMENDATIONS 37 AND 38--QUALITY ASSURANCE AND FIELD QUALITY CONTROL

Recommendation 37 is: Document the quality assurance programs by preparing quality assurance plans for each of the major hydrologic and hydrometeorologic agencies, for each of the local data networks, and for each of the laboratories providing analyses to be included in the data banks.

Recommendation 38 is: Initiate and maintain a field water quality measurement quality control program that would include an evaluation of field measurements of pH, specific conductance, and alkalinity.

The purposes of recommendations 37 and 38 is to provide the core parties with the ability to know the quality of their data and that the data represent what they are believed to be. This level of knowledge is attained from a fully functioning quality assurance (QA) program that includes quality control (QC) activities at a level appropriate for the work being undertaken.

A project subcommittee will be established to address the various aspects of recommendations 37 and 38. This subcommittee should be the same one formed to address recommendations 26 and 27. The US will provide a technical expert to work with the subcommittee. This work will be initiated at one year. The quality assurance plan (QAP) for each of the laboratories and the field quality control program will be completed six months later.

10.1 Quality Assurance Plans

The subcommittee will work with all laboratories to write, review, or complete a QA plan that defines their QA program. The subcommittee will concentrate on QAPs for the water quality laboratories first, The core parties can complete QAPs for other agencies to support their purposes following the work with the US expert on the laboratory QAPs.

This QAP document should be of a format that is easily amended to reflect changes in the program and should be updated regularly to indicate these changes. Although not inclusive, the following items usually are included in a comprehensive laboratory QA plan.

1. Title Page with Approving Signatures
2. Organizational Chart
3. Qualifications and Responsibilities of Personnel
4. Precision and Bias Targets for Methods

5. Training and Safety Protocols
6. Sample Management
7. Analytical Procedures
8. Calibration Procedures
9. Preventative Maintenance
10. Quality Control Checks
11. Data Reduction Validation and Reporting
12. Corrective Actions
13. Performance and System Audits

Some topics usually included in a QA plan are sometimes described elsewhere in laboratory documentation. An analytical methods manual and a separate training or safety document are typical examples. In such cases, the presence of these documents should be referenced in the QA manual. When properly prepared, the laboratory QA manual with supporting documentation describes the QA procedures used by a laboratory to obtain data of defined quality.

10.2 Field Quality Control

Working with the US expert the subcommittee will initiate a field water quality measurement quality control program to meet the needs and purposes of the core parties. This program will include an evaluation of field measurements of pH, specific conductance, and alkalinity. The QC activities are the specific things done by the field person to ensure a quality product, such as instrument calibration or replicate samples or measures. The subcommittee will decide the aspects of field QC will be included. The QC program might include technician training, field instrument checks, and analysis of historic water quality data. The technician training can be coordinated with the training described for recommendation 39.

11.0 RECOMMENDATION 23--ADOPT POLICY STATEMENTS

Recommendation 23 is: Adopt and implement the use of policy statements on original data, data storage and archiving, and data access.

An important use of a data bank is for legal purposes. In this case it is important that the legal definition of "original" be met. Historically, original data was the pen trace on a chart or an hydrographer's hand written notes. Today, it is more complex and a topic that must be addressed.

Archiving is the systematic process of placing valuable data into archives to preserve and protect it from inadvertent change or loss by providing appropriate security measures and procedures. Archiving data is critically important because computers and the included data banks are subject to data crashes and other failures requiring periodic restorations of the original data from back up files. User errors can sometimes require that the original data be accessed to rebuild a data set such as discharge data.

A project subcommittee will be established to address the various aspects of recommendation 23. This subcommittee could be the same one that was formed to address recommendations 33, 34, and 35 including the US expert. This work will be initiated at one year and be completed at 18 months. The following questions need to be addressed by the subcommittee.

1. What are original data?

2. What original data collected and other data stored in core party data bases should be placed in data archives?
3. What minimum data set should be maintained on line or available for immediate access at all times?
4. Who should have access to data stored in the data bank?

Annex E: Abbreviations, acronyms, and technical terms used in this report

ACCESS:	Microsoft database for PCs, with capability for access to larger central databases
CD-rom:	Compact Disk Read-only memory - CDs for software and data storage
C++:	Programming language
DAT:	Digital Audio Tape: Compact tape cassettes used for data backup
DBMS:	Data Base Management System - usually commercial software for management of large multiuser databases.
DOS:	Disk Operation System, used somewhat imprecisely for basic operation system developed by Microsoft for IBM in the early eighties, still at the bottom of Windows
EU:	European Union
ECU:	European Currency Unit
email:	electronic mail
EXACT:	EXecutive ACtion Team - Coordination committee for the Middle East Data Banks Plan
EXCEL:	Microsoft spreadsheet - the most commonly used spreadsheet
GB:	Giga Byte - corresponds roughly to thousand millions digits or letters of data storage
GIS:	Geographical Information System - software to produce and display spatial information
HYDSYS:	Australian hydrological data bank an software package, commercial product
HYCOS:	Hydrological Cycle Observing System - planned global hydrological real time network, based on satellite transmisson
HYCOS-MED:	HYCOS subnet for the Mediterranean region
HW:	Hardware
Internet:	International, loosely organized data communication net
JSET:	Joint Supervision and Enforcement Team
kB:	kilo Byte - corresponds roughly to thousand digits or letters of data storage
MB:	Mega Byte - corresponds roughly to one million digits or characters of data storage
modem:	MOdulator/DEModulator - equipment to transport digital data on analog (telephone) communication lines
NORAD:	Norwegian Agency for Development Cooperation.
Novell:	Network operation system - also the name of the firm
NVE:	Norwegian Water Resources and Energy Administration
PWA:	Palestinian Water Authority
Pentium:	Latest generation of Intel made processors, also referred to as 586-processors
RAM:	Random Access Memory - fast storage used for direct, immediate access by operation system and executing programs
SW:	Software
TOR:	Terms of reference
UNDDSMS:	United Nations Technical Assistance Program
UPS:	Uninterrupted Power Supply - Power supply with battery backup
USD:	US dollar
USGS:	United States Department of the Interior - Geological Survey
Visual Basic:	Userfriendly programming language and development environment (Microsoft)
Virus:	Malign software that links to and spreads with other software
Windows NT;	:Multiuser operation system, produced by Microsoft - mainly used for workstations and servers
Windows 95:	Single user operation system, produced by Microsoft - replacement for Windows 3.x
WMO:	World Meteorological Organization

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