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WHO/EMR CENTRE  
FOR ENVIRONMENTAL  
HEALTH ACTIVITIES  
CEHA DOC UNIT

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# NATIONAL WATER QUALITY SEMINAR

EMRO/Alexandria

23-26 November 1987

SEMINAR REPORT

and

RECOMMENDATIONS

By

Dr. B. T. Commins

WHO Consultant

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Sponsored by Drinking Water Supply and Sanitation Sector Support Project

## SEMINAR ON DRINKING WATER QUALITY

EGYPT, 23 - 26 NOVEMBER 1987.

### 1. INTRODUCTION:

The 4 day seminar held at The premises of the Eastern Mediterranean Regional Office "EMRO"/WHO was jointly organized by the organization for Reconstruction and Development of the Egyptian Village (ORDEV), UNDP, UNCIEF, WHO sector support project. The welcoming address was given by Dr. Islam Sheikh. He referred to the WHO Drinking Water Quality Guidelines and their use for setting National standards, which allowed more flexibility than the earlier 1971 WHO Standards. Dr. Sheikh mentioned the need for the safeguarding of water supplies and emphasized the significance of contamination of water by microbial pollution of human origin, and the special need for its control. The seminar which focussed on the provision of safe water, was part of the WHO strategy of Health for all by the year 2000. The full welcoming address is attached (see annex 1).

Mrs Samia Garas /UNDP Programme Officer read a statement on behalf of UNDP. She referred to the UNDP programme working with international organizations throughout the world including UNDP's very active role in Egypt where great strides had been made in the rural regions of the country in terms of drinking water supply and sanitation. The full statement is attached, (see annex 2).

Dr. Tharwat Saleh, Director of Drinking Water Supply and Sanitation Sector Support Project for Egypt, referred in his overview to the specific outputs of the Project including (a) Demonstrated least-cost appropriate sanitation technologies, (b) Human resources development, (c) Training, (d) Information systems, (e) Water Supply methods, (f) Water Quality control, (g) Sector progress monitoring. He outlined the activities for 1988/89 in relation to drinking water quality standards. He also referred to the formation of a specialist group to set National Standards based on WHO Guidelines taking in account National Considerations. The full text of the overview is attached, (see annex 3).

An opening statement was given by Mr. Mohamed Salah El-Din Soliman, Chairman of ORDEV and chairman of the Project Steering Committee. He referred to the activities of ORDEV in rural areas in relation to the provision of supplies of safe drinking water. He mentioned particularly the provision of wells, water treatment plants, and elevated water storage tanks. The full text of his statement is attached, (see annex 4).

Dr. Mohamed Salah El Din Soliman, Chairman of ORDEV was elected chairman of the Seminar; General Kamal Mohamed Hegab, Chairman of the General Organization of Greater Cairo Water Supply was Vice Chairman of the Seminar. Dr Brian Commins, (WHO consultant), was Rapporteur. 27 national, international and bilateral delegates attended (list attached, see annex 5)

Technical sessions were planned in which 14 papers were presented by National delegates relating to different aspects of the theme of the Seminar i.e role of the organizations in the provision of safe water, water resources water quality and supply systems, water treatment, surveillance and monitoring, pollution of water resources, water storage and its quality and leakage reduction from water distribution systems. Dr. Hend Galal Gorchev (WHO Geneva) and Dr. Brian Commins (WHO Consultant) presented a series of papers on Drinking Water Quality and Health, WHO Drinking Water Quality Guidelines and Development of National Drinking Water Standards. All papers were followed by discussions: particular emphasis was given to the bacterial contamination of water in rural situations. A task group chaired by Dr. H. Farouk Bedewi with some assistance from WHO, acted as the Seminar Recommendations draft committee. The submitted recommendations were discussed, and in principle they were adopted by the seminar. It was agreed that the recommendations should be finalized by the Project Director, Dr. Saleh, who would then submit them to all the participants for comment prior to producing the full seminar proceedings which should incorporate the agreed recommendations. The concept of forming a small committee to follow-up in regard to the implementations of the recommendations

formulated was discussed. The agenda of the Seminar is attached, (see annex 6). A list of the documentation provided at the Seminar is attached, (see annex 7).

## 2. JUSTIFICATION AND OBJECTIVES:

Because of the need for improving the drinking water quality for Egypt, it is necessary to make decision makers and others aware of the situation so that improvements in water quality can be achieved. The purpose of the seminar was to review all issues related to water quality including raw water quality, water treatment, water leakage, piping materials and monitoring. In connection with water quality standards, the WHO water quality guidelines need to be discussed together with various national considerations including those related to the implementation of standards and the development of realistic standards.

The objectives of the Seminar were:

- (a) To identify water quality problems for Egypt.
- (b) To create an awareness of the need for action in water quality control for Egypt.
- (c) To improve the understanding of drinking water quality criteria.
- (d) To encourage development of a defined comprehensive drinking water quality control programme in Egypt.
- (e) To identify priorities for action in water quality control.
- (f) To upgrade the current activities in water quality surveillance/monitoring.
- (g) To introduce the WHO Guidelines on Drinking Water Quality.
- (h) To guide the development of Drinking Water Quality Standards for Egypt.

The detailed protocol for the seminar is attached, (see annex 8).

### 3. DISCUSSIONS:

#### 3.1 Water Sources/Water Treatment:

It was emphasized by WHO that the presence of iron and manganese in drinking water cause no health problems (they are referred to in the drinking water quality guidelines as aesthetic parameters which for example cause staining of laundry etc.). This means that in many cases drinking waters containing excessive levels of iron and manganese found fairly often in waters in Egypt should be safe to drink; thus it was considered from a health standpoint to use a number of drilled-well supplies which have hitherto been rejected simply because the levels of these parameters marginally exceeded the existing drinking water standards for Egypt. It was recognized that in the United States, only the standards for health related parameters are regulated by law and this seemed to be a possible approach to take into account when revising the Egyptian drinking water standards. Acceptance of more supplies would be of particular benefit to organizations such as UNICEF who consider drilled-well sources in Egypt to be frequently safe. UNICEF considered it a "crime" to reject drilled well water simply because of the presence of some iron and manganese as people are then forced to consume very unsafe canal water for example. It was pointed out that excessive levels of iron and manganese can be removed, if required, by aeration and filtration of the water, although this was not at an insignificant extra cost. The Chairman suggested that UNICEF might supply their existing recommendations regarding the criteria for drilled-well water to HOPWASD so that a committee could perhaps be formed to evaluate the position. UNICEF referred to the deep-well handpump systems for small communities which had proved to be most valuable in some areas for providing safe drinking water in Egypt.

Particular problems due to the presence of algae in some raw waters existed when the water required for potable supply became treated with alum and chlorinated. The problems were of special concern at the terminal points of the river Nile. Although the problem seems

to have become largely overcome in Alexandria, in Damietta especially in summer, great difficulties arise. A suggestion for a collaborative effort research study on algae removal seemed to be of interest. Special problems existed in some raw waters, again in the Damietta region where fertilizer waste containing ammonia was discharged into canals; this caused difficulties related to the growth of algae leading to a reduction in the effectiveness of chlorination.

Problems have arisen of chemicals getting into canal water as a result of the use of herbicides to control weeds; it was suggested that mechanical means of weed control should be used instead.

The question of design capabilities of water treatment plants to cope with the fluctuating levels of pollutants in Nile water was raised; in Cairo and Alexandria, sufficient flexibility was said to be in-built to deal with anticipated changes. The treated water entering the distribution systems was considered essentially very safe in both Cairo and Alexandria because it is fully and effectively treated and disinfected. Some problems however arose with tap water, especially because of the abuse of water supplied to the household (eg. unsatisfactory plumbing and the use of tank storage) as well as ingress of pollution into distribution systems in some areas where low water pressure arises. For slum areas a particular problem existed, and poor quality water existed, which was very difficult to control.

It was considered that water treatment as well as the general control of raw water and that for irrigation should be standardized.

Some delegates expressed views were that all water supplies ought to be chlorinated; others considered that for certain underground sources it was not necessary to chlorinate where the system was well controlled. No firm recommendations were concluded.

Following the paper by USAID explaining certain cost-effective advantages which slow-sand filtration plants seem to have over rapid sand filtration systems in providing good quality water, it was however pointed out that in some cases (for canal sources) that the slow-sand filtration plants can become rapidly clogged. Also it was accepted that another disadvantage of slow-sand filtration plants was that they require much more land area, although in rural areas this generally was not a problem. There seems still to be a need for both slow and rapid systems in Egypt, although the latter suffered from the problem related to the lack of availability of chlorine and alum and poly-electrolytes in some situations especially for the rural areas of Egypt. In order to decide which system to use, it was suggested that situations be evaluated on a case-by-case basis (possibly using pilot plants).

In relation to the continuing use of compact plants for providing drinking water, the cost-effectiveness of alternative systems such as drilled-wells, desalinated water supplies, etc, was discussed. Changes in planning were already being considered and it was suggested that compact plants should not be used except where really necessary. In addition, the siting of plants with respect to the water intake was considered a very important aspect to take into account. In relation to the use of compact units, it was pointed out that they often become overloaded producing lower-quality grade water than the design specification; also, where it was necessary to meet the demand for greater quantities of water, systems had to be by-passed with shorter retention times resulting in a lower quality water being produced. It was pointed out that part of the WHO/ORDEV/UNDP Project, was to compare different supply systems but it was stressed that co-operation was needed with various Agencies to do this. The efficacy of using local sources of water (drilled shallow and deep wells) compared with using very long pipelines to carry Nile water or desalinated water was discussed; the criteria in relation to which system to use was discussed and it was suggested that all the on-going projects should be reviewed to provide co-operation and co-ordination of effort. It seemed appropriate to try to use local groundwater sources wherever possible.

The usefulness of water produced by desalination was discussed; reverse osmosis seemed to be better than electrodialysis for this purpose. The Chairman suggested that information on the criteria for water produced by desalination in Egypt should be made more widely available.

### 3.2 Distribution Systems:

In relation to distribution-system piping materials, it was confirmed by WHO that asbestos-cement pipes are not associated with any health problems as far as ingested asbestos is concerned; PVC pipes should however be of drinking water quality grade, to avoid any significant amount of vinyl chloride monomer being present in distributed water which is of health concern.

Water-leakage and water-loss were both regarded as extremely important consideration in that they both had an impact on water quality. In relation to water-loss which involved primarily the public sector, this was considered to be extremely difficult to control; the degree of water-loss was pointed out to be very significant indeed, and it was suggested that a committee could perhaps be formed to supervise what is done in the public sector and to act as an advisory body. Control of water-leakage was the responsibility of the water supply agencies; control by means of both detection and rehabilitation of water distribution systems was referred to. Water-leakage of distributed water was also mentioned as being very significant for the country as a whole; it was considered that a high-powered committee could be formed to assist in dealing with the situation. The ORDEV/WHO/UNICEF/UNDP Sector Support Project is well prepared to play a leading role in the field of leakage detection.

A discussion arose as to whose responsibility it was in relation to water-loss downstream of the meter in a building; this was thought to be an aspect for consideration as it had implications beyond the customer in terms of general water wastage, etc., and its (indirect) relationship with water quality.



### 3.3 Water Quality:

In relation to nitrate in drinking water, it was considered that higher than previously acceptable levels could be tolerated in situations where breast-feeding of babies occurs since methaemoglobinemia does not seem to be a problem then; no obvious cases of methaemoglobinemia seem to be known in Egypt.

Some non-health effect parameters are of special importance; eg. turbidity because this factor relates to the disinfection effectiveness of killing bacteria when the latter are occluded by suspended particles in water.

It was accepted that for the rural situation in Egypt the major important problem in terms of unsatisfactory water quality was due to microbiological pollution. A need to do much more in rural areas in terms of water quality control was considered necessary. The upgrading of sanitarians in rural areas was regarded to be important.

In relation to the contamination of roof-tank water, there seemed to be a need for a body to take responsibility for advice inspection and cleaning of such tanks.

It was stated that the MOH considered the existing criteria for acceptable levels of iron and manganese in drinking water needed revision

### 3.4 Surveillance Monitoring

It was pointed out that monitoring facilities needed upgrading; training was identified to be of special importance.

In addition to the standard parameters, a limited number of other substances in water, including selected heavy metals, were being measured in Cairo and Alexandria; in both cities the capabilities for significantly extending the monitoring programme were planned for the future.

The roles of the MOH as a checking agency, and the Water Supply Agencies as control bodies in water quality surveillance, were discussed and clarified.

### 3.5 Drinking Water Standards:

For the revision of the drinking water standards, it was considered that there ought to be an input from water producers, MOH, universities and environmental protection personnel, (both chemists and engineers as well as other relevant personnel being represented).

### 3.6 Co-ordination / Information systems:

A single body with a co-ordination function to be responsible for the river Nile in all its respects, was considered to be a valuable approach.

The need for the formulation of a Ministry of the Environment supporting EEAA in environmental protection of water was mentioned.

Overall co'ordination of effort of different bodies seemed essential; improvements in the feed-back of information to take needed action was also considered to be most important.

Treatment and the general control of raw water and that for irrigation should be standardized.

In relation to a data-base system which is to be available at the General Organization for the Greater Cairo Water Supply, it was pointed out that the WIO Sector Support Project also had a good data-base information facility

#### 4. RECOMMENDATIONS

##### 4.1. DRINKING WATER QUALITY STANDARDS:

The current National Water Quality Standards in their application are seen as being unrealistic and misleading to decision makers.

To assist in achieving the objectives of the International Drinking Water Supply and Sanitation Decade, the World Health Organization have published Guidelines for Drinking Water Quality. Individual countries are encouraged to revise their own water quality standards in light of the 1984 WHO Guidelines.

##### It is recommended that:

- (1) National Drinking Water Quality Standards for Egypt should be urgently revised taking into account, the national conditions and the 1984 WHO Guidelines for Drinking Water Quality. Differentiation should be made between health related parameters and aesthetic and organo-leptic characteristics.

(Project-11011)

##### 4.2 NATIONAL SOURCES FOR POTABLE WATER SUPPLY:

River Nile water has been subject to serious contamination due to consistent disposal of untreated waste water of all kinds. Such practices have created considerable water treatment difficulties and health problems.

##### It is recommended that:

- (2) The River Nile should be protected from the disposal of untreated industrial, sewage and agricultural wastes. Law 48/82 should be strongly enforced without delay.

(Ministry of Irrigation)

- (3) To minimize chemical pollution, physical rather than chemical means should be used to control aquatic plants in the River Nile and canals.

(Ministry of Irrigation)

- (4) To economize on Nile water use and reduce costs, local sources of groundwater should be used for drinking purposes rather than Nile water, especially in rural and desertic areas.

(NOPWASD)

#### 4.3 TREATMENT TECHNOLOGIES FOR DRINKING WATER:

The water treatment practices in Egypt vary widely and are often inadequate for providing good quality water especially when the water is derived from the River Nile. The continual changes in the quality of Nile water as a result of the construction of the High Dam and the disposal to the Nile of industrial and domestic wastewaters without treatment, make the conventional water-treatment systems inadequate for producing good quality water.

#### It is recommended that:

- (5) There is a need for one national scheme for Nile water treatment. This scheme should take into consideration the changes in Nile water quality, and also incorporate simplicity in design, operation and maintenance of the systems used for water treatment.

(NOPWASD)

- (6) A national technical committee, assisted by international expertise should be formed to investigate the current practices of algae removal and develop a new process for minimizing prechlorination and the consequent formation of chlorinated organic substances in drinking water.

(NOPWASD - Project)

- (7) The establishment of National industries to produce water treatment chemicals including alum is urgently needed.

(NOPWASD)

#### 4.4 DISTRIBUTION SYSTEMS FOR DRINKING WATER:

Considerable losses (over 50%), of drinking water occur in the distribution systems due to leakage. Direct results of this leakage are:

- (a) increased costs
- (b) deteriorations of water quality
- (c) aggravation of water tables.

#### It is recommended that:

- (8) Considerable attention should be given to all aspects of water loss. National and local Water Authorities should adapt appropriate Leakage Control procedures including Leak Detection and Rehabilitation of distribution system

(NOPWASD - Project)

#### 4.5 STORAGE AND USE OF DRINKING WATER:

Behavioral patterns play an important role in the quality of water which is drunk. Where water is handled/stored by urban or rural communities for drinking use, severe problems of postcontamination can occur.

#### It is recommended that:

- (9) An appropriate standard-design of Roof Water-Tanks should be developed, taking into consideration the current behavioral practices; the use of non-health hazard, construction materials and provision of tank covers.

(IIOH - NOPWASD)

#### 4.6 MONITORING WATER QUALITY:

Proper monitoring of water quality is essential for maintaining good quality water. However, monitoring bodies are not given enough consideration and support to perform adequately.

##### It is recommended that:

- (10) Provincial health laboratories should be upgraded for water quality testing in terms of:
  - (a) provision of adequate premises/facilities
  - (b) provision of adequate testing equipment
  - (c) adequate training for technical lab personnel
  - (d) record-keeping information and dissemination of data to concerned agencies. (MOH)
  
- (11) Periodic inspection and cleaning of roof water-tanks should be put in the hands of a health authority. (MOH)
  
- (12) A single government body charged with adequate powers should be responsible for the monitoring of Nile water quality. (MOH - EEAA)

#### 4.7 INSTITUTIONAL COORDINATION:

The lack of proper coordination of various activities involved in planning, designing, construction of water treatment systems and monitoring of water supplies, is hampering progress in improving the quality of drinking water.

##### It is recommended that:

- (13) A programme should be urgently introduced for implementing coordination of effort amongst sector organizations/authorities to ensure cooperation and to avoid duplication (NOPWASD)

#### 4.8 TRAINING AND EDUCATION:

In spite of heavy investment in higher education and training institutions, Egypt suffers from a severe shortage in trained and qualified manpower for the provision of safe water supplies. In addition there is a lack of public awareness of the problem of poor quality drinking water particularly in rural areas which is leading to health problems.

#### It is recommended that:

- (14) Intensification should take place of training programmes in the fields of:
  - (a) water supply systems operation/ maintenance
  - (b) water surveillance/monitoring and water works management
  - (c) information collection/ programming and storing.

(IIOH - Project)
  
- (15) Programmes should be urgently introduced to increase public awareness in water quality especially through audio-visual means in relation to:
  - (a) sources of pollution of drinking water
  - (b) appropriate health methods in handling and storage of drinking water
  - (c) health problems of drinking polluted water.

(IIOH)
  
- (16) International and bilteral agencies should be approached to support training programmes in the field of overall water quality control.

(IIOH - Project)

**5. CLOSING OF SEMINAR:**

General Karel El Din Hegab, Chairman UGCCMS on behalf of the Seminar expressed his thanks to The Regional Director of the WHO Eastern Mediterranean Office for arranging for the Seminar to be held at the Regional Office, and to Dr Sheikh and his staff for the considerable advice and help in the preparation and organization of the Seminar, and to the other Regional Office Staff who were involved for their assistance. He also wished to express his thanks to WHO Headquarters in Geneva for arranging for Dr. Hend Galal Gorchev to participate. He wished to thank all the participants and the various Organizations and agencies involved and the Project Director and his staff for their efforts.

The Chairman referred to the Seminar as "very very successful", he stated that in his opinion in relation to numerous seminars which he had attended that this was one of the best at which he had been present. He said the participants were sufficiently honest to admit that they had problems and this contributed to open and successful discussions. He considered the recommendations to be very good and thought they had a good future; there were some good points to aim at he said, and with proper follow-up, something good for the country as a whole would result.