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**WORLD HEALTH ORGANIZATION/UNITED NATIONS  
DEVELOPMENT PROGRAMME (SPECIAL FUND) PROJECT IN GHANA**

**PREPARATION OF A MASTER PLAN FOR WATER SUPPLY AND  
SEWERAGE FOR THE ACCRA-TEMA METROPOLITAN AREA (PHASE II)**

**ADVISORY PANEL**

**FIRST REPORT OF PHASE II**

**August 1968**

CWS/68.4

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CHAPTER I

Preliminary

1. Historical review

1.1 Plan of operations - 1963

In 1959 an Agreement was signed by the Government of Ghana and the World Health Organization as an implementation of the Community Water Supply Programme, adopted by the General Assembly of this Organization. Based on this Agreement in 1963 a Plan of Operations was signed by the Government of Ghana, the United Nations Special Fund (now United Nations Development Programme, UNDP) and the World Health Organization (WHO) to set up a project for the preparation of a Master Plan for water supply and sewerage for the Accra-Tema Metropolitan Area.

According to the Plan of Operations the Project would be implemented by the Government and UNDP, while WHO would act as the executing agency.

The general purpose of the Project was to assist the Government in the permanent and long-range solution of water and sewerage problems for the communities in Ghana and more especially in the preparation of a Master Plan for water supply and sewerage of the Accra-Tema Metropolitan Area, the organization and initial functioning of a National Water and Sewerage Authority and the training of Ghanaian staff.

To this end WHO made agreements with two consulting firms, viz:

- (a) Tahal (Water Planning) Ltd., Tel Aviv, Israel in association with Engineering Science, Inc., Arcadia, California, United States of America, to submit the Master Plan;
- (b) Public Administration Service (PAS), Chicago, Illinois, United States of America, to provide expert advice and assistance relating to the National Authority.

The project was to be supervised by a Project-Manager, appointed by WHO, with a Co-Manager, appointed by the Government in agreement with WHO.

Moreover the Plan of Operations provided for the establishment of an Advisory Panel to advise the Government on the broad programmes and policies of the Water and Sewerage Authority, to review periodically progress of the Project and to advise the Government on such alternate proposals as may be presented for individual components of the Project.

The Plan of Operations was extended in 1965 in order to arrange for the consultants to prepare a feasibility study, covering the next construction stages of the water and sewerage plan for the Accra-Tema area, and the staffing and financing of the National Authority.

The following items of the Project have been realized:

- (1) A Ghana Water and Sewerage Corporation was created by an Act of Parliament in 1965 and came into function by legislative instrument in September 1966. The Board of Directors had its inaugural meeting on 27 September 1966.
- (2) The Master Plan was submitted by Tahal in October 1965.
- (3) PAS submitted their consolidating report in September 1966.
- (4) The feasibility study was submitted by Tahal and PAS in November 1966.

(5) Construction and extensions of water plants at Weiija and Kpong (the so-called "West-German Works"), undertaken before by the Government, on which the Master Plan has been based, were completed by the end of 1966.

(6) The construction of the first stage water supply, incorporated in the Master Plan and providing for a new treatment plant at Kpong and transport of water to Tema and Accra (the so-called "Stepri-Works"), were undertaken by the Government and completed in the beginning of 1967.

(7) The Advisory Panel paid four visits to Ghana. Their fourth report, dated October 1966 as a follow up of the last visit in August 1966, contained a general review of the Panel's findings and recommendations covering the whole period of its activity.

## 1.2 Plan of operations - 1967

In December 1967 a second plan of operations has been signed by the Government of Ghana, UNDP and WHO, equally based on the agreement of 1959, with the broad purpose to continue assistance in the permanent and long-range solution of water and sewerage problems for the communities of Ghana (Phase II).

The specific purposes of this project are to assist the Government in:

- (a) the leakage survey, flow analysis and renovation of Accra's existing water supply distribution system;
- (b) the preparation of detailed design and relevant tender drawings and documents for the second stage development of water supply and the first stage development of sewerage for the Accra-Tema Metropolitan area, in accordance with the Master Plan and the Feasibility Study;
- (c) the assistance in the early stage of organizing and managing the Ghana Water and Sewerage Corporation;
- (d) the training of Ghanaian staff.

The Project is supervised by a Project-Manager, appointed by WHO, and a Co-Project-Manager, appointed by the Government in agreement with WHO.

Moreover an Advisory Panel has been foreseen for consulting services to the Government to advise on the broad programmes of policies of the Ghana Water and Sewerage Corporation and review periodically progress on the project and advise the Government on such recommendations as may be presented for the efficient functioning of the Corporation and for other components of the Project.

The Government has designated the Ministry of Works and Housing as the co-operating Government Agency. Moreover the Government has instructed the other Ministries concerned to co-operate in every way with the Project.

Based on the Plan of Operations WHO has made agreements with the same consulting firms as indicated before, viz. Tahal (Water Planning) Ltd. in association with Engineering Science Inc., and Public Administration Service (PAS).

## 2. Present situation of the Project

### 2.1 General

Since the signing of the agreements both consulting firms have proceeded according to the programme of work, submitted before.

On the basis of an exchange of interior letters before the signing of the agreements, the Tahal Office in Accra actually initiated its Project activities in May 1967, and PAS in January 1967.

The Advisory Panel has been composed as follows:

Professor W. F. J. M. Krul (Chairman), Professor emeritus in Sanitary Engineering, Technological University, Delft, the Netherlands;

T. B. Corlett Jr., C.E., P.E., Managing Director of the Minneapolis Water Works, Minneapolis, Minn., United States of America.

The Panel paid their first visit to Ghana in June 1968.

## 2.2 Review of the Panel's visit to Ghana

The programme of the visit was as follows:

June 9-11 Geneva (WHO headquarters)

June 11-22 Ghana

June 22-25 Geneva (WHO headquarters)

In Geneva the Panel had preliminary and final discussions i.a. with Mr P. Bierstein and Dr B. Dieterich of the Community Water Supplies Unit in the Division of Environmental Health.

In Ghana the Panel was in permanent contact with the Project Manager, Mr Y. M. Liu and the Project Co-Manager, Mr K. M. Addison, and during the first week with Mr V. Pinto, Environmental Health Adviser to the WHO Regional Office for Africa, Brazzaville.

The Panel had the privilege of meeting many authorities, inter alia:

### National Liberation Council

Mr L. K. Apaloo, Secretary.

### United Nations Development Programme

Mr A. Bryntsev, Deputy Resident Representative (in the absence of Mr M. M. Latour, Representative).

### World Health Organization

Dr D. J. Amah, Representative.

### Ministry of Works and Housing

Mr Issifu Ali, Commissioner.

Mr C. W. O. Sackeyfio, Principle Secretary.

Mr C. B. A. Mate-Kole, Principal Assistant Secretary.

### Ministry of Health

Dr E. Akwei, Commissioner.

### Ministry of Economic Affairs

Mr E. N. Omaboe, Commissioner.

Mr B. K. Mensah, Principal Secretary.

Mr H. P. Nelson, Principal Secretary, External Affairs Division.

Ghana Water and Sewerage Corporation

Mr M. K. Apaloo, Chairman of the Board of Directors.  
Mr. C. K. Annan, Managing Director, Member of the Board.  
Mr. D. B. Venkumini, Member of the Board.  
Mr. C. W. O. Sackeyfio, Member of the Board.  
Lt. Col. H. W. K. Sackeyfio, Member of the Board.  
Mr E. Lartey, Member of the Board.

Kumasi University of Science and Technology

Dr Evans Anfom, Vice Chancellor.  
Professor O. Jaroch, Dean of the Engineering Faculty.  
Mr J. Frimpong, lecturer in Sanitary Engineering.

U.S. Agency for International Development (AID)

Mr Richard M. Cashin, Director.  
Mr R. G. Rose, Chief of Public Works.

The Panel had many meetings and personal contacts with the consultant firms, not only with the resident members under the leading officers (Mr A. Bassan for Tahal, Mr H. Smith for Engineering Science, Mr C. D. Leikvold for PAS), but also with their special representatives who had come to Ghana for this occasion (for Tahal: Mr A. Wiener, Director General, Mr B. Wenderow, Director of Foreign Operations and Professor Abel Wolman, special adviser; for Engineering Science: Mr Harvey L. Ludwig, President and Mr Russel G. Ludwig, Vice-President; for PAS: Mr T. R. Jacobi, Headquarter's Representative).

The Panel attaches high value to their many contacts with the Managing Director and the Heads of Departments of the Ghana Water and Sewerage Corporation and with the Manager and Chief Engineer of the Accra-Tema area.

Visits were paid to the pumping-station and treatment works at Kpong, the Volta dam and power plant at Akosombo, the Barekese Dam for the water supply of Kumasi, the Water Works Operators School at Owabi and the Headworks of Kumasi Water Supplies at Owabi, and to the Kumasi University.

The Panel wants to express their appreciation for the open-heartedness and kindness shown by all contacted agencies and personalities during official meetings and visits and many non-official receptions.

Most of all the Panel's gratitude is due to the Project-Manager and the Co-Project Manager for their endeavors in setting up and constantly changing of programmes which led to a most appropriate use of the limited available time.

2.3 Scope of this report

During the four visits to Ghana under Phase I of the Project the preparation of a Ghana Water and Sewerage Corporation was under way.

Since then the Corporation has come into operation and it has to carry the responsibility of enabling - quoting the Plan of Operations - "the Government to embark on the construction of the second stage water supply and the first stage sewerage for the Accra-Tema Metropolitan area in accordance with the Master Plan and preliminary engineering studies, and also to build up a self-sustaining Corporation of international repute".

Therefore in this report the Panel has given principal attention to the present and future situation of the Corporation and the preparation of loan application for implementation of the engineering plans now under design.

The Chapter on the Corporation will be preceded by a review of the work of the consultant firms.

## CHAPTER II

### Activities of Tahal/Engineering Science

#### 1. General

The Panel discussed at length, in the presence of representatives of the Ghana Water and Sewerage Corporation (Accra-Tema area), the progress of the consultants' activities, based on the Agreement between WHO and Tahal, which actually started in May, 1967.

Two documents had been forwarded by the consultants, viz a draft Progress Report No. 1, covering the period January-March 1968, and a draft report on the Weiija New Dam, dated March 1968. During the meetings in Accra some changes in the draft-reports were agreed upon, which will be incorporated in the definite reports.

The following paragraphs contain the Panel's views on different items of the engineering projects.

#### 2. Water supply

##### 2.1 Review of basic data

##### 2.1.1 Water requirements

Water demand forecasts as made in the Feasibility Study 1966 have been analysed in the draft Progress Report No. 1 in the light of actual water consumption and domestic and industrial development in Accra and Tema since 1966. Water consumption could be measured more accurately than in the past, due to considerable improvements in the master metering provisions at the head works at Kpong and Weiija, as well as at the Tema and Accra terminal reservoirs.

In setting up a new design curve Tahal has taken into consideration that the commencement of operation of the First Stage ("Stepri Works" at Kpong) caused an immediate increase in consumption in Accra, due to a high unsatisfied potential demand in the past. In Tema an irregularity resulted from the slowdown of industrial programmes. In the central area between Accra and Tema most development programmes were cancelled.

Another basic fact is a rapid housing development in the past two years in the western part of Accra, expanding beyond the boundaries of Accra as assumed for the First and Second Stages in the Feasibility Study.

As a result a revised design curve as a basis for completion of the First Stage and for proceeding with the Second Stage of the Project had been developed in the draft Progress Report No. 1.

The Panel agrees with this basis.

##### 2.1.2 Water treatment processes

In their fourth report on Phase I of the Project the Panel advised (see conclusion 8, page 30) that during Phase II investigations should be undertaken on the existing treatment processes at Weiija and Kpong to determine the full operational capacity of all equipment, which might result in reduction of capital investments for future extensions.



The Panel regrets that such investigations have not been foreseen in the Agreement Phase II between WHO and Tahal and strongly recommends that WHO should take up this matter with Tahal and the Ghana Water and Sewerage Corporation.

At present the operation of all treatment plants is carried on in accordance with traditional manuals. By intensive study of the available operation capability of all parts of treatment works, more especially with regard to filtration capacity and application of different chemicals, it might be possible to increase filter rates and reduce the amount of new plant construction needed.

The study should include investigations on laboratory and pilot plant scale.

## 2.2 Densu river supply

### 2.2.1 Weiija Dam

Discussions on the draft Report on Weiija New Dam led to the following conclusions:

(a) The Panel agrees with the construction of a dual purpose dam for both water supply and irrigation, following a request from the Ministry of Agriculture, agreed by the Economic Committee of the National Liberation Council to use the Densu river for irrigation purposes. Extra costs of the dual purpose dam, calculated in the draft Report, are relatively low and will be compensated for a great deal when the dam should be used for irrigation.

In case the irrigation project should not be carried out, the extra capacity could be utilized for a flexible allocation of supply to all potential consumers on the Densu river with the possibility of increasing the supply to Accra above the present allocation for the Second Stage Water Supply.

(b) It was concluded that with the available new data as a result of investigations, the position of the dam axis as indicated in the draft Report could be altered with a view of preventing the flooding of existing pumping station, workshops and other buildings as a part of the so-called "West-German Works".

Although this would raise the cost of the dam about 10 per cent. the Panel is in favour of this solution. The consultants would be able to change the design within two months.

(c) Discussion on the consequences of the artificial lake to be formed behind the new dam at Weiija led to the recommendation that villages in the vicinity of the proposed dam should be at least one mile away from the "water-shed" in view of the responsibility of the Corporation for flood damages. As soon as a decision was reached on the demarcation of the water-shed the Government should be requested to acquire the proposed area to avoid difficulties in the future.

It was recommended that Tahal should consider the health aspects of the water-shed in their final report, more especially with a view of preventing malaria and bilharzia. Mr. Pinto expressed that the Afro-Regional Office of WHO would be happy to provide any information or data on this subject, if requested.

### 2.2.2 Weiija Water Works

The Panel received the Report on the rationalization of Weiija Water Works, presented by Tahal in September 1967 under a special contract with the Ghana Water and Sewerage Corporation.

This report gives a list of recommendations with an implementation time-table for removing obsolete old works, improving operating conditions and increasing efficiency of the existing "New Works" and "West-German Works".

The Panel wants to draw special attention to the recommended tests with a view to increasing the filtration capacity.

### 2.3 Volta river supply

#### 2.3.1 Volta lake

When visiting the dam and lake at Akosombo the Panel got the impression that recent flooding of land had caused an increase of flies, some kinds of which were reported to be able to cause serious health damage. Many complaints on this evil were received from the personnel of the Kpong water works.

The Panel wants to recommend this point to the attention of public health authorities in Ghana.

#### 2.3.2 Kpong Water Works

The new Kpong Works ("Stepri-Works") was inspected by the Panel and found to be operating in good condition. The plant facilities were neat and kept very clean. The consultants have proposed to increase the capacity of the new works from the present 32 mgd to the original design capacity of 40 mgd as an extension of the First Stage Water Supply (see under 4).

Here again the Panel insists on investigations to determine the possibility of producing a maximum quantity of treated water within the existing facilities.

The Panel received a report on the rationalization of Kpong old water works, produced by Tahal in October 1967 under a special contract with the Ghana Water and Sewerage Corporation. The proposed developments will open the possibility of continuing the supply of water to the present consumers in villages nearby Kpong at reduced operating expenses and of meeting the future demands of this area.

### 2.4 Distribution system

#### 2.4.1 General

Based upon the revised design curve of water demand (see under 2.1.1) the consultants are preparing a general revised plan for the distribution system for places where no development data are available. The Panel endorses the proposals contained in the draft Progress Report No. 1, more especially regarding development in the western part of Accra.

Improvement of the distribution system will include design of the primary and secondary mains by Tahal, whereas tertiary mains will be designed by the Corporation and installed at the Corporation's expense.

In former reports installation of a greater number of public hydrants has been recommended. It was reported that up to now this recommendation has not been followed.

The Panel wants to insist that Tahal should measure the flow-capacity of existing distribution mains to find their friction coefficients. On this basis rehabilitation work should be considered.

#### 2.4.2 Leakage survey

The Panel was informed that a report on the general preparation of the leakage survey and a list of manpower requirements has been determined, based on a survey of two pilot areas, and that two more selected areas - James Town and Usher Town - are being surveyed with the supporting staff provided by the Corporation (Accra-Tema area management) under the supervision of Tahal's leakage survey engineer. These areas were chosen as characteristic for an old-pipe system with assumed high rate of leakage. The preparatory work such as checking of valves and hydrants has been completed.

### 3. Sewerage

#### 3.1 Accra

Since the completion of the Feasibility Study 1966 three small individual sewerage schemes have been constructed (one to serve the Korle Bu Hospital, one for the Ministries area and one for extension of the existing system at the University of Ghana at Legon). Moreover some small sewerage schemes have been planned. These schemes will be incorporated, as far as possible, in Phase I of the sewerage project for Accra, now under preparation.

The Panel stressed the necessity of directing the Project first of all towards rehabilitation of the very bad conditions in the Korle Lagoon area, both for public health and economic reasons and welcomed the proposal to implement first of all the so-called Central Accra Scheme.

The Panel fully agrees with the proposals in the draft Progress Report No. 1 and more especially with the negotiations being carried out with the Mobil Oil Company to take over one or two abandoned submarine oil pipe-lines near Korle lagoon outfall for an interim sewerage outfall for Accra. In this way the construction of a large diameter submarine sewage outfall to the west of Accra at Chemu Lagoon, as foreseen in the Feasibility Study, could be postponed.

#### 3.2 Tema

In 1967 Dexiadis Associates have prepared a report on urgent amelioration works to relieve the overloading of the present sewerage system. The Panel agrees with the consultants' opinion that the Dexiadis recommendations can only be regarded as a short-term measure and that the proposals contained in the Feasibility Study should be implemented at an early date. The Project for Tema should be worked out in close contact with the Tema Development Corporation and its advisers.

### 4. Proposed construction programme

#### 4.1 Water supply

Based upon the analysis of future water requirements and new housing developments in Accra (see under 2.1.1) the draft Progress Report No. 1 proposed a revised construction programme for Stages I and II water supply for Accra and Tema. During the meetings in Accra the consultants presented the following programme of contracts under the assumption that before the end of 1972 the capacity of the Kpong Water Works will be increased from 32 mgd to the original design capacity of 40 mgd (see under 2.3.2).

Contract No. 1	First Stage distribution system for Accra (to be completed in 1969-1971)
Contract No. 2	Weiija Dam; low and high lift pumping stations; service reservoirs (to be completed in 1971-1973)
Contract No. 3	New treatment works at Weiija (to be completed in 1971-1973)
Contract No. 4	Second Stage distribution system (to be completed in 1975-1977).

The Panel proposed that Contract No. 2 should be split into one for the dam plus pumping stations and one for the service reservoirs.

#### 4.2 Sewerage

A revised five years step-by-step construction programme for the First Phase sewerage in Accra and Tema as presented in the draft Progress Report No. 1 was discussed and approved.

Agreement was reached on the proposed four contracts, viz No. 1 for the Central Accra Scheme, including temporary outfall using Mobil Oil pipelines, No. 2 for additional pipelines, appurtenances and pumping stations, No. 3 for submarine outfalls and No. 4 for additional pipelines, appurtenances and pumping stations. The Panel suggested that Contract No. 2 should include modifications to the Tema sewerage scheme.

### CHAPTER III

#### Activities of Public Administration Service

##### 1. General

The Panel discussed at length - in the presence of representatives of the Ghana Water and Sewerage Corporation - the progress of the Consultant's activities, which are based on the Agreement between WHO and PAS and actually started in the early part of 1967.

In general PAS has to advise the Corporation during Phase II of the Project on the implementation of their recommendations prepared under Phase I, which includes: assistance to the Ghana Water and Sewerage Corporation during the initial years of its operation, so as to introduce required modernization of management methods, to develop management self-sufficiency and to assist in developing training programmes.

These advisory services have to be provided by assigning expert advisers to the Corporation.

As a basis for discussion the Panel received PAS' First Quarterly Progress Report for the period January-March 1968, which includes a summary of activities in 1967 before the signing of the Agreement.

In this chapter the Panel will only summarize their findings on the progress and results of PAS' activities, all of which are so closely connected with the Corporation that a more detailed survey can better be incorporated in Chapter IV.

##### 2. Progress and results

PAS Senior Consultant, Mr C. D. Leitvold, arrived in Ghana in January 1967 and acts as special adviser to the General Management of the Corporation.

For the moment a full staff of PAS, as required under the Agreement, is now being employed, served as advisers in the fields of finance, accountancy, general services, operations, data processing and rate analysis.

During the meetings the Panel was briefed by the various consultants on their performances and their co-operation with the Corporation's leading officers.

In the short period of the Corporation's existence a great amount of work has been done and a still greater amount will have to be performed in the near future.

It is quite natural that difficulties were met, more especially by lack of personal communication in a changing and developing pattern of management, on which the consultants gave their critical comments. On request of the Panel PAS produced a special memorandum on training procedures within the Corporation.

The meetings gave a firm basis for the Panel's contacts with various leading officers in the Corporation, the results of which will be laid down in Chapter IV of this report.

## CHAPTER IV

### The Ghana Water and Sewerage Corporation

#### 1. General

The creation of a self-supporting national agency for water and sewerage had been recommended from the earliest studies on this subject.

Since the Corporation became operative it had gradually to take over the tasks and activities of the former Water Supplies Division. This means the transfer of a personnel of about 3000 from Civil Service status to Corporate status; the taking over of all assets and supplies; the inventory of all accounts, whether on record or not; the establishment of organizational procedures and the appointment and training of personnel at headquarters and in the regions, according to previous PAS recommendations; the improvement of revenue collection in Accra; the preparation of new water rates for the Accra-Tema area and, last but not least, the transfer of a great amount of construction work, some of which had been started under contracts by the Water Supplies Division.

In the following paragraphs many of these activities will be discussed as a result of close contacts with leading officers in the Corporation and their advisers.

Critical remarks will be made as a contribution to future improvements but the Panel wants to express first of all their appreciation for the amount of progress made in a relatively short period of time.

#### 2. Organization

##### 2.1 Top management

##### 2.1.1 Board of Directors

The over-all responsibility for the Corporation's activities has to be carried by the Board of Directors.

In its initial phases the Board could not be as effective as it should be, due to the absence of some members while on tour in the United States of America, several resignations and their replacement and the passing away of one of the most influential members, Mr H. F. Winful.

At present the Board takes an active part in the functioning of the Corporation. The Board meets formally every month and receives reports from the Managing Director.

The Panel had the pleasure to attend a Board meeting during which the desirableness was discussed that signing of contracts and expenditures above a certain level of expense should be made dependent on approval by the Board.

##### 2.1.2 Managing Director

All previous reports have dealt with the importance and complicated nature of the function of the Managing Director, more especially during the beginning period of the Corporation.

To cope with these problems a senior adviser to the Managing Director had been foreseen in the WHO/UNDP Project for the first years, who arrived in Ghana in January 1967.

The Panel fully appreciates the progress made in the management of the Corporation but is also fully aware of the necessary improvements. Such improvements need more constant and close contacts between the senior PAS advisers and the Managing Director, full implementation of PAS' recommendations, endorsed by WHO and accepted by the Government, avoidance of changes in

the organization without mutual consultation. The Panel hopes that ways will be found to extend PAS assistance to the general management beyond expiration of the term of services now foreseen in the Agreement between WHO and PAS.

Another support to optimal management might be created by offering the Managing Director an opportunity for academic and practical training in management abroad and visits to other organizations in the field of water supply and sewerage in order to broaden his experience in the management of a big-size organization. In the actual situation daily running of the Corporation during the absence of the Managing Director can be assured by now available staff at headquarters together with PAS assistance.

During the meeting of the Board of Directors, attended by the Panel, this point was discussed at length.

## 2.2 Headquarters management

Accompanied by the project management the Panel had the privilege to meet in the new Corporation building each of the department heads, together with their assistants, who gave an account of the history, actual functioning and hopes for the future of their departments (operations, general services, planning and programming, finance, design and construction, staff services).

The Panel became aware of the difficulties met in staffing key positions in headquarters and insists that great emphasis should be given to recruitment of adequate personnel.

The heads of departments and their staff are full of enthusiasm but a greater amount of efficiency can only be expected by sharper functional delineation and better co-operation between departments.

At the present time only two department heads have received finalized appointments, the others are still serving in an acting position.

For better co-operation and understanding the department heads have been united in a so-called Executive Board which is supposed to meet at least once a month with the Managing Director in the chair.

During Phase I of the Project PAS prepared numerous manuals on proper procedures to be used within the Corporation. The Corporation is now functioning with these manuals as a guide in many but not all cases.

It is to be strongly recommended that the Board, by formal action, should adopt the manuals as standards for operational procedures.

From time to time, based on experience gained, the manuals could be amended by formal action by the Board.

## 2.3 Regional management

The Panel had an opportunity to visit the Accra-Tema area manager and his staff in their offices at Mile 4 in Accra and the Ashanti regional manager/engineer and his staff in their offices in Kumasi, the former headquarters of the Water Supplies Division.

From these visits and discussions with the Managing Director, department heads and consultants the Panel concluded that the Accra-Tema area is now functioning as a properly managed entity but that work on the decentralization of the Corporation towards strong administrative units in all the regions should be accelerated. Better communication between headquarters and the regions should be established, department heads should be encouraged to work through the regional managers, following the PAS recommendations. From a memorandum, supplied by the Managing Director to the Board of Directors, the Panel learned to their

satisfaction that the Managing Director is convinced that successful operation of the Corporation depends heavily on efficient management in the regions and that careful selection of regional managers and engineers should therefore be fostered.

### 3. Personnel

#### 3.1 General

The transfer of personnel from Civil Service status to the new conditions of service of the Corporation was reported to have not yet been finished. This transfer should be accelerated.

The selection of personnel proved to be a delicate point in the organization, more especially with regard to appointment of junior staff and switching personnel from headquarters to the regions and vice versa, all of which should be realized taking into consideration only service needs and individual merits without any other implications.

Great difficulties were met in filling senior staff vacancies, although the Panel learned from a review, provided by the Managing Director, that considerable progress had been made since 1966.

Out of a total approved establishment of 265 senior staff in 1967 (257 in 1966), 245 posts had been filled (191 in 1966) by 28 expatriates (31 in 1966) and 217 Ghanaians (160 in 1966).

The Panel was informed that PAS had drawn up a personnel regulation for approval by the Managing Director and the Board of Directors, with reference to the Manual on Personnel Administration, prepared under Phase I of the Project.

#### 3.2 Training

##### 3.2.1 General

It is clear that the success of the Corporation greatly depends on the capability of its personnel and that training of personnel at all levels and both in the administrative and technical fields is absolutely necessary, more especially since gradually expatriates in leading functions are being replaced by Ghanaians.

PAS covered this subject in its Management Report of 1965 under Phase I of the Project and in its administrative Manual for General Services of 1966.

The Panel was informed that confusion had resulted from involving too many persons and agencies in the organization of training and that some PAS' activities had been duplicated.

On the Panel's request PAS has produced a Memorandum outlining the training activities to date, the current status of the Programme and recommendations for the future. This Memorandum has been sent to the WHO Regional Office and the project management.

The Panel hopes that under the general services department of the Corporation in close co-operation between the management, the Opex training officer who arrived in April 1968 and the PAS consultant to the department, a sound co-ordinated training programme will be implemented.

##### 3.2.2 Administrative training

Shortage of manpower on one hand stresses the necessity of training available administrative personnel, but on the other hand it causes difficulties in releasing badly needed personnel from their job to attend training courses.

Therefore such courses should be organized as efficiently as possible by sound programming of subjects and duration and by careful choice of teaching agencies and personalities.

### 3.2.3 Sub-professional technical training

Several training activities have been developed for surveyors, draftsmen, plumbers and drillers.

The PAS Memorandum, cited before, stresses the need for training by on-the-job instruction for personnel on the lower technical level and the lack of training manuals.

The Panel got a very good impression of the Training School at Owabi (Ashanti) for pumping station attendants, offering a six weeks basic training, followed by eight weeks specialized training after six months of on-the-job training and another three months advanced training after one year of interruption.

In this way 120 trainees can be handled per year. Extension of the existing dormitory for 20 students would allow to accept more trainees and for the future a course in water treatment is under consideration.

The Panel was informed that the very efficient Operator's School at Weija will suspend its three-year courses for a period of about one year and that during this time several short courses will be organized.

### 3.2.4 Professional technical training

Some engineers trained abroad have returned to Ghana and are occupied in the Corporation.

A WHO fellowship programme is being carried out under the supervision of the project manager. A number of candidates have been selected to be sent abroad for training in the course of 1968.

The Panel attaches high value to this form of training but expressed in former reports the necessity to restrict training abroad by using as much as possible the facilities for education of civil and mechanical engineers at the University of Science and Technology, Kumasi with advanced training in the post-graduate course in sanitary engineering.

On their visit to Kumasi the Panel was informed to their regret that the post-graduate course had been suspended after the department of Mr A. M. Wright, Senior Lecturer, on study leave in the United States of America.

The Dean of the Engineering Faculty (Professor O. Jaroch), the acting head of Civil Engineering (Professor P. A. K. Awotwi) and the lecturer in Sanitary Engineering (Mr J. Frimpong) expressed their great interest in reactivation of the post-graduate course.

A visit to the well-equipped laboratory for Sanitary Engineering, now practically out of use, strengthened the Panel's conviction that this occasion for advanced training and applied research should no longer be neglected by the Corporation. The WHO Regional Office for Africa has proposed to headquarters to send a short-time consultant to Kumasi to report on efficient organization of the post-graduate course. The Panel hopes that reanimation will succeed and wants to repeat their recommendation at former occasions that a close co-operation between the Corporation and Kumasi University should be fostered in the interest of both national institutions.

A post-graduate course can only flourish when a sufficient number of interested students are following the undergraduate courses and therefore the Corporation should encourage matriculation in civil and mechanical engineering by well organized public relations, propaganda at high schools and bonding students. It was reported that such activities are being applied by other corporations like the Volta river authority.



#### 4. Finance

##### 4.1 General

Although in 1967 the Finance Department of the Corporation was inadequately staffed by lack of experienced personnel in top-functions and over-staffing at lower levels, the situation since then has substantially improved.

Well qualified top-functionaries have been appointed and redundant staff have found employment in the regions. The programme is to develop each region as a financial unit, staffed with well-trained revenue and accounting personnel.

The Panel has the impression that the Finance Department has made substantial progress and got an optimistic view on financial development of the Corporation in the future.

##### 4.2 Accounting

The fiscal year of the Corporation has been changed from the calendar year to coincide with the fiscal year of the Central Government, starting in July. A Financial Report on the whole Corporation to the Government, covering the 22 months period from 1 September 1966 to 30 June 1968, is being prepared. Meanwhile the Corporation has submitted to the Government an operation and a capital budget for the fiscal year ending June 1969, based on the now finished - although still preliminary - evaluation of fixed assets and their depreciation.

At the present time the Accounting Division of the Accra-Tema area is establishing detailed job construction costs, based on individual time cards showing the job number and time worked thereon. By this system accurate construction costs can be determined and proper estimating information will become available. Present estimates are often excessive so that funds are obligated in excess of those necessary which results in a reduced amount of work being done.

##### 4.3 Data processing

The Panel visited the machinery for unit record type data processing of the Corporation at the head office in Accra, used for water inventory control and other accountant work. The Panel endorses PAS' recommendations to change from the unit record data processing system to the use of computer, rented or purchased.

##### 4.4 Government subsidies

In the past the Water Supplies Division was operated as a ministerial division with its accounting, budgeting and treasure management functions closely integrated with those of the National Government.

The Corporation, according to the Ghana Water and Sewerage Corporation Act, 1965, has to manage its affairs in accordance with the practices observed in public utility enterprises and "to ensure that, taking one year with another, its revenues are equal to or greater than its outgoings" (art. 7 of the Law). Moreover the Corporation "may receive grants from the Government for development and as working capital" (art. 9).

In a near future the new available financial records will make it possible to establish proper balance sheet accounts. On this basis the requirements for self-support of different parts of the Corporation and the necessary amount of Government subsidies can be analysed.

The Panel wants to stress the remark in PAS' first Progress Report that subsidies have a tendency to tie the Corporation more closely to the Central Government and to reduce the influence of the Board of Directors. Therefore financial self-supporting should be a principal goal, to be reached first in the Accra-Tema area and urban areas in the regions, so that Government subventions could be limited to rural areas where the full application of the self-supporting principle would lay a too high burden on the consumers.

Part of such subsidies might perhaps better be extended to the interested Local Authorities than to the Corporation.

It was reported to the Panel that in the near past Government subsidies were sometimes paid with much delay, due to complicated administrative procedure, so that the Corporation was not able to pay contractors in due time which caused delay in the implementation of contracts.

#### 4.5 Revenue collection

Already in 1966 the Water Supplies Division, on the advice of PAS, started implementation of new revenue billing and collection procedures in the Accra-Tema area and since then such procedures have been applied in some regions. The Panel was informed by the Accra-Tema management and PAS advisers on the measures taken in this area with the result that revenues almost doubled in 1967 as compared to 1966. This was due for the greater part to collection of arrears and improved filling and to a lesser extent to taking over the collection of so-called "general water rates" for water delivered by public taps from the Accra City Council by the Corporation.

The first financial report of the areas was published by 31 December 1967.

The actual revenue position had enabled the area to place some replacement funds into bank.

Metering at the present time only includes industrial and commercial users and high priority is being given to replacing defective meters. Moreover installation of meters at high-consumption domestic premises is under consideration.

The Panel visited the meter shop now under construction near the Mile 4 offices of the Accra-Tema area. The building had been completed and test equipment has been installed.

Completion of further equipment and training of meter repair personnel will lead to sound conducting of the meter programme.

#### 4.6 Rates

In the Feasibility Study 1966 a water and sewerage rate system for the Accra-Tema area has been incorporated on a financial self-supporting basis.

The conclusions - with which the Panel agreed - were that the then existing water rates will have to be increased as soon as possible by about one-third as an average and that further rate increases will be necessary to cover planned capital expenditures for the future.

Extension of the Tema sewerage system and implementation of a sewerage system in Accra would incur sewerage service charges on the water rates as indicated in the Feasibility Study.

In the course of 1967 the Corporation has fixed increased water rates following PAS recommendations, based on the Feasibility Study, but thus far the Government has not given its approval which is needed according to the Law.

The Panel was informed that in the actual economic situation of the country there is a general feeling against rate increasing by a national corporation which might lead to demands for higher salaries and wages.

During the Panel's discussions in Ghana the conclusion was reached that with the advice of the PAS rate analyst, just arrived, an additional rate study should be undertaken based on the present financial structure and the substantial increase of revenue as a result of still proceeding improvement of revenue collection.

5. Standardization of materials and equipment

The Panel was struck by the large number of pipe sizes to be installed in the Accra-Tema area. This means that stock piles of materials for each size of pipe has to be kept on hand, entailing a large capital investment which could be reduced if a small number of standard pipe sizes were accepted.

Similar conditions exist in pumps and other treatment facilities which also should be standardized.

The Panel strongly recommends that an effort be made by the Corporation to establish standardization in all regions and areas.

6. Production of materials and chemicals in Ghana

By contacts with the Project management, Corporation departments, the Ministry of Economic Affairs and the US Agency for International Development (AID) the Panel was informed that some efforts have been made to incite existing factories in Ghana to extend their possibilities for producing water and sewer concrete pipes and to attract foreign industries to install factories in Ghana for special materials, i.e. plastic pipes.

The Panel strongly recommends a close co-operation between the Corporation, the Ministry of Economic Affairs, the Ministry of Industry and AID in this field.

A constant need of pipes will continue for many years in a long future and fabrication in Ghana not only means saving foreign currency but also contributing to the country's industrialization.

The same considerations apply to the development of national supply of chemicals for water treatment such as aluminium sulfate, sodium carbonate, calcium hydroxide, chlorine, for which basic materials are available (bauxite, limestone, refinery products). Capital investment in chemical plants would have a good effect on the economy of the Corporation and contribute to the stability of the country's economy.

The Ministry of Economic Affairs, the Ministry of Industry and AID showed much interest in proposals of this kind forwarded by the Panel.

7. Urban water supplies and sewerage in the regions

The first Annual Report of the Corporation, covering the period 1966/1967, was published and distributed during the Panel's stay in Ghana. It confirmed the fact on which the Panel was informed in some meetings that progress in extension of urban waterworks in the region is lacking behind. Serious difficulties may occur in dry seasons by the necessity of curtailment of water services due to the lack of supply as well as plant facilities.

The Panel hopes that the Corporation will succeed in improving this situation, calling for immediate design by competent staff and by help of consultants.

The urgency is also felt to install sewers in some of the large towns in the regions.

8. Rural water supply

At the present time water supply for the rural areas is under intense pressure by the population and the Government.

The Panel was impressed by the amount of work and problems of the Department of Planning and Programming and the Department of Design and Projects in this field. However, shortage of necessary engineering personnel has a tendency to slow down the amount of design and construction within the rural areas.

When these limitations can be overcome, important developments may be realized by now available financial help from the Government and support from WHO, UNDP and AID.

In paragraph 2.3.2 of the Agreement between WHO and Tahal/Eng. Inc. a Report on planning needs of the Corporation for five years, to be prepared by the engineering consultants, has been foreseen. The Panel was informed that the Report would be worked out after clarification of some doubts on the meaning of this paragraph.

Another step has been taken by WHO in sending a short-time consultant (Mr M. Lilien), at the request of the Government, to study the rural water supply problem. The visit resulted in the preparation of a Government request for UNDP assistance to carry out rural water supply pilot projects in various regions.

Moreover the Panel was informed on budget support by AID in studying available water resources in the country for different purposes, water supply included.

#### 9. Public relations

In their meeting with the Staff Services Department the Panel was informed on the public relations activities of the Corporation, so highly important in order to secure necessary priority for investments in capital and manpower.

The department produces monthly newsletters and press releases and organizes public conferences, one of which was planned for 3-6 July on "Water for social and economic progress" with an interesting and elaborate programme.

Special efforts should be made in providing speakers to high schools to acquaint teachers and pupils with the advantages of proper water supply and sewerage and to attract students for graduation at the University of Kumasi.

Special attention is being given to build up a Central Library at headquarters and smaller libraries in the regions to make magazines and handbooks available for personnel of the Corporation.

### CHAPTER V

#### Loan application

In their fourth report under Phase I of the WHO/UNDP Project for Ghana, October 1966, the Panel recommended the financing of new water supply and sewerage works in the Accra-Tema area by long-term loans from the Government and agencies abroad.

The possibility of this solution had been discussed at length with representatives of the International Bank for Reconstruction and Development (IBRD) during their visits with the Panel to Geneva, Tel Aviv and Accra in August 1966.

Of course these representatives could not commit the IBRD in any way but they submitted a 27 page "Questionnaire for Water Works", used by the Bank for cases of loan application.

Based on these discussions the Feasibility Study 1966 contained all necessary data to answer the questionnaire.

Under the actual Phase II of the Project during the period of preparing engineering design and tender documents activities for loan application have been foreseen as a necessary preparation for implementation of the works after design.

A special impetus for loan application was given by the "Aid to Ghana Group" in 1967, a group of several countries together with the IBRD, who were prepared in principle to help the Ghana Government in the development of projects which could have an impact on the national economy. On the advice of the Ministry of Economic Affairs the Government presented a list of such projects, comprising an 8.5 million Cedis investment for implementation of the first part of the first phase of the sewerage project for Accra (central area scheme) and a first part of the second stage of the water supply project. After a meeting of the Aid to Ghana Group in Paris in February 1968 the Ministry of Economic Affairs and its Harvard/Ford economic advisers asked the Corporation for more financial data in relation with the estimated revenue of the Accra-Tema area in the coming years, based on the interim rates proposed by the Corporation which are still under consideration by the Government.

During the Panel's discussions with the Accra-Tema management, the consultants and the Ministry of Economic Affairs it was concluded that under the prevailing circumstances with so many uncertainties relating to revenues and rates (see Chapter IV, part 4) it did not seem appropriate to submit a loan application for 8.5 million Cedis, neither to the aid to Ghana Group nor to the IBRD as one of its members and financial advisers. For such an application a great amount of preparatory work would be needed, it might lead the World Bank to ask for additional data and would have to be followed in a near future by application for the total loan of about 50 million Cedis as foreseen in the Feasibility Study.

Therefore the Ministry of Economic Affairs agreed to send a letter to the World Bank, informing them (without mentioning the amount of investments involved at this stage):

- (a) that the engineering designs are now being prepared as a follow-up of the Feasibility Study and the discussions with IBRD - representatives in Geneva, Tel Aviv and Accra in 1966;
- (b) that it seems appropriate to contact IBRD at this moment in order to be able to prepare a definite loan application, more especially with a view to the possibility of receiving financial help from the Aid to Ghana Group to implement an initial part of the projected works;
- (c) that therefore it would be appreciated if the World Bank would send a representative for final discussions on loan application.

## CHAPTER VI

### Summary

The first visit of the Advisory Panel under Phase II of the WHO/UNDP-Project in Ghana on the preparation of a Master Plan for water supply and sewerage for the Accra-Tema Metropolitan area has led the Panel to the following findings and conclusions.

1. The Ghana Water and Sewerage Corporation, operative since September 1966, has gradually taken over the tasks and activities of the former Water Supplies Division.

This means a complete reorganization on the basis of the Feasibility Study 1966 under Phase I of the Project, covering the first period of management of the Corporation and the technical realization of the next construction stages for water supply and sewerage in the Accra-Tema area.

Phase II of the Project will provide necessary administrative and technical assistance, based on agreements between WHO, Public Administration Service (PAS) and Tahal/Engineering Science, both signed by the end of 1967.

In this short beginning period a great amount of work has been performed for which the Panel feels much appreciation.

Needless to say that many activities have still to be started or improved, more especially as far as management of the Corporation and its utilization of available administrative and technical assistance are concerned.

2. In the technical design period of Phase II special attention should be given to investigations on the treatment processes at the waterworks of Weiija and Kpong, which may lead to increasing the capacity of existing works and reducing the capital investments for extensions.

3. The construction for a new dam in the Densu river at Weiija should cover both water supply and irrigation purposes. In case the irrigation projects should be cancelled, the extra capacity of the dam could be used for water supply.

The situation of the dam axis should be projected in a way to prevent flooding of existing water works at Weiija.

4. Special attention should be given to the health aspects of the artificial lake behind the dam at Weiija and of the Volta lake, in co-operation with the Ministry of Health.

5. The Panel agreed with the work being performed in the production of basic data for the design of water distribution and sewerage systems, the improvement of the Accra distribution network and the construction programmes for water supply and sewerage in Accra and Tema, but wants to stress the necessity of directing the sewerage project first of all towards rehabilitation of the Korle lagoon area in Accra. Therefore implementation of the so-called central Accra scheme should be welcomed.

6. The Panel strongly recommends that an effort be made by the Corporation to establish standardization of pipe sizes, pumps and other equipment to reduce large capital investment in stocks.

7. The efforts already made to incite existing factories in Ghana to extend their possibilities for producing water and sewer pipes and to attract foreign industries to install factories in Ghana for special materials should be continued.

Fabrication in Ghana not only means saving foreign currency but also contributing to the country's industrialization.

The same considerations apply to the supply of chemicals for water treatment, for which basic materials are available in Ghana.

Constant contacts in these fields with the Ministry of Economic Affairs, the Ministry of Industry and the US Agency for International Development (AID) should be fostered by the Corporation.

8. Management of the Corporation has suffered by difficulties in staffing key positions in headquarters and the regions, in recruitment of adequate professional personnel and in decentralization towards strong administrative units in the regions.

It is hoped that the progress recently made will be accelerated, now that a full-size group of consultants, as foreseen for Phase II of the Project, is available.

9. Training of personnel of the Corporation at all levels, both in the administrative and the technical field, is absolutely necessary and should be based on a well co-ordinated programme for the future.

The Panel was informed of the support of several international agencies and learned with satisfaction that arrangements have been made available to the Managing Director for academic and practical training in management abroad and visits to other organizations.

A WHO fellowship programme is being carried out for training engineers at foreign universities. The Panel attaches high value to this form of training but insists on using as much as possible the facilities for education at the University of Science and Technology at Kumasi, more especially the post-graduate course in sanitary engineering.

10. A sound public relations programme has to be considered as most important for building up the image of the Corporation and secure necessary priority for investments in capital and manpower. Special efforts should be made to attract students for graduation at the Kumasi University.

11. The Panel was impressed by the progress made in the financial activities of the Corporation and hopes that in a near future proper balance sheet accounts will be established, indicating the requirements for self-support of different parts of the Corporation and the necessary amount of government subsidies.

The Panel underlines the necessity of reaching financial independence first of all in the Accra-Tema area and in urban areas of the regions so that government subsidies can be limited to rural areas.

12. In 1967 the Corporation has fixed increased water rates for the Accra-Tema area, based on the Feasibility Study 1966, which up to now did not get the approval of the Government.

Meanwhile substantial progress has been made in the revenue collection in this area. It has been concluded that an additional rate study should be undertaken based on the present financial situation.

The Panel hopes that the taking over of the collection of so-called "general water rates" from the Accra City Council for water delivered by public taps will lead to an extension of the number of these taps, as recommended in former reports.

13. During the period of engineering design under Phase II of the Project long-term loans for financing the new works will have to be negotiated with the Government and agencies abroad.

A special impetus for loan application at this moment has been given by the "Aid to Ghana Group" which has opened a possibility to implement a first part of the projected water and sewerage works.

In concurrence with the Corporation, consultants and the Panel, the Ministry of Economic Affairs concluded to invite the World Bank to send a representative in order to discuss all necessary data for a definite loan application.

14. The Panel was informed that progress in extension of urban waterworks in the regions is lacking behind. It is hoped that the Corporation will succeed in improving this situation, calling for immediate design by competent staff and help of consultants.

Shortage of personnel also tends to slow down the design and construction of water supply facilities in rural areas. The Panel hopes that these difficulties will be overcome as water supply for rural areas is under intense pressure by the population and the Government.