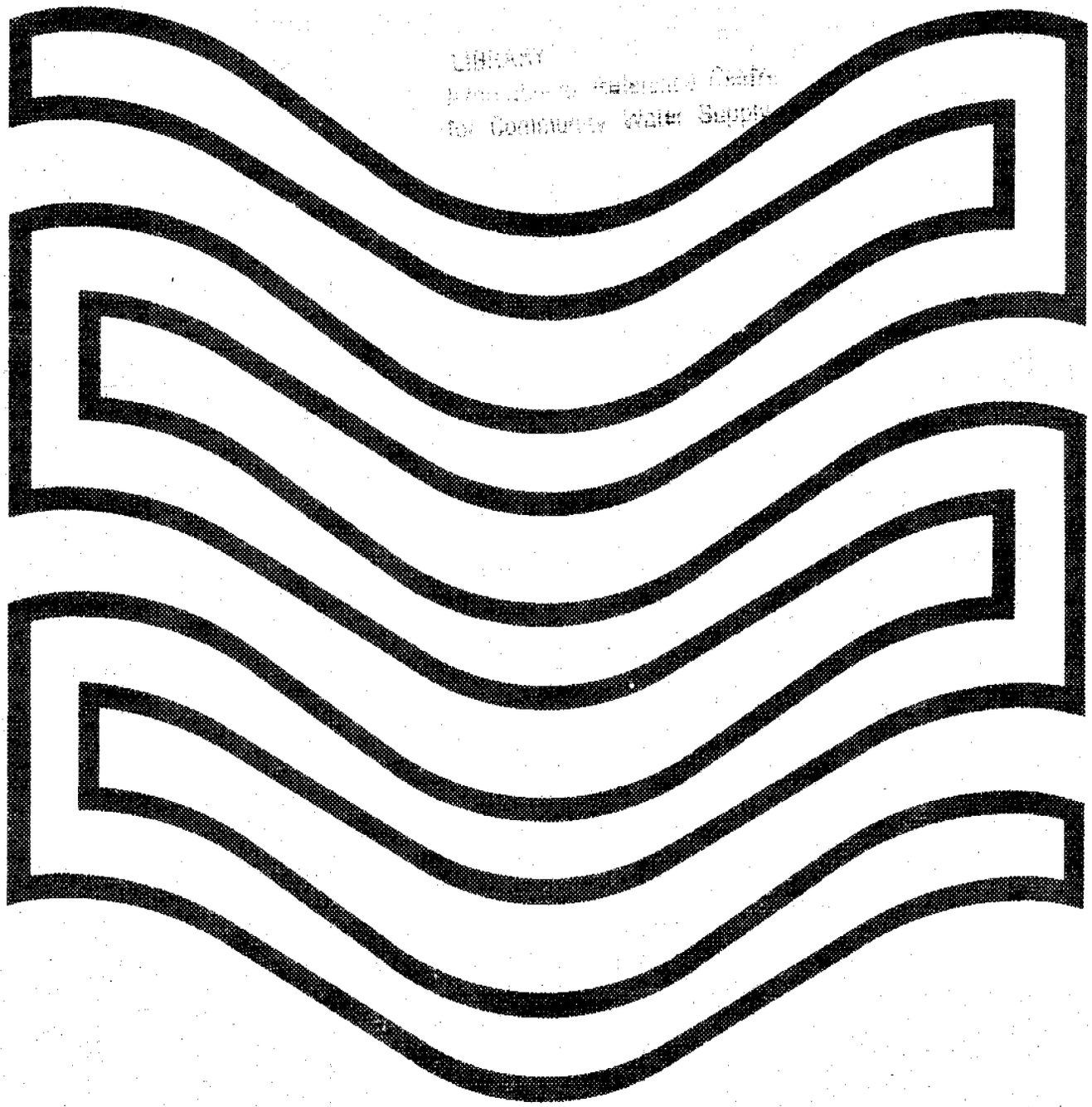
who international reference centre on community water supply

parkweg 13, the hague, the netherlands

first annual report



World Health Organization

International Reference Centre on Community Water Supply

First Annual Report

19 December 1968 to 31 December 1969

The Hague, the Netherlands

Parkweg 13, Telephone 070-514441

Government Institute for

Drinking Water Supply

Contents

1. Introduction

In December 1968 an agreement was concluded between the World Health Organization and the Government of the Netherlands by which the Government Institute for Drinking Water Supply in The Hague has been designated as an International Reference Centre on Community Water Supply. The Centre is located at the Government Institute for Drinking Water Supply, 13 Parkweg, The Hague.

It is intended that the Centre shall operate through a network of collaborating institutions, of which network it will form the nexus. The Centre will execute its tasks in co-operation with the Government Institute for Drinking Water Suplly and other bodies in the Netherlands active in water supply research and development.

2. Agreements.

The agreement between World Health Organization and the Government of the Netherlands was signed in December 1968 (US $ 5.000), with forward commitments of US $ 10.000 each for the following four years, subject to availability of funds.

A new agreement was signed in August 1969 as regards US $ 10.000.- for the year 1969 with forward commitments of US $ 10.000.- each for the following four years, subject to availability of funds.

3. Duties of the I.R.C.

The Centre sees as its duty to stimulate research and development as well as the co-ordination of research on drinkingwater supply throughhout the world, with the assistance of the Collaborating Institutions, for the benefit of both developed and developing coutries and to develop criteria for design and operation of water supply facilities.

More in detail its functions therefore will be:

- to develop criteria for the design and operation of community water supply facilities, especially in developing countries, and to encourage the maximum use of local materials and skills within such countries:

- to maintain and bring up - to - date periodically information about facilities and programmes of relevant research of the collaborating institutions, which information will be available to all those taking an interest in these activities as well as to foster public relations in the field of water supply;

- to conduct substantial research and development work in community water supplies and to keep up - to - date on research work related to water supplies being carried out throughout the world, whether undertaken by collaborating institutions or any other body; to maintain a reference library of published works on the subject and to provide information thereon;

- to advise World Health Organization and the Institutions as to problems on which research is required and to assist in stimulating a systematic approach to a solution of the problems;

- to act as a liaison between collaborating institutions, to advise upon and encourage joint research projects where appropriate, and to train fellows from the Institutions in water research;

- to promote evaluation of research work carried out and testing of practical applicability of new methods;

- to train local research workers by means of fellowships, exchanges, seminars, meetings etc.

The activities of the I.R.C. are a part of the over-all Community Water Supply Programme of the World Health Organization the objective of which is to assist governments, in developing countries particularly (but not exclusively), to provide more and better quality water to as many people as possible as quickly as practicable, in a convenient manner and at a price which they can afford.

The types of research and development envisaged to accomplish this end include the introduction of simplified methods of construction, operation and surveillance; the increased use of locally available materials and expertise; and the adaption of methods which have proved successful in one country to suit the needs and conditions in others.

It is hoped that by facilitating the exchange of information on successful practices, eliminating duplication of efforts and permitting full use to be made of research accomplishments without undue time-lag.

The programme to be carried out by the Centre will contribute to the most efficient use of the scarce scientific, technical and administrative personnel now available in the field of drinking water supply management throughout the world. Figure I shows a diagram of the functioning of W.H.O., the I.R.C. and the Collaborating Institutions in the field of water supply.

4. Organization

The diversity of the tasks facing the I.R.C. determines its characteristics, i.e. it requires a well co-ordinated organization system. The organization has to be flexible in order to fit an irregular work load, and to cope with is. There will be a need to perform documentation work continuously and systematically, but there will be a fluctuating supply of work as well, resulting from research, testing, consulting and personnel training requirements. Therefore the organization of the I.R.C. is completely incorporated in the organization of the Government Institute for Drinking Water Supply. In this way the diversity of work can be assigned and distributed to the specialists of the sections of the Institute. The I.R.C. manager distributes the work and takes advantage of the scientific and technical knowledge accumulated at the Institute and other bodies in the Netherlands active in water supply research and development.

The Institute employs 160 people, 33 of them graduated engineers, chemists, biologists, lawyers, and some 35 other technicians.

Some data about the Government Institute and its research activities will be found in Annex I.

4.1.1. Organization - Scheme I.R.C.

The organization of the I.R.C. is shown in figure II.
The purposes and duties of different positions are discussed in the following paragraphs.

4.1.2. I.R.C. Director.

The I.R.C. Director is the highest authority in the organization of the I.R.C. The I.R.C. itself is an annex to the Government Institute for Drinking Water Supply (R.I.D.). The I.R.C. Director co-ordinates

the efforts R.I.D.- I.R.C. and he is also responsible for staffing the I.R.C. He is given the full authority to guide the I.R.C. to a succesful performance, and he is responsible to W.H.O. for the activities of the I.R.C. The Director is in direct contact with the Advisory Board; he co-ordinates the efforts and interest of the Advisory Board.

4.1.3. Advisory Board.

The Advisory Board, having a consultative function, consists of those institutions to which the I.R.C. is connected directly or indirectly. It includes the World Health Organization as contractor, the Netherlands Government as grantor and other institutions the I.R.C. is related to.

A short description of the bodies represented on the Advisory Board is given below.

a. The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd.

The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd. (Keuringsinstituut voor Waterleidingartikelen K.I.W.A.) is the Institute of the Netherlands Water Undertakings. K.I.W.A., as it is abbreviated, has a staff of over 100 and has a duty to promote the use of suitable equipment and materials and also to carry out research in the whole field of drinking water supply.

b. The Netherlands Waterworks Association.

The Netherlands Waterworks Association (Vereniging van Exploitanten van Waterleidingbedrijven in Nederland V.E.W.I.N.) in which practically all Water Undertakings in the country are represented, deals with a variety of matters of mutual interest to its members. These are among others : research in the field of drinking water supply in chose co-operation with K.I.W.A., statistics, standardization, staff training, control of water meters, regrouping of water supplies, public relations etc. The various subjects are studied by special committees in which the Water Undertakings are represented.

c. Technological University Delft.

The chair for Civil Sanitary Engineering at the University of Technology, Delft, Netherlands, forms part of the Department of Civil Engineering. Next to a general education for all undergraduates in sanitary sciences, it takes care of the graduate education of students specializing in sanitary engineering.

For education, but especially for pure and applied research a large laboratory is available.

d. International Courses in Sanitary Engineering.

In 1960, the Netherlands Universities Foundation for International Co-operation (NUFFIC) and the Technological University, Delft, established International Courses in Sanitary Engineering. They are sponsored by W.H.O. and the Organization for Economic Co-operation and Development (OECD). The courses are an attempt to cover the urgent need for experts trained in the control of water quality, the supply of water for domestic and industrial use and the removal of waste products, a need that exists all over the world.

e. Research Institute for Public Health Engineering, T.N.O.

The Research Institute for Public Health Engineering T.N.O. at Delft is one of the research institutes of the Organization for Health Research T.N.O. This organization has been given as tasks : "to promote that applied scientific research is made subservient to public health in the most adequate way".

The Research Institute has a Department of Water and Soil. In this department research is carried out among other things in the fields of drinking - water and drinking - water supply, determination of protection zones for groundwater catchment areas, biology of storage reservoirs, aerobic sewage treatment, tertiary treatment of sewage, pollution of surface and subsoil waters.

f. National Institute for Public Health.

The National Institute of Public Health (Rijks Instituut voor de Volksgezondheid) at Bilthoven/Utrecht is the central reference laboratory of the Netherlands Public Health Service, for micro-biological, pharmacological, immunological, toxicological and environmental health protection problems. The activites of the Laboratory for Soil, Water and Air Research of this Institute cover the official sanitary quality control of all commercial and community supplies of piped drinking water.

4.1.4. I.R.C. Manager.

The I.R.C. Manager is directly subordinate to the I.R.C. Director. As a technical supervisor, the I.R.C. Manager is responsible for the guidance and co-ordination of I.R.C.'s work. A part-time manager will be appointed in 1970.

The I.R.C. secretariate is subordinate to the I.R.C. Manager. Its duties consist of the manifold secretarial work of an internationally operating office.

4.1.5. Collaborating Institutions.

A list of the collaborating Institutions as of 1 January 1970 is attached to this document as annex II.

5. Work performed during report period.

5.1. Documentation.

The Government Institute for Drinking Water Supply was established in 1913. Since that time a library and documentation system have been set up. Since 1968, also with respect to the I.R.C. the activities in the field of documentation have been increased.

In co-operation with the Nethterlands Waterworks Association a documentation-pool for the benefit of the Dutch Waterundertakings has been established, concerning the technical aspects of abstraction, purification and distribution of ground - and surfacewater. In this Pool,called "co-operation literature documentation water" (Saliwa), the Government Institute co-operates with ten Dutch Waterundertakings with sufficient documentation facilities.

Together, the members of the Pool work up the international known periodicals in the field of water supply and water supply systems. The abstracts are send to the Institute for the Testing of Waterworks Materials (KIWA), which acts as a distribution centre. The summaries (40% in the Dutch language and 60% in foreign languages) are coded according to the Universal Decimal Coding System and put away into a card-index.

This abstracting service will be made available for the Collaborating Institutions.

5.2. Research: Iodine disinfection of water from unequiped wells.

Assigned by W.H.O., a study has been made of the possibility to desinfect well water in the developing countries by means of iodine. An equipment with a controlled iodine dose rate was designed and tested on laboratory scale. The equipment consists of iodine crystals enclosed in a sealed cellophane membrane. Of the various membrane materials tested, cuprophane, which is used for artificial kidneys, proved to have the highest permeability.

5.3. Publicity.

In September 1969 the Director of the I.R.C. has announced the establishment of the Centre and its activities to the congress of the International Water Supply Association in Vienna. The I.W.S.A. has been provided with 2000 copies of a "brochure" about organization and activities of I.R.C.

At the same time a press report in English, French and German has been sent to 52 periodicals concerned in community water supply which are received by the Library of the World Health Organization Headquarters. In this matter I.R.C. had the co-operation of the Institute for the Testing of Waterworks Materials.

5.4. Visitors and correspondence.

During the report period many visitors from abroad have been received. Many of them were W.H.O.-fellows for whom programmes have been arranged in view of their particular interests.

The Centre has corresponded with experts and others in 30 countries. On behalf of the Research Institute for Water Supply and Testing Institute for Waterworks Materials the Centre undertook to gather data from the collaborating institutions with regard to health hazard of coagulant aids.

One of the subjects evoking the interest of correspondents was the W.H.O. Publication "The Village Tank as a Source of Drinking Water".

The centre received many interesting publications. Abstracts of some of them are to be found in annex II of this report.

6. Personnel.

Currently, the staff of the Centre consists of the following persons:

Director: Ir. T. Verheul (part-time)
Deputy Director: Mr. G.W. Putto (part-time)
Chemical Engineer: Ir. J. Hrubec (full-time).

So far as the planned specialized staff is not available its functions are performed by staff members of the Government Institute for Drinking Water Supply.

7. Future work.

The duties of the I.R.C. are mentioned in paragraph 3. Once again it is stated that this overall picture of future goals to be achieved necessitates an ambitious programme, a long term approach and a large staff of qualified persons. In 1970 a small staff will start on a limited field of activities and use the experience to be gained as a basis for the future planning and drawing up of advance systems of methodology.

7.1. Staffing the I.R.C.

It is intended to staff the Centre in the course of 1970 with 2 qualified engineers, one to start long term planning of activities in the field of design criteria and the other to do the same in the field of research co-ordination. In the meantime the staff of the Government Institute will carry out the different tasks. In the future the staff will be extended according to progress.

7.2. Documentation.

A first enquiry will be sent to the collaborating institutions, asking for specific data, the collection and dissemination of which will be completed in 1970. This basic information on the collaborating institutions will then be used for setting up a more advanced system of data-collecting and -dissemination. At the first meeting of the collaborating institutions the results of this first enquiry could be discussed.

The collection of the papers, reports, conference proceedings etc. will serve to provide the information to institutions, water undertakings, governmental officials, engineers, planners and all others interested in the problems of community water supply. I.R.C. will make a file of documentation, publications, papers, reports, researchprojects, standards and other material pertaining to the community water supply. Lists of research institutions, laboratories, universities, institutes for professional training, professional, industrial and other organizations related to the community water supply will be made.

A newsletter will be started. It will give in simple words the results of studies, the advances of research, the specific needs as collected by the I.R.C. from the collaborating institutions. *)

7.3. Design criteria.

The collection of data concerning existing systems in this field will be started in 1970. The ultimate goal of standardization will require an extensive programme of research and study. It will be investigated on what specific item the work should be started in order to approach the subject systematically so that the method may be applied to other items. The meeting of the collaborating institutions can be very useful to this purpose.

The study on iodine disinfection of water from unequipped wells will be continued.

A simple chlorine dosing equipment is an example of a subject on which research is highly needed and which might lead to an apparatus suitable for direct application in developing countries.

7.4. Promoting Research.

Based on the information obtained from the collaborating institutions an overall picture of the needs for research and development will be defined.

The co-ordination of the research programmes will be started thereafter. A priority-list for the research objects will be set up.

At the meeting of the collaborating institutions it can be discusses how the needs of both developed and developing countries should be defined and how co-operation should lead to a higher output of results.

*) Data on plastic pipes and bilharziasis and other items of special interest may be distributed in special papers. Newsletter and other forms of publication of results will be defined during the course of 1970.

Special attention will be given to the dissemination of the results of the research and to the applicability of scientific findings.

7.5. International co-operation.

In 1969 at the Vienna Congress of the International Water Supply Association (I.W.S.A.) two sessions were held on the problems of water supply in developing countries.

The following resolution was unanimously accepted:
" ..... that it be a recommendation to the Executive Board of the Association that there be formed a permanent standing committee on water supply in developing countries to co-operate with the World Health Organization and other Organizations which work in this field".

The Director of the I.R.C. will present before April 1970 a definite proposal to the Executive Board of the International Water Supply Association.

This proposal will include the following items:

- Formation of a standing I.W.S.A. Committee on Water Supply in developing countries;
- An outline of the policy for such a Committee;
- A programme of unit action for the improvement of communication between developing and developed countries;
- Preparation of a meeting or special session on this subject for the next congress;
- Procedures for co-operation with W.H.O.

THE HAGUE, 31 December 1969

Ir. T. Verheul,
Director,
W.H.O. International Reference Centre
on Community Water Supply.

DIAGRAM OF THE FUNCTIONING OF WHO, THE IRC AND THE COLLABORATING INSTITUTIONS IN THE FIELD OF WATER SUPPLY

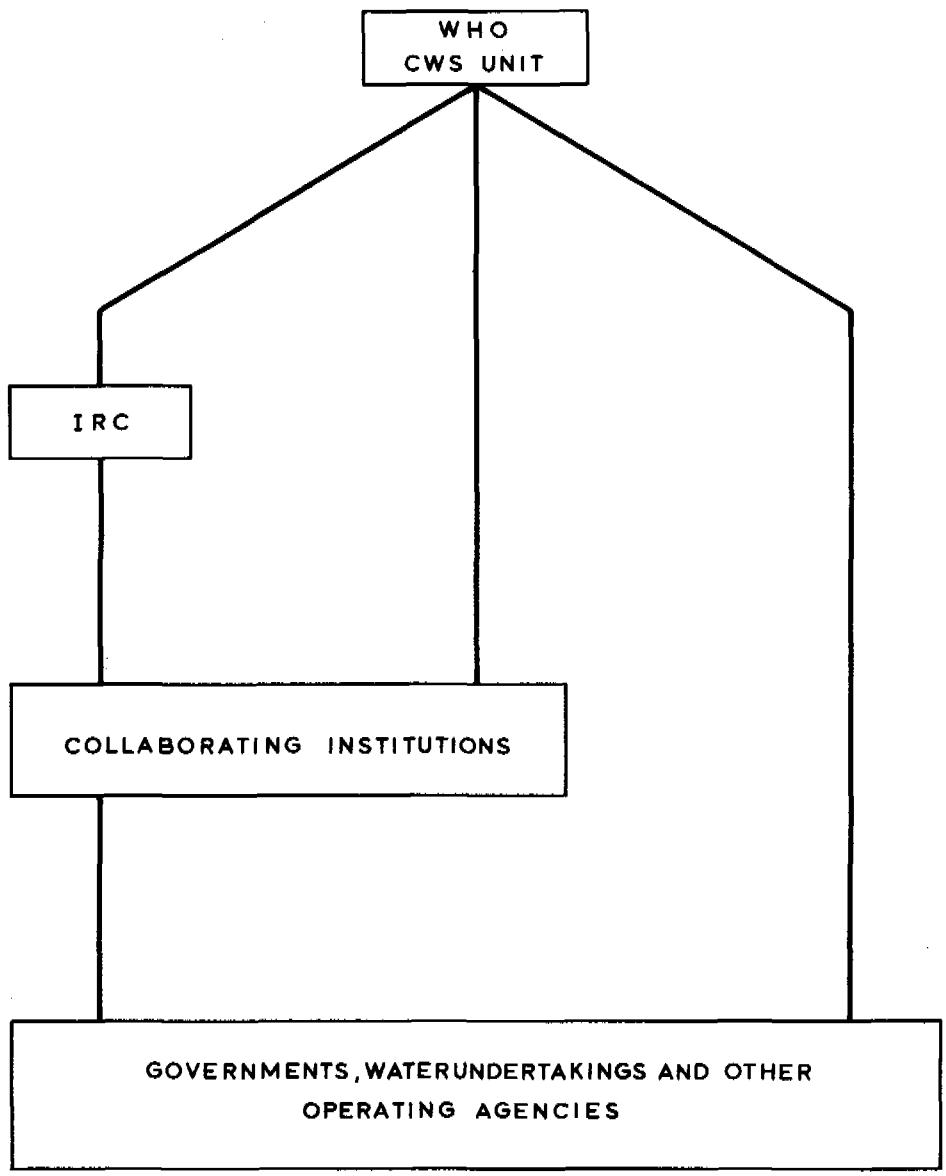


DIAGRAM OF THE ORGANIZATION OF THE

DIRECTOR,

Economic Section	Juridical Section	Technical Section	Section for Special Subjects
Economical affairs	Juridical Questions	Planning, Construction and Reconstruction of local and regional water supplies	Planning, construction, reconstruction and periodical control of individual water supplies.
Financial calculations	Preparation of legislative measures	Study and advice on technical questions	Design of water supplies for swimming pools and industries as well as cooling plants.
Subsidies (Grants)	Governmental affairs	Expertising	Special public health subjects
Tariffs		Research	Civil Defence
Valuations		Standardisation	Expertising
Statistics			

GOVERNMENT INSTITUTE FOR DRINKING WATER SUPPLY.

PUTY DIRECTOR

Chemical and Biological Section	Hydro-Geological Section	Section for Research and planning	Section for Administration
Physical, Chemical Bacteriological and Biological examinations.	Hydro-geological investigations for water supplies and public works (locks, tunnels, polders, sand excavations, etc.)	Master planning, needs and sources	Administration
			Library
Analytical research		Co-ordination of Research	Documentation
Purification of drinking, industrial and swimming water.	Protection of catchment areas.		
	Model research		
Investigations regarding radioactivity of water.	Hydro-geological Archives.		
Research.			

DIAGRAM OF THE ORGANIZATION OF THE W.H.O. INTERNATIONAL REFERENCE CENTRE ON COMMUNITY WATER SUPPLY

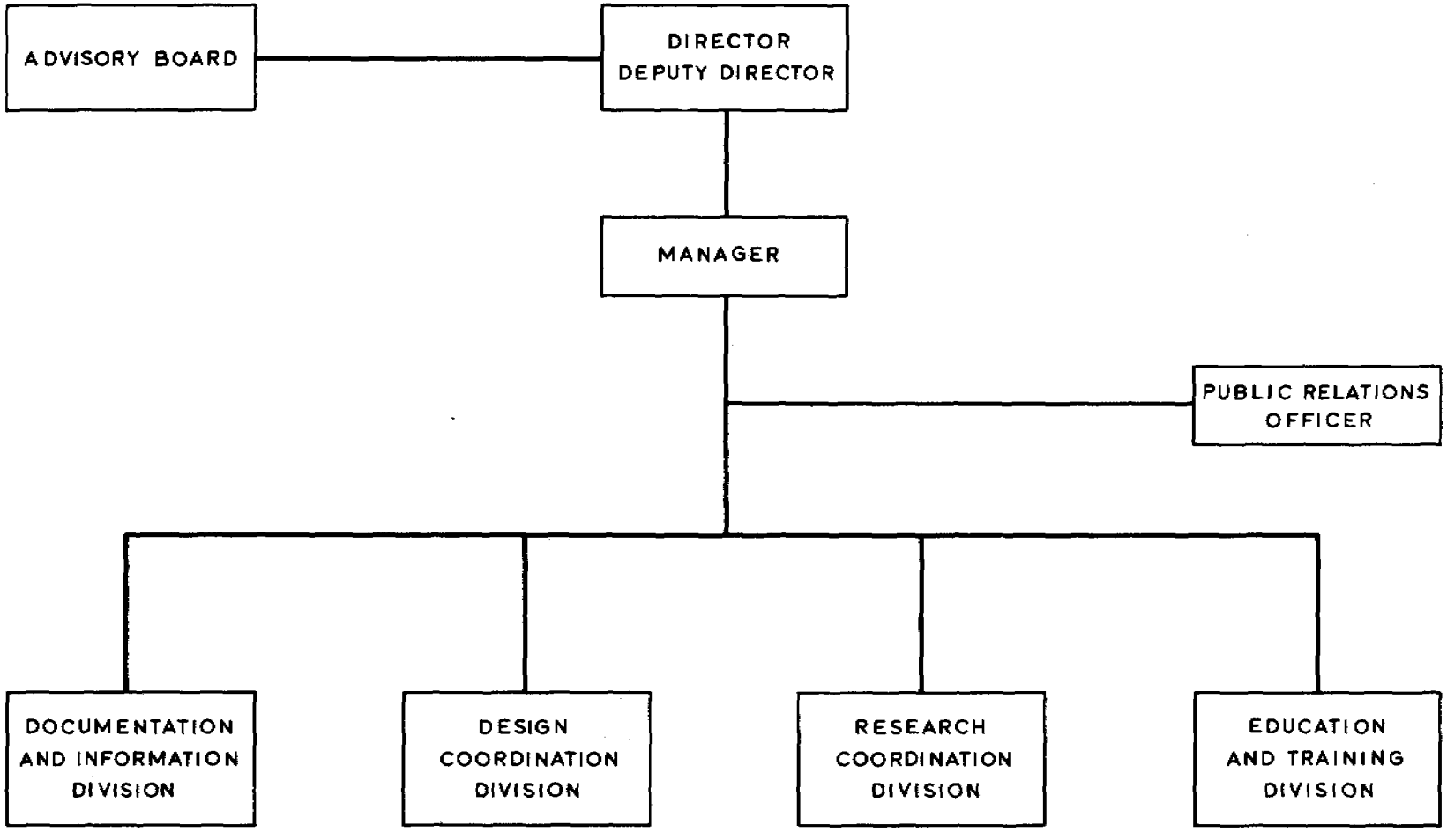


FIGURE II

Some research activities of the Government Institute for Drinking Water Supply.

In the Netherlands the ever increasing water demand, the difficulties of obtaining enough water of good quality and the problem of attributing water and storage capacity to the most appropriate demand, require a national policy aiming at an efficient use of the available water resources. This implies that decisions on the national level will have to be based on a masterplan for future water supply. The Minister of Social Affairs and Public Health therefore charged the Government Institute for Water Supply to prepare such a plan. This plan will mainly deal with the abstraction of ground and surface water, the storage of water and its transport. The Institute created a special section for dealing with this matter and gratefully accepted the co-operation of distinguished specialists in the field of water supply, not belonging to its staff and of the Netherlands Water Works Association.

In view of the preparation of the masterplan for water supply, research is being carried out, in co-operation with other institutions and waterworks specialists, on geo-hydrological and hydrological subjects, improvement of water quality in impounding reservoirs and by means of artificial recharge, quality standards, desalination and limnology of large water storage basins.
The investigations deal with matters which are of importance for the I.R.C.; some of the main items are summarized below.

In the meantime a comprehensive research programme for a period of five years has been set up in co-operation between the Netherlands Union of Waterworks and the Government Institute for Drinking Water Supply. Items envisaged in this programme are desalination, artificial recharge of groundwater, limnology, virology and toxicity of surface water, organic matter in surface water, filtration and coagulation, hydrogeology, construction and distribution.

1. Groundwater abstraction

Groundwater abstraction in a sedimentary basin in general causes a lowering of the phreatic watertable, which may inflict damage on agriculture and landscape. Consequently, the rate of groundwater recovery in such areas is mainly determined by the magnitude of the allowable lowering of the phreatic watertable.

Since in a number of cases there is a relation between the drainage discharge and the elevation of the phreatic groundwater table a simple method has been developed for estimating the lowering of the watertable as a result of an increase of the groundwater exploitation.

Also the quality of groundwater and distributed drinking water produced from groundwater, has been studied. The costs of drinking water production from groundwater has been estimated for regions which together cover the whole country.

2. Quality standards for surface water.

All plans for future watersupply envisage the availability of sufficient water of a satisfying quality. The question what water quality is to be aimed at when surface water is being utilized has been studied by a working group which took into account the requirements both for domestic consumption and for industrial use. The report of the working group contains as a conclusion quality standards relating to water delivered by water undertakings. Most essential are those standards which concern properties which cannot be dealt with sufficiently by the assimilative capacity of water or by purification, such as the stability of quality and the content of chlorides.

3. Characteristics of the discharge of the two rivers the Rhine and the Meuse in relation to storage.

The ever growing demand for suitable water for domestic and industrial purposes can only be dealt with if both groundwater and surface water will be utilized. As the river Rhine and the river Meuse are the main sources of surface water for the country the characteristics of the discharge of those two rivers have been studied.

The discharge of the Rhine usually is considerable but due to pollution its quality is unattractive, especially during periods of low water flow. The solution may be storage of surface water in reservoirs and artificial replenishment of groundwater by means of infiltration of surface water. For the purpose of storage of water from the river Rhine it is necessary to have characteristics of the discharge and the pollution of the river. A method has been developed to obtain characteristics of the discharge and the chlorine contents of the Rhine in a normal, a dry and a very dry year. The Meuse is a very complicated river, not only because of the properties of the catchment area but also due to human influences on the discharge of the river. The river has been canalised for navigation purposes.

Several storage reservoirs serve both flood control and watersupply.

Diversions of water that does not return into the catchment area complicate an analyses of the discharge of the river. It is to be expected that these diversions will further increase in the future. In periods of low discharge it will be impossible to withdraw enough water to guarantee an undisturbed supply of water. Storage is needed either in reservoirs or by artificial replenishment. Also for the Meuse a method

has been developed to arrive at characteristics of the discharge.

4. Improvement of water supply in impounding reservoirs.

In impounding reservoirs short-circuiting of water currents has to be avoided if the improvement of bacteriological and organic quality is aimed at.

If it is desired to lower the salt content of surface water, however, the only way to do so is, apart from desalination, to mix water of a relatively high salt content with a less salt containing water by short-circuiting of water currents.

Two types of reservoirs can be used. Reservoirs with constant water circulation (constant water level) and standing reservoirs (variable water level). Studies in view of improving the organic and the anorganic conditions of water from the Rhine by means of reservoirs have been carried out.

5. Improvement of water quality by means of artificial recharge.

In the field of drinking water supply, artificial recharge has already been applied for a long time, the main purpose being to transform surface water with varying characteristics into groundwater of a more constant quality, which will be safe for public supply. Short-circuiting of water currents has to be avoided if the improvement of bacteriological and organic quality is aimed at.

However, the variations in salt content of surface water can only be smoothed out by promoting a strong variation in detention time and - if necessary - even expecting short-circuiting. Efforts are made to outline the problem and to give suggestions for possible solutions.

6. Selective concentration and tentative identification of taste and odour compounds from infiltrated riverwater.

Taste and odour producing substances have been isolated from the used aeration of the non submerged prefilter stage of a purification plant, treating river-infiltrated groundwater.

The volatile compounds were isolated by a refrigerating process in which water vapour is condensed, followed by activated carbon adsorption of the so dried air. In this way, the volatile odour producing substances were sharply separated from all other water dissolved non-interesting organic compounds, such as humic acids. Extracts

in different solvents have been examined by C.L.C. One of the two main polar compounds was identified as an iso C5 fatty acid, which is supposed to be of bacterial origin. Three other polar compounds and 24 non-polar substances, among these several hydrocarbons, were found.

The search for identification is continued.

International Reference Centre on Community Water Supply

Synopsis of a number of reports received in 1969.

WHO International Reference Centre on Wastes Disposal.

by Professor O. Jaag, Director.

The Centre was established in September 1968 at the Federal Institute for Water Supply, Sewage Purification, and Water Pollution Control in Zurich, Switzerland.

The activities to be carried out by the Centre are summed up and Professor Jaag describes the technical and scientific work of the Federal Institute. The Institute concentrates on three major fields of activity: advisory services, research and teaching and training.

Fluorides and Aluminium Ions.

by Professor S.J. Arceivala, Director of the Central Public Health Engineering Research Institute, Nagpur, India.

Scientists of the Institute working on the problem of fluoridation to prevent caries have come to the conclusion that the "good effects" of fluoridation are actually a result of overcoming the "ill-effects" of aluminium ions in water supplies, rather than the presence of fluoride ions per se. Most natural waters, particularly those treated in modern water treatment plants with aluin coagulation, contain aluminium ions in a tripositive state. Aluminium co-ordinates selectively with fluoride as partner, as aluminium ions have a preferential affinity for fluorides over calcium. Where natural waters contain no fluorides, the aluminium co-ordinates with the fluoride from the teeth enamel. If the above-mentioned theory is right, water undertakings should envisage to use fluoride, or any other complexing agent, wherever aluminium is contained in the water or introduced into it as a result of aluin usage.

The Village Tank as a Source of Drinking Water.
WHO Community Water Supply Research and Development Programme.
Background document.

One of the most widespread problems of water supply to small communities concerns the multi-purpose village "tank". Showing many divergencies, they are all polluted, potential spreaders of epidemics and harbourers of pathogenic bacteria, viruses and parasites. The tank is used for watering cattle, washing of clothes, cattle, humans, and cooking pots; children use it for swimming and the whole of the village drainage finds its way into it. Besides it is the source for drinking water for the whole village, drunk by adults and infants alike without having undergone treatment of any kind.

Technically the provision of a pumped, treated and piped water supply to each community presents no serious problems. But the number of people to be served runs into millions, and the money and the trained manpower to plan, design, construct and operate waterworks for all these within the measurable future are lacking. Therefore a compromise solution is sought, which must comply with certain criteria: it must be cheap and simple, both in construction and in operation, be robust in construction and be acceptable to the villagers themselves.

The report mentions the most likely combination of units to serve this purpose, as there the intake, slow sand filtration, disinfection (chlorination) and handpumps.

The phase-separation method for the concentration and detection of viruses in water.
by Hillel I Shuval, Badri Fattal, Samuel Cymbalista and Natan Goldblum of the Hebrew University, Hadassah Medical School, Jerusalem, Israel.

In this method a water sample of several litres to be tested for viruses is mixed with a combination of organic polymers. After detention in a separatory funnel there are two phases. The small bottom phase concentrates the viruses of the sample and can be easily drained off.

The procedure is repeated to achieve a concentration factor of 500.

Virus recovery efficiency is high and as few as 1-2 virus infections units per litre of sample can be effectively detected.

Field surveys of sewage and water samples illustrate the application of this low cost and efficient method which should provide a valuable tool for epidemiological investigations, studies of the virus removal efficiency of various treatment processes, as well as in the routine monitoring of potable water supplies for virus contamination.

Training of Waterworks Personnel.

by Mr. S.G. Barrett, C.B.E. (Chairman) and
Mr. R.S. Fairall, B.Sc. (Econ.),
Water Supply Industry Training Board (Gr. Britain).

The function of the report is to identify a problem of common interest; to bring to the international forum an account of the experience and knowledge gained in attemtping a solution to that problem in a particular country; and to stimulate an international discussion to ascertain how far the special experience is of general value and the solutions attempted are of general validity.

This paper deals with the training of waterworks personnel. It attempts to assess the problems involved and to give an account of the solutions now being attempted in Great Britain by the Water Supply Industry Training Board which had just been established at the time of the International Water Supply Congress held in Barcelona some years ago.

The first part of the paper reviews shorly the work in this field of the International Water Supply Association in the past and therefore helps to identify the problems involved. Then the approach to finding the solutions in Great Britain is outlined and the last part contains a short account of the constitution and of the work of the Water Supply Industry Training Board of Great Britain.

Automatic level and discharge control in sand filters without moving elements.

by Ing. Carlos E. Ruiz Altena, Professor at Faculty of Sanitary Engineering of the National Technical University, Lima, Peru.

The system consts of a sifon, on the highest point of which a tube for air-admission is connected. The other end of the tube is submerged in the water above the filterbed. In this situation the openings in the air-tube are a little above the surface of the water. As filter-resistance increases, the waterlevel rises and closes the airopenings. A partial vacuum is created, which causes an increase of the discharge

and a lowering of the waterlevel. Again air is admitted through the openings and the cycle repeats.

All the existing level and discharge regulating devices have moving parts; the advantage of the above mentioned system is the lack of moving elements, which makes the system attractive concerning costs of operation and maintenance.

The Effectiveness of Iodine for the Disinfection of a Polluted Water Supply and the Physiological Effects on a Human Population.

by several authors, most of them from the staffs of the University of Florida, Gainesville, Florida and of the University of Cincinnati, Cincinnati, Ohio.

The first part presents the results of a study of the disinfection of the water supplies of three Florida prisons with iodine and the data conclusively demonstrate its effectiveness, its safety, and its several advantages when used for small systems where, so frequently, both operation and equipment are at a minimum level.

The other part contains the results of many years of study of the disinfection of public swimming pools with both chlorine and iodine. During 1967 and 1968, in co-operation with the Florida State Board of Health, two comprehensive field studies were made of a total of 193 representative chlorinated public pools along Florida's "Gold Coast", and it is believed that the results are of particular interest.

Suitability of Plastic Pipes for Conveying Drinking Water.

by N.U. Rao, R.P. Mishra, K. Subba Rao and C.S.G. Rao
Central Public Health Engineering Research Institute, Nagpur, India.

Plastic pipes are being widely used in may countries for agricultural and industrial purposes. In India these pipes were not readily accepted for the transportation of drinking water because it has not been ascertained that these pipes are suitable and safe under tropical conditions. The present investigation, therefore, is an attempt to evaluate the suitability of Alkathene, Hostalen and P.V.C. pipes for the conveyance of drinking water. These studies indicate that drinking water supplied through plastic pipes is in no way bacteriologically inferior to the water passing through the conventional galvanised iron and asbestos cement pipes. The number of bacteria adhering to the internal surfaces of these pipes is not higher than the quantity of those

adhering to the galvanised iron pipes, old or new. Disinfection experiments with very high doses of chlorine show that these pipes could be disinfected comparatively better than old and new galvanised iron pipes. Hence the conclusion that plastic pipes can be used for the conveyance of drinking water in India.

Defluoridation.

by Professor S.J. Arceivala, Director of the Central Public Health Engineering Research Institute, Nagpur, India.

Defluoridation is a process for reducing the concentration of fluorides present in drinking water to any desired value. Optimum concentration of fluorides seems to vary with proportion of body weight to the total amount offluoride consumed from water and food, and with the ambient temperature; in India it might vary between 0.5 and 1.2 mg/l depending upon climatic prevalent in different parts of the country.

In practice, the defluoridation process in its simplest form consists of passing the raw water through a bed of "Defluoron" medium contained in a cylindrical steel shell to which are attached the necessary pipe work and control valves. "Defluoron" is a synthetic carbonaceous sulphonated material developed by this Institute from indigenous material. It has high specificity for the removal of fluorides. It is operated on the aluminium cycle.

The maximum operating service flow rates are 8600 litres per sq meter of bed area per hour and 9,47 cubic meters of water per hour per cubic meter of medium. The medium can be regenerated by a 2.5 per cent aluin solution (pH between 2.9 and 3.1).

Sedimentation Models for Hydraulic Design of Clarifiers.

by B.W. Gould, M.E., M.I.E. Aust. Senior Lecturer in Public Health Engineering, University of New South Wales, Australia.

Although Chemical and Civil Engineering literature contain much general information on model similarity, suspension behaviour, fluidised beds, and similar problems, there is practically no readily available information about the similarity requirements for a scale model of a unit in which solid-liquid suspensions of moderate concentrations are contained within sloping boundaries, and may be subjected to a fluid upflow.

This article discusses the requirements for hydraulic similarity in such a model. It should be possible to have a good agreement between the hydraulic performance of a model and that of the corresponding prototype by proper choice of model velocities, model scale, sediment specific gravity, and sediment particle size.

World Health Organization

Community Water Supply Research and Development Programme

List of Collaborating Institutions

as of 1 January 1970

The WHO International Reference Centre for Community Water Supply,
Parkweg 13,
The Hague
Netherlands.

Collaborating Institutes designated.

1. Office de la Recherche Scientifique et Technique
   Outre-Mer,
   24 rue Bayard,
   Paris 8e,
   France.

2. The Water Research Association,
   Ferry Lane,
   Medmenham,
   Marlow,
   Bucks,
   England.

3. Sanitary Engineering Laboratory,
   Middle East Technical University,
   Ankara.
   Turkey.

4. Consiglio Nazionale delle Ricerche,
Via Serchio 9,
Rome,
Italy.

5. Centre of Sanitary Engineering,
The University of Naples,
via Mezzocannone 16,
Naples,
Italy.

6. Keuringsinstituut voor Waterleidingartikelen,
Sir Winston Churchilllaan 273,
Rijswijk (Z.H.),
Netherlands.

7. Department of Civil Engineering,
University of Newcastle upon Tyne,
Claremont Road,
New Castle upon Tyne 2,
England.

8. Faculty of Engineering and Architecture,
University of Khartoum,
Khartoum,
Sudan.

9. Sanitary Engineering Department
Factulty of Engineering,
The University of Alexandria,
Alexandria,
U A R

10. Hebrew University,
Hadassah Medical School,
Jerusalem,
Israel.

11. Bureau of Water Hygiene,
Department of Health, Education and Welfare,
Public Health Service,
Rockville,
Maryland 20852,
U.S.A.

12. Department of Environmental Sciences and Engineering,
School of Public Health,
University of North Carolina,
Chapel Hill,
North Carolina 27514
U.S.A.

13. Department of Environmental Engineering
College of Engineering,
University of Florida,
Gainesville,
Florida 32601
U.S.A.

14. Instituto de Engenharia Sanitaria
SURSAN
Rio de Janeiro,
Brazil.

15. Department of Sanitary Engineering,
Central University of Venezuela,
Caracas,
Venezuela.

16. National Sanitation Foundation,
2355 West Stadium Boulevard,
Ann Arbor
Michigan 48106
U.S.A.

17. Civil Engineering Department,
Faculty of Engineering,
University of Science and Technology,
Kumasi,
Ghana.

18. Faculty of Engineering
University of Lagos
Lagos
Nigeria.

19. The Victoria Jubilee Technical Institute
Matunga,
Bombay,
India.

20. Asian Institute of Technology
P.O. Box 2754
Bangkok,
Thailand.

21. Faculty of Engineering
University of Tokyo,
Tokyo.
Japan.