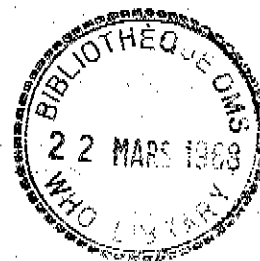


**WORLD HEALTH
ORGANIZATION**

**ORGANISATION MONDIALE
DE LA SANTÉ**



**COMMUNITY WATER SUPPLY RESEARCH AND DEVELOPMENT PROGRAMME
INFORMATION BULLETIN**

No 1

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**Community Water Supply Unit
Division of Environmental Health
Geneva**

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WORLD HEALTH ORGANIZATION
COMMUNITY WATER SUPPLY RESEARCH AND DEVELOPMENT PROGRAMME

Information Bulletin No.1
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Foreword

When the Twelfth World Health Assembly in 1959 initiated the WHO Community Water Supply Programme it was with the full recognition that developing countries of the world faced a formidable task in bringing safe and ample supplies of water to their people. The scope and magnitude of this task was outlined in a study which WHO published in 1963 entitled "Urban Water Supply Conditions and Needs in 75 Developing Countries". At that time only one third of the urban population and less than 10 per cent. of the total population of these developing countries were supplied with piped water in or near their homes. Many of this group had intermittent supplies which did not meet even minimum hygienic standards.

The Community Water Supply Programme has grown in an attempt to meet the needs for technical assistance by member countries in defining their problems and strengthening the necessary institutional, technical and managerial expertise that will provide the basis for a sound long-range programme which will most effectively utilize available resources to accomplish the task.

WHO proposes, in 1968, to carry out 234 activities involving community water supply with direct assistance to 82 member countries. One hundred and thirty-four WHO staff engineers will be required for this programme. The planned activities range from the provision of expert consultants on specific technical problems for short periods to the posting of WHO staff engineers to countries for a number of years, and include numerous seminars, conferences and training courses.

Experience gained during the life of this Programme has clearly indicated the need for a systematic and continued effort to find ways and means to utilize fully the limited resources available to developing countries in the construction of public water supplies. This will involve not only research but the development of methods, procedures and devices best suited to the economic and social environment of the developing country.

This information bulletin is not meant to replace the technical and scientific journals which nurture the professional growth of our colleagues in water supply, but rather to provide a medium for exchange of information on recent developments which will assist in creating an interest in and receptivity to new concepts in our field.

PAUL BIERSTEIN
Chief, Community Water Programme
World Health Organization

Preface

It is with some trepidation that we venture to add to the already overwhelming volume of literature, periodicals, newsletters and technical papers in the field of water research and development which are being published today. Furthermore, since we propose to circulate this information bulletin at three-monthly intervals, we feel that some introduction and explanation is called for.

Primarily it is intended as a means of information exchange among institutions and individuals collaborating in the WHO Community Water Supply Research Programme, which in 1968 enters a new and accelerated phase. A few words on this programme may, therefore, be opportune.

Research and development form one part of the functions of the Community Water Supply unit. The activities of this unit are directed mainly toward assisting the developing countries of the world in the attainment of the following objective: to provide a safe, ample, continuous and convenient supply of water to every member of the population, at a price which he can afford.

Within the last couple of years a number of research and development projects have been undertaken, and these are being incorporated, during 1968, into a research programme. An International Reference Centre, and a network of collaborating institutions in both developed and developing countries, will be set up during the year.

This bulletin will serve as one medium whereby these institutions can keep in touch with each other; at the same time it may help to keep workers in the water supply field all over the world informed on recent research and development activities, problems requiring solution, and similar matters of general interest. A great deal of this first number is taken up with a description of the programme, functions of collaborating institutions and notes on ongoing WHO research projects. It is hoped that future numbers will give greater emphasis to reviews of research work, news of projects in hand and pre-publication of papers.

We would welcome contributions, correspondence, queries, suggestions, criticisms. We will also be happy to include on our mailing list the name of any individual or institution desirous of receiving a copy.

Community Water Supply Unit
Division of Environmental Health
World Health Organization, Geneva.

The Community Water Supply Research and Development
Programme of the World Health Organization

Outline

The over-all objective of the Community Water Supply programme is to assist Member governments to improve the health and well-being of their people by the provision of a pure and adequate supply of water for all community purposes, and by the reduction of water-borne and water-related diseases.

Within this over-all plan the programme of research and development is intended to help governments, of developing countries particularly, to reduce the costs of construction and operation of waterworks, improve the efficiency of management of these works, and encourage the provision of more and better supplies to serve larger numbers of people at a price which they can afford.

Specifically, the research and development programme aims to achieve these objectives in several ways:

- (a) by adapting methods of design, construction and operation, which have proved successful in other parts of the world, to suit the physical, economic and social conditions of the countries concerned;
- (b) by encouraging an increasing use of locally produced raw and manufactured materials in water supplies, thus reducing the foreign exchange element of construction and operating costs;
- (c) by simplifying design, construction and operating techniques to make the best use of limited resources and skills;
- (d) by encouraging, programming, standardization and the setting of priorities on a national scale, thus enabling expenditure to be wisely planned and realistically adapted to the economic resources available;

(e) by training adequate numbers of professional and sub-professional personnel to enable each country to carry out its own programme on a continuing basis.

As the problems to be solved vary in different countries throughout the world, research and development must essentially be carried out within each country to meet its particular needs. On the other hand, since there is much common ground on which exchange of experience is of value to all, there should be a link joining all institutions working on related problems, a pooling of information and, most importantly, a two-way mechanism which will keep research workers in developing countries in touch with their colleagues in more advanced institutions elsewhere.

The WHO programme starts, therefore, with research institutions within individual countries, which are designated "collaborating institutions". A number of these are already working on water supply problems; in general, they are connected with universities or training establishments, but in some instances are government-sponsored research institutions. WHO, by correspondence and by visits of staff and consultants, are assisting in the programming of their work, and in certain instances are helping in a more practical way with the conduct of particular research projects.

Plans for the immediate future envisage increased assistance in a number of ways - by a regular and more systematic exchange of information, by the publication of research results, by exchange of research workers between different countries, by the provision of limited financial assistance and items of equipment, and by the organization of seminars and meetings of workers from different countries.

As the number of collaborating institutions increases the need for a focal point for co-ordination becomes more evident, and this need has been anticipated by the inclusion in the WHO Programme and Budget for 1968 of provision for the setting up of an "International Reference Centre" to carry out this function. Assistance to the collaborating institutions will be channelled through this Centre, which will also co-ordinate research and development work being carried out under the programme, and as a "bank" of information, and form a liaison between the collaborating institutions.

It is expected that the establishment of this international centre will give an impetus to the programme as a whole, and that as a result the number of countries in which collaborating institutions will be set up will materially increase. Every encouragement will be given to widening the scope of the programme in this way.

Community Water Supply Research Programme Functions of Collaborating Institutions

A Collaborating Institution is an institution which is engaged on research in the community water supply field and which is prepared to collaborate, through the medium of the World Health Organization's community water research programme, with institutions in other countries similarly engaged.

The objective of such collaboration is to increase the usefulness of research work undertaken for the benefit of the country in which the institution is situated, and of other countries throughout the world.

Methods whereby this objective can be furthered include the following.

1. Regular exchange of information among all collaborating institutions on their research programmes and findings.
2. A common approach to problems of general interest.

3. Direct contact between research workers engaged on similar problems in different countries.
4. A reference service through which background information on specific problems can be speedily provided.
5. Specialist advice which can be called upon when required in connexion with the planning or execution of research projects.
6. Facilities for the training of research workers, and for their interchange between institutions to enlarge experience.
7. Publication of research results of general interest in one of WHO's regular media, and prepublication by less formal methods of papers, summaries or reviews of more limited applicability. This will not, of course, prevent subsequent publication elsewhere.
8. Attendance by representatives of the institutions at occasional meetings sponsored by WHO on an international or regional level to discuss research policy and problems of mutual interest.

The type of research which it is hoped to encourage through this programme is that which will have an immediate applicability, within developing countries particularly, to render the construction and operation of community water supplies more efficient, more economical, more simple and more widespread. In particular, it is hoped that an increasing use of local materials, skills and methods will be encouraged, and that techniques which have proved successful in one country may be adapted to serve the needs of others.

The mechanism whereby WHO proposes to foster collaboration is through the medium of an International Reference Centre, to be designated in 1968. This centre will serve as a clearing house for the collection and dissemination of information, will keep up-to-date with research activities throughout the world, will maintain a library and reference service, and will be at the service of Collaborating Institutions to advise (when requested) and further their work in any way possible.

Participation by an institution in the programme will be effected with the minimum of formality; a simple exchange of letters will probably suffice. Since the value of the programme will materially depend upon the technical contribution of each of the Collaborating Institutions certain criteria must be accepted as a condition of participation, and the following are suggested:

- (a) the institution should be attached to a seat of learning, large public water undertaking or governmental body, and government approval will be necessary to its participation in the programme;
- (b) it must be sufficiently staffed and equipped to enable its participation to be effective and useful;
- (c) it must be engaged in research work in the community water supply field, or be about to undertake work of this nature;
- (d) it must be in a position to pass on the results of its researches to the operational water supply organizations within its own country, and thus assist in the solution of national problems;
- (e) it must be prepared to co-operate with similar institutions in other countries, and to pass on the results of work on general problems which would be of mutual interest;

(f) it must be prepared to provide information to the International Reference Centre from time to time as to its programme and lines of relevant research for incorporation into an annual report which will be available to all collaborating institutions.

Providing that these conditions are acceptable there would be no restriction on size, nor on the number of institutions within any country which may collaborate. After an exchange of letters between WHO and the institution participation in the programme will follow immediately and automatically.

PROJECTS IN HAND

Some current research projects being carried out at present with WHO assistance

Disinfection of small water supplies.

Objective: a publication on simple and inexpensive methods of ensuring the safety of supplies from village wells and other small sources.

Toxicity of plastics used in the manufacture of water pipes and fittings.

Objective: a guide, for use in countries without laboratory testing facilities, as to the types of plastic which may safely be used in pipes and fittings carrying water of particular chemical characteristics.

Toxicity of coagulant aids and other treatment chemicals.

Objective: a guide as to coagulant aids which may safely be used, and their concentration limits. Particular attention will be given to testing procedures to check the continuing quality of mass-produced chemicals supplied to water undertakings.

The use of iodine for drinking water disinfection.

Objective: a publication on the use of iodine and iodine compounds as disinfectants for community water supplies, setting out the circumstances under which this element may be preferable to chlorine. Special studies are being made on the physiological effects of iodine on various classes of consumers, and the limiting safe concentration under different conditions of temperature, pH and other characteristics.

The relationship between water supplies and the socio-economic status of the community.

A study on methods and criteria, with a view to conducting a detailed survey later in selected communities in developing countries.

Ultimate objective: evidence on the social and economic benefits to a community of adequate and safe water supplies, with a view to encouraging a higher priority for water supply investment within national planning.

Operational research techniques for improving the effectiveness of water supply systems.

Objective: a guide as to the circumstances under which operational research techniques may be justified, and details as to the benefits which may be expected from their use.

Biological methods of water treatment: first stage - slow sand filters.

Objective: a study of recent improvements in slow sand filters, and an identification of further research which may be needed, with a view to encouraging the use of this treatment process in appropriate circumstances. A paper will be prepared setting out the type of conditions under which slow sand filters are likely to provide the most suitable form of treatment.

FUTURE PROJECTS

Health aspects of desalting processes.

Much research and development has taken place in the field of desalination in recent years, resulting in new processes and improvement of existing methods of salt removal from the sea and from brackish waters.

Costs have been reduced, but despite this it is evident that for a considerable time to come the main use of desalted water will be for domestic purposes, particularly for human consumption.

The great advances made in the technology and economics of desalting plants per se should not obscure the health implications to the consumer, on which much research is still needed.

The desalting apparatus is not in itself a community water supply; it is one stage - certainly an important one - in an integrated system which extracts seawater, treats, stores, pumps, transmits and delivers it in an acceptable form to the consumer. Problems of the system must be considered as a whole if operational efficiency is to be maintained, and a constant supply of high quality water is to be provided at the end point, i.e. to the individual.

Additives, such as scale inhibitors or pH correctors, necessary to the operation of the plant must be shown to be harmless to those who drink the water, and also to other parts of the system where, for instance, aggressive waters might induce the pick-up of metallic salts.

In blending processes adequate precautions must be taken to ensure the safety of the resultant mixed water.

More information is required on the degree to which different processes will exclude pathogens, on the possibility of viruses being carried through membranes or high vacuum evaporators, on the resistance of viruses to freezing processes, and on precautions against accidental subsequent contamination of treated water within the plant.

Additional problems include the physiological effects of prolonged ingestion of desalinated water on various classes of consumer, e.g. infants, nursing mothers, sufferers from heart or arterial diseases, and the possibility that additives or dietary supplements may be necessary to counteract the removal of natural mineral and other constituents from the water.

A study on these lines is proposed by WHO, to commence in 1968. We would appreciate news of any research work which has been, or is being, carried out on these aspects of desalination.

PROBLEMS UNDER CONSIDERATION

Orthotolidine

In their booklet "Precautions for Laboratory Workers who handle Carcinogenic Aromatic Amines" the Chester Beatty Research Institute¹ lists orthotolidine under the list of "substances regarded as potential causes of tumours of the urinary tract, even under laboratory conditions".

On 9 December 1967 the Minister of Labour of the British Government made regulations imposing controls in the employment of persons in connexion with the making and use of certain substances "suspected of causing cancer"; orthotolidine is listed under this category.

The carcinogenic activity of orthotolidine was studied and published by Gehrman et al. 1949, and Spitz et al. 1950. It is also included in the list, published by the United States Department of Health, Education and Welfare, of carcinogenic material tested.

As Orthotolidine is widely used in many parts of the world as an indicator for chlorine residual tests on water supplies, often under anything but "laboratory conditions", we would be glad to hear of alternative tests for the same purpose.

The use of DPD (diethyl-para-phenylenediamine) is probably the most promising alternative and, so far as we know, this material presents no carcinogenic hazards. It has been used for some years as an indicator for estimating free, combined and total chlorine in a number of laboratories, and the test can be made with a simple field kit in small waterworks without laboratory facilities.

We have hopes of an even simpler test, in the form of an indicator paper, which could be used by unskilled operators, and we would welcome information as to whether any such material already exists.

We would also like to hear of any country where the use of orthotolidine has been discontinued for water testing, and what substitute test has been recommended in its place.

Coagulant aids

In connexion with a WHO assisted study on the toxicity of coagulant aids and other water treatment chemicals, we are in touch with work which has been carried out in the United Kingdom and the United States of America on the testing of polyacrylamides, and similar compounds. We are anxious to obtain information on work which has been carried out elsewhere, and would greatly appreciate information on the following points:

- (i) Names of institutes or individuals who are, or have been, engaged in research on this subject.
- (ii) Countries which have issued approved lists, specifications, or have regulations covering the use of polyelectrolytes or other coagulant aids in public water supplies.

¹ The Chester Beatty Research Institute, Institute of Cancer Research, Royal Cancer Hospital, London.

- (iii) Details of accepted testing procedures, particularly those involving determining the concentration of toxic monomers in the commercial product.

REVIEWS

Water-borne viral infections and their prevention

Dr Shih L. Chang, M.D., Medical Director, United States Public Health Service has recently undertaken a study for WHO on virus infections which may be transmitted by water, and on methods for their prevention.

In his report on this study Dr Chang describes the various viruses which may be transmitted by water, paying particular attention to the enteric group which grow in the human intestinal wall and are discharged in large numbers in the faeces. Of these, he considers specifically the enteroviruses (polio, coxsackie and echo) and the virus of infectious hepatitis.

He discusses the difference between "viral infection" (the establishment of parasitism in a host by the virus) and "viral disease" (an infection with overt symptoms and signs), showing how the former may well escape recognition. He then considers in detail the question of poliomyelitis and comes to the conclusion that the evidence supports the view that this disease can be water-borne.

He deals at greater length with infectious hepatitis and its transmission, but since this virus does not lend itself to laboratory examination or cultivation he recommends that enteroviruses be used as indicator viruses, in a similar way to the use of the coliform group as an indicator for pathogenic enteric bacteria.

After a section on the detection of enteric viruses in water, including a suggested technique involving the use of membrane filters, he goes on to the main body of his report, which details the effect of each stage of the water treatment process in the reduction and destruction of viruses. Storage, flocculation, filtration, disinfection by chlorine, ozone, iodine and other agents are dealt with, as is the significance of viral concentrations in the source water.

The report concludes with a discussion as to the degree of safety afforded by various combinations of treatment processes and suggests further lines of research needed to fill gaps in existing knowledge on the subject.

The full text of Dr Chang's report will be printed in the WHO Bulletin later in 1968, including an extensive list of references on recent research work in the field of water-borne viruses.

Health implications of water-related parasitic diseases in water development schemes

A recently published booklet, prepared jointly by the World Health Organization and the Food and Agriculture Organization under the above title, describes some of the many implications which the development of water resources can have for human and animal health.

Written specifically as a briefing to specialists working on water development schemes, under conditions of climate and in countries with which they may not be personally familiar, it is intended to define - and warn against - health hazards which may be encountered.

In the interests of brevity only the more common water-related diseases have been dealt with - malaria, schistosomiasis (bilharziasis), filariasis, onchocerciasis (river blindness), distomatosis (fascioliasis), and dracontiasis (guinea worm). The epidemiology of each is described, and there are notes on the effect of various types of water development upon the spread of each of these parasites. Enteric infections are mentioned briefly in the foreword, together with the necessity for sanitation, waste disposal and water supply for their control.

A small, pocket-sized booklet, it does not pretend to be a textbook but rather an aide-memoire to field workers. It is not listed in the regular publications of WHO, but a few copies are available on application to those interested.

FOOTNOTE

In making up our mailing list for this first number a certain amount of guesswork has obviously been necessary. We want to reach everybody to whom it will be of interest; conversely we do not wish to add to the list of documents which are filed or discarded as being of no value to the recipient.

We therefore make one final request. Would you be good enough to detach this page and return it, to let us know whether you would like to receive future numbers or would prefer to be omitted from the mailing list.

At the same time we would welcome suggestions as to anyone to whom you feel a copy should be sent, and you might care to attach such names at the same time.

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I do/do not wish to receive future copies of the CWS Research and Development Programme Information Bulletin.

Signed

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