

Studies in Environmental Science 12

WATER SUPPLY AND HEALTH

Edited by
H. van Lelyveld
B. C. J. Zoeteman

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**Proceedings of an International Symposium, Noordwijkerhout, The Netherlands,
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Edited by

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The three days of the symposium were divided into the following sessions:

- Health effects of organisms,
chaired by T. Schneider, National Institute for Public Health, Bilthoven,
The Netherlands
- Health effects of inorganic constituents
chaired by K. Biersteker, Agricultural University, Wageningen,
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- Health effects of organic constituents
chaired by J.A. Cotruvo, Environmental Protection Agency, Washington D.C.,
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- Health effects of specific treatment processes
chaired by J.C. Morris, Harvard University, Cambridge, Massachusetts,
U.S.A.
- New strategies for the design of water supply systems
chaired by Th. G. Martijn, The Netherlands Waterworks Testing and Research
Institute, Rijswijk, The Netherlands.

The Organizing Committee has attempted to attract internationally known specialists for the different areas to be discussed and expresses its gratitude to the speakers and authors who have given their precious time and who contributed much to the success of the Symposium.

During the Symposium discussion groups were formed on water microbiology, inorganic water constituents, organic water constituents and water treatment trends. During a final panel discussion the chairmen of the discussion groups resp. Y. Kott from Technion Haifa, Israel, R.F. Packham from the Water Research Centre, Medmenham, U.K., J.A. Cotruvo, from the EPA, Washington D.C., USA and G.G. Robeck, from the EPA, Cincinnati, Ohio, USA, reported to the symposium participants. The personal impressions of the chairman of the panel discussion, B.C.J. Zoeteman, from the National Institute for Water Supply, Voorburg, The Netherlands, in relation to the outcome of the discussions during the Symposium are given in the final chapter of this work.

A limited number of posters were presented of which a brief summary is included in these proceedings.

We trust that this volume will be useful as a review of the present knowledge in the area of health effects of drinking water quality and that it will also stimulate further research to elucidate the role of water constituents in the cause and prevention of disease in man.

The Symposium organizers thank the following organizations for financial assistance:

- Ministry of Health and Environmental Protection, The Netherlands
- Environmental Protection Agency, United States of America
- Water Research Centre, United Kingdom
- Royal Institution of Engineers in The Netherlands

The Organizing Committee

B.J.A. Haring

G.J. Piet

B.C.J. Zoeteman (chairman).

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WELCOME SPEECH

P. SANTEMA

Director of the National Institute for Water Supply, Voorburg, The Netherlands

Ladies and Gentlemen,

It is with great pleasure that I may welcome you today at the beginning of this International Symposium on Water Supply and Health.

A special word of welcome to all those participants coming from abroad, to our guests and to Dr. L. Ginjaar, Minister of Health and Environmental Protection, who will officially open this symposium in a few minutes.

This international symposium has a multipurpose nature. Firstly, it plays a role in finalizing the work of the Working Group on Health Aspects of Drinking Water of the NATO-CCMS Drinking Water Pilot Study. The chairman of this Working Group, Professor Borzelleca from Richmond, Virginia USA, will present during the symposium the results obtained so far.

Secondly this symposium is held on the eve of the 13th Congress of the International Water Supply Association in Paris. Many of you probably will attend this congress in Paris as well, where our first lecturer of today, Professor Bonde from Aarhus, Denmark, will present a general report on water quality and health. Possibly some of the items discussed during the coming days can be presented by him to the larger forum of the IWSA congress next week.

The Organizing Committee together with the Advisory Committee have tried to compose a programme covering a number of relevant aspects of water supply and health in order to set further research priorities and to recommend to the responsible national and international authorities specific measures to reduce potential health risks.

As you many have seen in the programme the emphasis of the symposium is on the health effects of inorganic and organic water constituents. It places the major steps in water supply systems such as treatment and distribution in a new perspective which eventually may result in new strategies for the design of water supply systems.

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The Organizing Committee has aimed at linking results of scientific studies to the need for answers to specific questions of the governmental agencies. And in this connection I hope you will all actively participate in the discussion.

In conclusion I may say that we are very happy that so many internationally recognized scientists and experts from the US EPA, the Water Research Centre, the Engler-Bunte Institute and from other institutions in France, Israel, Germany, Canada and The Netherlands came to Noordwijkerhout. We hope that your stay here will be a pleasant one. If you have questions: the Organizing Committee and the secretariat will be ready to help you.

Ladies and Gentlemen,

As it is time to really open this symposium I am very pleased to introduce to you Minister Dr. L. Ginjaar, who will now present his opening address.

OPENING ADDRESS

L. GINJAAR

Minister of Health and Environmental Protection, Leidschendam, The Netherlands

Ladies and gentlemen,

Water supply has been linked with health in a very positive way during the past century. The realization of public water supply systems contributed significantly to the successful abatement of water-borne diseases like typhoid and cholera. Until recently public water supply was mainly a matter of civil engineering. A Dutch rhyme of the beginning of this century illustrated this by saying that the director of a waterwork just "had to push a pipe into the ground before presenting the waterbill around". Nowadays the quality of drinking water has become a matter of growing concern among water producers as well as water consumers, because of possible health risks of chemical water contaminants.

Some problems that were already known in the Roman empire such as the possible health risks of old lead pipes used for water distribution, recently surfaced again. Major new problems were the necessity to use water sources which had become contaminated by municipal and industrial wastes. At the beginning of the seventies political attention focussed on the chemical contamination of surface waters. This was initiated by the evident increase of the pollution of e.g. the river Rhine where massive fish-kills occurred and dissolved oxygen levels dropped below 4 mg/l during the summer. The waterworks along the Rhine organized themselves into the Internationale Arbeitsgemeinschaft der Wasserwerke im Rheineinzugsgebiet (IAWR) and the governments of the countries along the Rhine started annual meetings of the Ministers concerned to prepare international regulations. Finally these efforts in combination with the growing public interest resulted in an agreement against the chemical pollution of the Rhine in 1976 and several directives of the Council of the European Communities to limit surface water contamination in view of its uses for potable water supply, recreation and fresh water organisms designated for human consumption.

However the driving force behind these developments was the potential health risk of tapwater derived from such contaminated river water.

At present we can conclude that these efforts were not without success. Generally speaking water pollution is slowly decreasing and surface water quality improves gradually every year. Typical examples in this respect are the tenfold reduction of the level of mercury and lindane in the Rhine and the increased level of dissolved oxygen from 4 mg/l in 1972 to 8 mg/l in 1979. Although this is a major achievement of the past ten years I am well aware of the fact that much remains to be done before surface water is a truly reliable source of potable water. This is illustrated by the fact that some of our water supply systems can no longer produce safe drinking water without the intensive application of chemicals like chlorine and ozone and of adsorbents like activated carbon.

Such a situation is not acceptable. We should be able to prepare drinking water from surface water by simple means such as coagulation and sandfiltration, as was the case in the beginning of this century. To achieve this goal the potentially toxic and relatively persistent chemicals in our rivers and lakes have to be identified and further removed. Within the framework of the existing international legislative possibilities, research on the type and impact of chemical pollutants in water can contribute significantly to the successful fulfilment of this task.

I could have pointed at the same issues a few years ago. The picture of the problems of surface water as a source of water supply has not changed dramatically in the last years.

This is quite different from the situation in relation to groundwater as a source for the public water supply. Here serious calamities have occurred on a scale which was not foreseen until very recently.

Surface water pollution was the dominating water problem in the seventies. Soil and groundwater pollution has been recognized as a major environmental problem in the eighties. The first signs of the magnitude of the problem of soil pollution were registered in Holland in 1977 when several cases of trichloroethylene contamination of drinking water derived from groundwater incidentally were discovered by the National Institute for Water Supply. Subsequently a systematic investigation of the quality of groundwaters used for potable supply in The Netherlands revealed a limited number of other cases of contamination of which the Almelo-Wierden case of tribromoethylene pollution was the most striking one. Still the water supply in all these situations did not have to be disrupted.