

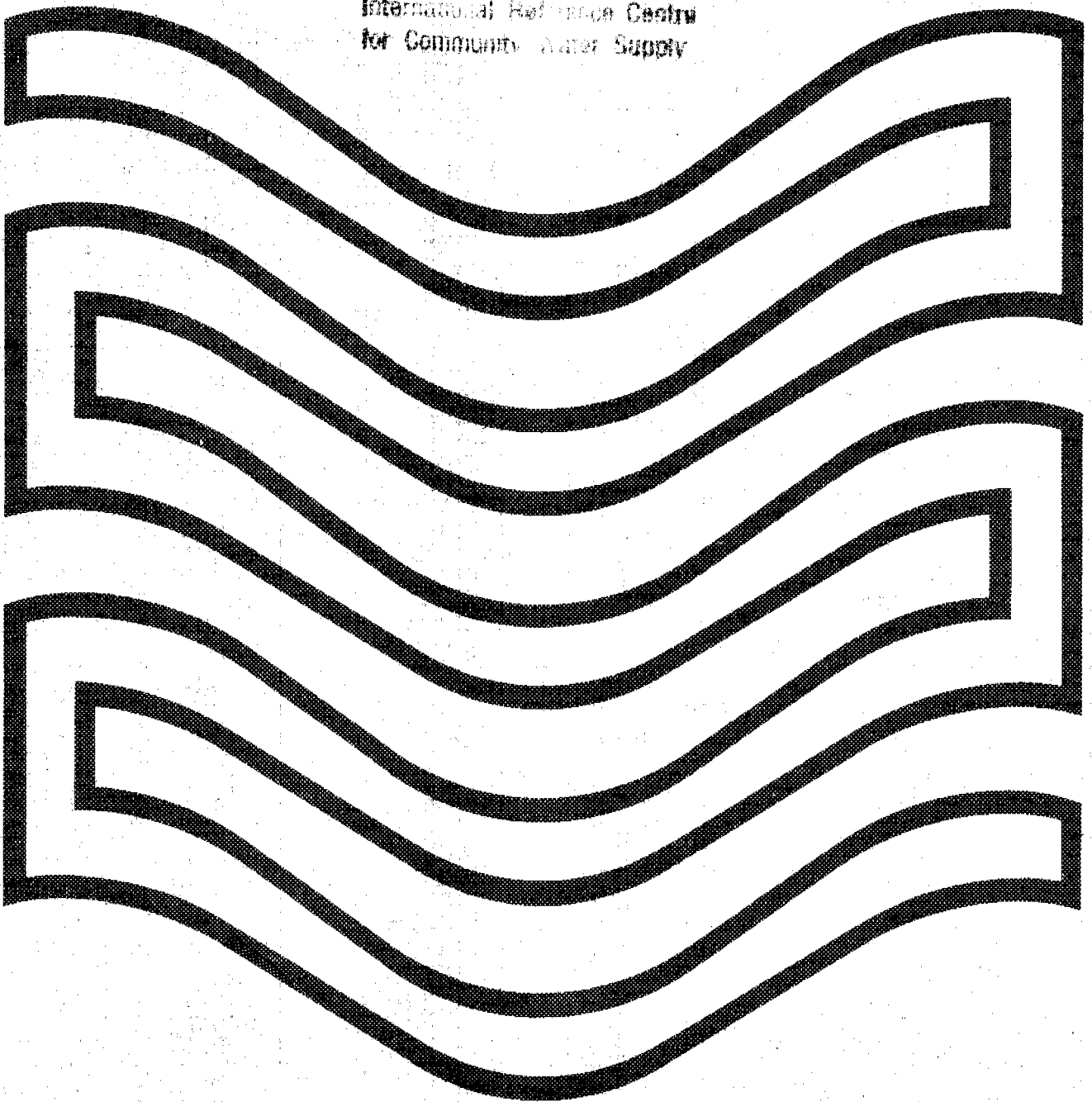
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## community water supply research 1973

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WORLD HEALTH ORGANIZATION  
INTERNATIONAL REFERENCE CENTRE FOR COMMUNITY WATER SUPPLY

COMMUNITY WATER SUPPLY RESEARCH 1973

BULLETIN NO. 6

Inventory of research projects of the  
Institutions collaborating with the  
WHO International Reference Centre  
for Community Water Supply

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OCTOBER 1973

THE HAGUE - THE NETHERLANDS

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## 1. INTRODUCTION

Within the International Network for Community Water Supply, the International Reference Centre (IRC) has as a responsibility to coordinate the efforts of Regional Reference Centres and Collaborating Institutions which are taking part in an international programme of research and development in the water supply field. Dissemination and transfer of technical and scientific information on community water supply is one of the basic tasks of the IRC. In 1971 a bulletin series was started in which an inventory of research projects carried out in this field is given and it is hoped that this series contributes to a more extensive exchange of research methods and findings and a better coordination of research activities.

The present report is the third in this series on research projects in community water supply. The inventory includes research projects carried out by 15 institutions collaborating with the Centre.

All research projects have been classified according to a general classification of community water supply topics, elaborated for the purpose of the inventory.

Institutions, which are working in the water supply field, and - although not officially collaborating within the Network - wish to have their programmes included in the next bulletin, are encouraged to provide the IRC with the information concerned.

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2. RESEARCH INSTITUTIONS

The research projects of the following Collaborating Institutions are given in this bulletin:

1. The Water Research Association  
Ferry Lane, Medmenham  
Marlow, Bucks. SL7 2HD  
England
2. Environmental Engineering Department  
Middle East Technical University  
Ankara  
Turkey
3. The Testing and Research Institute of the  
Netherlands Waterundertakings KIWA Ltd.  
P.O. Box 70  
Rijswijk 2109  
The Netherlands
4. Department of Civil Engineering  
University of Newcastle upon Tyne  
Claremont Road  
Newcastle upon Tyne NE1 7RU  
England
5. Institute of Hygiene  
University of Aarhus  
DK 8000 Aarhus-C  
Denmark
6. Environmental Protection Agency  
National Environmental Research Center  
Water Supply Research Laboratory  
Cincinnati, Ohio 45268  
U.S.A.
7. Department of Sanitary Engineering  
Faculty of Engineering  
Central University of Caracas  
Caracas  
Venezuela
8. National Sanitation Foundation  
P.O. Box 1468  
Ann Arbor, Michigan 48106  
U.S.A.
9. Asian Institute of Technology  
P.O. Box 2754  
Bangkok  
Thailand

10. Department of Sanitary Engineering  
Faculty of Engineering  
University of Tokyo  
Hongo 7-3, Bunkyo-ku  
Tokyo  
Japan
  
11. Section of Sanitary Engineering  
All India Institute of Hygiene and Public Health  
110 Chittaranjan Avenue  
Calcutta-12  
India
  
12. Central Public Health Engineering Research Institute  
Nehru Marg  
Nagpur-440020  
India
  
13. Institute of Hygiene and Epidemiology  
Dept. of General and Environmental Hygiene  
Srobárova 48  
100 42 Prague-10  
Czechoslovakia
  
14. Faculty of Engineering and Architecture and  
School of Public Health  
American University of Beirut  
Beirut  
Lebanon
  
15. Academic Department of Sanitation  
National University of Engineering  
Lima  
Peru

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3. GENERAL CLASSIFICATION OF COMMUNITY WATER SUPPLY TOPICS

1. Water Supply - General

- 1.1 Historical survey
- 1.2 Water and environmental hygiene
- 1.3 Water supply categories and schemes
- 1.4 Demand for water and water consumption
- 1.5 Water for fire purposes
- 1.6 Sociology of community water supply
- 1.7 Planning
- 1.8 Financing
- 1.9 Economics
- 1.10 Legislation
- 1.11 Manpower
- 1.12 Research
- 1.13 Standardization
- 1.14 Statistics
- 1.15 Water utilities
- 1.16 Local authorities
- 1.17 National agencies and policy
- 1.18 International cooperation
- 1.19 Quality of water supplies
- 1.20 Reuse of waste water
- 1.21 Water losses in water supplies
- 1.22 Geographical survey
- 1.23 Other problems

2. Water quality

- 2.1 Water quality general
- 2.2 Quality of natural waters and contaminants
- 2.3 Physical characteristics of water
- 2.4 Chemical characteristics of water and chemical substances in water
- 2.5 Micro-organisms in water (Microbiology)
- 2.6 Organic life in water (Hydrobiology)
- 2.7 Radioactivity and radioactive substances in water
- 2.8 Technique of examination of water
- 2.9 Standards on water quality in water sources
- 2.10 Drinking water quality standards

- 2.11 Industrial water quality standards
- 2.12 Self-purification of waters
- 2.13 Water quality control
- 2.14 Water quality deterioration in distribution systems
- 2.15 Economic evaluation of water quality
- 2.16 Other problems

### 3. Water catchment

- 3.1 Water catchment general
- 3.2 Water supply sources
- 3.3 Subsurface-water intake works
- 3.4 Surface-water intake works
- 3.5 Special problems of water catchment

### 4. Water transmission

- 4.1 Water transmission general
- 4.2 Transmission mains
- 4.3 Pumping stations
- 4.4 Special works
- 4.5 Special problems of water transmission

### 5. Water treatment

- 5.1 Water treatment general
- 5.2 Initial preparation of water
- 5.3 Screening and straining
- 5.4 Coagulation, flocculation, sedimentation and clarification
- 5.5 Filtration
- 5.6 Iron-manganese-colour removal
- 5.7 Softening and demineralization
- 5.8 Antiscale and anticorrosion treatment
- 5.9 Desalination
- 5.10 Removal of radionuclides
- 5.11 Fluoridation and defluoridation
- 5.12 Disinfection
- 5.13 Other methods of water treatment
- 5.14 Economics of water treatment
- 5.15 Special problems of water treatment



6. Water distribution

- 6.1 Water distribution general
- 6.2 Water distribution systems and schemes
- 6.3 Planning, design and hydraulics of distribution systems
- 6.4 Distribution system storage facilities
- 6.5 Pipe materials, coatings, linings, and joints for water disinfection systems
- 6.6 Valves and hydrants
- 6.7 Water meters and water metering
- 6.8 Water main laying
- 6.9 Tapping, cleaning, disinfection, inspection and maintenance of water mains
- 6.10 Metallic corrosion and protection of mains against corrosion
- 6.11 Special problems of water distribution

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4. CLASSIFIED RESEARCH PROJECTS

1. WATER SUPPLY - GENERAL

Research topic	Research Institution
<p>1.1 <u>Historical survey</u></p> <p>1. Evaluation of the effectiveness of the Royal Thai Government's National Potable Water Project (evaluation of administrative, technical and operational factors in 165 village systems).</p>	<p>Asian Institute of Technology, Bangkok, Thailand</p>
<p>1.2 <u>Water and environmental hygiene</u></p> <p>1. Role of potable water in community health planning (evaluation of relationships between incidences of water rural diseases, water quality, and rural sanitation and water use habits.</p> <p>2. Investigate problems of waterborne disease.</p> <p>3. Review of waterborne disease outbreaks.</p> <p>4. Endemic occurrence of waterborne disease.</p> <p>5. Hepatitis virus in water.</p> <p>6. Study of PVC pipes as used in water supplies.</p>	<p>Asian Institute of Technology, Bangkok, Thailand</p> <p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p> <p>idem</p> <p>idem</p> <p>idem</p> <p>Environmental Engineering Department Middle East Technical University, Ankara, Turkey.</p>
<p>1.3 <u>Water Supply categories and schemes</u></p> <p>1. Closed system on industrial water usage.</p>	<p>Department of Sanitary Engineering, University of Tokyo, Tokyo, Japan</p>

Research topic	Research Institution
<p>1.4 <u>Demand for water and water consumption</u>                      1. Per capita water consumption and losses.</p>	<p>Environmental Engineering Department                      Middle East Technical University,                      Ankara, Turkey.</p>
<p>1.5 <u>Water for fire purposes</u></p>	
<p>1.6 <u>Sociology of community water supply</u>                      1. Pilot plant testing of two-stage water filters using local materials.</p>	<p>Asian Institute of Technology,                      Bangkok, Thailand.</p>
<p>1.7 <u>Planning</u>                      1. Evaluation of the effectiveness of the Royal Thai Government's National Potable Water Project (evaluation of administrative, technical and operational factors in 165 village systems).</p>	<p>Asian Institute of Technology,                      Bangkok, Thailand.</p>
<p>1.8 <u>Financing</u></p>	
<p>1.9 <u>Economics</u>                      1. Development of simple low-cost water filters for individual and small community use.</p>	<p>Asian Institute of Technology,                      Bangkok, Thailand.</p>
<p>1.10 <u>Legislation</u></p>	
<p>1.11 <u>Manpower</u></p>	
<p>1.12 <u>Research</u></p>	

Research topic	Research Institution
1.13 <u>Standardization</u> _____	
1.14 <u>Statistics</u> _____	
1.15 <u>Water utilities</u> _____	
1.16 <u>Local authorities</u> _____	
1.17 <u>National agencies and policy</u> 1. Evaluation of the effectiveness of the Royal Thai Government's National Potable Water Project (evaluation of administrative, technical and operational factors in 165 village systems).	Asian Institute of Technology, Bangkok, Thailand.
1.18 <u>International Cooperation</u> _____	
1.19 <u>Quality of water supplies</u> 1. Toxicological research.  2. Relationship of treatment to distribution metal levels.  3. Determine occurrence of organophorous in distributed water.  4. Bacteriological criteria for bottled water.  5. Survey organic levels in drinking water.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands  Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.  idem  idem  idem

Research topic	Research Institution
<p>1.20 <u>Reuse of waste water</u></p> <ol style="list-style-type: none"> <li>1. Trace metals in sewage.</li> <li>2. Dual distribution system by reuse of sewage on city renewal case.</li> <li>3. Reuse of sewage - treatment by activated carbon filter, reverse osmosis and electro dialysis.</li> </ol>	<p>Environmental Protection Agency, National Environmental Research Laboratory, Water Supply Research Center, Cincinnati, Ohio, U.S.A.</p> <p>Department of Sanitary Engineering, University of Tokyo, Tokyo, Japan.</p> <p>idem</p>
<p>1.21 <u>Water losses in water supplies</u></p> <ol style="list-style-type: none"> <li>1. Waste control economics.</li> </ol>	<p>The Water Research Association, Marlow, Bucks., England.</p>
<p>1.22 <u>Geographical survey</u></p> <ol style="list-style-type: none"> <li>1. Assessment of water quality in Lebanon.</li> <li>2. Fluoride content of water supplies in Lebanon and some neighbouring countries.</li> <li>3. Biological control of bulinus snails in the Litani River.</li> <li>4. Baseline studies of water quality of Hooghly Estuary.</li> <li>5. Ground water quality in Rajasthan.</li> <li>6. Preliminary survey of River Yamuna between Wazirabad Reservoir and Okhla.</li> </ol>	<p>Faculty of Engineering &amp; Architecture, and School of Public Health, American University of Beirut, Beirut, Lebanon.</p> <p>idem</p> <p>idem</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p> <p>idem</p> <p>idem</p>

Research topic	Research Institution
<p>1.23 <u>Other problems</u></p> <ol style="list-style-type: none"><li>1. Study on hand pumps.</li> <li>2. Advice by visit and letter on water supply problems.</li></ol>	<p>Section of Sanitary Engineering, All India Institute of Hygiene and Public Health, Calcutta, India.</p> <p>The Water Research Association, Marlow, Bucks., England.</p>

2. WATER QUALITY

Research topic	Research Institution
<p>2.1 <u>Water quality - general</u></p> <p>1. Study of relation between drinking water hardness and cardiovascular diseases.</p>	<p>Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.</p>
<p>2.2 <u>Quality of natural waters and contaminants</u></p> <p>1. Occurrence and toxic action of pesticides in surface waters.</p> <p>2. Coloured refractories / polyphenol polycondensates in surface waters - hygienic aspects and harmful action.</p> <p>3. Hygienic protection of impounded waters used for community water supply.</p> <p>4. Assessment of water quality in Lebanon.</p> <p>5. Polluting effects of steelworks effluents.</p> <p>6. Baseline studies of water quality of Hooghly Estuary.</p> <p>7. Ground water quality in Rajasthan.</p> <p>8. Preliminary survey of River Yamuna between Wazirabad Reservoir and Okhla.</p>	<p>Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.</p> <p>idem</p> <p>Faculty of Engineering &amp; Architecture and School of Public Health, American University of Beirut, Beirut, Lebanon.</p> <p>Department of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p> <p>idem</p> <p>idem</p>



Research topic	Research Institution
<p>9. Study of the concentration of organics in waters using carbon chloroform extraction method.</p>	<p>Central Public Health Engineering Research Institute, Nagpur, India</p>
<p>10. Organic pollution in surface water.</p>	<p>The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands</p>
<p>2.3 <u>Physical characteristics of water</u></p>	
<p>2.4 <u>Chemical characteristics of water and chemical substances in water</u></p>	
<p>1. Biological availability of fluorine compounds in drinking water.</p>	<p>Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.</p>
<p>2. Fluoride content of water supplies in Lebanon and some neighbouring countries.</p>	<p>Faculty of Engineering &amp; Architecture and School of Public Health American University of Beirut, Beirut, Lebanon.</p>
<p>3. Total organic carbon analysis.</p>	<p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p>
<p>4. NMR chemical identification.</p>	<p>idem</p>
<p>2.5 <u>Microorganisms in water (Microbiology)</u></p>	
<p>1. Enterobacteriae - occurrence and survival in surface waters in connection with water-borne infections.</p>	<p>Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.</p>
<p>2. The effect of environmental factors on the growth and death of intestinal bacteria.</p>	<p>Dept. of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.</p>

Research topic	Research Institution
3. The use of bifidobacterium as an indicator of faecal pollution in water.	Dept. of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.
4. Survey of water supplies in Northeast for virus.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
5. Survey of water supplies in Northwest for virus.	idem
6. Survey of water supplies in South for virus.	idem
7. Bacteria associated with virus in drinking water.	idem
8. Survival of indicator organisms and pathogens in bottom muds.	idem
9. Rapid methods for indicators.	idem
10. MF-plate count methods.	idem
11. Suppression of coliforms by other organisms.	idem
12. Examination of bacteria in water other than indicators (Nuisance bacteria).	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
12. Media for examination of such organisms - standards for "germ counts".	idem
13. Microbiological research	The Testing and Research Institute of the Netherlands Waterundertakings
13. Microbiological res	KIWA Ltd., Rijswijk, The Netherlands
2.6 <u>Organic life in water</u> <u>(Hydrobiology)</u>	
1. Biological control of bulinus snails in the Litani River.	Faculty of Engineering & Architecture and School of Public Health, American University of Beirut, Beirut, Lebanon

Research topic	Research Institution
2. Growth of Cladophora in the River Stour.	Department of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.
3. Hydraulics factors affecting the distribution of stream invertebrates.	idem
4. Toxicity of copper to Ephemeroptera.	idem
5. Parasites associated with virus in drinking water.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
6. Algae in raw water storage reservoirs.	The Water Research Association, Marlow, Bucks., England.
2.7 <u>Radioactivity and radioactive substances in water</u>	
2.8 <u>Technique of examination of water</u>	
1. Analysis of water: chemical, bacteriological, biological.	Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.
2. Fluorescent staining techniques for the rapid detection of bacteria in water supplies.	Department of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.
3. Study of the concentration of organics in wastewaters using carbon chloroform extraction method.	Central Public Health Engineering Research Institute, Nagpur, India.
4. Analytical techniques.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
5. Organic pollutants in water.	The Water Research Association, Marlow, Bucks., England.

Research topic	Research Institution
6. Trace metals in water.	The Water Research Association, Marlow, Bucks., England.
7. General chemical analytical methods.	idem
8. Examination of bacteria in water other than indicators (Nuisance bacteria).	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
9. Media for examination of such organisms - standards for "germ counts".	idem
10. Membrane filters and their scale-up.	Central Public Health Engineering Research Institute, Nagpur, India.
11. M.F. technique: Development of suitable media to replace the imported and dehydrated media for membrane filters.	idem
12. Flow-through sample virus methods.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
13. Sequential virus techniques.	idem
14. Adsorbant virus techniques	idem
15. Develop automatic water quality monitor.	idem
16. Develop organic monitoring techniques.	idem
2.9 <u>Standards on water quality in water sources.</u>	
1. Examination of bacteria in water other than indicators (Nuisance bacteria).	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.

Research topic	Research Institution
<p>2. Media for examination of such organisms - standards for "germ counts".</p>	<p>Institute of Hygiene, University of Aarhus, Aarhus, Denmark.</p>
<p>2.10 <u>Drinking water quality standards</u></p>	<p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p>
<p>1. Health criteria for organic contaminants of drinking water.</p>	<p>idem</p>
<p>2. Health criteria for inorganic contaminants of drinking water.</p>	<p>idem</p>
<p>3. Investigate problems of waterborne disease.</p>	<p>Institute of Hygiene, University of Aarhus, Aarhus, Denmark.</p>
<p>4. Media for examination of such organisms - standards for "germ counts".</p>	<p><u>Industrial water quality standards</u></p>
<p>2.11 <u>Industrial water quality standards</u></p>	<p><u>Self-purification of waters</u></p>
<p>2.12 <u>Self-purification of waters</u></p>	<p><u>Water quality control</u></p>
<p>1. Hygienic control of eutrophized waters designed for personal uses (inclusive water bloom control).</p>	<p>Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.</p>
<p>2. Simulation methods in water quality.</p>	<p>Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.</p>
<p>3. Condition of water supplies with virus.</p>	<p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p>

Research topic	Research Institution
2.14 <u>Water quality deterioration in distribution systems.</u>	
1. Leaching of toxic stabilizers from uPVC water pipes.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
2. Protection of distribution systems against back-flow from domestic apparatus.	idem
3. Organisms in water mains.	idem
4. Research and control water quality in pipe lines.	idem
5. Evaluate bacteriological quality deterioration in distribution.	Environmental Protection Agency National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
6. Evaluate chemical quality deterioration in distribution.	idem
7. Water quality monitoring distribution systems.	National Sanitation Foundation, Ann Arbor, Michigan, U.S.A.
2.15 <u>Economic evaluation of water quality</u>	
2.16 <u>Other problems</u>	
1. Comparison of quality of imported and local mineral waters.	Faculty of Engineering & Architecture and School of Public Health, American University of Beirut, Beirut, Lebanon.
2. Variations in chemical characteristics of thermal water in Lebanon.	idem
3. Acute toxicity of organics	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.

Research topic	Research Institution
4. Effect of methyl mercury on central nervous system.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
5. Effects of methyl mercury on hepatic detoxification enzymes.	idem
6. Effect of cadmium on renal enzymes.	idem
7. Non-lethal genetic effects of cadmium and cobalt.	idem
8. Mutagenic potential of drinking water contaminants.	idem
9. Trace metal body burdens from drinking water.	idem
10. On-line monitoring of water quality.	The Water Research Association, Marlow, Bucks., England.
11. Inter-laboratory checks.	idem

3. WATER CATCHMENT

Research topic	Research Institution
3.1 <u>Water catchment general</u>	
3.2 <u>Water supply sources</u>	
1. Limnology of storage reservoirs.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
2. Bare holes.	idem
3. Artificial recharge.	idem
4. Baseline studies of water quality of Hooghly Estuary.	Central Public Health Engineering Research Institute, Nagpur, India.
5. Ground water quality in Rajasthan.	idem
6. Preliminary survey of River Yamuna between Wazirabad Reservoir and Okhla.	idem
7. Hygienic protection of impunded waters used for community water supply.	Institute of Hygiene and Epidemiology. Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.
3.3 <u>Subsurface water intake works</u>	
1. Groundwater research.	The Water Research Association, Marlow, Bucks., England.
2. Bare holes.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
3. Research of shallow tube-wells and hand-made strainers.	Section of Sanitary Engineering, All India Institute of Hygiene and Public Health, Calcutta, India.
3.4 <u>Surface water intake works.</u>	



Research topic	Research Institution
<p>3.5 <u>Special problems of water catchment</u></p> <ol style="list-style-type: none"><li>1. Artificial recharge.</li> <li>2. Study quality effects of storage.</li> <li>3. Study on hand pumps.</li></ol>	<p>The Water Research Association, Marlow, Bucks., England.</p> <p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Labo- ratory, Cincinnati, Ohio, U.S.A.</p> <p>Section of Sanitary Engineering, All India Institute of Hygiene and Public Health, Calcutta, India.</p>

4. WATER TRANSMISSION

Research topic	Research Institution
4.1 <u>Water transmission - general</u> _____	
4.2 <u>Transmission mains</u> _____	
4.3 <u>Pumping stations</u> _____	
4.4 <u>Special works</u> _____	
4.5 <u>Special problems of water transmission</u> _____	

5. WATER TREATMENT

Research topic	Research Institution
<p>5.1 <u>Water treatment - general</u></p> <p>1. Evaluation of the effectiveness of the Royal Thai Government's National Potable Water Project (evaluation of administrative, technical and operation factors in 165 village systems).</p>	<p>Asian Institute of Technology, Bangkok, Thailand.</p>
<p>5.2 <u>Initial preparation of water</u></p>	
<p>5.3 <u>Screening and straining</u></p>	
<p>5.4 <u>Coagulation, flocculation, sedimentation and clarification.</u></p> <p>1. Upward flow clarification.</p> <p>2. Treatment methods for turbidity.</p> <p>3. Flocculation optimization through "G" and "T" - A model operated unit.</p> <p>4. Experiment on up-flow sedimentation.</p> <p>5. Synthetic coagulant aids.</p> <p>6. Evaluation of polymeric floccs.</p>	<p>Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.</p> <p>Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p> <p>Department of Sanitary Engineering, Faculty of Engineering, Central University of Venezuela, Caracas, Venezuela.</p> <p>Department of Sanitary Engineering, University of Tokyo, Tokyo, Japan.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p> <p>The Water Research Association, Marlow, Bucks., England.</p>

Research topic	Research Institution
7. Sedimentation tank design.	The Water Research Association, Marlow, Bucks., England.
8. Evaluation of local clays as potential coagulant aids in water treatment.	Faculty of Engineering & Architecture and School of Public Health, American University of Beirut, Beirut, Lebanon.
9. Bentonite as a coagulant in water purification.	idem
10. Novel processes for the clarification of water and wastewater using local materials.	idem
5.5 <u>Filtration</u>	
1. Filter backwashing.	The Water Research Association, Marlow, Bucks., England.
2. Slow sand filtration.	Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.
3. Filtration and mix bed applications.	idem
4. Backwashing of R.S. filters and related theories.	idem
5. Rapid filtration.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
6. Biological carbon filtration.	idem
7. Pilot plant testing of two-stage water filters using local materials.	Asian Institute of Technology, Bangkok, Thailand.
8. Development of simple low-cost water filters for individual and small community use.	idem

Research topic	Research Institution
9. Filter aids.	Central Public Health Engineering Research Institute, Nagpur, India.
10. Filtration of water: setting up of a reference collection of coals and sands.	idem
11. Filtration of water: study of performance of roughing filters by utilizing model columns.	idem
12. Filtration of water: two-layer filtration.	idem
13. Filtration of water: up-flow filtration.	idem
14. Up-flow filtration through a floating medium.	Faculty of Engineering & Architecture and School of Public Health, American University of Beirut, Beirut, Lebanon.
15. Economical designs of the automatic washing of rapid filters with variable head.	Academic Department of Sanitation, National University of Engineering, Lima, Peru.
5.6 <u>Iron-manganese-colour removal</u>	
1. Treatment of coloured (low turbidity) water	The Water Research Association, Marlow, Bucks., England.
5.7 <u>Softening and demineralization</u>	
1. Removal of trace toxic metals.	The Water Research Association, Marlow, Bucks., England.
2. Removal of nitrates from borehole water.	idem
3. Water softening, demineralization.	Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.

Research topic	Research Institution
4. Central softening by waterworks.	The Testing and Research Institute of the Netherlands Waterundertakings, KIWA Ltd., Rijswijk, The Netherlands
5.8 <u>Antiscale and anticorrosion treatment</u>	
1. Anticorrosion treatment.	Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.
1. Reverse osmosis.	Marlow, Bucks., England.
5.9 <u>Desalination</u>	
1. Reverse osmosis.	The Water Research Association, Marlow, Bucks., England.
2. Desalination.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
5.10 <u>Removal of radionuclides</u>	
5.11 <u>Fluoridation and defluoridation</u>	
1. Fluoridation and defluoridation.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
2. Defluoridation of water.	Central Public Health Engineering Research Institute, Nagpur, India.
3. Biological availability of fluorine compounds in drinking water.	Institute of Hygiene and Epidemiology, Dept. of General and Environmental Hygiene, Prague, Czechoslovakia.
5.12 <u>Disinfection</u>	
1. Interferences to efficient disinfection.	The Water Research Association, Marlow, Bucks., England.
2. Water disinfection practices.	Environmental Engineering Department, Middle East Technical University, Ankara, Turkey.
3. Ozonization.	The Testing and Research Institute

Research topic	Research Institution
	of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
4. Disinfection of viruses in water using ozone.	Department of Civil Engineering, University of Newcastle upon Tyne, Newcastle upon Tyne, England.
5. Methods of disinfection of virus.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Labo- ratory, Cincinnati, Ohio, U.S.A.
6. Chlorine resistance of naturally occurring viruses.	idem
7. Effects of turbidity on disinfection.	idem
8. Amaeba cysts destruction by chlorine and iodine.	Department of Sanitary Engineering, Faculty of Engineering, Central University of Venezuela, Caracas, Venezuela.
5.13 <u>Other methods of water treatment</u>	
1. Activated carbon.	The Water Research Association, Marlow, Bucks., England.
2. Flotation.	idem
3. Hyperfiltration.	The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
4. Effectiveness of reverse osmosis.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Labo- ratory, Cincinnati, Ohio, U.S.A.
5. Effectiveness of ultra-filtration.	idem
6. Evaluation of ion exchange resins.	idem

Research topic	Research Institution
7. Organic treatment by adsorbants, resins and oxidants.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
8. Treatment methods for trace organics and taste-odour.	idem
9. Reverse osmosis.	Central Public Health Engineering Research Institute, Nagpur, India.
5.14 <u>Economics of water treatment</u>	
5.15 <u>Special problems of water treatment</u>	
1. Sludge disposal.	The Water Research Association, Marlow, Bucks., England.
2. Review safety of products used in water treatment.	Environmental Protection Agency, National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.
3. Acrylamide monomer measurement.	idem
4. Treatment methods for trace metals and nitrate.	idem
5. Bench-scale study of inorganic and organic mercury.	idem
6. Pilot-scale study of mercury.	idem
7. Bench-scale study of resins for nitrate removal.	idem
8. Fate of polyelectrolytes in reservoirs.	idem



Research topic	Research Institution
9. Activated silica soils.	Central Public Health Engineering Research Institute, Nagpur, India.

6. WATER DISTRIBUTION

Research topic	Research Institution
6.1 <u>Water distribution - general</u>	
6.2 <u>Water distribution systems and schemes</u>	
6.3 <u>Planning, design and hydraulics of distribution systems</u> 1. Effect of in-house storage on water network design. 2. Minimising pumping costs in distribution systems 3. Computer applications to networks 4. Cost of distribution systems 5. Distribution problems	The Water Research Association, Marlow, Bucks., England. idem Environmental Engineering Department, Middle East Technical University, Ankara, Turkey idem The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands
6.4 <u>Distribution system storage facilities</u>	
6.5 <u>Pipe materials, coatings, linings, and joints for water distribution systems</u> 1. Dynamic testing of plastic pipe 2. Study of PVC pipes as used in water supplies 3. Examination of water pipes, joints, fittings, valves and hydrants	The Water Research Association, Marlow, Bucks., England Environmental Engineering Department, Middle East Technical University, Ankara, Turkey The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands

Research topic	Research Institution
<p>4. Leaching of toxic stabilizers from uPVC water pipes</p>	<p>The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands</p>
<p>6.6 <u>Valves and hydrants</u></p>	
<p>6.7 <u>Water meters and water metering</u></p>	
<p>6.8 <u>Water main laying</u></p>	
<p>6.9 <u>Tapping, cleaning, disinfection, inspection and maintenance of water mains</u></p> <ol style="list-style-type: none"> <li>1. Slimes and deposits in mains</li> <li>2. Protection of distribution systems against backflow from domestic apparatus</li> <li>3. Organisms in water mains</li> <li>4. Water main sanitation methods</li> <li>5. Water quality monitoring - distribution systems</li> </ol>	<p>The Water Research Association, Marlow, Bucks., England</p> <p>The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands</p> <p>idem</p> <p>Environmental Protection Agency National Environmental Research Center, Water Supply Research Laboratory, Cincinnati, Ohio, U.S.A.</p> <p>National Sanitation Foundation, Ann Arbor, Michigan, U.S.A.</p>
<p>6.10 <u>Metallic corrosion and protection of mains against corrosion</u></p> <ol style="list-style-type: none"> <li>1. Corrosion of copper service pipes</li> <li>2. Corrosion of domestic pipes by softened water</li> </ol>	<p>The Testing and Research Institute of the Netherlands Waterundertakings KIWA Ltd., Rijswijk, The Netherlands</p> <p>idem</p>

Research topic	Research Institution
<p>6.11 <u>Special problems of water distribution</u></p> <p>1. Water quality changes during distribution</p>	<p>The Water Research Association, Marlow, Bucks., England.</p>

5. RESEARCH PROJECTS OF EACH  
RESEARCH INSTITUTION

1. The Water Research Association

Ferry Lane, Medmenham

MARLOW, BUCKS. SL7 2HD

England

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Waste control economics	Dr. P.A. Mawer	1967	1974
- Advice by visit and letter on water supply problems	Mr. F. J. Machon	continuing	
- Algae in raw water storage reservoirs	Mr. R.W. Collingwood	1965	1975
- Organic pollutants in water	Dr. B.T. Croll	1965	1975
- Trace metals in water	Mr. A.L. Wilson	1971	1974
- General chemical analytical methods	Mr. A.L. Wilson	continuing	
- On-line monitoring of water quality	Mr. A.L. Wilson	continuing	
- Inter-laboratory checks	Mr. A.L. Wilson	continuing	
- Groundwater research	Mr. J.A. Cole	1965	1975
- Artificial recharge	Mr. Hunter Blair	1969	1974
- Evaluation of polymeric flocs	Dr. R.F. Packham	1968	1974
- Sedimentation tank design	Mr. R. Gregory	1968	1974
- Filter backwashing	Mr. C.S. Short	1971	1973
- Treatment of coloured (low turbidity) water	Mr. J.G. McNaughton	1972	1974
- Removal of trace toxic metals	Dr. R.F. Packham	1972	1973
- Removal of nitrates from borehole water	Dr. R.F. Packham	1972	1974

The Water Research Association  
 Ferry Lane, Medmenham  
MARLOW, BUCKS. SL7 2HD  
 England  
 continued

Research topic	Name of project leader	Commencement date	Estimated completion date
- Reverse osmosis	Mr. M.J. Burley	1968	1974
- Interferences to efficient disinfection	Dr. M. Hutchinson	1970	1973
- Activated carbon	Dr. D.G. Miller	1968	1974
- Flotation	Dr. R.F. Packham	1969	1973
- Sludge disposal	Mr. M.J. Burley	1971	1974
- Effect of in-house storage on water network design	Mr. D.W. Hilder	1972	1974
- Minimising pumping costs in distribution systems	Dr. P.A. Mawer	1968	1974
- Dynamic testing of plastic pipe	Mr. R.A. Chisholm	1970	1975
- Slimes and desposits in mains	Mr. R.A. Chisholm	1970	1974
- Water quality changes during distribution	Mr. R.A. Chisholm	1972	1974

2. Environmental Engineering Department  
Middle East Technical University  
ANKARA  
Turkey

Research topic	Name of project leader	Commence-ment date	Estimated completion date
- Study of PVC pipes as used in water supplies	S. Erol Uluğ Ü. Taşöz	March 1971	Sept. 1973
- Per capita water consumption and losses	S. Arceivala and staff	March 1973	March 1974
- Simulation methods in water quality	S. Arceivala - Y. Tokuz	Dec. 1971	April 1973
- Water disinfection practices	S. Arceivala - T. Arsel	Dec. 1971	Sept. 1973
- Upward flow clarification	S. Erol Uluğ - E. Koca	Dec. 1971	Sept. 1973
- Slow sand filtration	S. Erol Uluğ - S. Siber	Nov. 1971	March 1974
- Filtration and mix bed applications	A. Gür -	March 1973	March 1974
- Backwashing of R.S. filters and related methods	S. Erol Uluğ	June 1971	Sept. 1973
- Water softening, demineralization	A. Gür, Y. Oktay	March 1973	March 1974
- Anticorrosion treatment	A. Gür, F. Türkmen	March 1973	March 1974
- Computer applications to networks	S. Erol Uluğ - E. Gülbay	March 1972	March 1974
- Cost of distribution systems	S. Arceivala and staff	March 1973	March 1974



3. The Testing and Research Institute of the  
Netherlands Waterundertakings KIWA Ltd.  
P.O. Box 70  
RIJSWIJK 2109  
The Netherlands

Research topic	Name of project leader	Commencement date	Estimated completion date
- Organic pollution in surface water	Dr.Ir. A.P. Meyers	1972	continuing
- Toxicological research	Dr. C.L.M. Poels	1973	-
- Rapid filtration	-		continuing
- Desalination	Dr.Ir. D. Kuiper <sup>*)</sup>	1968	1974
- Hyperfiltration	Dr.Ir. D. Kuiper <sup>*)</sup>	1972	-
- Central softening by water works	-	1971	-
- Fluoridation and defluoridation	C.H.J. Elzenga	1966	1973
- Examination of water pipes, joints, fittings, valves and hydrants	M. Sollman		continuing
- Leaching of toxic stabilizers from uPVC water pipes	C.H.J. Elzenga	1969	1974
- Corrosion of copper service pipes	C.H.J. Elzenga <sup>*)</sup>		continuing
- Protection of distribution systems against backflow from domestic apparatus	P.J. van Winsen		
- Distribution problems	-		continuing
- Limnology of storage reservoirs	- <sup>*)</sup>	1967	-
- Organisms in water mains	C.H.J. Elzenga	1967	-

\*) In cooperation with the Netherlands Government Institute for Water Supply, The Hague

The Testing and Research Institute of the  
 Netherlands Waterundertakings KIWA Ltd.,  
RIJSWIJK 2109  
 The Netherlands  
 continued

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Bare holes	-	1968	-
- Artificial recharge	- *)	1971	-
- Microbiological research	Ir. D. v.d. Kooy	1973	-
- Biological carbon filtration	Ir. D. v.d. Kooy	1972	-
- Ozonization	Dr.Ir. A.P. Meyers	1971	-
- Research and control of water quality in pipe lines	C.H.J. Elzenga	1973	-
- Analytical techniques	Drs. W. v.d. Meent	continuing	
- Corrosion of domestic pipes by softened water	P.J. van Winsen	1971	-

\*) In cooperation with the Netherlands Government Institute for  
 Water Supply, The Hague.

4. Department of Civil Engineering  
 University of Newcastle upon Tyne  
 Claremont Road  
NEWCASTLE UPON TYNE NE1 7RU  
 England

Research topic	Name of project leader	Commencement date	Estimated completion date
- Disinfection of viruses in water using ozone	A. James	1.9.1970	31.8.1973
- Fluorescent staining techniques for the rapid detection of bacteria in water supplies	L.M. Evison	1.10.1970	30.9.1973
- The effect of environmental factors on the growth and death of intestinal bacteria	L.M. Evison	1.11.1971	28.2.1973
- The use of bifidobacterium as an indicator of faecal pollution in water	L.M. Evison	1.2.1970	30.9.1976
- Growth of cladophora in the river Stour	A. James	1.10.1971	31.3.1973
- Hydraulics factors affecting the distribution of stream invertebrates	A. James	1.10.1969	30.6.1973
- Toxicity of copper to ephemeroptera	A. James	1.10.1970	30.9.1973
- Polluting effects of steelworks effluents	B. Prater	1.10.1971	30.9.1978

5. Institute of Hygiene  
University of Aarhus  
DK 8000 AARHUS-C  
Denmark

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Examination of bacteria in water other than indicators (Nuisance bacteria)	G. Bonde	1.10.1969	31.12.1973
- Media for examination of such organisms - standards for "germ counts"	G. Bonde		

6. Environmental Protection Agency  
 National Environmental Research Center  
 Water Supply Research Laboratory  
CINCINNATI, OHIO 45268  
 U.S.A.

Research topic	Name of project leader	Commencement date	Estimated completion date
- Health criteria for organic contaminants of drinking water	R.G. Tardiff	1972	1979
- Effectiveness of reverse osmosis	Max L. Deinzer	1972	1974
- Effectiveness of ultrafiltration	Max L. Deinzer	1972	1974
- Evaluation of ion exchange resins	Fred Kopfler	1972	1974
- Total organic carbon analysis	Jack Mayer	1972	1974
- NMR Chemical identification	Robert Melton	1972	1974
- Acute toxicity of organics	R.G. Tardiff	1972	1974
- Health criteria for inorganic contaminants of drinking water	Gunther F. Craun	1972	1979
- Effect of methyl mercury on central nervous system	R.J. Bull	1972	1973
- Effects of methyl mercury on hepatic detoxification enzymes	R.G. Tardiff	1972	1973
- Effect of cadmium on renal enzymes	A. Zygmuntowicz	1971	1973
- Non-lethal genetic effects of cadmium and cobalt	A. Malcolm	1972	1974

Environmental Protection Agency  
 National Environmental Research Center  
CINCINNATI, OHIO 45268  
 U.S.A.

continued

Research topic	Name of project leader	Commencement date	Estimated completion date
- Mutagenic potential of drinking water contaminants	G.F. Craun	1973	1974
- Trace metal body burdens from drinking water	G.F. Craun	1972	1974
- Investigate problems of waterborne disease	N.A. Clarke	1971	1978
- Review of waterborne disease outbreaks	G.F. Craun	1960	1980
- Endemic occurrence of waterborne disease	F.E. Hamblet	1970	1972
- Survey of water supplies in Northeast for virus	O.C. Liu, M.D.	1969	1973
- Survey of water supplies in South for virus	E. Akin	1972	1973
- Survey of water supplies in Northwest for virus	W. Jakubowski	1972	1973
- Bacteria associated with virus in drinking water	V. Cabelli	1972	1973
- Parasites associated with virus in drinking water	S.L. Chang	1972	1974
- Condition of water supplies with virus	R. Hammerstrom	1972	1973
- Flow-through sample virus methods	P.C. Liu	1972	1973
- Sequential virus techniques	W.H. Hill	1972	1973

Environmental Protection Agency  
 National Environmental Research Center  
CINCINNATI, OHIO 45268  
 U.S.A.  
 continued

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Adsorbant virus techniques	J.C. Hoff	1972	1973
- Hepatitis virus in water	N.A. Clarke	1972	1978
- Review safety of products used in water treatment	B.J. Pringle	1970	1973
- Acrylamide monomer measurement	R. Melton	1970	1973
- Trace metals in sewage	J.D. Weeks	1971	1974
- Treatment methods for trace organics and taste-odor	J.M. Symons	1972	1975
- Develop organic monitoring techniques	E. McFarren	1972	1972
- Survey organic levels in drinking water	O.T. Love	1973	1974
- Organic treatment by adsorbants, resins and oxidants	O.T. Love	1972	1975
- Treatment methods for trace metals and nitrate	J.M. Symons	1972	1973
- Bench-scale study of inorganic and organic mercury	G. Logsdon	1972	1972
- Bench-scale study of arsenic and selenium	G. Logsdon	1972	1973
- Pilot-scale study of mercury	G. Logsdon	1973	1974
- Bench-scale study of resins for nitrate removal	R. Buelow	1972	1973

Environmental Protection Agency  
 National Environmental Research Center  
CINCINNATI, OHIO 45268  
 U.S.A.

continued

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Methods of disinfection of virus	H. Seraichekas	1970	1973
- Chlorine resistance of naturally occurring viruses	H. Seraichekas	1972	1973
- Effects of turbidity on disinfection	H. Seraichekas	1972	1973
- Evaluate chemical quality deterioration in distribution	J.M. Symons	1972	1973
- Develop automatic water quality monitor	J.M. Symons	1971	1973
- Relationship of treatment to distribution metal levels	R.A. Dangel	1972	1973
- Determine occurrence of organophorous in distributed water	F. Kopfler	1972	1973
- Study quality effects of storage	J.M. Symons	1972	1973
- Fate of polyelectrolytes in reservoirs	J.M. Symons	1973	1973
- Survival of indicator organisms and pathogens in bottom muds	H.D. Nash	1972	1973
- Evaluate bacteriological quality deterioration in distribution	E.E. Geldreich	1972	1973
- Rapid methods for indicators	D.J. Reasoner	1972	1973



Environmental Protection Agency  
National Environmental Research Center  
CINCINNATI, OHIO 45268  
U.S.A.

continued

Research topic	Name of project leader	Commence-ment date	Estimated completion date
- Bacteriological criteria for bottled water	H.D. Nash	1972	1973
- MF-plate count methods	R.C. Taylor	1972	1973
- Suppression of coliforms by other organisms	G.J. Vasconcelos	1972	1973
- Water main sanitation methods	R.W. Buelow	1973	1973

7. Department of Sanitary Engineering  
Faculty of Engineering  
Central University of Caracas  
CARACAS  
Venezuela

Research topic	Name of project leader	Commence-ment date	Estimated completion date
- Flocculation optimization through "G" and "t" - A model operated unit	G. Rivas-Mijares & Sergio Parello, Evanam Fernández	Nov. 1972	April 1973
- Amaeba cysts destruction by chlorine and iodine	G. Rivas-Mijares & M. Lewis, Carlos Thodé, Edgar Dagoi	Oct. 1972	April 1973

8. National Sanitation Foundation

P.O. Box 1468

ANN ARBOR, MICHIGAN 48106

U.S.A.

Research topic	Name of project leader	Commencement date	Estimated completion date
- Water quality monitoring - distribution systems	Dr. N.I. McClelland	1968	

9. Asian Institute of Technology

P.O. Box 2754

BANGKOK

Thailand

Research topic	Name of project leader	Commencement date	Estimated completion date
- Evaluation of the effectiveness of the Royal Thai Government's National Potable Water Project (evaluation of administrative, technical and operational factors in 165 village systems)	Dr. R.J. Frankel	June 1972	June 1973
- Pilot plant testing of two-stage water filters using local materials	Dr. R.J. Frankel	May 1972	Sept. 1973
- Development of simple low-cost water filters for individual and small community use	Dr. R.J. Frankel	June 1972	Sept. 1973
- Role of potable water in community health planning (evaluation of relationships between incidences of water rural diseases, water quality, and rural sanitation and water use habits.	Dr. R.J. Frankel	Sept. 1972	June 1973

10. Department of Sanitary Engineering, Faculty of Engineering  
University of Tokyo  
Hongo 7-3, Bunkyo-ku  
TOKYO  
Japan

Research topic	Name of project leader	Commencement date	Estimated completion date
- Dual distribution system by reuse of sewage on city renewal case	H. Aya	Jan. 1973	March 1974
- Closed system on industrial water usage	T. Ishibashi	Jan. 1973	March 1974
- Reuse of sewage - Treatment by activated carbon filter, reverse osmosis and electro-dialysis.	H. Aya		March 1974
- Experiment on up flow sedimentation	H. Aya	Jan. 1974	March 1974

11. Section of Sanitary Engineering

All India Institute of Hygiene and Public Health

110 Chittaranjan Avenue

CALCUTTA-12

India

Research topic	Name of project leader	Commencement date	Estimated completion date
- Research of shallow tube-wells and hand-made strainers	S. Subba Rao	1970	1974
- Study on hand pumps	N. Majumder	1970	1974

12. Central Public Health Engineering Research Institute

Nehru Marg

NAGPUR-440020

India

Research topic	Name of project leader	Commencement date	Estimated completion date
- Baseline studies of water quality of Hooghly Estuary	A.K. Pasu	April 1972	May 1974
- Ground water quality in Rajasthan	K.L. Saxena	Feb. 1972	Jan. 1973
- Preliminary survey of River Yamuna between Wazirabad reservoir and Okhla	J.M. Tuli	1972	1974
- Study of the concentration of organics in waters using carbon chloroform extraction method	R.C. Trivedi	Sept. 1971	Aug. 1973
- Activated silica soils	D.N. Kulkarni	July 1969	Dec. 1972
- Defluoridation of water	K.R. Bulusu	Dec. 1966	Dec. 1973
- Filter aids	M.V. Nanoti	Sept. 1969	Dec. 1972
- Filtration of water: setting up of a reference collection of coals and sands	R. Paramasivam	1972	1973
- Filtration of water: study of performance of roughing filters by utilizing model columns	R. Paramasivam	1972	1973
- Filtration of water: two-layer filtration	R. Paramasivam	1969	1973
- Filtration of water: upflow filtration	R. Paramasivam	1969	1973
- Membrane filters and their scale-up	M.V. Nanoti	April 1969	March 1974

Central Public Health Engineering Research Institute

NAGPUR-440020

India

continued

Research topic	Name of project leader	Commencement date	Estimated completion date
- M.F. technique: Development of suitable media to replace the imported and dehydrated media for membrane filters	S.R. Joshi	Aug. 1971	Dec. 1973
- Reverse osmosis	A.S. Bal	July 1971	June 1974
- Synthetic coagulant aids	M. Vidya	July 1969	Dec. 1973



13. Institute of Hygiene and Epidemiology  
 Dept. of General and Environmental Hygiene  
 Šrobárova 48  
 100 42 PRAGUE-10  
 Czechoslovakia

Research topic	Name of project leader	Commencement date	Estimated completion date
- Hygienic aspects of pollution and quality control of surface waters used for community water supply and recreation	Dr. V. Jiřík	1971	1975
- Occurrence and toxic action of pesticides in surface waters	Dr. J. Pokorný Mr. H. Culíková	1971	1975
- Biological availability of fluorine compounds in drinking water	Dr. J. Janeček	1970	1972
- Coloured refractories / polyphenol polycondensates / in surface waters - hygienic aspects and harmful action	Dr. J. Chalupa	1970	1975
- Enterobacteriae - occurrence and survival in surface waters in connection with waterborne infections	Dr. V. Jiřík and Dr. L. Mašínová	1971	1975
- Hygienic control of eutrophized waters designed for personal uses, inclusive water bloom control	Dr. M. Štěpánek	1971	1975
- Hygienic protection of impounded waters used for community water supply	Dr. J. Čuta	1971	1975
- Study of relation between drinking water hardness and cardiovascular diseases	Dr. J. Janeček	1973	1975

Institute of Hygiene and Epidemiology  
Dept. of General and Environmental Hygiene  
100 42 PRAGUE-10  
Czechoslovakia  
continued

Research topic	Name of project leader	Commence- ment date	Estimated completion date
- Analysis of water: chemical, bacteriological, biological	-	continuing	

14. Faculty of Engineering & Architecture and  
 School of Public Health  
 American University of Beirut  
BEIRUT  
 Lebanon

Research topic	Name of project leader	Commencement date	Estimated completion date
- Assessment of water quality in Lebanon	Raif Milki	May 1973	Nov. 1974
- Fluorine content of water supplies in Lebanon and some neighboring countries	Aftim Acra	May 1971	Dec. 1973
- Comparison of quality of imported and local mineral waters	Aftim Acra	Sept. 1972	June 1973
- Variations in chemical characteristics of thermal water in Lebanon	Aftim Acra	Feb. 1970	Oct. 1973
- Evaluation of local clays as potential coagulant aids in water treatment	George Ayoub	May 1973	Nov. 1974
- Bentonite as a coagulant in water purification	George Ayoub	Feb. 1973	Sept. 1973
- Novel processes for the clarification of water and waste water using local materials	Aftim Acra	May 1973	Nov. 1974
- Up-flow filtration through a floating medium	George Ayoub	June 1972	April 1973
- Biological control of bulinus snails in the Litani River	Aftim Acra	May 1973	April 1974

15. Academic Department of Sanitation  
National University of Engineering  
LIMA  
Peru

Research topic	Name of project leader	Commencement date	Estimated completion date
- Economical designs for the automatic washing of rapid filters with variable head	Ing. Carlos Ruiz Altuna	April 1973	Aug. 1973

## IRC PUBLICATIONS

### Technical Papers

- Technical Paper no. 1 - Plastic pipe in drinking water distribution practice, 1971
- Technical Paper no. 2 - The suitability of iodine and iodine compounds as disinfectants for small water supplies, 1972, B.C.J. Zoeteman
- Technical Paper no. 3 - The purification of water on a small scale, 1973 (also in French)
- Technical Paper no. 4 - Health aspects relating to the use of uPVC pipes for community water supply - Report of a Consultant Group, 1973
- Technical Paper no. 5 - Health aspects relating to the use of uPVC pipes for community water supply - Report of a Consultant Group, 1973
- Technical Paper no. 6 - The potential pollution index as a tool for river water quality management, 1973, B.C.J. Zoeteman

### Bulletins

- Bulletin no. 1 - Community Water Supply Research, 1972
- Bulletin no. 2 - Training Courses in Community Water Supply, 1972
- Bulletin no. 3 - Community Water Supply Research, 1972
- Bulletin no. 4 - The Story of CIPHERI, 1972 (out of stock)
- Bulletin no. 5 - Meeting of Directors of Institutions collaborating with the WHO International Reference Centre for Community Water Supply, Bilthoven, The Netherlands, 9-13 April 1973, Report of the Proceedings

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