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# W.F.O. International reference centre for community water supply

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## community water supply research 1971

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WORLD HEALTH ORGANIZATION  
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COMMUNITY WATER SUPPLY RESEARCH 1971

BULLETIN NO. 1

Inventory of research projects of the  
Institutions collaborating with the  
W.H.O. International Reference Centre  
for Community Water Supply

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JUNE 1971

THE HAGUE - THE NETHERLANDS

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INTRODUCTION

Research co-ordination is one of the tasks of the W.H.O. International Reference Centre for Community Water Supply.

This bulletin gives a compilation of the research items of the Collaborating Institutions and is based on information provided by the Collaborating Institutions at the beginning of 1971.

The aim of this paper is to enable research workers in the field of community water supply to get into contact with his colleagues about problems of mutual interest.

With regard to research projects, a general classification of community water supply topics has been elaborated.

All research projects have been classified according to this classification. Next to the research topic the name of the project leader is mentioned and an indication is made if papers or reports are available for dissemination.

It is intended that I.R.C. repeats this collection of information every year in order to get an up to date review of the research undertaken by the Collaborating Institutions.

I.R.C. hopes that this information will result into an intensive exchange of research findings and programs.

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COLLABORATING INSTITUTIONS AS OF JANUARY 1, 1971

1. Office de la Recherche Scientifique Outre-Mer, France
2. The Water Research Association, England
3. Sanitary Engineering Laboratory, Middle East Technical University, Turkey
4. Consiglio Nazionale delle Ricerche, Italy
5. Centre of Sanitary Engineering, The University of Naples, Italy
6. Testing and Research Institute of the Netherlands Waterundertakings  
KIWA Ltd., The Netherlands
7. Department of Civil Engineering, University of Newcastle-upon-Tyne, England
8. The Institute of Hygiene, The University of Aarhus, Denmark
9. Faculty of Engineering and Architecture, University of Khartoum, Sudan
10. Sanitary Engineering Department, The University of Alexandria, U.A.R.
11. The Hebrew University, Hadassah Medical School, Israel
12. Division of Water Hygiene, Environmental Protection Agency, U.S.A.
13. Department of Environmental Sciences and Engineering, University of  
North Carolina, U.S.A.
14. Department of Environmental Engineering, University of Florida, U.S.A.
15. Instituto de Engenharia Sanitaria, Brazil
16. Department of Sanitary Engineering, Central University of Venezuela,  
Venezuela.
17. National Sanitation Foundation, U.S.A.
18. Civil Engineering Department, University of Science and Technology, Ghana
19. Faculty of Engineering, University of Lagos, Nigeria
20. The Victoria Jubilee Technical Institute, India
21. Asian Institute of Technology, Thailand
22. Faculty of Engineering, University of Tokyo, Japan
23. The All-India Institute of Hygiene and Public Health, India
24. Central Public Health Engineering Research Institute, India
25. The University of Nairobi, Kenya
26. Institute of Hydro Sciences and Water Resources Technology, Iran
27. Department of General and Environmental Hygiene, The Institute of Hygiene  
and Epidemiology, Czechoslovakia
28. Centre Belge d'Etude et de Documentation des Eaux CEBEDEAU, Belgium

## 2. 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 distribution 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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3. CLASSIFIED RESEARCH PROJECTS

1. WATER SUPPLY - GENERAL

Research topic	Research Institution
1.1 <u>Historical survey</u>	
1.2 <u>Water and environmental hygiene</u>	
1. Study of new piping materials on toxicity to water supplies.	Sanitary Engineering Laboratory, Middle-East Technical University, Ankara, Turkey.
2. Trace metals in water supplies.	Consiglio Nazionale delle Ricerche, Rome, Italy.
3. Toxicity of coagulant aids.	The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.
4. Use of highly alkaline waters in absence of distribution pipe network.	Civil Engineering Department, University of Khartoum, Khartoum, Sudan.
5. Health effects of nitrates in drinking water.	The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.
6. Health effects of nitrates in drinking water.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
7. Epidemiological study of correlation of water quality and disease.	idem
8. Toxicological investigations of organic found in water supplies.	idem
9. Health effects of toxic chemicals within the water environment.	idem
10. Investigations on water-borne disease etiology.	idem

Research topic	Research Institution
11. Investigation of water-borne disease outbreaks.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
12. Development and application of quantitative tissue culture methods to environmental problems in chemical toxicology.	idem
13. Occurrence of human enteric viruses in drinking water.	idem
14. Protection of public health.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
15. Impact of the potable water project on village life.	Asian Institute of Technology, Bangkok, Thailand.
16. Survey of waters for enteric viruses.	Central Public Health Engineering Research Institute, Nagpur, India.
17. Reduction of micro-organisms at different stages of water treatment.	idem
18. Hygienic protection of surface waters (with special respect to drinking water reservoirs).	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
19. Maximum allowable concentrations of toxic (harmful) substances in water.	idem
20. Trace elements metabolism in warm-blooded organisms, toxic effects.	idem
1.3 <u>Water supply categories and schemes</u>	
1. Conventional methods of city water supplies and its development.	Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.

Research topic	Research Institution
<p>2. Ground water supplies for isolated areas.</p> <p>3. Feasibility of dual water supplies.</p> <p>4. Regionalization of community water supplies.</p> <p>5. Development of indigenous technology in water supplies in developing countries.</p> <p>6. Managing metropolitan area water systems.</p>	<p>Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.</p> <p>Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.</p> <p>idem</p> <p>idem</p> <p>Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.</p>
<p>1.4 <u>Demand for water and water consumption</u></p>	
<p>1.5 <u>Water for fire purposes</u></p>	
<p>1.6 <u>Sociology of community water supply</u></p> <p>1. Impact of the potable water project on village life.</p>	<p>Asian Institute of Technology, Bangkok, Thailand.</p>
<p>1.7 <u>Planning</u></p> <p>1. Scale and timing in water supply investment.</p>	<p>Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.</p>

Research topic	Research Institution
1.8 <u>Financing</u>	
1.9 <u>Economics</u>	
1. Economics of water supply engineering.	The Water Research Association, Marlow, England.
2. Economics of water supply engineering.	Consiglio Nazionale delle Ricerche, Rome, Italy.
3. Study of methods for providing inexpensive potable water to small communities in Asia.	Asian Institute of Technology, Bangkok, Thailand.
4. Cost of potable water in rural communities of Thailand.	idem
1.10 <u>Legislation</u>	
1.11 <u>Manpower</u>	
1.12 <u>Research</u>	
1.13 <u>Standardization</u>	
1.14 <u>Statistics</u>	
1.15 <u>Water utilities</u>	

Research topic	Research Institution
<p>1.16 <u>Local authorities</u></p> <hr/>	
<p>1.17 <u>National agencies and policy</u></p> <ol style="list-style-type: none"> <li>1. Study of methods for providing inexpensive potable water to small communities in Asia.</li> <li>2. Evaluation of the National Potable Water Project in Thailand.</li> </ol>	<p>Asian Institute of Technology, Bangkok, Thailand.</p> <p>idem</p>
<p>1.18 <u>International Cooperation</u></p> <hr/>	
<p>1.19 <u>Quality of water supplies</u></p> <ol style="list-style-type: none"> <li>1. Demineralization of ground water supplies.</li> <li>2. Toxicological investigations of organic found in water supplies.</li> <li>3. Surveillance of drinking water quality.</li> <li>4. Arsenic in water supply in Venezuela.</li> <li>5. Bacteriological quality of rural water supplies in Thailand.</li> <li>6. Biology and control of nuisance causing organisms in water supplies.</li> </ol>	<p>Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.</p> <p>Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.</p> <p>Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.</p> <p>Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.</p> <p>Asian Institute of Technology, Bangkok, Thailand.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>

Research topic	Research Institution
<p>1.20 <u>Reuse of waste water</u></p> <ol style="list-style-type: none"> <li>1. Reuse of water, Dallas Project.</li> <li>2. Reclamation of water from oxidation ponds for human and industrial reuse.</li> <li>3. Reuse of sewage (filtration by activated carbon bed, electro dialysis).</li> </ol>	<p>Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.</p> <p>Asian Institute of Technology, Bangkok, Thailand.</p> <p>Department of City Planning and Sanitary Engineering, University of Tokyo, Tokyo, Japan.</p>
<p>1.21 <u>Water losses in water supplies</u></p> <ol style="list-style-type: none"> <li>1. Wastage of water.</li> <li>2. Water losses in distribution systems.</li> <li>3. Leakage detection and wastage prevention in water mains.</li> </ol>	<p>The Water Research Association, Marlow, England.</p> <p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>
<p>1.22 <u>Geographical survey</u></p> <ol style="list-style-type: none"> <li>1. Study of methods for providing inexpensive potable water to small communities in Asia.</li> <li>2. Bacteriological quality of rural water supplies in Thailand.</li> <li>3. Cost of potable water in rural communities in Thailand.</li> <li>4. Evaluation of the National Potable Water Project in Thailand.</li> </ol>	<p>Asian Institute of Technology, Bangkok, Thailand.</p> <p>idem</p> <p>idem</p> <p>idem</p>

Research topic	Research Institution
5. Arsenic in water supply in Venezuela.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
6. Research on water quality improvement in Iran including desalination and pollution control.	Institute of Hydro Sciences and Water Resources Technology, Teheran, Iran.
7. Ground water survey from the existing dug and tube wells in Bombay to determine the yield, quality of water, etc.	Victoria Jubilee Technical Institute, Bombay, India.
1.23 <u>Other problems</u>	
1. Management technique.	Consiglio Nazionale delle Ricerche, Rome, Italy.
2. Study of hand pumps for rural water supplies.	The All-India Institute of Hygiene and Public Health, Calcutta, India.

2. WATER QUALITY

Research topic	Research Institution
<p>2.1 <u>Water quality - general</u></p> <ol style="list-style-type: none"> <li>1. Effluent standards and water quality criteria.</li> <li>2. Trace metals in water supplies.</li> <li>3. Water treatment chemistry.</li> <li>4. Maximum allowable concentrations of toxic (harmful) substances in water.</li> </ol>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>idem</p> <p>Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.</p> <p>Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.</p>
<p>2.2 <u>Quality of natural waters and contaminants.</u></p> <ol style="list-style-type: none"> <li>1. Research on new pollution problems in water likely to arise due to widespread use of domestic and agricultural chemicals and establishment of factories.</li> <li>2. Control of stream pollution.</li> <li>3. Surface water pollution caused by the principal pesticides and herbicides.</li> <li>4. Effluent standards and water quality criteria.</li> <li>5. Organic pollution in surface water.</li> </ol>	<p>Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.</p> <p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>idem</p> <p>idem</p> <p>The Testing and Research Institute KIWA Ltd. Rijswijk, The Netherlands.</p>



Research topic	Research Institution
6. Water quality improvement in impoundment lakes.	Department of Civil Engineering, University of Newcastle-upon-Tyne, Newcastle-upon-Tyne, England.
7. Biological indicators of water pollution, in particular aerobic spore formers and clostridium perfringens.	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
8. Microchemical pollution by fungicides and mercury.	idem
9. Behavior and control of contaminants in surface waters.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
10. Effect of industrial pollutants on water quality.	idem
11. Chemical pollutants in the water environment.	idem
12. Controlling pollution caused by heated water discharges, oil and sediments.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
13. Chemical indicators of fecal pollution.	idem
14. Sanitary survey of Valencia Lake.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
15. Sanitary study of the San Pedro and Guaire Rivers.	idem
16. Evaluation of the sanitary quality of the water to be used in the tropical experimental station.	idem

Research topic	Research Institution
17. Trace metals in water supplies - at the source and in the distribution system.	National Sanitation Foundation, Ann Arbor, Michigan, U.S.A.
18. Studies on stream pollution using digital computer.	Victoria Jubilee Technical Institute, Bombay, India.
19. Hygienic protection of surface waters (with special respect to drinking water reservoirs).	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
20. Water quality management of impoundments.	Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.
2.3 <u>Physical characteristics of water</u>	
2.4 <u>Chemical characteristics of water and chemical substances in water.</u>	
1. Research on new pollution problems in water likely to arise due to widespread use of domestic and agricultural chemicals and establishment of factories.	Sanitary Engineering Laboratory, Middle-East Technical University, Ankara, Turkey.
2. Surface water pollution caused by the principal pesticides and herbicides.	Consiglio Nazionale delle Ricerche, Rome, Italy.
3. Synthetic detergents.	idem
4. Contaminating agents, aromatic polycyclic hydrocarbons.	idem
5. Trace metals in water supplies.	idem
6. Microchemical pollution by fungicides and mercury.	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.

Research topic	Research Institution
7. Chemical pollutants in the water environment.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
8. Arsenic in water supply in Venezuela.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
9. Trace metals in water supplies - at the source and in the distribution system.	National Sanitation Foundation, Ann Arbor, Michigan, U.S.A.
10. Humic acids, refractories.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
<u>2.5 Microorganisms in water (Microbiology)</u>	
1. Isolating and identifying virus strains in surface water.	Consiglio Nazionale delle Ricerche, Rome, Italy.
2. Microorganisms used as tracers.	idem
3. Dispersion and die-away of bacteria in sea water and streams.	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
4. Nuisance bacteria.	idem
5. Dispersion and die-away of bacteria and viruses in streams and sea water.	The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.
6. Antiviral activity in natural waters.	idem
7. Enteric virus survival in estuarine water.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
8. Effect of viral configuration on virus transmission by water.	idem
9. Detection of pathogens in water.	idem

Research topic	Research Institution
10. Bacterial survey of marine bottom silt.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
11. Occurrence of human enteric viruses in drinking water.	idem
12. Chemical indicators of fecal pollution.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
13. Die-away of E.coli in marine water for several temperatures.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
14. Development of synthetic medium for bacteriological analysis of water.	Central Public Health Engineering Research Institute, Nagpur, India.
15. Survey of waters for enteric viruses.	idem
2.6 <u>Organic life in water (Hydrobiology)</u>	
1. Hydrobiological problems.	Office de la Recherche Scientifique et Technique Outre-Mer, Paris, France.
2. Algae in stored water.	The Water Research Association, Marlow, England.
3. Eutrophication of sea water.	Consiglio Nazionale delle Ricerche, Rome, Italy
4. Biological indicators of water pollution, in particular aerobic spore formers and clostridium perfringens.	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
5. Algae control.	Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.

Research topic	Research Institution
6. Quantitative recovery of <i>P. aeruginosa</i> from potable and recreational waters.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
7. Predicting ecologic change.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
8. Phytoplankton of Valencia Lake.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
9. Biology and control of nuisance causing organisms in water supplies.	Central Public Health Engineering Research Institute, Nagpur, India.
10. Control of aquatic weeds by biological methods.	idem
11. Trace elements metabolism in warmblooded organisms, toxic effects.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
12. Water bloom control.	idem
2.7 <u>Radioactivity and radioactive substances in water.</u>	
2.8 <u>Technique of examination of water</u>	
1. Procedures for biological and chemical analysis.	The Water Research Association, Marlow, England.
2. Methods of examination of water.	Consiglio Nazionale delle Ricerche, Rome, Italy.

Research topic	Research Institution
3. Statistical evaluation of data about the precision and accuracy of techniques used in the bacteriological, chemical and biological laboratories.	Consiglio Nazionale delle Ricerche, Rome, Italy.
4. Microorganisms used as tracers.	idem
5. Neutron activation technique (Ag, As, Au, Co, Cr, Hg, Re, Sb, U, Zn)	idem
6. Methods of examination of water.	Centro Studi e Ricerche di Ingegneria Sanitaria della Universita di Napoli, Naples, Italy.
7. Use of anaerobic lactobacilli in the examination of drinking water.	Department of Civil Engineering, University of Newcastle-upon-Tyne, Newcastle-upon-Tyne, England.
8. Rapid detection of Coliforms with fluorescent antibodies.	idem
9. Analysis of phosphates and organic material.	Institute of Hygiene, University of Aarhus, Aarhus, Denmark.
10. Detection and quantification of Salmonella sp. in water.	idem
11. Statistical evaluation of bacteriological methods.	idem
12. Methods for detecting enteroviruses in water.	The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.
13. Method development for examining water and shellfish for viral pollutants.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
14. Direct low temperature enumeration methods for fecal coliforms in water.	idem

Research topic	Research Institution
15. Rapid method for detection of fecal coliforms.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
16. Detection and quantitation of pathogenic bacteria in water.	idem
17. Detection of pathogens in water.	idem
18. Direct methods for the enumeration of salmonella in water.	idem
19. Development of methodology for quantitation of free monomer in polyacrylamide.	idem
20. Methodology development for chemical indicators of fecal pollution.	idem
21. Analytical method evaluation and quality control.	idem
22. Field test for free chlorine.	Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.
23. Chemical indicators of fecal pollution.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
24. Comparative studies on the filtering membrane method and the lacteous broth multiple tubes method, in the coliform group research.	Instituto de Engenharia Sanitaria, Rio de Janeiro, Brazil
25. Statistical evaluation of data about the precision and accuracy of techniques used in the bacteriological, chemical and biological laboratories.	idem

Research topic	Research Institution
26. Influence of temperature on BOD variation of coef. of temperature (values).	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
27. Development of membrane filters.	Central Public Health Engineering Research Institute, Nagpur, India.
28. Development of synthetic medium for bacteriological analysis of water.	idem
29. Humic acids, refractories.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
30. Analysis of water: chemical, bacteriological, biological.	idem
2.9 <u>Standards on water quality in water sources.</u>	
1. Effluent standards and water quality criteria.	Consiglio Nazionale delle Ricerche, Rome, Italy.
2. Evaluation of the sanitary quality of the water to be used in the tropical experimental station.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
2.10 <u>Drinking water quality standards</u>	
1. Water quality criteria.	Centro Studi e Ricerche di Ingegneria Sanitaria delle Universita di Napoli, Naples, Italy.



Research topic	Research Institution
<p>2.11 <u>Industrial water quality standards</u></p> <p>1. Industrial water requirements.</p>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p>
<p>2.12 <u>Self-purification of waters</u></p> <p>1. Bio-ecological phenomena in relation to the self-purification.</p> <p>2. Biological succession of self-purification processes in polluted streams.</p> <p>3. Use of several types of weirs for the aeration of waters.</p> <p>4. Confiability of BOD methods for determining the dioxygenation constant.</p> <p>5. Study of the effect of aeration on the self-purification of water in Kidderpore docks, Calcutta.</p> <p>6. The role of photosynthesis in stream sanitation.</p> <p>7. The phenomenon of nitrification in a channel.</p>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.</p> <p>Instituto de Engenharia Sanitária, Rio de Janeiro, Brazil.</p> <p>Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.</p> <p>The All-India Institute of Hygiene and Public Health, Calcutta, India.</p> <p>Centre Belge d'Etude et de Documentation des Eaux CEBEDEAU, Liege, Belgium.</p> <p>idem</p>
<p>2.13 <u>Water quality control</u></p> <p>1. Control of stream pollution.</p> <p>2. Surface water quality monitoring.</p>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>idem</p>

Research topic	Research Institution
3. Control of stream pollution.	Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.
4. Behavior and control of contaminants in surface waters.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
5. Analytical method evaluation and quality control.	idem
6. Controlling pollution caused by heated water discharges, oil and sediments.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
7. Control of aquatic weeds by biological methods.	Central Public Health Engineering Research Institute, Nagpur, India.
8. Research on water quality improvement in Iran including desalination and pollution control.	Institute of Hydro Sciences and Water Resources Technology, Teheran, Iran.
9. Water bloom control.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
2.14 <u>Water quality deterioration in distribution systems.</u>	
1. Study of new piping materials on toxicity to water supplies.	Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.
2. Protection of the water quality in distribution systems.	The Testing and Research Institute KIWA Ltd. Rijswijk, The Netherlands.
3. Organisms in water mains.	idem
4. Leaching of toxic stabilizers from uPVC pipes.	idem

Research topic	Research Institution
<p>5. Water quality deterioration in distribution systems.</p> <p>6. Trace metals in water supplies - at the source and in the distribution system.</p>	<p>National Sanitation Foundation, Ann Arbor, Michigan, U.S.A.</p> <p>idem</p>
<p>2.15 <u>Economic evaluation of water quality</u></p>	
<p>2.16 <u>Other problems</u></p> <p>1. Water quality study on two distinct villages (CENTO project).</p> <p>2. Evaluation of bathing beach criteria.</p> <p>3. Use of highly alkaline waters in absence of distribution pipe network.</p> <p>4. Development of data for bathing beach criteria.</p> <p>5. Bench scale biofiltration performance related to BOD removal and nitrogen transformation.</p> <p>6. Seasonal variations in quality of hand-pump waters.</p>	<p>Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.</p> <p>Institute of Hygiene, University of Aarhus, Aarhus, Denmark.</p> <p>Civil Engineering Department, University of Khartoum, Khartoum, Sudan.</p> <p>Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.</p> <p>Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>

3. WATER CATCHMENT

Research topic	Research Institution
3.1 <u>Water catchment general</u>	
3.2 <u>Water supply sources</u>	
1. Hydrological systems.	Office de la Recherche Scientifique et Technique Outre-Mer, Paris, France.
2. Hydrological problems.	idem
3. Rainfall and river flow data.	The Water Research Association, Marlow, England.
4. River flow measurement.	idem.
5. Ground water abstraction and recharge.	idem
6. Hydrological problems.	Consiglio Nazionale delle Ricerche, Rome, Italy.
7. Improving regional water resource planning and management.	idem
8. System for the classification of inland waters.	idem
9. Groundwater abstraction and recharge.	idem
10. Rainfall and river flow data.	idem
11. Estuaries.	idem
12. Preparation of water maps in different areas.	idem
13. Use of models in ground-water investigations.	idem
14. Interdisciplinary study of Tiber river basin.	idem

Research topic	Research Institution
15. Computer simulation of aquifers.	Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.
16. Improving regional water resource planning and management.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
17. Hydrological problems.	Department of Civil Engineering, University of Science and Technology, Kumasi, Ghana.
18. Ground water survey from the existing dug and tube wells in Bombay to determine the yield, quality of water, etc.	Victoria Jubilee Technical Institute, Bombay, India.
19. Preparations of water maps in different states.	Central Public Health Engineering Research Institute, Nagpur, India.
20. Ground water recharge.	idem
21. Extension of information on solar radiation for hydrologic computations.	Institute of Hydro-Sciences and Water Resources Technology, Teheran, Iran.
22. Use of models in ground water investigations.	idem
23. Evapotranspiration in Iran.	idem
24. Friction factors in alluvial channels.	idem
25. Magnitude of watershed erosion in Iran and its control.	idem
26. Hygienic protection of surface waters (with special respect to drinking water reservoirs).	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.

Research topic	Research Institution
<p>3.3 <u>Subsurface water intake works.</u></p> <ol style="list-style-type: none"><li>1. Bored wells.</li><li>2. Ground water survey from the existing dug and tube wells in Bombay to determine the yield, quality of water, etc.</li><li>3. Investigation on shallow tube wells and hand made strainers.</li></ol>	<p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>Victoria Jubilee Technical Institute, Bombay, India.</p> <p>The All-India Institute of Hygiene and Public Health, Calcutta, India.</p>
<p>3.4 <u>Surface water intake works</u></p> <ol style="list-style-type: none"><li>1. Siltation and water intake problem.</li></ol>	<p>Department of Civil Engineering, University of Science and Technology, Kumasi, Ghana.</p>
<p>3.5 <u>Special problems of water catchment</u></p> <hr/>	

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> <ol style="list-style-type: none"><li>1. Water treatment chemistry.</li><li>2. Water treatment plants.</li><li>3. Reduction of micro-organisms at different stages of water treatment.</li></ol>	<p>The Water Research Association, Marlow, England.</p> <p>idem</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</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> <ol style="list-style-type: none"><li>1. Study of upward-flow sedimentation and flocculation basin.</li><li>2. Toxicity of coagulant aids.</li><li>3. Clarification of water by sludge blanket units.</li><li>4. Recovery and re-use of alum</li></ol>	<p>Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.</p> <p>The Testing and Research Institute KIWA Ltd. Rijswijk, The Netherlands.</p> <p>Centro Studi e Ricerche di Ingegneria Sanitaria delle Universita di Napoli, Naples, Italy.</p> <p>Department of Civil Engineering, University of Newcastle-upon- Tyne, Newcastle-upon-Tyne, England.</p>



Research topic	Research Institution
5. Use of starch as a coagulant.	Civil Engineering Department, University of Khartoum, Khartoum, Sudan.
6. New metal salt coagulants.	Department of Environmental Engineering, University of Florida, Gainesville, Florida, U.S.A.
7. Determination of optimum coagu- lant dose by colloidal titration.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
8. Sedimentation tanks.	Victoria Jubilee Technical Institute, Bombay, India.
9. Flocculation by using many per- forated plates in horizontal flow sedimentation tank.	Department of City Planning and Sanitary Engineering, University of Tokyo, Tokyo, Japan.
10. Development of coagulant aids.	Central Public Health Engineering Research Institute, Nagpur, India.
11. Development of activated alumina, activated silica.	idem
12. Coagulation in water treatment.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
5.5 <u>Filtration</u>	
1. Study on filtration theories and mixed bed applications.	Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.
2. Study of backwashing of rapid sand filters related theories.	idem

Research topic	Research Institution
3. Simple equipment for filtering and chlorination for installation in villages.	Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.
4. Filtration of water.	The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.
5. Filtration of water.	Centro Studi e Ricerche di Ingegneria Sanitaria della Università di Napoli, Naples, Italy.
6. Nitrate removal by slow sand filtration.	Civil Engineering Department, University of Khartoum, Khartoum, Sudan.
7. Sulphate removal by slow sand filtration.	idem
8. Filter pump system for small communities.	idem
9. Water filtering through double layer beds: anthracite and sand.	Instituto de Engenharia Sanitária, Rio de Janeiro, Brazil
10. Upflow filtration in incipient and partial fluidised sand beds.	Department of Sanitary Engineering, Universidad Central Venezuela, Caracas, Venezuela.
11. Upflow filters.	Victoria Jubilee Technical Institute, Bombay, India.
12. Filtration of water by micro-floc method.	Department of City Planning and Sanitary Engineering, University of Tokyo, Tokyo, Japan.
13. Development of filter aids.	Central Public Health Engineering Research Institute, Nagpur, India.

Research topic	Research Institution
14. Sand filtration of water in general.	Central Public Health Engineering Research Institute, Nagpur, India.
15. Two-layer filtration.	idem
16. Optimisation in the design of water filtration system with the help of computers.	idem
17. Upflow filtration.	idem
18. Optimisation of rapid sand filters for water treatment.	The University of Nairobi, Nairobi, Kenya.
5.6 <u>Iron-manganese-colour removal</u>	
1. Manganese removal from ground water.	The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.
2. Iron and manganese removal.	Central Public Health Engineering Research Institute, Nagpur, India.
5.7 <u>Softening and demineralization</u>	
1. Sulphate removal by ion exchange.	Consiglio Nazionale delle Ricerche, Rome, Italy.
2. Softening and demineralization of water.	The Testing and Research Institute KIWA Ltd. Rijswijk, The Netherlands.
3. Demineralization of ground water supplies.	Sanitary Engineering Department, Alexandria University, Alexandria, U.A.R.
5.8 <u>Antiscale and anticorrosion treatment.</u>	

Research topic	Research Institution
<p>5.9 <u>Desalination</u></p> <ol style="list-style-type: none"><li>1. Desalination.</li> <li>2. Desalination.</li> <li>3. Desalination by reverse osmosis.</li></ol>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>
<p>5.10 <u>Removal of radionuclides.</u></p>	
<p>5.11 <u>Fluoridation and defluoridation</u></p> <ol style="list-style-type: none"><li>1. Fluoridation of water.</li> <li>2. Development of a new defluoridation material "Defluoron-2"</li> <li>3. Fluoridation of water.</li></ol>	<p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p> <p>Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.</p>
<p>5.12 <u>Disinfection</u></p> <ol style="list-style-type: none"><li>1. Simple equipment for filtering and chlorination for installation in villages.</li> <li>2. Efficiency of ozone for virus disinfection.</li></ol>	<p>Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.</p> <p>Department of Civil Engineering, University of Newcastle-upon-Tyne, Newcastle-upon-Tyne, England.</p>

Research topic	Research Institution
3. Disinfection of enteroviruses in water.	The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.
4. Regrowth of coliform organisms after chlorination of water.	idem
5. Coliform organisms resistant to chlorination.	idem
6. Effect of chlorination on human enteric viruses.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
7. Field test for free chlorine.	Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.
8. Double-action tablets for removal of turbidity and disinfection of water.	Central Public Health Engineering Research Institute, Nagpur, India.
9. Sulphanic acid in chlorine stabilisation.	idem
10. Disinfection of water.	Institute of Hygiene and Epidemiology, Prague, Czechoslovakia.
5.13 <u>Other methods of water treatment.</u>	
5.15 <u>Economics of water treatment.</u>	
5.15 <u>Special problems of water treatment.</u> 1. Biological methods of water treatment for rural areas and disaster conditions.	Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.

Research topic	Research Institution
2. Efficiency control of water treatment plant units by means of tracers.	Consiglio Nazionale delle Ricerche, Rome, Italy.
3. Small and movable units for water treatment.	Sanitary Engineering Department, Alexandria, University, Alexandria, U.A.R.
4. Removal of nitrates from water and waste-water.	The Hebrew University, Environmental Health Laboratory, Jerusalem, Israel.
5. The removal of mercury from industrial wastes by algal bacterial photosynthetic processes.	idem
6. Removal of inorganic contaminants.	Division of Water Hygiene, Environmental Protection Agency, Washington, U.S.A.
7. Removal of organic contaminants.	idem
8. Quantitative recovery of <i>P. aeruginosa</i> from potable and recreational waters.	idem
9. Development of a prototype for removal of organics from water.	idem
10. Efficiency control of water treatment plant units by means of tracers.	Instituto de Engenharia Sanitária, Institute of Sanitary Engineering, Rio de Janeiro, Brazil.
11. Reuse of sewage (filtration by activated carbon bed, electro dialysis).	Department of City Planning and Sanitary Engineering, University of Tokyo, Tokyo, Japan.

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. Distribution network analysis. 2. Distribution network analysis. 3. Balancing of water distribution networks with linear and non-linear bounding conditions. 4. Electric analyser for water distribution network.	The Water Research Association, Marlow, England.  The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.  Victoria Jubilee Technical Institute,  Central Public Health Engineering Research Institute, Nagpur, India.
6.4 <u>Distribution system storage facilities.</u> 1. Behaviour of water in reservoirs.	The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.
6.5 <u>Pipe materials, coatings, linings, and joints for water distribution systems.</u> 1. Study of new piping materials on toxicity to water supplies.	Sanitary Engineering Laboratory, Middle East Technical University, Ankara, Turkey.

Research topic	Research Institution
<p>2. Examination of water pipes, joints, fittings, valves and hydrants.</p> <p>3. Leaching of toxic stabilizers from uPVC pipes.</p> <p>4. Plastic pipe in water systems.</p> <p>5. Use of plastic pipes in water supplies.</p>	<p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>idem</p> <p>Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina, U.S.A.</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>
<p>6.6 <u>Valves and hydrants</u></p>	
<p>6.7 <u>Water meters and water metering</u></p> <p>1. Water metering in water supply systems.</p> <p>2. Water metering in water supply systems.</p>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</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> <p>1. Sanitation, cleaning and chlorination of main systems.</p> <p>2. Water losses in distribution systems.</p>	<p>The Water Research Association, Marlow, England.</p> <p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p>



Research topic	Research Institution
<p>3. Water losses in distribution systems.</p> <p>4. Protection of the water quality in distribution systems.</p> <p>5. Organisms in water mains.</p> <p>6. Water quality deterioration in distribution systems.</p> <p>7. Trace metals in water supplies - at the source and in the distribution system.</p> <p>8. Leakage detection and wastage prevention in water mains.</p>	<p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>idem</p> <p>idem</p> <p>National Sanitation Foundation Ann Arbor, Michigan, U.S.A.</p> <p>idem</p> <p>Central Public Health Engineering Research Institute, Nagpur, India.</p>
<p>6.10 <u>Metallic corrosion and protection of mains against corrosion.</u></p> <p>1. Corrosion processes.</p> <p>2. Corrosion of copper service pipes.</p> <p>3. Laboratory investigations of the atmospherical corrosion of constructional steel.</p> <p>4. Kinetics of the atmospherical corrosion of steel.</p>	<p>Consiglio Nazionale delle Ricerche, Rome, Italy.</p> <p>The Testing and Research Institute KIWA Ltd., Rijswijk, The Netherlands.</p> <p>Centre Belge d'Etude et de Documentation des Eaux CEBEDEAU, Liege, Belgium.</p> <p>idem</p>
<p>6.11 <u>Special problems of water distribution.</u></p> <hr/>	

1. Office de la Recherche Scientifique et Technique Outre-Mer  
Service Central Hydrologique  
19, Rue Eugène Carrière  
75-PARIS-18e  
France

Research topic	Name of project leader	Papers/reports available for dissemination.
- Hydrological systems	M. Marcel Roche	yes
- Hydrological problems	MM. Pierre Dubreuil Jean Rodier	yes
- Hydrobiological problems	M. Marc Mouraret	yes

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

Research topic	Name of project leader	Papers/reports available for dissemination.
- Rainfall and river flow data.	Mr. J.A. Cole	
- River flow measurement.	Mr. R.A. Chisholm	
- Ground water abstraction and recharge.	Mr. A. Hunter Blair	
- Algae in stored water.	Mr. R.W. Collingwood	
- Procedures for biological and chemical analysis.	Mr. A.L. Wilson	
- Water treatment chemistry.	Dr. F.R. Packham	
- Water treatment plants.	Dr. D.G. Miller	
- Distribution network analysis.	Mr. B.D. Field	
- Sanitation, cleaning and chlorination of main systems.	Dr. M. Hutchinson	
- Wastage of water.	Mr. R.A. Chisholm	
- Economics of water supply engineering.	Dr. P.A. Mawer	
<p>* Water Research Association reports are generally only available to Members of the W.R.A. Reprints of papers given by W.R.A. Staff to Journals and Learned Societies are available on request (as long as stocks last). Specific enquiries will be answered by letter.</p>		

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

Research topic	Name of project leader	Papers/reports available for dissemination.
- Biological methods of water treatment for rural areas and disaster conditions.	Dr. S. Erol Ulug	no
- Study of filtration theories and mixed bed applications.	Dr. Adnan Gür	yes
- Study of backwashing of rapid sand filters related theories.	Dr. S. Erol Ulug	yes
- Study of upward-flow sedimentation and flocculation basin.	idem	no
- Simple equipment for filtering and chlorination for installation in villages.	idem	no
- Study of new piping materials on toxicity to water supplies.	idem	no
- Research on new pollution problems in water likely to arise due to widespread use of domestic and agricultural chemicals and establishment of factories.	idem	no
- Water quality study on two distinct villages (CENTO project).	Dr. S. Erol Ulug Dr. N. Tekirli	no

4. Consiglio Nazionale delle Ricerche  
Istituto di Ricerca sulle Acque  
Via Reno 1  
ROME  
Italy

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Interdisciplinary study of Tiber river basin.</li><li>- Methods of examination of water.</li><li>- Desalination.</li><li>- Control of stream pollution.</li><li>- Statistical evaluation of data about the precision and accuracy of techniques used in the bacteriological, chemical and biological laboratories.</li><li>- System for the classification of inland waters.</li><li>- Effluent standards and water quality criteria.</li><li>- Trace metals in water supplies.</li><li>- Rainfall and river flow data.</li><li>- Surface water quality monitoring.</li><li>- Synthetic detergents.</li><li>- Neutron activation technique (Ag, As, Au, Co, Cr, Hg, Re, Sb, U, Zn)</li></ul>		

Consiglio Nazionale delle Ricerche  
ROME  
Italy

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Preparation of water maps in different areas.</li><li>- Use of models in ground water investigations.</li><li>- Eutrophication of seawater.</li><li>- Ground water abstraction and recharge.</li><li>- Sulphate removal by ion exchange.</li><li>- Corrosion processes.</li><li>- Efficiency control of water treatment plant units by means of tracers.</li><li>- Economics of water supply engineering.</li><li>- Bio-ecological phenomena in relation to the self-purification.</li><li>- Microorganisms used as tracers.</li><li>- Isolating and identifying virus strains in surface water.</li></ul>		

Consiglio Nazionale delle Ricerche

ROME

Italy

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Surface water pollution caused by the principal pesticides and herbicides.</li><li>- Contaminating agents: aromatic polycyclic hydrocarbons.</li><li>- Estuaries.</li><li>- Management technique.</li><li>- Industrial water requirement.</li><li>- Hydrological problems.</li><li>- Improving regional water resource planning and management.</li><li>- Water losses in distribution systems.</li><li>- Water metering in water supply systems.</li></ul>		

5. Centro Studi e Ricerche di Ingegneria Sanitaria della Università di Napoli  
(Centre of Study and Research of Sanitary Engineering of the University  
of Naples)

Via Claudio 21

NAPLES

Italy

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Water quality criteria.</li><li>- Methods of examination of water.</li><li>- Clarification of water by sludge blanket units.</li><li>- Filtration of water.</li></ul>		



6. The Testing and Research Institute of the Netherlands Waterundertakings  
 KIWA Ltd.,  
 Sir Winston Churchill-laan 273  
RIJSWIJK 2100  
 The Netherlands

Research topic	Name of project leader	Papers/reports available for dissemination.
- Organic pollution in surface water.	Dr.Ir. A.P. Meijers	yes
- Toxicity of coagulant aids.		no
- Filtration of water		no
- Desalination.	Dr.Ir. D. Kuiper	no
- Manganese removal from ground water.		yes
- Softening and demineralization of water.		no
- Fluoridation of water.		yes
- Examination of water pipes, joints, fittings, valves and hydrants.		no
- Leaching of toxic stabilizers from uPVC water pipes.		no
- Corrosion of copper service pipes.		yes
- Protection of the water quality in distribution systems.		no

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

RIJSWIJK

The Netherlands

Continued.

Research topic	Name of project leader	Papers/reports available for dissemination.
- Water losses in distribution systems.		no
- Distribution network analysis by computers.		no
- Water metering in water supply systems.		no
- Behaviour of water in reservoirs.		yes
- Organisms in water mains.		no
- Bored wells.		no

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

Research topic	Name of project leader	Papers/reports available for dissemination.
- Efficiency of ozone for virus disinfection.	Mrs. L. Evison	
- Use of anaerobic lactobacilli in the examination of drinking water.	Dr. A. James and Mrs. L. Evison	
- Recovery and re-use of alum sludge using sulphuric acid.	No longer working on this project	yes
- Rapid detection of Coliforms with fluorescent antibodies.	Mrs. L. Evison	
- Water quality improvement in impoundment lakes.	Dr. A. James	

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

Research topic	Name of project leader	Papers/reports available for dissemination.
- Biological indicators of water pollution, in particular aerobic spore formers and clostridium perfringens.	G. Bonde	yes
- Microchemical pollution by fungicides and mercury.	J.C. Hansen	yes
- Nuisance bacteria.	G. Bonde	no
- Analysis of phosphates and organic material.	K. Grunnet	no
- Dispersion and die-away of bacteria in sea water and streams.	G. Bonde	yes
- Statistical evaluation of bacteriological methods.	G. Bonde	yes
- Evaluation of bathing beach criteria.	G. Bonde	yes
- Detection and quantification of Salmonella sp. in water.	K. Grunnet	yes

9. Civil Engineering Department  
 Faculty of Engineering and Architecture  
 University of Khartoum  
 P.O. Box 487  
KHARTOUM  
 Sudan

Research topic	Name of project leader	Papers/reports available for dissemination.
- Nitrate removal by slow sand filtration	Dr. Idris Ahmed Mahmoud	
- Sulphate removal by slow sand filtration.	idem	
- Filter pump system for small communities	Dr. Hamid I. Hamid & Dr. B.W.M. Fisher	yes
- Use of starch as a coagulant.	Dr. Idris Ahmed Mahmoud	
- Use of highly alkaline waters in absence of distribution pipe network.	idem	
- Diffusion of submerged jet laden with solid particles.	Dr. M.I. Ridjanovic	
- Energy distribution due to jet impingement.	Dr. M.I. Ridjanovic & Dr. H.I. Hamid.	

10. Sanitary Engineering Department  
Faculty of Engineering  
Alexandria University  
ALEXANDRIA  
United Arab Republic

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Algae control.</li><li>- Control of stream pollution.</li><li>- Small and movable units for water treatment.</li><li>- Demineralization of ground water supplies.</li><li>- Conventional methods of city water supplies and its developments.</li><li>- Ground water supplies for isolated areas.</li></ul>		

11. The Hebrew University  
 Hadassah Medical School  
 Department of Medical Ecology  
 Environmental Health Laboratory  
JERUSALEM  
 Israel

Research topic	Name of project leader	Papers/reports available for dissemination.
- Methods for detecting enteroviruses in water.	Prof. H. Shuval	yes
- Disinfection of enteroviruses in water.	Prof. H. Shuval & Dr. E. Katzenelson	yes
- Dispersion and die-away of bacteria and viruses in streams and seawater.	Prof. H. Shuval & Dr. E. Katzenelson	yes
- Health effects of nitrates in drinking water.	Prof. H. Shuval & Dr. N. Gruener	yes
- Removal of nitrates from water and waste-water.	Dr. G. Shelef	no
- Antiviral activity in natural waters.	Prof. H. Shuval & A. Thompson	yes
- Regrowth of coliform organisms after chlorination of water.	Dr. B. Kletter	no
- Coliform organisms resistant to chlorination.	Dr. B. Kletter	no
- Biological succession of self-purification processes in polluted streams.	Dr. I. Dor	no
- The removal of mercury from industrial wastes by algal bacterial photosynthetic processes.	Dr. H. Schechter & D. Ben-Bassat	no

12. Division of Water Hygiene  
 Environmental Protection Agency  
 Crystal Mall Bldg. 2  
WASHINGTON, D.C. 20242  
 U.S.A.

Research topic	Name of project leader	Papers/reports available for dissemination.
- Enteric virus survival in estuarine water.	Elmer Akin	yes
- Method development for examining water and shellfish for viral pollutants.	Oscar C. Liu	yes
- Effect of viral configuration on virus transmission by water.	John Hoff	no
- Epidemiological study of correlation of water quality and disease.	Leland McCabe	yes
- Investigations on water-borne disease etiology.	Shih L. Chang	no
- Toxicological investigations of organic found in water supplies.	Robert Tardiff	no
- Health effects of nitrate in drinking water.	Leland McCabe	yes
- Development of data for bathing beach criteria.	Victor Cabelle	no
- Health effects of toxic chemicals within the water environment.	Aniela Zygmuntowicz	no
- Investigation of water-borne disease outbreaks.	Leland McCabe	yes



Division of Water Hygiene  
 Environmental Protection Agency  
WASHINGTON D.C. 20242  
 U.S.A.

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
- Re-use of water, Dallas Project.	James Symons	no
- Behaviour and control of contaminants in surface waters.	James Symons	yes
- Removal of inorganic contaminants.	Ralph Beulow	no
- Removal of organic contaminants.	Ralph Buelow	no
- Effect of chlorination on human enteric viruses.	Oscar L. Liu	yes
- Direct low temperature enumeration methods for fecal coliforms in water.	Alfred Dufour	no
- Rapid method for detection of fecal coliforms.	E.E. Geldreich	yes
- Detection and quantitation of pathogenic bacteria in water.	E.E. Geldreich	yes
- Detection of pathogens in water.	E.E. Geldreich	yes
- Bacterial survey of marine bottom silt.	Robert Huntley	no
- Effect of industrial pollutants on water quality.	Robert Huntley	no

Division of Water Hygiene  
Environmental Protection Agency  
WASHINGTON D.C. 20242  
U.S.A.

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
- Quantitative recovery of <i>P. aeruginosa</i> from potable and recreational waters.	Morris Levin	no
- Direct methods for the enumeration of <i>Salmonella</i> in water.	Victor Cabelli	no
- Development and application of quantitative tissue culture methods to environmental problems in chemical toxicology.	Benjamin Pringle	no
- Development of methodology for quantitation of free monomer in polyacrylamide.	Benjamin Pringle	no
- Chemical pollutants in the water environment.	Fred Kapfler	no
- Methodology development for chemical indicators of fecal pollution.	Robert Huntley	no
- Analytical method evaluation and quality control.	Earl McFarren	yes
- Development of a prototype for removal of organics from water.	Benjamin Pringle & James Symons	no
- Occurrence of human enteric viruses in drinking water.	Helen Seraichekas	no

13. Department of Environmental Sciences and Engineering  
School of Public Health  
University of North Carolina  
CHAPEL HILL, NORTH CAROLINA 27514  
U.S.A.

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Feasibility of dual water supplies.</li><li>- Surveillance of drinking water quality.</li><li>- Plastic pipe in water systems.</li><li>- Regionalization of community water supplies.</li><li>- Development of indigenous technology in water supply in developing countries.</li><li>- Scale and timing in water supply investment.</li><li>- Computer simulation of aquifers.</li><li>- Water quality management of impoundments.</li><li>- Field test for free chlorine.</li></ul>		

14. Department of Environmental Engineering  
College of Engineering  
University of Florida  
GAINESVILLE, FLORIDA 32601  
U.S.A.

Research topic	Name of project leader	Papers/reports available for dissemination.
- Managing metropolitan area water systems.	Dr. J.P. Heaney	no
- Improving regional water resource planning and management.	Dr. J.P. Heaney	yes
- Controlling pollution caused by heated water discharges, oil and sediments.	Dr. J.P. Heaney	no
- Protection of public health.	Dr. J.E. Singley	yes
- Predicting ecologic change.	Dr. H.T. Odum	yes
- Water treatment chemistry.	Dr. A.P. Black & Dr. J.E. Singley	yes
- Chemical indicators of fecal pollution.	Dr. J.E. Singley	yes
- New metal salt coagulants.	Dr. A.P. Black & Dr. J.E. Singley	no

15. Instituto de Engenharia Sanitária  
 Superintendência de Urbanização e Saneamento  
 (Institute of Sanitary Engineering)  
 Rue Fonseca Teles, 121 - 150  
RIO DE JANEIRO  
 Brazil

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"> <li>- Efficiency control of water treatment plant units by means of tracers.</li> <li>- Comparative studies on the filtering membrane method and the lacteous broth multiple tubes method, in the coliform group research.</li> <li>- Statistical evaluation of data about the precision and accuracy of techniques used in the bacteriological, chemical and biological laboratories.</li> <li>- Water filtering through double layer beds: anthracite and sand.</li> <li>- Use of several types of weirs for the aeration of waters.</li> </ul>		

16. Department of Sanitary Engineering  
 Universidad Central Venezuela  
CARACAS  
 Venezuela

Research topic	Name of project leader	Papers/reports available for dissemination.
- Upflow filtration in incipient and partial fluidised sand beds.	G. Rivas Mijares	no
- Bench scale biofiltration performance related to BOD removal and nitrogen transformation.	G. Rivas Mijares & E. López	yes
- Confiability of BOD methods for determining the deoxygenation constant.		no
- Die-away of E.coli in marine water for several temperatures.	O. Palacios & Mr. Cartaya	no
- Influence of temperature on BOD variation of coefficient of temperature (values).	Juan Pablo Rodríguez & Griselda Giner	no
- Sanitary survey of Valencia Lake.	A. Cárdenas & T. Torrealba	no
- Arsenic in water supply in Venezuela.	G. de Genatios & G. Castillo & H. Escalona	no
- Sanitary study of the San Pedro and Guaire Rivers.	G. de Giner	no
- Phytoplankton of Valencia Lake.	Iraides Villegas	no

Department of Sanitary Engineering  
Universidad Central Venezuela  
CARACAS  
Venezuela

Continued.		
Research topic	Name of project leader	Papers/reports available for dissemination.
- Determination of optimum coagulant dose by colloidal titration.	G. de Giner & Mr. Barroeta	no
- Corrosion in Venezuelan air ports.	L. Cortez	no
- Panamerican air pollution monitoring network.	G. Genatios & L. Cortez	no
- Evaluation of the sanitary quality of the water to be used in the tropical experimental station.	G. Genatios	no
- Mean residence time in a trickling filter.	Mr. Gambati & Mr. Cobos	no

17. National Sanitation Foundation  
2355 West Stadium Boulevard  
ANN ARBOR, MICHIGAN 48106  
U.S.A.

Research topic	Name of project leader	Papers/reports available for dissemination.
- Water quality deterioration in distribution systems.	N.I. McClelland	yes
- Trace metals in water supplies - at the source and in the distribution system.	N.I. McClelland	yes



18. Department of Civil Engineering  
Faculty of Engineering  
University of Science and Technology  
KUMASI  
Ghana

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Siltation and water intake problems.</li> <li>- Hydrological problems.</li></ul>		

19. Faculty of Engineering  
University of Lagos  
LAGOS  
Nigeria

AT PRESENT, NO RESEARCH ACTIVITY

20. Victoria Jubilee Technical University  
Matunga  
BOMBAY  
India

Research topic	Name of project leader	Papers/reports available for dissemination.
<ul style="list-style-type: none"><li>- Sedimentation tanks.</li><li>- Upflow filters.</li><li>- Balancing of water distribution networks with linear and non-linear boundary conditions.</li><li>- Studies on steam pollution using digital computer.</li><li>- Groundwater survey from the existing dug and tube wells in Bombay to determine the yield, quality of water, etc.</li></ul>		

21. Asian Institute of Technology

P.O. Box 2754

BANGKOK

Thailand

Research topic	Name of project leader	Papers/reports available for dissemination.
- Study of methods for providing inexpensive potable water to small communities in Asia.	Dr. R.J. Frankel	no
- Reclamation of water from oxidation ponds for human and industrial re-use.	Dr. M.G. McGarry	no
- Bacteriological quality of rural water supplies in Thailand.	Dr. R.J. Frankel	no
- Impact of the potable water project on village life.	Dr. R.J. Frankel	no
- Cost of potable water in rural communities of Thailand.	Dr. R.J. Frankel	no
- Evaluation of the National Potable Water Project in Thailand.	Dr. R.J. Frankel	no

22. Department of City Planning and Sanitary Engineering  
Faculty of Engineering  
University of Tokyo  
Hongo 7-3, Bunkyo-ku  
TOKYO  
Japan

Research topic	Name of project leader	Papers/reports available for dissemination.
- Flocculation by using many perforated plates in horizontal flow sedimentation tank.	T. Ishibashi	no
- Filtration of water by micro-flow method.	T. Ishibashi	no
- Re-use of sewage (filtration by activated carbon bed, electro dialysis).	H. Aya	no

23. The All-India Institute of Hygiene and Public Health  
110, Chittaranjan Avenue  
CALCUTTA-12  
India

Research topic	Name of project leader	Papers/reports available for dissemination.
- Investigation on shallow tube wells and hand made strainers.	Shri S. Subba Rao	no
- Study of handpumps.	Shri N. Majumder	no
- Study of the effect of aeration on the self-purification of water in Kidderpore docks, Calcutta.	Shri M.A. Sampath-kumaran & Shri S.B. De	no

24. Central Public Health Engineering Research Institute  
 Nehru Marg  
NAGPUR-3  
 India

Research topic	Name of project leader	Papers/reports available for dissemination.
- Development of coagulant aids.	Shri K.R. Bulusu	yes
- Development of a new defluorodation material "Defluoron-2"	Shri V.P. Thergaonkar	yes
- Development of activated alumina, activated silica.	Shri R.C. Dixit & Shri D.N. Kulkarni	yes
- Double-action tablets for removal of turbidity and disinfection of water.	Shri B.N. Pathak	yes
- Development of filter aids.	Shri M.V. Nanoti	yes
- Development of membrane filters.	Shri M.V. Nanoti	yes
- Iron and manganese removal.	Shri R.C. Dixit	yes
- Biology and control of nuisance causing organisms in water supplies.	Dr. K.P. Krishnamurty	yes
- Development of synthetic medium for bacteriological analysis of water.	Dr. N.U. Rao	yes
- Survey of waters for enteric viruses.	Dr. V. Chalapati Rao	yes
- Sand filtration of water in general.	Shri R. Paramshivam	yes

Central Public Health Engineering Research Institute  
Nehru Marg  
NAGPUR-3  
India

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
- Two-layer filtration.	Shri R. Paramshivam	yes
- Leakage detection and wastage prevention in water mains.	Prof. V. Raman	no
- Use of plastic pipes in water supplies.	Miss S.S. Dandekar	yes
- Electric analyser for water distribution net-work.	Shri V.L. Lokre	no
- Reduction of midro-organisms at different stages of water treatment.	Dr. N.U. Rao	yes
- Control of aquatic weeds by biological methods.	Dr. K.P. Krishnamurty	no
- Optimisation in the design of water filtration system with the help of computers.	Prof. V. Raman	no
- Seasonal variations in quality of hand-pump waters.	Shri J.M. Tuli	yes
- Preparations of water maps in different states.	Shri Y.S. Murty	yes
- Desalination by reverse osmosis.	Shri A.S. Bal	no



Central Public Health Engineering Research Institute

Nehru Marg

NAGPUR-3

India

Continued

Research topic	Name of project leader	Papers/reports available for dissemination.
- Sulphenic acid in chlorine stabilisation.	Shri R.C. Dixit	no
- Ground water recharge.	Shri K.R. Bulusu	no
- Upflow filtration.	Shri R. Paramshivam	no

25. Institute of Hydro-Sciences and Water Resources Technology  
 64, Ghadessi Street  
TEHERAN  
 Iran

Research topic	Name of project leader	Papers/reports available for dissemination.
- Extension of information on solar radiation for hydrologic computations.	Dr. Mozayeny	yes
- Use of models in ground water investigations.	Mr. Tscheltzoff & Mr. Daum & Mr. Ghasemi	yes
- Research on water quality improvement in Iran including desalination and pollution control.	Mr. Fintajsl	yes
- Evapotranspiration in Iran.	Dr. Mozayeny	yes
- Friction factors in alluvial channels.	Mr. G. Holtorff	yes
- Magnitude of watershed erosion in Iran and its control.	Mr. G. Holtorff	yes

26. Centre Belge d'Etude et de Documentation des Eaux CEBEDEAU  
2, Rue Armand Stévert  
LIEGE  
Belgium

Research topic	Name of project leader	Papers/reports available for dissemination.
- The role of the photosynthesis in stream sanitation.	F. Edeline	yes
- Laboratory investigation of the atmospherical corrosion at constructional steel.	J.Hissel	yes
- The phenomenon of nitrification in a channel.	F. Edeline	yes
- Kinetics of the atmospherical corrosion of steel.	J. Hissel	

27. Department of Civil Engineering  
The University of Nairobi  
Box 30197  
NAIROBI  
Kenya

Research topic	Name of project leader	Papers/reports available for dissemination.
- Optimisation of rapid sand filters for water treatment.		no

28. Department of General and Environmental Hygiene  
 The Institute of Hygiene and Epidemiology  
 Srobarova 48  
PRAGUE  
 Czechoslovakia

Research topic	Name of project leader	Papers/reports available for dissemination.
- Hygienic protection of surface waters (with special respect to drinking water reservoirs).	Dr. V. Jiřík & Dr. J. Čuta	yes
- Maximum allowable concentrations of toxic (harmful) substances in water.	Dr. J. Chalupa, CSc.	yes
- Trace elements metabolism in warmblooded organisms, toxic effects.	Dr. J. Janeček, CSc.	no
- Coagulation in water treatment.	R. Červenka	yes
- Fluoridation of water.	Dr. J. Janeček, CSc.	no
- Disinfection of water.	Dr. J. Pokorný, CSc. & Dr. V. Bernátová & Dr. L. Mašíňová	yes
- Water bloom control.	Dr. M. Štěpánek, CSc.	yes
- Humic acids, refractories.	Dr. J. Chalupa, CSc.	yes
- Analysis of water: - chemical - biological - bacteriological	Dr. J. Čuta Dr. M. Štěpánek, CSc. Dr. L. Mašíňová	yes yes yes