# NEWS AND BOOK REVIEWS

## GRADUATE COURSE IN HYDROLOGY

March 12 - June 15, 1979

The School of Civil Engineering of The University of New South Wales has conducted a graduate course in hydrology each year since 1960. The next Course will commence on March 12, 1979 and will last for three months on a full-time basis, concluding on June 15. The 1979 Course will be similar to those of recent years and students can elect to specialise either in surface water hydrology or in groundwater hydrology.

These courses are suitable for engineers, surveyors, agricultural scientists, meteorologists, foresters, soil conservationists and hydro-geologists, and are particularly convenient for students who are unable to spend one or two years in Sydney to complete normal graduate courses in hydrology.

Admission requirements for the Course are a first degree in engineering or science or alternatively, similar qualifications together with suitable experience in the field of hydrology. The cost of the course is $A750. Brochures giving full details of the course may be obtained from the Head, School of Civil Engineering, The University of New South Wales, P.O. Box 1, Kensington. N.S.W. 2033. AUSTRALIA.

## INTERNATIONAL CONFERENCE ON THE IMPACT OF ACID PRECIPITATION AND ASSOCIATED AIR-BORNE POLLUTANTS ON THE NATURAL ENVIRONMENT.

11-13 March 1980

### The Norwegian Interdisciplinary Research Programme "Acid Precipitation - Effects on Forest and Fish"

The conference is open to scientists from all countries. The conference will focus on the effects of acid precipitation on terrestrial and aquatic ecosystems.

Conference topics will be addressed by invited key speakers and by voluntary contributions from participants.

Arrangements will be made for suitable publication of accepted contributions.

A second announcement will be issued at a later date.

*Inquiries about this International Conference may be directed to:*
**SNSF-project, P.O. Box 61, 1432 Aas-NLH, NORWAY.**

PREDICTION IN CATCHMENT HYDROLOGY, edited by T. G. Chapman and F. X. Dunin, published by Australian Academy of Science, 1975, 498pp.

This book consists of 21 invited papers read at the third National Symposium on Hydrology, sponsored by the Australian Academy of Sciences in November 1975.

The symposium was conceived as a "forum for a critical review of methods of prediction of the hydrological behaviour of catchments." Prediction was chosen as a criterion by which to judge practical results of research and "the conceptual and technical difficulties of achieving significant results." The focus on catchments was to ensure real world complexities were faced – a catchment being regarded as any part of the earth's surface with spatial extent.

All but two papers have been written by people currently working in Australia. Considerable effort on the part of the editors has ensured minimal overlap among papers, consistency, and uniformity of style and presentation. Two indexes, subject and author, have been glued into the volume after binding – a useful afterthought in a volume of this size.

Papers have been placed in 7 groups by subject but a majority occur in two sections – physical processes in surface hydrology, and catchment models. Of the remaining 5 sections, two have two papers and three have only one paper, suggesting that some categorizing was to avoid the dreaded "Miscellaneous".

In the Introduction are two "backgrounders" – one of practical issues and the other on science, both with respect to catchment prediction. The former looks at some of the more important uses of prediction techniques and pleads for recognition of the limitations of catchment response models, particularly with respect to their data requirements. A gap is identified between those producing techniques and those who regularly use them. The rapid proliferation of prediction techniques with limited validation is deplored. Continuation of these developments is questioned and new directions for research into design and management criteria for water resource developments are suggested.

J. R. Philip provides a short paper on science and prediction, written in lucid style, with some customary direct comments on physics, statistics, and systems analysis. A brief foray into trans-science is a timely reminder of the necessity for practical solutions to practical problems – all of course based on methods as scientific and objective as possible. He finished "let us at least work towards a situation where the trans-scientific judgements which practical hydrologists are forced to make are informed and sustained by a truly scientific hydrology: a sceptical science with a coherent intellectual content firmly based on the real phenomena."

Subsequent papers include topics on rainfall, interception, infiltration, soil water movement, overland flow, streamflow, materials transport in streams, evaporation, urban hydrology, physical process models, empirical models, model evaluation and calibration, water quality models, synthetic data series, data needs and availability, and future trends in catchment modelling. They are too numerus and comprehensive to review individually. Suffice it to say that Philip's desire for scientific hydrology is well-supported. The high standards of clarity, rigor and elegance that have come to be associated with hydrological research in Australia are again evident.

The book is a must for hydrologists taking a physical approach to prediction problems. It will be used by enegineers and scientists as an invaluable synthesis of the insufferably voluminous literature in physical hydrology.

*D. L. Murray.*

THE SHALLOW LAND BURIAL OF LOW-LEVEL RADIOACTIVELY CONTAMINATED SOLID WASTE. NAS-NRC Panel Report, published by U.S. National Academy of Sciences, Washington D.C., 1976. 150 pp.

Storage of radioactive waste is one of the most contentious problems connected with nuclear fission as a power source. This report by a U.S. National Academy of Sciences panel presents an evaluation of the methods used by the U.S. Energy Research and Development Administration (previously the U.S. Atomic Energy Commission) to dispose of low-level solid radioactive waste (LLSRW). Disposal of high-level radioactive waste, for which the favoured method is deep burial, is a different problem. LLSRW consists of material similar to industrial waste, ranging from protective clothing to construction materials, with average radioactivity levels of about 40 microcuries/cubic meter. (A curie is an amount of material having $3.7 \times 10^{10}$ nuclear disintegrations/second.)

During development of the atomic bomb (the Manhattan Project), LLSRW generated was buried in shallow pits near the site of generation, but currently more care is taken to ensure long-term containment of the waste. Present production of LLSRW by ERDA is equal to the volume of trash generated by a town of 55,000 inhabitants. Commercial production in the U.S. is about the same, but will increase strongly in the future especially if dismantling of existing reactors is undertaken.

Unfortunately the report is dull and repetitious, but it is exceedingly thorough. A brief introduction in chapter 1 describes the objectives and methods of the study and identifies the most serious problem, that of managing waste containing the very long-lived transuranium nuclides (uranium, plutonium, etc.). Chapter 2 outlines 14 recommended principles for the handling and burial of LLSRW. Some of these are simply good practice for handling any trash (such as segregation of types of waste, and volume reduction), while others are specific for low-level waste (long-term containment and detailed record-keeping of amounts, types and concentrations of radionuclides buried). In Chapter 3 a brief description of types of LLSRW already buried from the Manhattan Project to the present is given. Chapter 4 lists possible hazards from burial of LLSRW if movement of nuclides either by air or water occurs, but without evaluation of the health risks associated with such movement.

Chapter 5, the longest (42 pages) and most interesting chapter, is on conditions today, possible future problems and possible solutions. The problem of transuranium waste is discussed in view of ERDA's intention to exhume material containing more than 10,000 microcuries/$m^3$ (10 nanocuries/gram) of transuranium nuclides, and move it to a special repository. The panel is against such exhumation and the additional handling involved, unless risks are clearly demonstrated for the present burial sites of the waste. Other problems considered are burial site selection, ground water monitoring and future research needs.

Brief conclusions are given in chapter 6 under the headings local problems, disposal of transuranium waste and role of the Federal Government. The findings of the panel are given at the beginning of the report, written in a careful, legalistic and obscure way. There are six appendices containing descriptions of existing burial and waste generating sites, a summary of hydrogeologic research, bibliographies and letters. A list of references and a glossary of terms complete the report.

The report is difficult reading, but for the reader prepared to struggle through it is quite informative. The recommendations and descriptions are entirely technical; the public health risks associated with the conditions described are not mentioned. It should probably be noted that the levels of radioactivity of the vast majority of the material considered are less than maximum levels of natural radioactivity that occur in the U.S. at shallow depths below the surface. For the hydrogeologist, the report will probably be a disappointment as hydrogeological aspects are treated in a fragmentary and severely limited manner, although for the limited field surveyed the bibliography is comprehensive.

*M.K. Stewart.*