

international stature. The director of the division, R. K. Appleyard, is nothing daunted by current French tactics, and he ends the report with an optimistic vision of future European scientific cooperation. Euratom played a part in persuading several cancer research institutes to pool their efforts in the European Organization for Research on Treatment of Cancer, and Dr Appleyard feels that there is a bright future for this type of organization, not too closely tied to the EEC and therefore relatively independent of the vagaries of politics.

SCIENCE POLICY

Staff Changes at NRC

THE National Research Council of Canada is the latest of Canada's scientific institutions to undergo a change—in this case, a change in organization which reflects altering responsibilities and priorities. The top echelon of the organization has been strengthened by the creation of four new senior positions, all of whom report direct to the President of the NRC, Dr W. G. Schneider. The most interesting of these is the appointment of Dr L. G. Cook, who is to be described as *Délégué Général*, and will be responsible for (in NRC's words) Program Analysis and Review, Research Policies and Planning. Before his appointment to the NRC, Dr Cook was manager of the Project Analysis and Program Planning Section of General Electric Research Laboratory at Schenectady, New York. His role will be to assist Dr Schneider and the council of the NRC in the formulation of research policies, and he will be assisted by a small group of scientists, engineers and economists. It is hard to avoid the supposition that NRC is getting into the business of technological forecasting, although it is not using the expression itself yet.

The other two appointments are two new vice-presidents, Mr R. D. Hiscocks and Dr Donald J. LeRoy, and one executive-director, Dr D. W. R. McKinley. There are now three vice-presidents; Mr Hiscocks is responsible for industrial research assistance and promotion, a field in which Canada is trying very hard, so far without conspicuous success; Dr LeRoy is responsible for grants to university research, and Dr K. F. Tupper, previously a vice-president (scientific), is now responsible for administration. Dr McKinley will be looking after NRC's own laboratories.

ENVIRONMENT

Too Much Hot Water

EACH week seems to bring another dire warning of yet another devastating type of environmental pollution. The latest to be given an airing is thermal pollution of aquatic environments—in other words, the potentially destructive effects to fauna and flora in fresh and coastal waters of heat or heat change due to human activities and especially the increasing world population of power stations. A second international "thermal workshop" was recently held at the Chesapeake Biological Laboratory of the University of Maryland's Natural Resources Institute, Solomons, Maryland, under the sponsorship of the International Biological Programme and the US National Academy

of Sciences. It was under the leadership of Dr Joseph A. Mihursky of the laboratory, and 200 scientists attended, mostly from the USA (twenty-seven states were represented), but five foreign countries were represented, including Britain, Sweden and Canada. A third workshop is planned for next year now.

The basic proposition of the discussion was this—that thermal pollution—or "thermal addition" as it is often called—is not only of great scientific interest but also has considerable economic significance. Many of the areas affected by heated water are frequently the major habitats of important shellfish and finfish besides being the nurseries where deep ocean fish pass much of their growing phase. There is the possibility that the heated water could be put to profitable use in warming up marine areas now too cold to support large fish populations.

While this is the generalized position, it seems that, as so often, it is in the United States that documentation of mismanagement is most lavishly available. In one north-eastern river, a temperature rise of 40°–50° F has been recorded as a result of the heated discharges from various industries, and this has led to a water temperature of about 140° F, a level nearly 50° above the lethal threshold for most aquatic organisms. Expectations from the projected increase in power stations to keep pace with American industrial needs for the next 10 years assuming current designs continue to be employed are that cooling waters equivalent to one-sixth of the total run-off of freshwater in the US (200 billion gallons a day) will be required by 1980. During the dry months, half the total run-off would be called for. Nuclear power plants consume relatively more cooling water per unit output than conventional designs and in mid-1967 fifteen nuclear plants were in operation in the US and eighty-seven were definitely projected or under construction, according to the Atomic Energy Commission. The AEC has no responsibilities regarding thermal wastes resulting from its activities, it was stressed at the Solomons "workshop".

Another destructive effect already reported from North America has come about through deforestation. The resulting exposure of streams to sunlight has caused widespread loss of cold-water trout and salmon populations. On the whole, it was reported, however, that high latitude species are more tolerant to temperature change than low latitude species (though the evidence seems based primarily on measurements within the US). It is interesting that the electric industry in the south-eastern states of the US has decided that no power stations are to be sited on estuaries or other areas of limited water circulation, but only on the coast proper. (Whether this alone is enough to halt the dry-out of the Florida Everglades and whether the effect is still reversible is uncertain.)

The British record as it emerged at the Solomons workshop seems rather better. Indeed, most of the evidence for the beneficial effects that may result from manipulating water temperature in natural waters came from British sources. It would have been comforting if there had been any discussion of what responsibility the UK Atomic Energy Authority and its contractors feel towards the emission of quantities of boiling brine from its much publicized seawater conversion plants. Hot water is a tonic to local aquatic populations compared with hot brine whether off Scotland or on the equator.