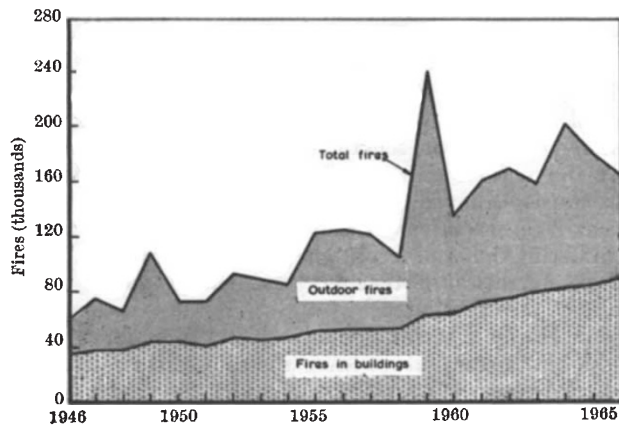


materials such as matches and naked lights caused 131 fatal fires, 25 per cent of the fatal fires from known causes. Electrical appliances and fires in grates each cause 19 per cent, and although children with fire caused only 5 per cent, this proportion is increasing. The number of incidents in which more than one person has died has been increasing over the past six years, and stands at 78 for 1966. Fires in buildings were more frequent in winter than in summer, while the



Annual incidence of fires in the United Kingdom (from United Kingdom Fire Statistics for 1966).

reverse was true for fires not in buildings. The largest fire loss for a single month was estimated at more than £10 million, and the smallest at about £4 million. A computer was used for the first time to produce the 1966 tables and it is hoped that in future results will be produced more quickly.

Design for a Fusion Reactor

THE major problem of using nuclear fusion to produce power remains that of stabilizing a high temperature plasma for long enough for the reactions to produce a net gain of power. Although this has yet to be achieved, some rather speculative studies have been made of the engineering characteristics of fusion reactors. Mr R. Carruthers, Dr P. A. Davenport and Dr J. T. D. Mitchell of the Culham Laboratory of the United Kingdom Atomic Energy Authority have written the most recent of these, called *The Economic Generation of Power from Thermonuclear Fusion* (HMSO, 4s. 6d.).

All, or almost all, designs for fusion reactors use magnetic fields as a means of keeping the very hot gases together. The authors of this report do the same, and suggest that the best geometry for the reactor is toroidal—doughnut shaped. The plasma, at a temperature of $7 \cdot 10^8$ °K, is contained in what amounts to a cylinder with the open ends joined to form a closed loop. The fuel used is a 50/50 mixture of deuterium and tritium. To get the reactor started, both fuels would be injected into the reactor, but once it was operating it would generate its own tritium in a blanket of molten salt surrounding the plasma. The blanket, containing lithium salts, would generate tritium by the $\text{Li}(n,t)$ reaction, and would also act as a means of extracting the useful heat from the reactor. Thus the blanket would be circulated through salt pumps and heat extractors, and the lithium replenished. In this

sense, the real fuels for the reactor would be deuterium and lithium.

The reactor chosen for the study is one of 5,000 MW (thermal), or 1,250 MW (electrical). The authors estimate that the capital cost of such a system would be between £68.5 and £74 per kW, the greater part of this (£29 per kW) being spent on conventional equipment, which includes the salt recirculating pumps, and the necessary electrical equipment. The second most expensive item is the superconducting magnet which would be used to keep the plasma in the right place; the reactor vessel and "blanket" would be reasonably cheap, only £4 per kW. On the basis of a 25 year life at 80 per cent load factor, and interest rates of 8 per cent, the generating costs of such a system would be 0.23 to 0.25 pence per kWh, of which the vast majority is attributable to the capital costs of the station. Fuel charges would be only 0.004 pence per kWh, and operation and maintenance 0.017 pence per kWh.

But the authors concede that there are a number of problems outstanding before this type of reactor can be built. The most obvious one, of course, is that of plasma containment, but there are others; the properties of the vacuum wall, for example, would need to be quite unusual. Fuel injection and exhaust extraction would also be a problem. It would even be quite hard to get the reactor started. For all that, the report is striking evidence of the continued optimism of those involved in fusion research.

Crystal Growing

THE Science Research Council has awarded a grant of £14,505 to Dr J. N. Sherwood, of the University of Strathclyde, Glasgow, to set up facilities for the growth of organic molecular crystals. Molecular solids are attracting a great deal of attention at present because of their uses in solid state devices. In particular, the electro-optical properties of many organic crystals suggest applications in radiation detectors—a familiar example is the use of certain aromatic phosphors in scintillation counters.

The electrical, optical and mechanical properties of these solids frequently depend on the structure of the material as well as its chemical composition. This is why there is a demand for high quality single crystals of organic substances.

Dr Sherwood will use the SRC grant to provide a crystal growing service for the universities and industry. This seems to be a desirable step. Crystal growing can require specialized equipment, and is frequently time-consuming. Because many research workers need only a few samples of the crystals they are studying, it is logical to have a laboratory with the facilities and the skill to provide the service.

Effects of Malnutrition

ONCE again the need to produce more food to keep up with trends in increasing population and changing social habits has been stressed. This time it is the joint FAO/WHO Expert Committee on Nutrition in its seventh report (published with two alternative covers as *WHO Tech. Rep. Series No. 377*, and *FAO Nutrition Meetings Rep. Series No. 42*).

The report reviews the state of knowledge in relation to nutritional requirements, and includes a discussion

of various health problems which arise from malnutrition. The consequences of infection are made worse by malnutrition. Weaning diarrhoea, which is almost universal in developing countries, is caused by a combination of malnutrition and reduced resistance to infection in an environment with poor sanitation. The committee recommends that the relationship between malnutrition and resistance should be investigated and stressed in the education of medical and public health workers.

Iron deficiency is one of the causes of anaemia, and a programme of study initiated by WHO in 1961 is in progress to investigate this problem. The contribution of factors such as loss of blood caused by hookworm infection is also being investigated. Experiments with iron-59 have shown that iron from wheat is less readily absorbed than haemoglobin, ferritin or ferrous ascorbate, and people deficient in iron absorb less iron from wheat than do healthy people. The committee recommends that, while such studies should continue, more emphasis should be placed on anaemia in infancy and childhood, times when it is possible that iron deficiency could cause irreparable damage to the blood and other tissues such as the gastro-intestinal tract. Vitamin A deficiency is another serious problem, causing various diseases of the eye in infants and young children in Asia, Africa and Latin America. In South and East Asia such diseases constitute an important cause of preventable blindness. An effective preventive treatment for vitamin A deficiency is likely to be the enrichment of foodstuffs with the vitamin. The committee recommends investigation of the stability of vitamin A in enriched foods, and the effects of cooking on its biological activity.

Rickets, caused by vitamin D deficiency and lack of exposure to sunshine, is prevalent in many tropical and subtropical countries—in North Africa a WHO consultant found signs of the disease in between 45 and 60 per cent of children between birth and 5 years old. It has been suggested that rickets influences infant mortality by lowering resistance to infections and aggravating the course of pneumonia and bronchopneumonia. As measures to prevent rickets, the committee recommends supplementing breast milk with vitamin after the third or fourth month, treatment with vitamin D during the first 2 years of life as a public health measure, and education of mothers to expose their children to sufficient sunlight. Daily administration of vitamin D will not be easy to achieve, and other approaches such as the use of periodic massive doses may be tried.

Progress is also being made in the control of endemic goitre by the introduction of iodized salt to counteract iodine deficiency. In the Himalayan endemic goitre belt there has been a striking reduction—from about 40 per cent to 15 per cent—in the prevalence of the condition in areas receiving salt fortified with potassium iodide or iodate.

There is also some evidence that malnutrition in early childhood can adversely affect mental development, although there are so many complicating social factors that the results of intelligence tests are very difficult to assess in these terms. The committee recommends that studies should be encouraged to assess the effects of malnutrition on mental development, learning and behaviour of young children, and that, when sufficient data have been accumulated, possibly within

5 years, an expert group should be convened by WHO to discuss the evidence.

Alerting Chemists Quickly

It is becoming increasingly difficult for the information section of an organization to keep research staff informed of the literature. Scanning journals for articles of likely interest to research staff, and attempting to keep up to date with their changing interests and projects, can put a great strain on the information staff. While the ratio of information to research staff in the USA is 1 : 10, in Britain 1 : 30 is more usual, and 1 : 500 is not unknown. Use of printed current awareness journals can help to some extent, particularly in small organizations or in those with restricted subject interests. A new innovation is the use of computers for current awareness, providing what is known as a Selective Dissemination of Information service (SDI); that is, a service aimed at alerting research staff to material relevant to their subject interests. The application of computers to SDI is only just beginning in Britain, but there are a few research programmes in progress now, and there is growing experience of the use of magnetic-tape outputs from large literature-handling services such as MEDLARS and Chemical Abstract Services.

The main computer-based service operating at present is the Chemical Society Research Unit in Information Dissemination and Retrieval at Nottingham University supported by the Office for Scientific and Technical Information. This unit is currently running searches (on a KDF 9 system) of the magnetic tape versions of *Chemical Titles (CT)*, *Chemical Biological Activities (CBAC)* from the Chemical Abstracts Services, for a selected user population of more than 300 chemists. Two other mechanized SDI services for chemists are those being run at the UKAEA laboratory at Aldermaston and the Shell laboratory, Sittingbourne. These are also based on taped *CT*. Outlines of these services, which are still in the experimental stage, were given by Mr L. Corbett of Aldermaston and Mr P. Gallagher of Sittingbourne at a meeting of the Institute of Information Scientists on March 13. Their talk was entitled, "Using Commercially Available Literature Tapes and 'Package' Computer Programmes for Current Awareness Services". Mr Corbett spoke of the advantages, limitations, potential and user reactions, and effects of the mechanized literature services operated at Aldermaston, and Mr Gallagher concentrated on features and problems of the programmes and machine operations.

At Nottingham, the unit has developed its own programmes for the university's computer. The Aldermaston and Shell services, however, use IBM 360/40 computers with the "1401 package" programmes of *CT*. Experimental runs on issues of *CT* were begun at Aldermaston in 1966. Twenty issues have now been run. The maximum throughput is 150 questions consisting of approximately 700 search words. These have to be processed in two "passes" through the computer for each *CT* issue. There are now more than 40 users of the service. The machine time per issue is 1½–1¾ hours, and the number of references distributed is about 800. On the usefulness of the references or "hits" sent to users, Mr Corbett