

oxide is being studied in sealed tubes. Another investigation was concerned with the nature and properties of radioactive aerosols, and laboratory experiments have been made on the release of iodine in air and carbon dioxide at very low vapour concentrations. Considerable technical work has been undertaken into criticality to back particular design studies as well as a more generalized study.

Work continued on the application of radioisotopes, especially in industry. The method of fluorescence spectroscopy, using radioactive sources, has been applied to measuring very thin surface coatings, and by tracer methods the rate of flow of liquid in closed channels can now be measured with an error of less than one part in 200. Further work has been done on the use of large sources of  $\gamma$ -radiation for sterilization and other purposes, and a pilot-scale plant for irradiating packages of materials with  $\gamma$ -rays has been built at Wantage. A mass spectrometer has been developed at Capenhurst for the analysis of the active species present in gas/solid chemical reactions, and basic studies have been made of the friction and wear behaviour of materials in reactor coolant environments at high temperatures. Considerable progress has been achieved at Aldermaston in the provision of short-duration radiographs of systems opaque to ordinary light and moving at high speed, and two types of mechanical very-high-speed cameras are manufactured at Aldermaston, one, the streak camera recording along a length of film the size of a light source which is varying with time, the other, the framing camera, producing individual pictures at intervals on a strip of film. A third type takes a single picture with a time of exposure of  $1 \times 10^{-7}$  sec., using a Kerr cell shutter.

In the work on controlled thermonuclear reactions, the stored energy supply and the stabilizing magnetic field supply of *Zeta* were both increased by about six times during the year, and experimental elucidation of the physical phenomena in the *Zeta* and *Sceptre* plasmas continued successfully, while work also continued on some other plasma physics prob-

lems, and considerable progress was made in solving the formidable technological problems associated with the production and control of currents in the range of  $10^8$  amp., and in the development of methods of construction to withstand the severe conditions expected in experiments such as the Intermediate Current Stability Experiment. The Authority has reconsidered its earlier decision to move controlled thermonuclear research from Harwell to Winfrith, and has chosen instead a site at Culham, where the laboratories to be erected will form a large autonomous unit within the Authority's Research Group. The Authority's commitments under its long-term uranium contracts are now greater than its immediate requirements, and for some years, mainly due to the slowing down of the nuclear power programme, it will hold larger uranium stocks than it needs. A new Health and Safety Branch, independent of the Groups, was established as from July 1, 1959, to advise on the formulation of health and safety policy and disseminate this policy for application by heads of groups and establishments, apply this policy to the assessment and inspection of reactors and plant, and provide the focal point for conducting external relations in this field. A wide range of health and safety problems investigated during the year included developments in measuring techniques applied to the monitoring of fall-out from nuclear weapon tests, controlled studies of the uptake from fresh water of strontium-90 by fish and of this and other radioisotopes by common aquatic plants, and work on the diffusion and dispersion of gases and particulates.

Information Services have included, besides the Harwell Reactor School, the Calder Operation School, the Isotope School, now at Wantage, and the training programme for Central Electricity Generating Board operating staff, the issue of an illustrated summary of this sixth annual report, together with some additional material to July 1, 1960\*.

\* Atom 1960: an Illustrated Summary of the Sixth Annual Report from 1st April, 1959, to 31st March, 1960, of the United Kingdom Atomic Energy Authority, with some additional material to 1st July, 1960. Pp. 34. (London: H.M. Stationery Office, 1960.) 2s. 6d. net.

## TUBERCULOSIS: RISK TO FAMILY CONTACTS

**I**N developed countries with adequate hospital accommodation, drug treatment of tuberculosis has often freed beds. In less-developed countries with inadequate hospital accommodation, the problem of beds for tuberculous patients remains acute. In India, for example, it is particularly serious, since there are only 23,000 beds for tuberculous patients, against a total number of persons affected that may be put at between 1.5 and 2.5 million. Because of this, a comparative study of domiciliary and sanatorium treatment of tuberculosis was undertaken by the Tuberculosis Chemotherapy Centre, Madras, which was set up in 1956 under the joint auspices of the World Health Organization, the Indian Council of Medical Research, the Madras Government and the Medical Research Council of Great Britain. The purpose of the study was to determine whether drug treatment of tuberculosis in a country like India was as effective in the home as in the sanatorium; or, to put it differently, whether domiciliary treatment did away with the need to send a fair number of tuber-

culosis patients to hospital (*World Health Org. Chron.*, 14, No. 7; July 1960).

A group of 193 patients were selected, most of them from the poorest classes of Madras City. They had to be more than twelve years old, to have had no previous drug treatment, and to have a positive sputum. Out of these 193 patients, 96 were treated at home, 97 in the sanatorium. The period of comparison lasted a year, and the results of the study indicated that domiciliary treatment seemed to give as good results as sanatorium treatment.

There remains the important point whether the risk of infection to the family is not greater when the patient is treated at home. A fresh study was carried out under World Health Organization auspices on the same group of patients to determine the overall prevalence of cases of tuberculosis among family contacts when the diagnosis of tuberculosis was established in the family member included in the comparative study (the index case), and the number of fresh clinical and primary cases occurring among

family contacts during the first year of his treatment. Contacts include all the other members of the family, but the inquiry was limited to 'close' family contacts, that is, those who had been living with the index case for at least three months before diagnosis. In fact, 96.7 per cent of the 693 close family contacts had been living with the index case for at least a year.

Examinations were carried out in 693 contacts of the 193 patients treated at home or in the sanatorium; of these, 347 were men and 346 women. The survey of the prevalence of tuberculosis when the index case started treatment was based on 672 contacts. Active tuberculosis was found in 46; in another 2, activity was doubtful; and in 11, tuberculosis was inactive.

Of still more interest was the inquiry into fresh cases of tuberculosis appearing in close family contacts of patients treated either at home or in the sanatorium during the first year of treatment. There were 257 contacts of the 75 patients treated at home, and 275 contacts of the 73 patients in the sanatorium. The two groups were alike in the proportion of men to women, in the kind of home they lived in and in the results of the initial examination; and they were followed up in the same way during the year of the

inquiry. During this year, 26 active cases of tuberculosis were discovered in the two groups of contacts; 9 (3.5 per cent) in the group of contacts of patients treated at home, and 17 (6.2 per cent) in the group of contacts of patients treated in the sanatorium.

Of these 26 cases, 15 were less than five years old and 21 less than two years old. The most serious cases all belonged to the group whose index cases were treated in the sanatorium.

Even if encouraging conclusions can be drawn from this study, domiciliary treatment of the open tuberculous patients should be considered an emergency measure only, to be taken when institutional treatment for 3-6 months is impossible because of shortage of beds. Every effort should be made not to send patients home until their sputum has become negative for tubercle bacilli, at least on microscopical examination.

A final conclusion is that the frequency and seriousness of tuberculosis lesions in young contacts are a sufficient justification for systematic prophylactic treatment of children whenever a sputum-positive patient is newly diagnosed in their household. This treatment should be started immediately and carried out for a minimum period of six months.

## NOISE IN FACTORIES AND ITS CONTROL

NOISE is always associated with the application of power, and the trend towards the use of more powerful machines in industry is making the problem of noise in factories increasingly serious. A survey "Noise in Factories", by A. G. Aldersey-Williams, which has recently been published for the Department of Scientific and Industrial Research (Building Research Station) in the series "Factory Building Studies" (No. 6. Pp. iv+26. London: H.M. Stationery Office, 1960. 3s. 6d. net), emphasizes that the noise factor should be considered at the earliest stages in the planning of a factory. Choice of the manufacturing method, which largely determines the noise-level and its effect on the occupants of the factory and residents in the area, is the responsibility of the management. Noise at source can be reduced by machine manufacturers in the design of their machines, but where this is not possible, factory engineers can minimize the effect by taking precautions in the installation of the machines, and the building designer can reduce annoyance by siting noisy equipment away from other buildings and by the use of enclosures and sound-absorbing roof linings.

The 26-page booklet consists of two parts. Part 1 deals with the properties of sound and explains the terms used, the sources of noise in factories, and the effects of noise. It is pointed out that the most intense noise in factories is generally caused by machine tools and by operations involved in making and handling the product, and it is only when the process is a quiet one that the noise from service equipment, such as fans, pumps and compressors, may be the more intense. Excessive noise will influence the welfare, safety and, indirectly, the efficiency of the occupants of the factory. As the level of noise increases, its effect on people is first annoyance, then interference with communication and, finally, damage to hearing. In addition, since

noise is associated with vibration, the performance of delicate equipment in the factory may be upset, and if the noise is transmitted through the factory structure or through the ground to the outside of the factory, it may also cause discomfort.

In Part 2, methods for the reduction of noise and their effectiveness are discussed. The radiation of noise, resonance and damping, and vibration isolation are dealt with first, then noise reduction and lay-out, enclosures to reduce noise, sound-absorbing materials, partial enclosures and screens, and finally ear protection. The most effective way of controlling noise once it has been generated and radiated is to contain it within an enclosure, a reduction of about 50 db. being readily provided by an ordinary building enclosure; but the efficiency of an enclosure depends on its completeness and uniformity, and direct air leaks through a hole or through porous material reduce the efficiency considerably. The build-up of reverberant sound within an enclosure can be controlled by the use of sound-absorbing materials to reduce the amount of sound reflected. The booklet gives a list of absorption coefficients of common sound-absorbing materials and contains illustrations of various sound-absorbing arrangements in factories. For individual ear protection, where operators of noisy machines are exposed to high levels of noise, two forms of commercially available 'ear defenders' are ear plugs and ear muffs. Ear plugs are inexpensive, small and inconspicuous, but may be uncomfortable when first worn. Dry cotton wool is not an effective ear plug. Ear muffs fit over the ears, and though heavier and more expensive than ear plugs, they give greater reduction of noise. In the latest types the seal around the ear is made by a plastic cushion partly filled with liquid, and the muff is very comfortable to wear even for long periods of time.

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