wastes, and if the information resulting from this research is properly acted upon by the industries concerned, a potent source of pollution will be greatly reduced. Experiments on the anaerobic digestion of partially neutralized waste liquor from the kiering of cotton were also continued. This method of treatment is a possible one for pre-treatment before discharge to a public sewer, having the merit first of requiring less space than a percolating filter to effect the same degree of improvement, and secondly of the ability to treat undiluted kier liquor, whereas for a percolating filter the liquor would require considerable dilution.

The section on water is very brief. Experiments are described on the removal of fluoride from water by passage through a column of activated alumina. The reason for the complete blockage of two slow sand-filters was investigated and found to be due to deposited crystals of calcium carbonate which had bound the sand grains together, the deposit having been induced by loss of carbon dioxide from the water during previous aeration.

Lastly the report emphasizes that an important part of the Laboratory's activities is now concerned with the development of automatic equipment. A noteworthy achievement has been the production of an instrument for the continuous recording of the dissolved oxygen content of a stream of water, thus giving valuable information about fluctuations that would usually be missed by the methods of intermittent sampling that otherwise have to be employed.

STANFORD RESEARCH INSTITUTE, CALIFORNIA

REPORT FOR 1954

THE annual report for 1954 of the Stanford Research Institute, California*, records an increase of 242 in the staff during the year, and, of these, 165 have professional training and five to ten years of industrial experience. The staff now totals 916, and the revenue has increased by 40 per cent to 7·57 million dollars. Contract research is now being conducted at the rate of 8·5 million dollars a year, and the number of research projects has increased from 382 to 478, of which 297 were for private business, 128 for the Government and 53 were sponsored by the Institute as part of its plan for aiding the technological and economic development of the western part of the United States. In terms of dollars, the ratio of commercial projects to government projects was 54 : 46—an almost exact reversal of the ratio in 1953.

The 53 public service projects include studies of air pollution and high-temperature materials, of industrial water resources in California and of surface tension in solids; research on human engineering in industry; the effect of γ-radiation on high polymers; a survey of industrial land use in the Portland area; and the production of such reference works as the "Western Resources Handbook", "The Chemical Economics Handbook" and "The Directory of Western Chemical Producers". The Institute also sponsored symposia on the automatic production of electronic equipment, on social science for industry and on area development problems.

* Stanford Research Institute: Annual Report for 1954. Pp. 48. (Stanford, Calif.: Stanford Research Institute, 1955.)

In the Engineering Division electronics claims the largest share of attention, particularly the theoretical analysis of antenna systems, the design and manufacture of prototypes and the performance of radiation systems. The Physical Sciences Division has dealt with the production of chemicals from petroleum, utilization of wood waste, tallow, bagasse and fish waste, as well as the properties and applications of polymers, the storage and utilization of solar energy, the effect of infra-red radiation on chemical reactions, the use and control of sound waves and with the weapons-effect programme. The Division is also engaged in biochemical research and on problems in nutrition, microbiology, physiology and toxicology, while expansion into pharmacology is in progress. The Economics Division is concerned with three broad categories of work: the economic analysis of problems for specific companies; the examination of specific functions, such as the application of electronic data-handling equipment to accounting and clerical operations, the application of operational research in management and the industrial application of social science; and the use of economic surveys in area development, including also the location and protection of plant, military logistics and weapons-system evaluation.

In the Poulter Laboratories contributions have been made to the understanding of shock waves and detonations which have increased the effectiveness of explosives both for military purposes and in mining, agriculture and demolition. The Institute's work on defence against nuclear bombs has shown that earth-covered steel-arch structures above ground provide a significant level of protection at economical cost; but that most ordinary structures not specifically designed for the purpose are not significantly strengthened against blast by earth cover. Work on rocket liners has shown that detonation in tubes can be limited by absorbing compression-wave energy at the walls and, in work on graphite nozzles for liquid fuel rockets, a new technique for converting graphite to metallic carbide for an appreciable depth has given promise. A non-destructive test device, called a stub meter, for the plastic-adhesive bonded sandwich has been developed by the Institute physicists. Ten common weeds, grown under controlled conditions, have now been standardized as indicators of atmospheric pollution by hydrogen fluoride, sulphur dioxide, hydrogen sulphide, ammonia, chlorine and oxides of nitrogen. Under a project sponsored by the Southern Pacific Co., the hydrofriction system for freight cars has been developed to distribute the impact of energy more evenly or at a more constant rate by new shock-absorbing mechanisms.

METABOLISM OF RADIOACTIVE SUGARS

H. K. PORTER and L. H. May have followed the uptake and utilization of radioactive sugars by tobacco leaf disks (*J. Exp. Bot.*, 6, 16, 43; 1955). When destarched tobacco-leaf disks were floated on 5 per cent (w/v) solutions of sucrose uniformly labelled with carbon-14 in either the glucose or fructose moiety, and on invert sugar in which one hexose only was so labelled, in an atmosphere of oxygen at 25° C., seventy-five per cent of the sugar lost from the external solutions was recovered as starch, sucrose, fructose, glucose and carbon dioxide.