Letters

Science and Engineering Manpower

Your news article on science and engineering manpower [*Science* **135**, 301 (26 Jan. 1962)], together with the volume of public mail in response to the President's statement at his press conference on 15 January, emphasizes the importance of the studies the President has requested. Despite differences of view over whether or not the drop in engineering enrollments is significant, and despite inadvertent errors, originating in my office (in the statistics included in the press conference statement, the year 1951 should have read 1950 in the listings of graduates in sciences, and engineering enrollments for 1951 should have read 146,000), there is, nevertheless, a growing consensus that major problems may be developing as we move further into the 1960's. As a minimum, there is an urgent need to understand the significance of the many statistics and statements relating to the subject of technical manpower.

We probably need better statistics and, more important, better analyses of what the statistics mean. For example, figures comparing present college enrollments with what they have been during the past decade are badly confused by the post-World War II "bulge." But regardless of any difference over numbers, the simple fact is that it is time for searching study and analysis of our technical manpower—its quality and utilization, as well as its quantity—and its implications for public policy. Similarly, we must make careful assessments of the demands our expanding research and development programs, both public and private, will place on our technical manpower resources. It is precisely such studies that the President now has asked for.

One matter of primary concern in the consideration of technical manpower problems is that of quality. I am convinced that it is necessary to improve the over-all quality of science and engineering education at all levels, to stimulate a high order of advanced training through research, and to make it possible for scientists and engineers to enhance their professional skills and to utilize their talents to the fullest. It is also necessary, in the planning of the government's research and development programs, to give greater emphasis to the effective use of technical manpower. The effective employment of our scientists and engineers is important for the individual as well as for the nation. In my view, far too little attention has been directed toward determining how effectively the national pool of scientific and technical manpower is distributed among industry, government, and universities, or to gaining a better understanding of the technical manpower needs and practices of each of these sectors and of the factors that influence manpower distribution.

It is for these reasons, among others, that there is a need for more study of our human resources for research and development.

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Research in Australia

My associates and I feel that the article "Financing scientific research in Australia" by S. Encel [*Science* **134**, 260 (1961)] presents an inaccurate and unflattering picture of this company's contribution to research. The following facts are provided in the hope that their publication may lead to a more balanced picture.

Encel says: "In 1955 the company embarked on a research program which has involved a capital cost of over £A400,000 ($1 million) to date, and its annual expenditure is now about £A100,000. It employs about 90 scientists, engineers, technicians, and geologists." Later, in commenting on a total estimated industrial research budget of about £A5 million, he says, "Almost all of this is for 'development' rather than 'research'."

The figures in the first quoted passage apply reasonably well to staffing and expenditure at the Central Research Laboratories alone at a time about 2 years ago. However, this is only one facet of research in this company. The Central Research Laboratories were opened in March 1957 to undertake fundamental and long-term research for the steel industry. Prior to that date research was conducted for the individual steel plants, and still is, in even greater volume.

Laboratories at present operated by the company for research purposes include the Central Research Laboratories at Shortland, the Works Research Laboratories at Newcastle and Port Kembla, the Central Mineral Dressing Laboratories at Whyalla, and smaller but important facilities in sev-