News and views

Industrial Research

Federal Survey Reported

A preliminary report on the resources and the extent of industrial research and development in the United States has been issued by the Department of Defense Research and Development Board and by the Department of Labor's Bureau of Labor Statistics. The report, which summarizes the results of an RDB survey covering about eighty-five percent of all research and development carried on by industry during 1951, includes data on some two thousand companies.

The total cost of research for all reporting companies was nearly two billion dollars in 1951, about half of which was supplied by the Department of Defense, the Atomic Energy Commission, and other federal agencies. Some 94,000 research scientists and engineers were employed by industry as of January 1952, according to the report. Most were associated with four major groups—electrical engineering, aircraft, chemicals, and the professional and scientific instruments industries. An additional 140,000 workers, listed as "supporting personnel", swelled the total of industrial research staffs to 234,000 for the year.

The average research cost per research scientist or engineer was $22,100. Taking all research employees into account, including supporting personnel as well as professional scientists and engineers, the average cost per research worker was $8,900. Costs, the report pointed out, varied widely by industry and by the size of the company's professional research staff. The chemical industry's average cost, for instance, was $16,500 per research scientist or engineer, while the motor vehicle industry reported an average cost of $68,600. The wide difference among industries, according to the report, can be traced to the varying ratios of scientists and engineers to supporting personnel. Small companies, with fewer than five researchers, averaged only $15,400 per professional worker. Those having professional staffs of one thousand or more reported an average cost of $25,000 per scientist or engineer.

"Ratios of research cost to research manpower," the report emphasized, "can be used to estimate the total cost of employing a given number of workers, or conversely, to estimate the manpower needed to carry out a program of a given dollar size. Such information, not heretofore available on a national scale, is also valuable in setting cost standards for research activities."

The cost of research during 1951 for the companies responding to the RDB survey amounted to two percent of the total value of their sales or services. The proportion varied widely among industries, ranging from thirteen percent in aircraft manufacturing to 0.6 percent in petroleum refining and primary and fabricated metals. In nonmanufacturing industries (principally telecommunications) the ratio of research costs to sales or services was 1.7 per cent.

In the smallest organizations, slightly over one-third of the research cost was on government work. It was 56 percent in all firms with professional research staffs numbering 500 or more. The relatively high figure for companies with large research programs resulted mainly from large government research contracts in the aircraft and electrical machinery industries.

The survey indicated that, if necessary, industry could further increase its defense research program. About 70 percent of the companies replied that they were able and willing to take on new defense research contracts. Although the relative number of engineers and scientists available for new defense work varied greatly by industry, companies in all industries and all size categories indicated that they had a reservoir of personnel that could be utilized.

According to the RDB survey, the number of engineers and scientists who left the research staffs of reporting firms during 1951 averaged 16.4 per 100 employed at the end of that year. In petroleum refining the average separation rate was only 8.8 per 100, less than half the rate for the aircraft industry (20.8) where recent expansion has led to strong competition for engineers and scientists. Call-ups for military service (including Selective Service and activation of Reserves) caused less than one-fifth of all these separations. The over-all annual rate was only 3 per 100 workers, of which Reserve calls accounted for 1.8 and Selective Service 1.2. Although these Reserve and Selective Service calls did not cut deeply during 1951, the effects in a full mobilization could be more serious, the RDB said. As of January, 1952, 19 percent of the research engineers and scientists in the survey were members of the Reserves or National Guard and therefore were liable for service. Another 6 percent were classified 1A or 2A by Selective Service (available for immediate induction or granted temporary occupational deferments). These two groups totaled about 23,500 of the 94,000 research engineers and scientists on which RDB received information. The two industries with the largest defense research programs appeared most vulnerable to military call-ups—34 percent of the engineers and scientists in the electrical machinery industry (including most electronics research) and 29 percent of the engineers and scientists in the aircraft industry were subject to these calls.

In releasing the preliminary report, the Research and Development Board noted that "although detailed information has already been compiled on research operations of educational institutions and Government agencies, very little information concerning private industry's vast research activities is available. The demands for scientific manpower and research facilities arising

out of the defense program make it important that we know more about this largest sector of the Nation's total research and development potential". A complete report, giving results in greater detail, is being compiled.

Radiation Instruments

Growth of Industry Shown by AEC Survey

The radiation instrument industry, virtually nonexistent in 1946, had an annual business volume of approximately $20,000,000 and employed more than 2400 persons in 1952, according to a survey conducted by the U. S. Atomic Energy Commission. Growth of the new industry has paralleled development of the nation's atomic energy program since early 1947, when the AEC adopted a policy of encouraging its operating contractors to procure radiation instruments from commercial manufacturers. Before that time, security restrictions had required contractors to the Manhattan Engineer District, predecessor to the AEC, to design, develop, and produce their own radiation instruments.

The survey shows an expanding market for radiation instruments outside of the atomic energy program as well as within AEC installations. According to the survey, military agencies of the government now provide about fifty percent of the total market; the AEC and its principal contractors provide about thirty percent, and the remainder is accounted for by private industry, universities, hospitals and research institutes, civil defense, export, and uranium ore prospecting. The AEC survey is believed to cover more than ninety percent of the radiation instrument industry in terms of business volume. Seven companies with probable business volume in excess of one million dollars each in 1952 account for about fifty percent of the industry's activity.

More than 50 patents in the field of radiation instruments are owned by the U. S. Government and held by the AEC. A total of 51 nonexclusive, royalty-free licenses have been granted on these patents. Application for such licenses may be made to the Chief, Patent Branch, Office of the General Counsel, U. S. Atomic Energy Commission, Washington, D. C.

Support for Education

Advisory Council Established

The Council for Financial Aid to Education, an organization formed last month to stimulate industrial and business support of the nation's colleges and universities, will serve as an advisory body and central agency for such programs, according to Frank W. Abrams, chairman of the Standard Oil Company of New Jersey, who is one of five industrialists heading the Council. Pointing out that "corporations pay the colleges little or nothing for training the personnel which they now eagerly recruit each June," he called for a better understanding by business and the public alike of the contributions made by higher education to the growth and development of industry. Mr. Abrams, who addressed a group of educators at the 13th Annual Forum of the Tuition Plan in New York City last month, added that industry and business would be among the first to be adversely affected by any decrease in the number and quality of privately endowed educational institutions. Other members of the new Council include Irving Olds, former board chairman of the U. S. Steel Corporation, Walter Paepcke, chairman of Container Corporation of America, Henning W. Prentis, Jr., chairman of Armstrong Cork Company, and Alfred P. Sloan, Jr., chairman of General Motors Corporation.

APS Honors Shockley

Buckley Solid State Physics Prize

The first presentation of the American Physical Society's recently-created Oliver E. Buckley Solid State Physics Prize was made on January 23rd at the joint meeting of the APS and the American Association of Physics Teachers in Cambridge, Massachusetts. William Shockley, research physicist at the Bell Telephone Laboratories, received the $1000 award for his contributions to semiconductor research. The prize was established last summer under the endowment of a $50,000 trust fund provided by Bell Labs in honor of the Laboratories' former president, who recently retired after having served for thirty-eight years in scientific and administrative posts with the Bell System. The prize is administered entirely by a committee of the Physical Society.

New Computer

Argonne's AVIDAC is Completed

The successful operation of a new electronic digital computer, designed and constructed by staff members of the physics division of the Argonne National Laboratory, was announced at the end of January. The $250,000 computer, based on an instrument recently constructed at the Institute for Advanced Study at Princeton, New Jersey, has been named AVIDAC, which is reported to stand for "Argonne's Version of the Institute's Digital Automatic Computer". AVIDAC is expected to facilitate the solution of mathematical problems of Argonne scientists engaged in reactor engineering and theoretical physics research. In the past, the lack of such a computing device has meant that many complex problems had to be solved by time-consuming methods or by the use of existing machines in other parts of the country. An additional computer is now being constructed at Argonne for use at the Oak Ridge National Laboratory. Another member of the same family of computers is the Los Alamos Scientific Laboratory's MANIAC, a device that was designed and constructed by members of the Los Alamos scientific staff.

Construction of the Argonne machine, according to the Laboratory's announcement, was proposed several years ago by Donald A. Flanders, senior mathematician in the physics division. The engineering and building