News of Science

First U.S. Trade Fair of the Atomic Industry

Approximately 70 industrial firms and organizations exhibited various types of materials, equipment, and instruments suitable for use in constructive applications of atomic energy at the first U.S. Trade Fair of the Atomic Industry in Washington, D.C., 27–30 Sept. The fair was held at the Sheraton-Park Hotel in conjunction with the annual Forum on Commercial and International Developments in Atomic Energy sponsored by the Atomic Industrial Forum, Inc.

Products displayed included the following: (i) metals, alloys, and compounds capable of withstanding the effects of high-temperature, high-pressure, corrosive atmospheres; (ii) reactor and power-plant components fabricated from these materials; (iii) materials for shielding against radiation and devices for remote handling and observation of radioactive materials; (iv) basic instrumentation for the detection, measurement, and analysis of radioactivity, as well as instruments for use in x-ray therapy and other medical applications of atomic energy, radiation sterilization, processing, radiography, and fundamental research; (v) reactor control mechanisms and panels; and (vi) models of several research reactors and nuclear power plants.

Metals, alloys, and compounds suitable for use in the fabrication of pipe, fittings, pumps, valves, heat exchangers, reactor vessels, fuel elements and other internal components of nuclear reactors, and waste storage tanks were displayed by several companies. Brush Beryllium Company: fabricated shapes — block, rod, sheet, foil, and tubing—of beryllium; beryllium oxide and beryllium alloys. Carborundum Company: properties of zirconium and its alloys; reactor-grade zirconium and alloys in sponge, ingot, and fabricated shapes. International Nickel Company: high-temperature application of nickel alloys; Inco-Rod A for welding dissimilar alloys. Lukens Steel Company: clad steel for ore-processing equipment, heat exchangers, and acid and waste storage tanks. Metals and Controls Corporation: ingots and shapes of aluminum-uranium alloy, thorium, and zirconium for fabrication of fuel elements and fuel plates. National Carbon Company: high-purity graphite for use as a moderator, reflector, and shield; molds and crucibles used in reprocessing metals. National Lead Company: zirconium, titanium, and other metals. Norton Company: boron compounds; refractories; and oxide, boride, carbide, and nitride materials in granular and powdered form. Republic Steel Corporation: corrosion resistance, thermal resistance, and fabrication qualities of stainless steel and titanium. Vitro Corporation of America: mining, milling, processing, and refining of uranium.

Displays or descriptions of large numbers of reactor components and power plant components were presented by more than 25 companies. In general, only the smaller components such as high-pressure pipe, valves, and fittings; pumps and mechanical seals for liquid sodium and other corrosive liquids; fuel elements; and control rods and control-rod drive mechanisms were actually on display.

Among them were Chempump Corporation's seal-less centrifugal pump; Metals and Controls Corporation's fuel elements, including the rod, tube, and flat-plate types; Robertshaw-Fulton Controls Company's packless valve; and Westinghouse Electric Corporation's hermetically-sealed motor pump for pressures up to 2500 pounds per square inch and temperatures up to 650°F.

Babcock and Wilcox Company displayed a section of the core of the pressurized-water thorium-uranium converter reactor that will be used in Consolidated Edison Company's nuclear-powered electric-generating station at Indian Point, N.Y. The core is made up of replaceable, square-cross-section fuel elements, each of which contains alternate basic fuel plates of a uranium-Zircaloy matrix clad with Zircaloy and fertile plates of thorium clad in Zircaloy. The moderator and coolant, ordinary water, flows through the channels formed by the alternate fuel and fertile plates.

Other components exhibited or described included reactor vessels, steam generators and superheaters, heat exchangers, and gas and steam turbines. Among the turbines described were some that can be operated by steam direct from a reactor; their use would eliminate the need for a heat exchanger in the steam system.

Corning Glass Works displayed 6-foot-thick radiation windows of glass composition that will not darken under intensive radiation. Other shielding devices included biological research enclosures; hoods; and shipping containers, transfer casks, and vaults made of lead and other materials. National Lead Company showed samples of concrete to which barites or magnetite had been added to increase the density. Remote handling equipment included Central Research Laboratories' Master-Slave Manipulator and General Mills' mechanical arm.

Approximately 25 companies had numerous instruments on display. Some companies emphasized survey and prospecting instruments, others emphasized instruments for research, and still others instruments for industrial use. Counters, scalers, rate meters, thickness gages, liquid-level gages, monitoring instruments, density gages, and radiation sources for calibration were among those included. Central Scientific Company showed a meter that utilizes the absorption of beta rays from a strontium-90 source to measure the percentage of hydrogen in liquid hydrocarbons. M. W. Kellogg Company gave radiography demonstrations using radioisotopes in the Kel-Ray projector.

An operating reactor simulator, including rod-drive mechanism and reactor control panel, was displayed by the Minneapolis-Honeywell Regulator Company. It included recorders and amplifiers for the start-up channel, safety channel, log N, and the period channel. The "scram" button, which broke a magnetic circuit and released the control rod, attracted the spectators. Westinghouse Electric Corporation exhibited the Mark II nuclear reactor control assembly.

Models of several nuclear research and power reactors were on display, including the following electric-power-generating reactor plants. Allis Chalmers Manufacturing Company: nuclear electric power plant under construction at Argonne National Laboratory under the AEC's 5-year reactor development program; completion is scheduled for 1956. Atomic Power Development Associates: model and explanatory material concerning a liquid-metal-cooled fast neutron breeder reactor power plant that will operate a 100,000-kilowatt generator. Consolidated Edison Company: model of proposed nuclear power station with a capacity of 250,000 kilowatts; this plant will use a heat exchanger to keep the reactor-coolant water separated from the steam that operates the turbine. An oil-fired superheater will be used.

General Electric Company: model of a dual cycle boiling water reactor to be used to power a 180,000-kilowatt plant that the Commonwealth Edison Company, a member of the Nuclear Power Group, proposes to build at the confluence of the Kankakee and Des Plaines rivers 47 miles south of Chicago, Ill. Newport News Shipbuilding and Drydock Company: model of homogeneous reactor developed by the Union Carbide Nuclear Company; model of a Mariner class merchant vessel showing possible utilization of nuclear power for propulsion.

NBS Velocimeter

The National Bureau of Standards has developed an instrument, a velocimeter, that automatically measures the speed of sound in the sea to depths as great as 300 feet and plots the result as a function of depth or time. Martin Greenspan and C. E. Tschiegg of the bureau's Sound Laboratory designed and constructed the instrument under the sponsorship of the Office of Naval Research. Because of its high accuracy and almost instantaneous response, the velocimeter is expected to be a useful addition to underwater signaling and detecting apparatus; it should also prove to be a valuable research instrument in oceanography.

The speed of sound in large natural bodies of water varies from about 4600 to 5140 feet per second. These variations occur with changes in temperature and, to a lesser extent, with changes in water salinity. Sound velocity also increases about 1 foot per second for each 55-foot increase in depth. Several other factors, not all of which are well understood, influence the velocity of sound in the sea. In current practice an estimate of the sound velocity is calculated from the measured temperature and an assumed salinity. The NBS velocimeter, on the other hand, gives an almost instantaneous meter reading of the actual sound velocity.

The instrument consists essentially of a pair of piezoelectric transducers of polarized barium-calcium-lead titanate and a reflector mounted to form a sound path of fixed length. The sending transducer is connected to a pulse generator, and the receiving transducer provides the input for a high-gain pulse-shaping amplifier. The amplifier output retriggers the pulse generator, which then applies another pulse to the sender. The sender in turn produces in the water a sound pulse to actuate the receiver. Thus the system continually regenerates a sound pulse whose repetition rate depends on the time it takes the pulse to move through the water. Since the path length is fixed, the frequency depends only on the speed of sound through the water and on the circuit delays. Any variations in sound velocity are recorded as variations in the operating frequency of the velocimeter.

News Briefs

■ Cecil F. Powell of Great Britain, head of the Bristol University physics department and 1950 Nobel prize recipient, has just returned from a 4-day tour of Soviet nuclear plants. He reports that the 37,000-ton proton synchro-cyclotron on the Volga River is the biggest of its kind in the world. He also reports that Bruno Pontecorvo is working there.

Pontecorvo, born in Italy in 1913, was a naturalized Briton who became senior principal scientific officer at Harwell, a major British nuclear research center. He disappeared while on a holiday in Italy in 1950, then last March he held a press conference in Moscow. He is said to have become a Russian citizen in 1952.

During the recent meeting of the British Association for the Advancement of Science, Powell made known that he had received an invitation to go to Moscow to discuss collaboration in cosmic ray research between Great Britain and the Soviet Union. The proposal for this cooperation came from the Moscow Academy of Sciences.

Powell has expressed interest in the plan. He commented that although there has been a good deal of collaboration with American cosmic ray specialists, little is known of the Soviet work and an exchange of information would be invaluable. Powell, who has been the leader of Britain's study of cosmic rays, is particularly interested in gaining permission to undertake an expedition to the Soviet Arctic.

■ A high-frequency titrimeter for the chemical analysis of complex mixtures has been designed by Andrew Timnick of the Michigan State University chemistry department and Arthur H. Johnson, now with the Bauer and Black Company of Chicago. With the new device analyses can be made without introducing electrodes or electric probes into the solution being studied. The instrument operates in the 100-megacycle-per-second range. Analyses can be carried out on solutions of high concentrations.

■ An electronic instrument that will enable optical scientists to evaluate and grade the performance quality of lenses in objective mathematical terms has been developed experimentally by the Radio Corporation of America. The lens-tester resulted from initial research conducted by Otto H. Schade, R.C.A. engineer who has pioneered in the development of universal ratings and allied test equipment with which the picture quality of all picture-reproducing devices—lenses, motion picture film, TV cameras, and picture tubes—can be determined with scientific objectivity.

Heretofore, the performance quality of any given lens, with regard to sharpness, contrast, and gradation, has been determined solely by visual tests. The R.C.A. device will enable lens manufacturers and users to determine the response characteristics of a lens and compare them with mathematical optimums.

Major components of the lens-tester include a special test drum, a microscope, a multiplier phototube, and an oscilloscope. The test drum has nine groups of high-contrast black-and-white lines of different widths, ranging from 3 per inch for the coarse group to 200 per inch for the finest group. The black lines correspond to 3 to 200 TV lines per millimeter in the image.

To obtain the square wave flux response of a given lens, it is made to view the test drum, which is revolved by a synchronous motor. The lens is also rotated, about its transverse axis, to test its performance off axis. The lens image of the test drum is then scanned by the multiplier phototube through a narrow slit.

For a theoretically perfect lens, the contrast between black and white lines, as measured by the phototube, would be modified only by diffraction effects. With a practical lens, the contrast deteriorates as the line width decreases because of the combined effects of diffraction and aberrations. The line at which the contrast disappears represents zero square wave flux response for the given lens.

■ The surplus of women over men in Sweden dropped from 130 per 1000 in the middle of the 18th century to only 8 per 1000 by 1950 according to a recent publication issued by the Swedish Central Bureau of Statistics. The number of persons over 65 years of age has increased from 6 to 10 percent of the total, while that of persons below 15 has decreased from 33 to 23 percent of the population.

■ Findings that throw considerable light on the nature of the oxygen effect in modifying some of the effects of ionizing radiations on living systems are reported by H. Laser of the University of Cambridge in *Nature* (20 Aug.). The change produced in hemoglobin depended on its initial oxidized or reduced state, and was independent of the presence of oxygen. That is, irradiated hemoglobin becomes oxidized, whereas methemoglobin becomes reduced.

Like hemoglobin, ferrocytochrome becomes oxidized whether irradiated in air