posed site had been presented to House and Senate Appropriations Committees. Plans for the site have been given to the National Capital Planning Commission and to the Regional Planning Council, and it is expected that these groups will work with the bureau in utilizing the land. The General Services Administration will participate in planning and will supervise construction. Transfer of operations to the new location is expected to be completed in about 5 years.

The bureau occupied its present site on Connecticut Avenue in Washington in 1903. Since that time its responsibilities have greatly increased, largely as a result of the rapid expansion of technology and the growth of scientific research. Extensive programs of research and development must now be conducted in the physical sciences and engineering to meet the needs of science and industry for new and improved standards and measurement methods.

It is expected that the new location will make possible a more modern research operation in structures that can be very efficiently managed. In addition, the rural location will remove the bureau's work from the variety of mechanical, electric, and atmospheric disturbances present in a city and will reduce the effect of these forces on precise scientific measurements.

In addition to its Washington laboratories, the bureau maintains a major research center in Boulder, Colo., and 20 widely scattered field stations. The Boulder laboratories are concerned with radio propagation research, radio standards, and cryogenic engineering. Most of the field stations are engaged in gathering data on radio propagation.

Science, Secrecy, and Wall Street

It is perhaps of interest to note that recently the *Wall Street Journal* carried a full-page condensation of testimony on "The High Cost of Secrecy to Science" given by Gerard Piel, publisher of *Scientific American,* before the House Government Information Subcommittee. The article ends with the following paragraphs.

"Under our Constitutional principle of the separation of powers, our Congress has long opposed the human tendency in the Executive Department to make Government a private affair. It is an old experience in the administration of our country that secrecy can be a shield for incompetence and corruption.

"Now we have a new reason to oppose secrecy in the operations of the Government. It is the danger that secrecy lays to the advancement of science, and hence to the general welfare and to national security."

Nuclear Progress in India

India's first atomic reactor went into operation on Trombay Island, 13 miles from Bombay, on 4 Aug. This is the first reactor to be set up in Asia. Japan is running just behind India in the atomic field; its first reactor is due to start operating shortly.

The Indian reactor will turn out radioactive isotopes for use in biological, medical, and industrial research, and will be used to train nuclear scientists for further projects. A second reactor, provided by Canada under the Colombo Plan, will start operating by 1958. This will also be set up at Trombay, and will be a high-power, high-flux machine that will enable India to undertake advanced engineering research and the testing of materials connected with the more advanced types of power reactors.

To feed the reactors, India has vast potential supplies of atomic fuel. The beaches of Travancore-Cochin are rich in black monazite sands, bearing uranium, thorium, and zirconium. The thorium content of the sands is estimated at 100,000 tons—the biggest thorium deposits in the world. In Rajasthan, deposits of beryl have been discovered, and uranium-bearing materials have been located in Bihar, Udaipur, and Nellore.

A plant has already been operating for 4 years at Alwaye in Travancore-Cochin to process monazite sands for the extraction of uranium and thorium "cake." A second plant at Trombay processes the cake for the production of small quantities of pure thorium nitrate and uranium. Two more atomic fuel plants are being planned: one plant will extract uranium from copper tailings; another, to be set up at Nangal in the Punjab, will turn out heavy water as a byproduct of nitrogenous fertilizers.

The training of special workers was begun 11 years ago by the Tata Institute of Fundamental Research, so that when the government established its Atomic Energy Commission in 1948 there was already a small team of trained nuclear physicists. Today, there are 200 natural scientists on the staff of the Atomic Energy Commission's establishment at Trombay. By 1959 there will be 800.

In addition to Canada, other foreign countries have also helped Indian nuclear development. Britain has signed an agreement with India for "close cooperation and mutual assistance" on the peaceful uses of atomic energy and is providing enriched uranium as fuel for the first reactor. A British firm of consultants is helping to plan the heavy-water factory at Nangal.

The United States is also ready to cooperate with India and is supplying 21 tons of heavy water for use in the second reactor. France has been cooperating in the processing of the monazite sands. The U.S.S.R. has offered India any information needed on peaceful uses of atomic energy. India is also cooperating informally with Norway and Sweden.

Larger Orbit for Satellite

Improvement in the performance o the launching vehicle for the IGY earth satellite, including a reduction in the vehicle's weight, has led to new estimates for the orbit that may be attained, according to those in charge of Project Vanguard in the Office of Naval Research. It is now estimated that a satellite may attain a final velocity of 19,000 miles per hour instead of 18,000, and an elliptical orbit that could reach a maximal distance from the earth of some 1500 miles instead of the 800 originally predicted. Spokesmen for the project indicate that developments have gone better than expected and that recent rumors about unexpected difficulties are unfounded.

Heavy Water in Germany

The production of heavy water is of great importance in the atomic energy program. How far this program can compete with ordinary power stations depends to some extent on the price of the heavy water.

H. C. Urey and collaborators discovered the heavy hydrogen isotope in 1932 by the fractional evaporation of liquid hydrogen, and in 1943 Urey and engineers at the DuPont Company considered its industrial use. However, it was Clusius who suggested independently in 1941 that heavy water might be produced on an industrial scale by rectification of liquid hydrogen. He gave detailed calculations in 1949, and now K. Winnacker, Frankfurt (M)-Hoechst [*Physik. Bl.* **12**, No. 6, 274 (1956)], reports that an installation is being set up in cooperation with Linde Eismaschinen for a production of 6 tons of heavy water per year.

As starting material for the heavy hydrogen, ammonia synthesis gas of about 70 percent hydrogen, 20 percent nitrogen, and some impurities is being used. (The exact composition may vary from plant to plant. For example, at the Phillips plant in Etter, Tex., the gas contained 72.2 percent hydrogen, 24.1 percent nitrogen, and various impurities). Since in normal hydrogen only 1 atom of heavy hydrogen in about 7000 atoms of ordinary hydrogen is present, large amounts of synthesis gas (8500 cubic meters per hour) have to be processed. By cooling this gas with liquid nitrogen under a pressure of 8 atmospheres, most of the nitrogen is removed. The last traces of impurities

are removed at temperatures of between 30° and 60°K. Next the hydrogen is liquefied and distilled at 20°K in rectification columns.

This process leads to 90 percent HD. By warming this to room temperature, using a catalyst, a mixture of light and heavy hydrogen is obtained; this mixture is again cooled to liquid hydrogen temperatures, again rectified, and finally 99.7 percent deuterium is obtained. The deuterium is burned with oxygen to heavy water, which can be used directly as a moderator in reactors.

This is the first time that large amounts of liquid hydrogen have been used in a technical production line, although the French Atomic Energy Commission has authorized the Societé de l'Air Linde to build a plant for this purpose at Toulouse. For American plans and a review of the various processes, see M. Benedict in *Peaceful Uses of Atomic Energy* (United Nations) [8, 378 (1956)].—K.L.-H.

News Briefs

■ The Canadian Meteorological Station at Departure Bay, Vancouver Island, will soon launch 15,000 bottles on the Pacific Ocean, one of the most extensive projects of the kind ever carried out. The bottles will be used for a survey of ocean currents and the launching will be done by about 30 ships, the most distant one being 1500 miles from shore. For more than a year, J. Tully, who is in charge of the experiment, has been collecting old bottles, for new ones are somewhat more fragile. The number of bottles that return to Departure Bay is not expected to exceed 2 percent, or 300 bottles.

■ President Eisenhower has signed the bill authorizing construction of an atomic powered merchant ship. No limit is set on the cost of the vessel, but it has been estimated at about $40 million.

■ Moscow Radio reports that a station to study cosmic rays is to be built near Alma Ata, capital of the Soviet Central Asian State of Kazakhstan. The station will be more than 10,000 feet above sea level.

■ Jayaprakash Narayan, former leader of the Socialist party in India, has come out strongly in favor of banning the slaughter of cattle, according to the *New York Times*. Twelve Indian states already have laws banning cattle slaughter, and in others the question is a divisive issue and a matter of debate. Prime Minister Nehru has opposed legislation to enforce the ban.

The latest official figures are for the year 1951, when there were 155.5 million cattle and 43.3 million buffalo in India. This is 19 percent of the world's cattle population and more than half the world's buffalo. Opponents of the ban on slaughter point out the magnitude of the economic burden involved in maintaining the old and useless animals and hold that it retards any real progress in the development of Indian agriculture.

■ Recent legislation passed by Congress authorizes the expenditure of $400,000 to enable the World Health Organization to hold its 11th World Assembly in the United States in 1958.

Scientists in the News

ROGER BARNES, chairman of the department of urology at the College of Medical Evangelists School of Medicine (Los Angeles), is now in Vellore, India, lecturing on urology at the Christian Medical College. He will return to his post next July.

Also at the College of Medical Evangelists, J. E. THOMAS will commence a 3-year interim appointment as visiting professor and chairman of the department of physiology in September.

EILEEN R. CUNNINGHAM, librarian for the Vanderbilt University School of Medicine, retired on 1 July after 31 years of service. In recognition of her work with medical and nursing school students, Mrs. Cunningham was appointed professor of medical library science in 1949. She was elected president of the Medical Library Association in 1948, and received the first Marcia C. Noyes award for outstanding achievement in medical librarianship to be given by that association.

She has headed a number of important national and international library committees, and she has participated in many international conferences. In addition, she has been active in promoting the recently organized International Association of Medical Libraries.

Mrs. Cunningham is the author of *Classification for Medical Literature,* a system that is in use in many libraries in various parts of the world. She is also a coauthor of the annotated *Bibliography of the Reference Works and Histories in Medicine and the Allied Sciences.*

She is succeeded at Vanderbilt by ELEANOR G. STEINKE, assistant librarian since 1946.

LEROY E. BURNEY has been sworn in as Surgeon General of the U.S. Public Health Service. The appointment is subject to Senate confirmation. Burney, who has been serving as Assistant Surgeon General and deputy chief of the PHS Bureau of State Services, succeeds Leonard Scheele, who resigned on 1 Aug.

The following awards were made during the recent annual meeting of the American Society for Engineering Education:

LLEWELLYN M. K. BOELTER, dean of the College of Engineering at the University of California in Los Angeles, received the Lamme medal for contributions to teaching, research, administration, and the advancement of the profession.

CLIFFORD C. FURNAS, chancellor of the University of Buffalo who is on leave to serve as Assistant Secretary of Defense for Research and Development, received the Vincent Bendix award in recognition of outstanding contributions in engineering college research and its administration.

MILTON C. SHAW, professor of mechanical engineering at the Massachusetts Institute of Technology, received the George Westinghouse award, which is given to a young engineering teacher for achievement in teaching.

CHARLES S. JONES, president of the Academy of Aeronautics, LaGuardia Airport, New York, received the $500 James H. McGraw award for leadership in 2-year technical institute education.

RALPH J. PAFFENBARGER, head of the department of engineering at Ohio State University, received a citation for distinguished service in his profession.

C. H. LI, metallurgist in the tube division of the Radio Corporation of America, Harrison, N.J., received the $100 Gessner prize in nomography for the best graphical representation of a mathematical equation published in 1955–56.

EDWARD U. CONDON, head of the department of physics at Washington University (St. Louis), has been named editor of *Reviews of Modern Physics,* quarterly journal of the American Institute of Physics.

CHARLES S. CAMERON, medical and scientific director of the American Cancer Society, has been appointed dean of Hahnemann Medical College, effective 1 Nov. He will fill the post that was left vacant when CHARLES L. BROWN resigned to become head of the Seton Hall University Medical College.

THEODORE E. STERNE, a specialist in weapons systems evaluation, has been appointed associate director of the Astrophysical Observatory of the Smithsonian Institution in Cambridge, Mass., and Simon Newcomb professor of astrophysics at Harvard University.

SAMUEL B. BATDORF, physicist, formerly of the Westinghouse Electric Company, has joined Lockheed's Missile Systems Division as assistant director and head of the electronics division.