TECHNOLOGY

Baby Reactors Teach A-Energy

First educational atomic reactor "packages" are now available to colleges for training students. Various fields of industry are open to young persons with atomic training.

By NELSON M. GRIGGS

➤ TO RUN the atomic power plants of the future, colleges are teaching atomic energy, not only out of books, but by having baby atomic reactors in their laboratories.

These machines are complete with uranium and a neutron source, but are what the scientists call "subcritical," that is, they are not self-energetic and "hot," as the bigger atomic furnaces that are "critical," and therefore are a kind of non-exploding atomic bomb.

In addition, the new baby reactors are obtainable for a fraction of the cost of even the cheapest critical reactor. The difference is that a separate neutron source is provided for the "baby" as it does not contain enough atomic material to sustain a chain reaction by itself.

The move to make reactors available to colleges for purposes of education and training was instituted by the Atomic Energy Commission in September, 1956, as part of a program "to increase the supply of engineers, scientists, and technicians for the national atomic energy program and for the growing atomic energy industry." Lewis L. Strauss, then chairman of the AEC, said the purpose was two-fold: to "provide for direct financial assistance in securing equipment and teaching aids, and for a broadening of the Commission's existing program of assistance in the form of loans of certain materials."

The AEC policy has proved a boon to schools faced with growing student demands for atomic instruction in an atomic age but unable to afford reactors costing hundreds of thousands of dollars.

Special "Baby" for Schools

Under the plan, the AEC makes funds available to schools for the purchase of reactors, provided the school can show the need for a reactor in a planned curriculum of educational projects, and also provided the school can guarantee funds for operating the equipment and conducting the required courses. In addition, atomic materials, which, under the law, cannot be owned by anyone but the AEC, will be furnished on a loan basis as reactor fuel.

No funds, however, will be available for incidental costs such as for a new building to house the reactor, etc., nor will the AEC permit subsidized equipment to be used for commercial purposes.

The new baby reactor, designed especially for use in schools, is manufactured by Nuclear-Chicago Corporation, Chicago, Ill. Company officials say that to date 50 schools have made application to the AEC for grants for atomic education programs, and the company in turn has made definitive proposals to the schools at their request.

Most of these schools will be given the green light, Science Service learned, with the possible exception of one or two small liberal arts colleges that lack qualified staff members. Even these, however, will probably win limited grants for "pre-atomic" programs involving elementary equipment such as radiation sources, radiation counters, and the like. After a time, perhaps a year, when these schools can show capability improvement, grants for baby reactors will be allowed.

At present, Nuclear-Chicago has received purchase orders for eight units to be delivered to colleges by Sept. 1 for installation by the beginning of the 1958-59 school year. Most of the units are what the manufacturer calls "full packages" containing all necessary items and instrumentation for conducting a full atomic laboratory program.

Three Prices

Schools may buy the baby reactor in three price ranges:

1. Reactor alone, less accessories, $10,000.
2. Reactor with basic equipment such as platform, supports, plumbing fixtures, etc., $13,000.
3. Full reactor package, including all accessories and instruction manual, $30,000.

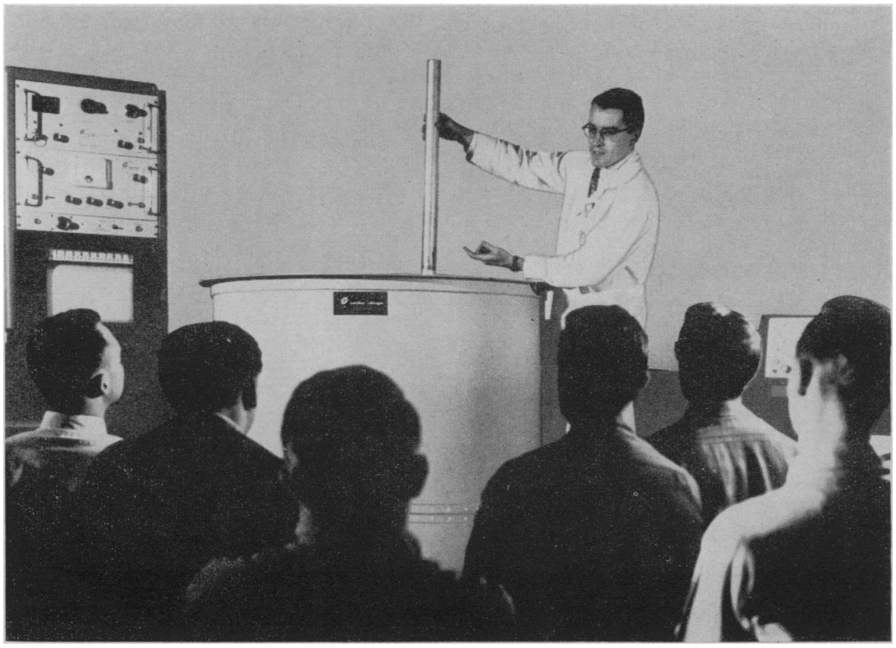
Although the above prices are approximate, based on the particular requirements of the individual college, they run pretty close to actual costs, a company spokesman said, and compare favorably with the least expensive critical reactor which costs in the neighborhood of $90,000.

Instrumentation contained in the "full package" consists of standard "catalogue items," and accounts for approximately $17,000 of the package cost. Any school might already own some of these instruments, which would not need to be duplicated, leading to further savings both to the school and to the taxpayer.

Such instruments are standard in industry and by working with them, students will gain knowledge and familiarity that will carry over into professional life.

The instruments include scintillation counters, Geiger counters, portable survey meters, and five- or six-student counter "set-ups," individual instrumentation combinations which enable more than one student to conduct laboratory experiments at one time. The package also includes a unique neutron counter that is placed directly in the heart of the reactor itself and indicates internal atomic activity by means of a remote meter. This device is exclusive with Nuclear-Chicago.

A feature of the package is the instruction manual. Individual instructors, perhaps at a loss to devise adequate training projects for individual students, will find a suggested curriculum outlined in the manual, from which he and the student may select appropriate experiments.



BABY ATOMIC REACTOR—An instructor is demonstrating to his class the operation of the "baby" subcritical atomic reactor developed by Nuclear-Chicago Corporation especially for educational and training use in colleges.

The curriculum was carefully compiled from data supplied by university consultants, advanced engineering schools that had built their own subcritical reactors in the past, and from experiments in the manufacturer's own laboratories.

Wide Open Field

Professional opportunities for graduates in atomic energy are wide open, AEC officials say, and are not confined to the nuclear physics field. Not every student will go into industry to run a reactor. But graduates with a background of nuclear training will find open doors as chemists, biochemists, physicists, medical technicians, and many other positions where their knowledge of nuclear techniques is necessary to their working with radioactive materials.

Industry has been slow to make full use of radioactive isotopes. This hesitation is due to two factors: industrial executives have been reluctant to allow radioactive materials to enter their plants, fearing radiation injury to their workers; and, except in the largest plants, industrial firms lack personnel trained in the effective use of such materials.

Manufacturers, however, can save money and make better products through the use of radioisotopes in analytical procedures by trained men who are familiar with such materials and their use.

Medicine, on the other hand, is advanced in isotope use.

Doctors can educate themselves in the techniques involved in isotope use through the reading of detailed published accounts of the results of experiments in laboratories all over the world. Through their associations with hospitals and clinics they have been practicing radioactive diagnostic and therapeutic techniques for many years.

Needed: Personnel

The need today is for trained personnel in industrial research laboratories, both large and small. Because of the opportunities for unlimited research, university chemists and physicists usually tend to stay put, except to go with large corporations at substantial salary increases with equal research opportunities.

Well-paid industrial nuclear engineering personnel can seldom be lured away from lucrative positions by smaller companies. The small business, therefore, must rely on the engineering graduate, of which there are all too few, or do without.

The starting salaries for the graduate accepting a position as a nuclear technician have been estimated at $5,000 to $6,000 per year, with advancement strictly a matter of personal accomplishment.

Through its progressive program of help to the school and encouragement to the student, the Atomic Energy Commission is pursuing its "program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress" as charged by the Congress in the Atomic Energy Act of 1954.

Science News Letter, August 9, 1958

NUTRITION

Surplus Food, Surplus Fat Problem to U. S. Alone

➤ A "LUXURY nutrition problem" faces the United States while most other nations have an "essential nutrition problem."

One aspect of our national nutrition problem, a form of malnutrition very different from that facing other nations, is that we have surplus food on the farms and surplus fat on the individual.

The malnourished American eats virtually no breakfast, has a light lunch and gorges on his evening meal.

In much of the world, however, antiquated agricultural practices, lack of technology for transporting and preserving foods, and social and religious customs keep millions more malnourished, Dr. Arnold E. Schaefer of the National Institutes of Health, Bethesda, Md., has said.

Goiter from lack of iodine in the food has been prevalent so long in some areas of the world that it is considered a natural part of the anatomy.

Dr. Schaefer explained that these countries are eager for assistance. Home economists are among the scientists who can continue to contribute greatly to world nutrition improvement programs.

Dr. Schaefer is executive director of NIH's interdepartmental committee on nutrition for national defense.

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ASTRONAUTICS

New Space Board Charts Man's Space Penetration

➤ A SCIENCE SPACE board to survey problems, opportunities, and implications of man's advance into space has been formed by the National Academy of Sciences and the National Research Council.

Under the chairmanship of Dr. Lloyd V. Berkner, president of Associated Universities, committees will be headed by Dr. Harold C. Urey, University of California; Dr. Harrison S. Brown, California Institute of Technology; Dr. Leo Goldberg, University of Michigan; Dr. Donald F. Hornig, Princeton University; Dr. W. A. Noyes, University of Rochester; Dr. R. W. Porter, General Electric Company; Dr. Bruno B. Rossi, Massachusetts Institute of Technology; A. H. Shapley, National Bureau of Standards; Dr. John A. Simpson, University of Chicago; Dr. James A. Van Allen, Iowa State University; Dr. O. G. Villard Jr., Stanford University; Dr. Harry Wexler, U. S. Weather Bureau; Dr. H. Keffer Hartline, Rockefeller Institute for Medical Research; and Dr. S. S. Stevens, Harvard University.

Fields to be explored include: moon and planets, geochemistry of space, radio astronomy, space stations and interplanetary vehicles, international relations, space laboratories and satellites, long-range planning, ionosphere, fields and particles in space, telecommunications, telemetry, guidance, meteorology of space, psychological and biological research, geodesy.

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