

to run—this is important to budgetmakers.

Yet it would take a bold man to assess in terms of mere cash a recent yard-long BNL product no thicker than the business end of a softball bat. It was pure cobalt metal. BNL scientists irradiated it for most of a year in another of their tools, the controlled A-bomb known as an atomic research reactor. This turned the bar into cobalt⁶⁰, a great blessing to cancer patients.

BNL people get a lot more satisfaction knowing their cobalt⁶⁰ is helping keep fellow human beings alive than in thinking about its money value. Nonetheless, the price tag on a chunk of natural radium the size of this one would exceed \$80 million—or what it cost us to build Brookhaven!

What is Brookhaven's main goal? It is one so broad you have to stop and think a

December, Brookhaven dedicated the only hospital with its own research reactor to continue the work. Treatments which called for 150 helpers per patient at the original reactor will now be handled by two or three nuclear experts under medical supervision.

How safe is the reactor? So safe that it couldn't possibly explode, no matter what happened. Could it "run away" or burn up and spew radioactive material into the atmosphere? Never. Why not? Because of the "scram circuits" or automatic shutdown alarms. The reactor is responsive to a total of 56, yet any one of these "scram circuits" can smother the chain reaction in a flash by automatically ramming home all the boron steel control rods. Similar multiple-check, foolproof devices prevent any accidental withdrawal of those rods too rapidly.



Brookhaven has first hospital devoted exclusively to atomic research in medicine. Geiger counter shown here follows path of radioactive material swallowed by patient with cancer condition in thyroid gland. The "X" marked on throat enables operator to focus machine accurately during test.

minute before it starts to focus; it is something which, unfortunately, you cannot touch, taste, smell, see, or hear. Knowledge is its name, and it alone is the main work of the 1,800 men and women of BNL.

How does Brookhaven justify its dedication to pure research without concern about discovering things which can be converted promptly to cash? It doesn't try to. Along with President Eisenhower and others responsible for the free world's future, BNL feels that its objectives justify themselves.

In use around the clock at Brookhaven, for example, are a number of different atom smashers. Oldest is the nuclear reactor, a many-slotted, 25-foot graphite cube shielded with five feet of high-density concrete. This is to protect scientists from neutron radiation as the uranium slugs inside the reactor turn out up to 30 megawatts (30,000 kilowatts) of incidental thermal power. Cost of this one atom smasher: \$27 million.

The immediate product of this chain-reacting 700-ton cube is called a neutron. By carefully bringing together enough fissionable material (in this case, Uranium 235), a "critical mass" is obtained. That means the stuff reacts with itself to produce neutrons in greater quantity than the reacting mass can absorb them. These split off other neutrons to keep the process going.

With inspection and uranium-fuel replenishment shutdowns every couple of weeks or so, the reactor has steadily churned out neutrons and irradiated some 300 items a month for medical and other research purposes.

The reactor even has facilities for irradiating animals and instruments. During research on neutron-bombardment therapy for the brain tumor known as glioma, the reactor also was able to accommodate human beings in a delicate 150-man procedure. Prospects for this therapy and similar medical programs were so promising that, last

Among the more interesting features of Brookhaven for the general public—or at any rate for the first 10,000 who write in for invitations to the annual three-day open house in October—is the so-called Gamma Garden. This carefully guarded 10-acre circular tract has a pipe at dead center with a radioactive cobalt slug inside that is hoisted for 20 out of each 24 hours to test the effects of gamma radiation on plant life. To permit work in the garden, the cobalt is lowered for half an hour at 8:30 a.m. and again for three-and-a-half hours at 1 p.m. From May to October the plants nearest the "source," as the cobalt slug is called, wither and die, while in concentric rings out from it they develop the mutations which BNL geneticists study for clues to the secrets of life.

Since all but a tiny fraction of BNL's work is unclassified, and none of it is connected with atomic weapons, the three-day October open house is welcomed by the entire staff as an opportunity to show what we as a nation are doing for the nuclear future. One day is for high-school students, one for college people, and one for Mr. and Mrs. U.S.A.

As you might expect in a lofty operation like BNL, run as it is by Associated Universities, Inc. (Johns Hopkins, Cornell, Columbia, Princeton, Massachusetts Institute of Technology, Rochester, Pennsylvania, Harvard, and Yale) under a nonprofit, no-strings-attached contract with our Atomic Energy Commission, there are no mad scientists. You might ask directions of one with a distant look in his eye, as I did, but he will always be a helpful soul who could tell you a great deal more than how to get to the place you're going.

The nearest thing to a mad scientist that I found at this exciting place was a computer or electronic brain known, in all seriousness, as MANIAC. It's a condensed nickname for the special counting job it handles.

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