Kentucky newspapers 1949 look at the city, part 5

(As published in *The Oak Ridger's Historically Speaking* column on May 12, 2015)

Here is the third installment in the series of articles Sam Adkins, staff writer for the Louisville, Ky., daily newspaper, The Courier-Journal, wrote about Oak Ridge. The first article in the series was published on Aug. 14, 1949, the fourth anniversary of the surrender of Japan.

The editor of The Courier-Journal has given permission for Adkins' series of articles to be reprinted in part here. I think you will appreciate seeing the view of Oak Ridge history from the perception of a reporter looking at us from one state away. Remember, this is 1949!

The Courier-Journal title for this installment in the series: **Atomics May Lengthen The Life Span of Man**
By Sam Adkins, Courier- Journal Staff Writer

This is the third article on Oak Ridge, the atomic installations there and the research on nuclear physics in the Tennessee city.

Oak Ridge, Tenn. – This is being written just after a visit to a mechanical monstrosity which has in it both the seeds of world destruction and the greatest new hope since the 17th Century for a longer, easier life for every human being.

That device is the atomic chain-reaction pile, or reactor, at the Oak Ridge National Laboratory of the Atomic Energy Commission. The "seeds of world destruction," of course, is the ability of the reactor to transmute Uranium-238 into the plutonium which is used in atomic bombs and other weapons. And the hope for a longer, easier life for man is the reactor's ability to produce useful, beneficial radioactive isotopes or radioisotopes.

To understand what this is all about, it's necessary first to do some defining.

Like A Solar System

All the phases of atomic energy are, of course, based on the atom, the basis of all substance and most or all energy in this world of ours.

What is an atom?

Well, it resembles the solar system. It is a particle so small that man has not been able to see it; and he doesn't even hope ever to be able to see it. Billions of atoms would be quiet comfortable resting on the head of a pin, for instance. Each atom contains an outer ring of electrons which holds it together. Inside this ring is the nucleus. This is made up of a number of positive electrical charges called protons and uncharged particles called neutrons. The number and ratio of these protons and neutrons is different in each of the 96 elements now known to exist, but always the same in all the atoms of each individual element or isotope.

What is an isotope?

The word "isotope" comes from two Greek words meaning "same" and "place."

It has been discovered that any one of the 96 elements can exist in several species of atoms, the elements being identical chemically, but of different weights. Thus, species of elements which have atoms with weights varying from that of the basic element are called isotopes. They're like twins which look and act exactly alike, but don't weigh the same. Hence, Uranium-235 and Uranium-238 are both isotopes of uranium with 23's atoms weighing more than those of 235.

Altogether, the 96 elements have close to 1,000 isotopes.

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Reaction Controlled

Some of these isotopes are "stable" and some are "radioactive." The stable ones are all natural and just what the word stable indicates. The radioactive isotopes are in some cases natural, but in most cases man-made. The nuclei of these isotopes are unstable. When they are formed, excess energy is locked up inside them. It is thrown off in the form of gamma, beta or alpha rays. This is described as decay or disintegration of the atom. During a certain period, it will lose half of its radioactivity. Then, in the same period, it will lose another half, it will "decay" into another atom altogether.
And what is a reactor, or a pile?

Well, basically, it's a sort of furnace in which scientists can start, keep going and control a chain reaction. When an atomic bomb goes off, that is an uncontrolled chain reaction. And it strictly does nobody but the wielder any good. What goes on in a reactor is exactly the same thing, except that it can be slowed down, controlled and forced to do work the scientists want it to do.

Usually, the outer layer of a reactor is very thick concrete. Inside that is a matrix or core of graphite; and it is around and through this graphite that the chain reaction (caused here by splitting the U-235 atom) takes place.

The graphite and special metal (boron) rods act as "blotters" for the energy hurled off by the splitting atoms, and this keeps the reaction under control.

Recently in a national magazine, the reactor here at Oak Ridge was described as being "larger than a boxcar." I didn't recognize it from the description. I was permitted to see only the "unrestricted" portion of it; but it obviously is three stories (or more than 50 feet) high. It's about 20 or 30 feet wide. I had no way of judging its thickness.

Atoms Bombarded

The front of the portion I was allowed to see contains several hatchways into the pile's innards, plus certain gauges and other gadgets. Also much in evidence were safety devices – particularly Geiger counters and similar instruments for checking on the amount of radioactivity in the air of the pile building. When there is too much around for human safety, the Geigers click madly, measuring the gamma and beta rays. Geigers aren't so good on detecting alpha rays, but other devices take care of that.
Now, how is a radioisotope made?

Certain amounts of basic elements are inserted into the pile. There, they are bombarded with neutrons from the splitting U-235 atom. These neutron "bullets" either knock particles out of the material to be changed, or the material "captures" one or more of the U-235 neutrons per atom. At any rate, the weight of the atoms in the basic element is changed, and it emerges as a radioactive isotope.
The operation looks pretty easy – and very dangerous.

Operators of the pile place the material to be transmuted in small aluminum tubes. The pile is "shut down," or the chain reaction inside is halted. It would be highly fatal (if fatality can be high) to open the pile while a chain reaction was in progress.

Then, working behind lead or other shields, and using special tongs and mirrors, the operators place the tubes of basic elements inside the reactor. The hatches are closed and sealed. The chain reaction is started again, and the transmutation, or neutron bombardment, begins.
…
Next we will see Sam Adkins' perspective on radioisotopes.

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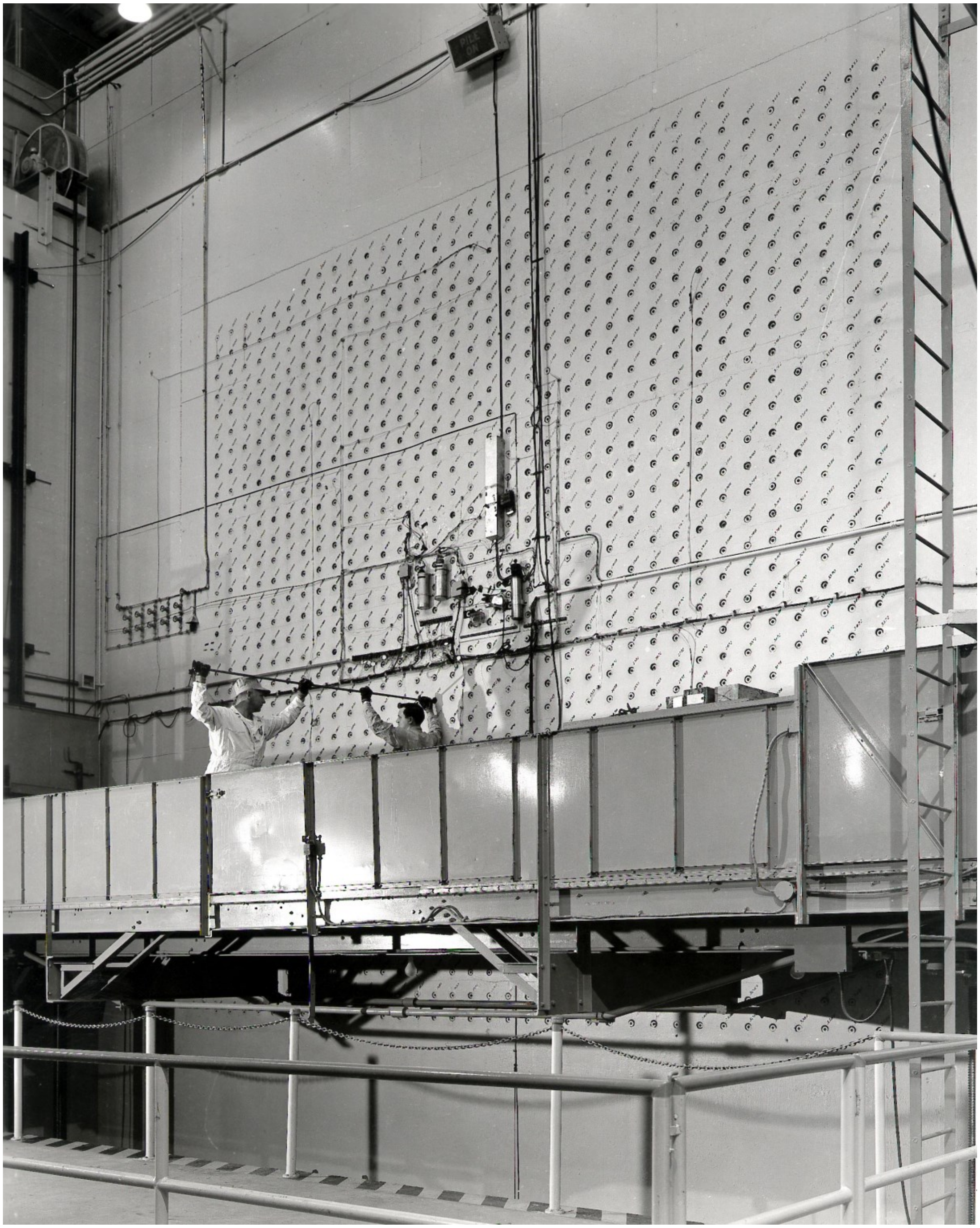

The Graphite Reactor face that Sam Adkins would have been shown

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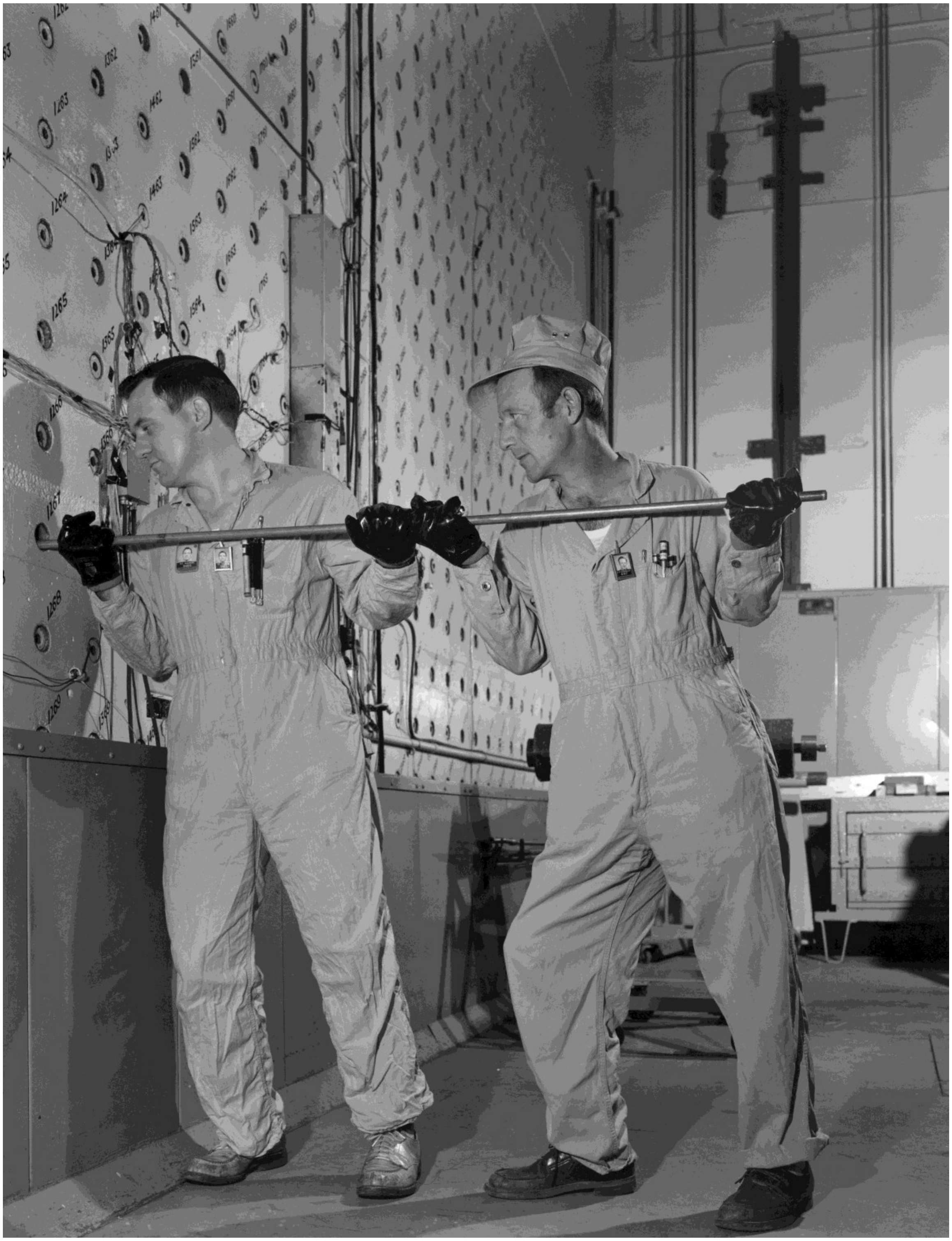

The uranium fuel being inserted into the Graphite Reactor face