AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

No. L-123
Tel. 973-3335 or
973-3446

June 7, 1968

NOTE TO EDITORS AND CORRESPONDENTS:

Following is the text of an announcement dictated to the wire services at 6:30 p.m., EDT, Thursday, June 6, 1968:

''A nuclear test of low yield was conducted underground today by the Atomic Energy Commission at its Nevada Test Site.''

#

6/7/68

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

NOTE TO EDITORS AND CORRESPONDENTS:

Attached for your consideration and possible use is the fifth of a series of articles on major AEC installations and laboratories.

We plan to provide an article on an AEC installation or laboratory on an approximately once-a-month basis until a total of nine or ten major AEC sites is covered. Each article will be appropriately illustrated by one or more multilith prints supplied for your use. If your publication requires glossy prints you should write to Elton Lord, Deputy Chief, Audio-Visual Branch, Division of Public Information, U. S. Atomic Energy Commission, Washington, D. C. 20545.

We hope you find the articles of interest. We would appreciate your comments and/or a tear sheet on any use you may make of the material.

John A. Harris, Director
Division of Public Information

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

No. FS-5-68
Tel. 973-3335 or
973-3446

FOR IMMEDIATE RELEASE
(Friday June 7, 1968)

Editor's Note: The Atomic Energy Commission, charged by Congress with the development and control of the Nation's nuclear energy program, owns an $8.7 billion complex of laboratories, production, manufacturing and testing facilities scattered throughout the country. Slightly more than half of their overall operation is devoted to peaceful uses of the atom. This series of articles describes some of the work done and under way at these installations and how it relates to individual citizens today.

Richland, Washington -- Plutonium, power and pigs make an unlikely combination to relate to a billion-dollar Atomic Energy Commission facility.

In a sense, however, this is the combination which symbolizes the transition of the AEC's Hanford Project in southeastern Washington State from an industry based entirely on military, national defense needs to one based on the proliferating peaceful atom.

Plutonium was part of the atomic weapon sword which brought World War II to a climactic end.

Now, Hanford scientists are turning plutonium into an implement to cultivate a rich garden of nuclear benefits on land, under the sea and in outer space.

(more)

They have shown how plutonium can be used as a fuel to generate cheap electrical power anywhere in the world.

Pigs come into the picture in the laboratories at Hanford where a specific miniature breed has been developed to stand in for man in studies which give precise information on the effects of radioactivity.

PLUTONIUM

Plutonium is a metallic element which was not discovered until 1941. Nature's cupboard is so barren of plutonium that most experts refer to it simply as an "artificial" element which can be manufactured by changing the structure of uranium atoms.

This is what is done at the Hanford Project by more than 8,000 workers engaged directly in production activities, providing services directly related to plutonium production, or on research related to its applications.

Plutonium, like uranium-235, can be used as the explosive ingredient in nuclear weapons.

Both are fissionable -- the atoms are capable of splitting apart, releasing energy and neutrons which strike other atoms to create a chain reaction.

Under control, as in nuclear-fueled power plants, the fission process generates heat which is used to produce electricity in the same manner that heat is used from burning coal, oil or gas.

Plutonium, in different isotopic forms, also can serve as a heat source to warm divers' suits for exploring the cold depths of the oceans, to

(more)

generate small amounts of electrical current for power in space vehicles, or could be used as a source of energy to power an artificial heart.

Essentially, the Hanford Project is a national defense installation for the production of weapon grade plutonium.

The other side of the plutonium coin, however, shows a peaceful image. The knowledge gained in almost 25 years of operation at Hanford makes this AEC site a center for the development of methods of using this exotic material.

Complementing this technical ability is a laboratory operation which has played a key role in developing standards now used internationally for measuring man's tolerance to radioactivity of all forms.

Biology, however, is only a part of the work done by the 2,500 members of the laboratory staff. Chemistry, metallurgy, physics and meteorology are other fields in which research is being done.

NEW REACTOR

During World War II, three large plutonium-producing facilities, called reactors, were built at Hanford. Large chemical processing plants also were built in which the manufactured plutonium was extracted from the uranium in which it was mixed.

Later, five more reactors were built as the need for plutonium increased. New chemical processing methods were developed and two new facilities were built to replace the original plants.

All this activity was based on national defense needs.

(more)

In 1959, construction of a ninth plutonium reactor was started, but it was a reactor to bridge the gap between the military and civilian needs.

It now produces plutonium for the nation's nuclear defense arsenal and steam to generate electrical power. It is the nation's first large-scale, dual-purpose nuclear complex.

Sixteen public utility districts in the State of Washington banded together to finance the $120 million electrical generating plant adjacent to the AEC's new reactor.

The utility group buys the steam which is a by-product of plutonium production and uses it to generate as much as 800,000 kilowatts of power -- enough to supply the complete residential, business and industrial needs of a city of 500,000 population.

The power is distributed by the Bonneville Power Administration throughout the Pacific Northwest.

PLUTONIUM FUELS

Reactors now generating electrical power for utility systems use uranium as a fuel. However, only a small portion of the uranium is the fissionable variety, uranium-235. The remainder, which amounts to more than 99 percent, is uranium-238, which does not usually split when it is hit with a neutron from the fissioning uranium-235. Usually, the amount of uranium-235 in fuel elements is increased beyond the "normal" percentage by enrichment.

Uranium-238 is converted to fissionable plutonium by capturing a neutron given off by splitting atoms of other fissionable material, such

(more)

as uranium-235. The fissionable plutonium then can be used as a substitute for the fissionable uranium which is consumed in the fission process.

The supply of fissionable uranium is limited, but there is enough of the other variety to last the world for centuries if it is converted to plutonium.

Hanford scientists demonstrated how this could be done in the Plutonium Recycle Test Program.

Plutonium was extracted from the spent -- used-up -- fuel elements, processed into new fuel elements and recycled as new fuel into the same reactor.

All uranium fueled power reactors inevitably produce some plutonium which has a current value of about $4,000 a pound. The use of this plutonium helps reduce the cost of power by making it possible to get more mileage from the original fuel supply.

In the reactors now in use, however, only a small portion of the nonfissionable uranium is converted to plutonium.

A new plutonium development program in progress is aimed at demonstrating how plutonium can be used as a fuel in "fast-breeder" reactors which produce more fuel than they consume.

Uranium-238 is converted to plutonium faster than the fissionable uranium or plutonium is consumed.

The goal is to design a reactor which will have a "doubling time" of seven to ten years. Doubling time is the time it takes to manufacture surplus fuel equal to the amount the reactor started with.

(more)

This fuel would provide enough power to keep pace with the demand for electricity and provide a source of cheap electrical power.

Some small, experimental fast-breeder reactors have been built in the United States, but none is now producing electrical power for commercial use.

Hanford scientists, among many others elsewhere, are at work to solve the problems associated with the development of commercially feasible fast reactors.

Plans are on the drawing board for a "Fast Flux Test Facility" which will provide a fast-breeder reactor environment with extremely high temperatures and radiation. These conditions will enable the Hanford scientists to develop durable and practical fuel elements and other materials. The facility will include a reactor with a heat removal capability of 400 thermal megawatts and unique closed loop facilities capable of testing fuels and materials under temperatures and other environmental conditions more severe than those of the test reactor.

In addition to its role as an irradiation facility, the FFTF will substantially enhance the United States' industrial capability to provide reliable systems, equipment, components, and instrumentation for fast breeder power reactors. Development of economic fast breeder fuels is an integral part of a major AEC objective to develop commercial economic fast breeder reactors which, through their ability to consume a much larger fraction of the energy potential in uranium than is possible in existing power reactors, will assure economical use of the Nation's nuclear resources for energy production.

OTHER RESEARCH

Not all of the Hanford Project effort is directed at the production or use of plutonium.

Research and development always has been a companion to plutonium production. At first this work was carried on by individual components of the atomic project. In 1956, the Hanford Laboratory was formed to consolidate all research activities. It now is known as the Pacific Northwest Laboratory.

Among the tasks which started almost as soon as the atomic plant itself was that of defining and determining the effects of the project on the environment. Operating procedures were established to ensure the safety of the workers and the residents of the area.

The success of this effort can be illustrated by the safety record established at Hanford. In almost 25 years of operation, no worker has been injured seriously in any incident involving radioactivity.

(more)

Radioactivity in the air, water and ground around Hanford is less than occurs naturally in many areas of the world. In fact, residents of some high altitude areas receive more exposure to radiation from cosmic rays than do residents near the Hanford project from plant sources.

Further work was done in the laboratory to determine how much radiation is necessary to cause noticeable effects. One study, using sheep, was carried on for 17 years to determine the effects of radioactive iodine on the thyroid gland. The amount necessary was found to be many times more than the amount established as the maximum permissible limit for humans.

Radioactive iodine in minute amounts, now is used widely as an aid in the diagnosis of ailments involving the thyroid gland.

Another study was made at Hanford to determine the effects of continuous ingestion of radioactive strontium-90 in animals similar to man. A deliberate attempt was made to cause bone tumors by using large amounts of strontium-90. Only a few were produced.

However, the scientists found that leukemia could be produced in pigs in a very predictable pattern. This information was made available to medical scientists who are studying the processes of leukemia.

Rabbits, pigs and sheep were used in a study to determine the response of the skin to radioactive materials. After eight years, rabbits and sheep developed skin tumors, but only one tumor has been found in a pig thus far.

The skin of pigs is similar to that of man.

MINIATURE SWINE

Pigs prove particularly useful as laboratory animals because of their similarity to man in skin, digestive system, circulatory system, nutrition requirements and dental structure.

Hanford scientists found, however, that ordinary pigs, with a mature weight of about 800 pounds, are formidable opponents in a laboratory wrestling match.

They set out to develop a new breed which would mature at about the size of an average man -- 170 to 180 pounds -- and have white skin with little hair.

The result is the Hanford Miniature Swine, a program now being concluded. However, these swine continue to be in demand at other laboratories.

HEART STUDIES

Hanford Miniature Swine stood in for man in a study of how the body might tolerate an artificial heart which would use radioactive material as the power source.

A special form of Plutonium (Pu-238) is a candidate as the power source.

For the experiment, however, electrically energized heaters that give off about the same amount of heat as a 40-watt light bulb have been placed in the main blood vessels of several pigs.

(more)

Preliminary results indicate that the blood temperature is raised only about one degree. The circulatory system is capable of dissipating most of the heat through the normal process of radiation through the skin.

The project is financed by the National Institutes of Health and the National Heart Institute.

Separate work on the development of a heart pump device is being carried on at the Hanford site by another laboratory which is owned and operated by the McDonnell Douglas Aircraft Co., co-owner of the company that operates the Hanford plutonium reactors.

NEW METHODS

The Hanford plutonium-production reactors are cooled by water taken from the Columbia River. For each reactor complex there is a water treatment facility similar to those used by most cities and large enough for a city of about 350,000 population.

New chemicals were found which increase the capacity and efficiency of the filter beds. More than 40 cities have adopted the new water treatment process.

Dentists may be able to eliminate the use of X ray for dental diagnosis as a result of work at Hanford. A study now is being made to see if ultrasonic waves can produce the same sort of picture of hidden cavities in teeth. If feasible, this would help reduce man's exposure to X rays over a lifetime.

WASTE MANAGEMENT

Millions of gallons of radioactive wastes from plutonium production are buried in steel-lined concrete tanks at Hanford. While the tank storage method is safe and adequate, it is not considered a permanent solution to the problem of disposing of radioactive wastes.

To minimize the problem, the long-lasting, heat-producing radioactive materials are being removed. The liquid is boiled off and the remaining material is converted to a cake of dry salt crystals for permanent storage.

For wastes which will be produced in the future from reprocessing of fuels from commercial-power reactors, methods are being tested for converting them into a glass-like solid for long term storage. The volume is reduced tenfold by the process.

INDUSTRIAL DIVERSIFICATION

For more than 20 years a single prime-contractor firm operated the entire Hanford Project. E. I. duPont de Nemours & Company was first. The General Electric Co. took over in 1946 and stayed until 1965.

Starting in 1964, however, the need for plutonium for defense was reduced and the AEC began gradually to reduce its production operation at Hanford. Since then, five of the nine reactors have been taken out of service. Only one chemical separation facility remains in operation.

At the same time, the system of operation was changed to broaden the participation of industry by having separate firms operate different segments of the nuclear project.

Among the new contractors are the McDonnell Douglas Aircraft Co., United Nuclear Corp., Atlantic Richfield Co., Battelle Memorial Institute, International Telephone and Telegraph Corp., and Computer Sciences Corp.

These firms have pledged to invest about $43 million in private, commercial activities to stimulate the economy of the area, offsetting the reduced activities at the AEC project.

Specialized laboratories, a zirconium tube fabrication facility, a new motel-convention center, a cattle feed lot and meat packing plant and an assembly plant for electronic controls are among the projects brought to the Tri-City area of Richland, Pasco, and Kennewick, near the Hanford Project. About 1,700 new jobs are being created by private industry.

The Tri-Cities were spared a serious economic setback as a result of a joint local, state, and federal government program of segmentation and diversification. The new development is but another step in the transformation which has taken place at the Hanford Project.

#

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D. C. 20545

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. ATOMIC ENERGY COMMISSION

PI101568289003614 J-01

CLICK RELANDER
CITY EDITOR
THE YAKIMA HERALD-REPUBLIC
YAKIMA WA 98901

NEWS RELEASE