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Progress Report to the Joint Committee on Atomic Energy

JUNE THROUGH NOVEMBER 1952

DELETED VERSION ONLY

~~RESTRICTED DATA~~

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UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D. C.

DECEMBER 29, 1952

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PROGRESS REPORT OF THE

United States Atomic Energy Commission

JUNE THROUGH NOVEMBER 1952

PREPARED FOR THE

JOINT COMMITTEE ON ATOMIC ENERGY

OF THE UNITED STATES CONGRESS

DECEMBER 29, 1952

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

December 29, 1952

Honorable Carl T. Durham
Chairman, Joint Committee on
Atomic Energy
Congress of the United States
Washington 25, D. C.

Dear Mr. Durham:

Transmitted herewith, in accordance with the Joint Committee's request of July 23, 1947, is the Progress Report of the United States Atomic Energy Commission covering the period June through November 1952. In this fifteenth report are outlined the measures being taken to accomplish the Commission's major objectives, as well as changes in these program goals which have occurred since the preceding report. As in preceding reports, Part III, Weapons, is submitted as a separate document.

Sincerely yours,

Gordon Dean
Chairman

FOREWORD BY THE COMMISSION

Perhaps no period in the Commission's six-year history has brought forth such major events of consequence for the nation's future in atomic energy as has the interval covered by the present Progress Report. The fruition of long effort is seen in three events: A large scale thermonuclear device was successfully tested. The breeding of fissionable material was demonstrated. The $3.4 billion Expansion Program, aimed at doubling the previously projected rate of fission weapon production, was authorized by the Congress and construction is under way. While other important developments occurred, these appear to hold the greatest potentialities.

Thermonuclear Weapons

Less than three years ago we were directed by the President to give high priority to determining the technical feasibility of a thermonuclear weapon. On November 1, 1952, a device was detonated at Eniwetok which established the feasibility on a large scale of achieving a thermonuclear reaction (fusion) in liquid deuterium and also extensive fission of natural uranium. The primary objective now is to obtain as soon as possible deliverable thermonuclear weapons.

Breeding Fissionable Material

Preliminary measurements secured with the Experimental Breeder Reactor show that breeding has been accomplished, that is, more fissionable material has been produced than consumed in reactor operation. These results indicate the good possibility of securing a "doubling" of the amount of material invested in a specific reactor system in roughly five years, using a full-scale, high-power breeder reactor. The long run consequences of breeding, while largely unforeseeable, appear to be exceedingly great, as measured by the possible impact on future reactor design, raw material utilization, plutonium production, and perhaps the economical production of electric power. Development of a fast neutron breeder reactor is now an important objective.

1952 Expansion Program

Construction began on the new Expansion Program facilities authorized by the Congress in July 1952. In terms of fissionable material, these new facilities are aimed at providing by 1958 a 50 percent increase in the previously established rate of plutonium production and a 150 percent increase in U 235 output. This means that by 1958 the output of U 235 will be 24 times that in 1947, the first year of Commission operation, and output of plutonium will be 18 times that in 1947.

The main steps taken toward construction since early July are these: The site of the third gaseous diffusion cascade was selected near Portsmouth, Ohio, in August, and

construction has been started. At Oak Ridge, construction of the K-33 addition to the cascade began July 16; at Paducah, construction of the C-35 and C-37 plants to be added to the cascade now being built was begun August 26. At Hanford, construction of the two Jumbo-size plutonium production reactors began September 10.

Construction of facilities under the 1950 Expansion Program has continued to be somewhat hampered, mainly by delays in delivery of materials and equipment. At Savanna River, operation of the first reactor is now scheduled for June 1953, instead of March. At Paducah, construction has proceeded with fewer labor stoppages recently and the C-31 and C-33 plants are expected to reach full operation in January 1954. At Hanford, the newly constructed sixth reactor was completed early in November, 20 months after construction began in March 1951.

A prolonged work stoppage in the Dunkirk, N. Y., plant of the American Locomotive Company has seriously affected the atomic energy program by delaying delivery of process equipment for gaseous diffusion and heavy water plants now under construction. The provisions of the Taft-Hartley Act have been invoked by the President at the request of the Commission and a temporary restraining order has been issued by a Federal court enjoining the continuance of the strike. The employees have returned to work.

Policy Issues Encountered

While the above events appear to us to be the most significant of the period, we believe attention should be called to certain major issues of policy that have arisen. Among these are: the provision of additional technical support for the thermonuclear weapon development program; the question of constructing a production-scale linear accelerator; the policy problems raised now by the industrial power reactor program; and the problem of transmitting classified information to friendly countries.

It becomes increasingly clear, particularly in recent negotiations with such ore-producing countries as Belgium and Australia, that the Commission must be given a much broader discretion to transmit to such friendly countries information and materials of a classified nature dealing with reactor design and construction. The amendment to Section 10 is unsatisfactory to accomplish this result. Incidentally, our inability to transmit such information is having the effect of causing such countries as Denmark, Norway, Belgium and others to turn for assistance to such countries as England and France rather than to the United States. We will be prepared to discuss this problem and a possible remedy with the Joint Committee when the Congress convenes.

The impelling needs of the weapons program have led us to establish a project at the University of California Radiation Laboratory with primary emphasis on the thermonuclear program. This research will complement the work being conducted at the Los Alamos Scientific Laboratory.

After many months of consideration devoted to the high energy linear accelerator proposal, including evaluation of technical feasibility, comparative production economics and alternative uses of scarce resources, we concluded in August, 1952, that the construction of the production-scale accelerator should be indefinitely deferred. Research and development based on operation of the pilot model, Mark I, will be continued by the University of California Radiation Laboratory and the California Research and Developmen

All four industrial teams that have been studying the technical and economic feasibility of dual purpose reactors (producing power for industrial use and plutonium for sale to the government) have now submitted their reports for Commission consideration. Each has indicated a desire to proceed further with industrial power reactors whether dual purpose or power only. A variety of policy issues are raised thereby: the problems involved in long-term Government commitments for the purchase of plutonium; the ownership of facilities; disposition of patents; commitment of feed materials, and many others. We are giving these problems careful and continuing study. We are seeking solutions that will ultimately permit construction, ownership and operation of power reactors on a private investment basis. Further development of technical data on power reactors, consultation with other departments of the Executive Branch, and further discussions with industry will be necessary in order to see the problems more sharply. It is clear that substantial revision in the law will be required if private capital is to be brought into the atomic energy program to produce nuclear power.

Summary of Operating Programs

The principal events and the major policy issues of the period have been mentioned. Certain other developments in the various programs also should be cited.

Raw Materials. Still higher procurement goals have been established by the Commission — 12,500 tons of U_3O_8 annually, expected to be reached by 1960. Smaller than expected deliveries of concentrates from the Belgian Congo in 1952 caused a small drop in the feed stock inventory, but have had no adverse effect upon fissionable materials production. Still smaller deliveries from the Belgian Congo in 1953 and later are expected to be more than offset by greater receipts than were previously projected to come from other sources, such as South Africa where the first uranium production plant began operation in September 1952.

The Commission has arranged for an independent appraisal of its world-wide uranium procurement program. The study will review among other things the existing plans, and will explore the economic and production problems which would be involved in a further increase in uranium procurement.

Fissionable Materials. Plutonium production continued to gain as a result of increased power levels and decreased number and severity of slug failures. Recovery of depleted uranium from the underground storage tanks at Hanford began in November. U 235 production also rose, primarily because of full operation of the K-31 plant throughout the six-month period.

Weapons. A few days after the thermonuclear test mentioned above, the highest yield fission weapon ever detonated was also tested at Eniwetok, giving a yield of roughly 550 kilotons.

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We have a stockpile requirement from the Department of Defense for DELETED this high yield weapon in 1953, and we have informally urged the Department of Defense to give consideration to a requirement for a larger number. Development of atomic warheads for rockets and guided missiles is proceeding, and first flight tests have been made with nonnuclear warhead assemblies in place.

Research and Development. Often overlooked is the research and development work which underlies and customarily precedes by some years the more evident advances in technology. The recommendation of the House Appropriations Committee for a reduction in the amount of funds available in fiscal year 1953 for physical research and process development is an example of this failure to recognize the full importance of path-making research to subsequent technical progress.

As in other periods, the major technical accomplishments of the past six months have stemmed from research and development efforts extending over many years. Some illustrations are the following: The average operating power level per pile at Hanford has been pushed up to a level that is now double that in 1949. The process selected for separating lithium 6 in the plant now being constructed at Oak Ridge was based on research undertaken some years ago at a time when there was no indication that its production on a large scale would be necessary for the thermonuclear program. Similarly, the design of the thermonuclear device tested this fall was based in large part on calculations carried on over a period of many months of mathematical research with electronic computers. These are but illustrative. (End of T[redacted] section.)

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

December 23, 1952

Mr. Gordon Dean
Chairman, United States
Atomic Energy Commission
Washington 25, D. C.

My dear Mr. Dean:

I submit herewith, in response to the Commission's request, a report of progress in the activities of the U. S. Atomic Energy Commission during the period June through November 1952.

Respectfully submitted,

M. W. Boyer
General Manager

CONTENTS

*Transmitted as separate document.

PART VI

BIOLOGY AND MEDICINE

RESTRICTED

During the past six months emphasis has been given in the biology and medicine program to preparations for weapons test operations. A world-wide monitoring network system was established during the recent IVY tests to collect data on radioactive fall-out resulting from detonations at Eniwetok Atoll. In the coming spring, 1953, continental series (UPSHOT-KNOTHOLE), the personnel shelters designed for Commission installations will be tested for resistance to blast and for shielding against neutron and gamma radiation. Test proposals submitted by other Federal agencies and now being reviewed by the Commission are discussed below under the Civil Effects Test Program. In addition, the Commission, through its National Laboratories and contracts with private research institutions, has continued to support a large number of biomedical research projects.

Weapon Test Activities

(Unclassified aspects of the monitoring activities and fall-out studies performed in connection with recent weapon tests will be discussed in greater detail in the Thirteenth Semiannual Report to be submitted to the Congress in January 1953.) (End of RESTRICTED section.)

Fall-Out Studies (TUMBLER-SNAPPER Series) RESTRICTED

The extensive nation-wide monitoring system for collecting fall-out data during the spring, 1952, weapons tests at the Nevada Proving Ground, as described in the previous report, has made possible the collection, tabulation, and analysis of tens of thousands of fall-out measurements. None of these has indicated the presence of any concentration of radioactivity which could have been considered a health hazard. A final report on fall-out will soon be completed.

Radiation effects on the photographic industry. By prior agreement the Commission has transmitted relevant information on the effects of test activities to the National Association of Photographic Manufacturers to enable that group to take proper precautions against possible effects of fall-out upon photographic products. As a result of the TUMBLER-SNAPPER tests, the Eastman Kodak Company found it advisable to close its cellulose ester plant, at Kingsport, Tennessee, for several days. On the industry as a whole the effects of radioactive fall-out particles have been very much less than anticipated.

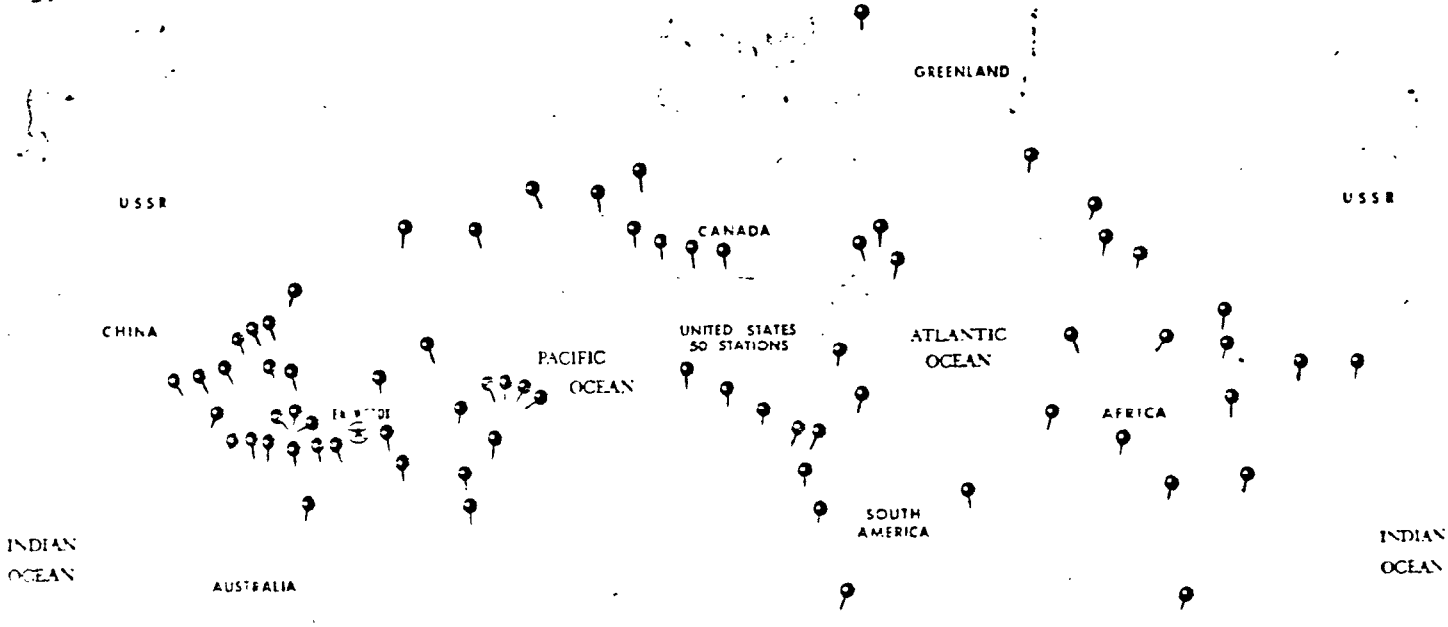
Radiation effects on range cattle. Although the Commission repeatedly informed cattle grazers and the public of the potential hazards to range cattle within the control area for the TUMBLER-SNAPPER tests, cattle were found less than 20 miles from the point of detonation on several occasions. A preliminary examination of cattle owned by a resident of Alamo, Nevada, indicated that the animals had been exposed to radiation carried in low-level dust clouds which settled in areas adjacent to the firing site. On some

cattle, patches appeared where the hair had been lost or discolored, and localized radiation damage, not unlike a burn on the skin, was observed. The injuries, involving skin areas about the size of a silver dollar, were only superficial and showed normal healing. The Commission will continue observations of some of the exposed animals.

World-Wide Monitoring Program (IVY Test Series)

In view of the valuable data obtained earlier in 1952 from the monitoring operations during the TUMBLER-SNAPPER series, the Commission expanded the system into a world-wide network for the IVY tests recently held in the Pacific. The Health and Safety Division of the Commission's New York Operations Office, in cooperation with the United States and Canadian weather bureaus, the U. S. Air Force, Navy, Coast Guard, and Department of State, extended the network across the continental United States to Canada, Europe, Africa, Central and South America, and the Pacific. Three weeks after the first IVY shot only very small traces of radioactivity had been detected across the northern part of the United States but none elsewhere in the nation. (End of [redacted] section.)

WORLD WIDE FALL-OUT STATIONS (RESTRICTED)



(End of [redacted] section.)

Civil Effects Test Program at Operation UPSHOT-KNOTHOLE [redacted]

Because of the growing need for research and experimentation in atomic weapons effects on civilian personnel, civilian structures, and services, the Commission has expanded its Continental Test Organization to include a Civil Effects Test Group in addition

to the Weapons Development and Military Effects Groups. An AEC representative in Washington headquarters has been designated as Director of the Civil Effects Test Group to coordinate all civil effects studies with the above groups.

The civil effects test presently under consideration for the spring, 1953, series (UPSHOT-KNOTHOLE) includes various projects sponsored by the Commission, the Federal Civil Defense Administration, the Food and Drug Administration, the Naval Medical Research Institute, and the Naval Radiological Defense Laboratory. These studies are to be financed by the sponsoring agencies and have been classified in nine major categories:

a. Tests of home and community shelters, typical residences, and air-zero locators;

b. Food and drug irradiation studies;

c. Civil Defense Radiological Defense Training;

d. Biomedical experiments;

e. Tests of blast effects on services and utilities;

f. Tests of civilian vehicles;

g. Physical and biological evaluation studies of fall-out near the test site;

h. Tests of the radiation telemetering system;

i. Comparison and evaluation of dosimetry methods.

(End of CONFIDENTIAL section.)

Civil Defense Activities

Meeting on Air Raid Shelters (UNCLASSIFIED)

The Commission, in cooperation with the Federal Civil Defense Administration, has assisted the State of New York in planning the construction of air-raid shelter accommodations in the state for approximately 3 million persons, of whom 2 million reside in the city of New York. Construction costs would be expected to average $100 per person and to reach a total of about $300 million.

Representatives of the Commission met with officials of the New York State Department of Public Works, the State Civil Defense Engineer, and members of the firm, Consulting Engineers, engaged to make bomb shelter surveys in ten major cities in the state. The group reviewed information available on the suitability of ordinary building materials, the most efficient structural forms to resist blast overloading and the requirements for shielding against thermal and radiation hazards. The Commission also recommended that the state officials consult directly with the Federal Civil Defense Administration concerning criteria for shelter accommodations established by that agency as a result of previous studies.

Research Activities

Study of Fission Products

The Applied Fisheries Laboratory of the University of Washington is evaluating the uptake by aquatic animals and plants of fission products released during the IVY test operations in the Pacific. The project is a continuation of the study of radioactive contamination of the biological systems in the Eniwetok and Bikini areas, where resurveys were made prior to the test activities. Information is being obtained on the distribution of fission products in aquatic organisms and in waters of the test area; their accumulation by fish, clams, corals, and microscopic plants and animals; and the presence of radioactive materials in bottom deposits. Land plants are being studied for the presence of tumors and other abnormalities which have been observed to result from earlier bomb tests. (End of UNCLASSIFIED section.)

Analysis of Radioactive Soils ([redacted])

New information has been obtained from the continuing studies of radioactive soil produced by the underground shot at Operation JANGLE in November 1951. As previously reported, radioactive strontium, one of the fission products, is taken up rapidly by plants growing in the soil. Recent tests, using various mixtures of radioactive and natural soils, have been conducted by the Commission in cooperation with the Department of Agriculture and the University of California at Los Angeles. Probably because of the similarity in the chemical properties of strontium and calcium, the quantity of radioactive strontium taken up by the plants appears to vary inversely with the amount of exchangeable calcium present in the soil. Additional studies will involve the use of weathered radioactive fall-out material. (End of [redacted] section.)

Study of Radioactive Particles – Radium Salts (UNCLASSIFIED)

Recent data from Argonne National Laboratory on the rate at which finely particulated insoluble radium salts are eliminated from the human body indicate that one-half of any inhaled material is eliminated from the lungs or body every 120 days. This information, the first reasonably quantitative data on the rate of removal, is particularly useful in the Commission's efforts to detect and prevent the development of potential radiation hazards in production processes. (Other unclassified research activities will be discussed in greater detail in the Thirteenth Semiannual Report to be submitted to the Congress in January, 1953.)

Industrial Health Program

Radiation Instrumentation

A survey of the role of private industry in the development, manufacture, and sale of radiation instruments has been completed. The survey reveals that: (1) the number of companies representing the radiation industry totaled 80 in 1952, as compared to 48 in

1948; (2) the volume of business has grown from $4.5 million in 1948 to about $20 million in 1952; (3) employment has increased from 130 people in 1944 to about 2,400 in 1952; (4) government contracts have accounted for about 85 percent of the market, and military procurement for about 50 percent of the government market today.

Neutron instrument development. During the past six months the Commission has encouraged within its installations the development of improved methods for detecting neutrons over a wide energy range and measuring their effect. One device developed for this purpose at Columbia University is the Tissue Equivalent Neutron Chamber designed to measure multiple types of radiation and to absorb neutrons in much the same way as does human tissue. This characteristic makes the instrument a valuable and useful tool in biomedical research and in the health physics program. The instrument will be made available commercially to major instrument companies through contract arrangements. (End of UNCLASSIFIED section.)

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PARTIAL DOCUMENT RECORD SHEET

Parts of this document were judged irrelevant to the CIC collection effort and were not copied:

Pages Part I (pgs 13-30), Part II (pgs. 31-44), part ~~III~~ IV (pgs. 45-54)

~~Enclosures~~ Part V (pgs. 55-60), Appendices (pgs. 67-79)

Attachments _____

Other _____

DOE ARCHIVES

Title page and table of contents have been copied for reference.

W. Tench
signature

9/15/86
date