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AEC 129/62

June 11, 1956

COPY NO. 28

ATOMIC ENERGY COMMISSION

QUARTERLY PROGRESS REPORT
TO THE JOINT COMMITTEE ON ATOMIC ENERGY
JANUARY - MARCH 1956

Note by the Secretary

1. The General Manager has requested that the attached report by the Controller be circulated for consideration by the Commission during the week of June 11th.

2. Part II - Special Nuclear Materials - and Part III - Weapons - of the Quarterly Progress Report are being circulated separately as AEC 129/63 and AEC 129/64, respectively.

W. B. McCOOL
Secretary

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ATOMIC ENERGY COMMISSION

QUARTERLY PROGRESS REPORT, JANUARY - MARCH 1956

Report to the General Manager by the Controller

1. In accordance with the plan outlined in the Chairman's letter of August 24, 1955, to Senator Anderson, four classified progress reports are to be submitted to the Joint Committee on Atomic Energy during each year, as of the end of each calendar quarter.

2. The report submitted herewith, for the period January - March 1956, is not intended necessarily to be a comprehensive summary of all AEC activities, but is primarily to update the Program Status Report, December 31, 1955.

3. All material in the report has been written as of March 31, 1956. Most developments occurring after the March 31 date can and probably should be held for the April - June report. However, if it appears that there are more recent items of sufficient importance to be added to the report, the addition can best be accomplished by the use of footnotes.

4. Appendix "A" contains portions of the report bearing a classification of SECRET or lower. Part II - Special Nuclear Materials and Part III - Weapons are being distributed as separate staff papers.

5. As in the past, Part III - Weapons, will be printed as a separate TOP SECRET document to facilitate strict control of its distribution. The remainder of the report will be printed as two

[redacted]

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SECRET documents: one, containing Part II - Special Nuclear Materials, will receive only slightly wider distribution than the Weapons report; the other, containing neither Part II nor Part III, will be printed for distribution among the Commission's principal staff. Distribution of these documents would be in accordance with lists approved by the General Manager.

STAFF JUDGMENTS

6. The Divisions of Raw Materials, Production, Military Application, Reactor Development, Civilian Application, Research, Biology and Medicine, and International Affairs have cleared the sections of the report relating to their respective activities.

RECOMMENDATION

7. The General Manager recommends that the Atomic Energy Commission:

a. Approve, for transmittal to the Joint Committee on Atomic Energy, the report attached as Appendix "A", and Part II (Special Nuclear Materials) and Part III (Weapons) being circulated as AEC 129/63 and AEC 129/64 respectively.

b. Note that the printed report will be transmitted to the JCAE by letter such as Appendix "B".

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This document consists of 53 pages

Copy No. [redacted] of 32 Series A

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APPENDIX "A"

U. S. ATOMIC ENERGY COMMISSION

WASHINGTON, D. C.

QUARTERLY PROGRESS REPORT

JANUARY - MARCH 1956

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CONTENTS

*Transmitted as a separate document.
**Available in Progress Reports and Statistics Branch, Division of Finance.

Pages 47 - 78 were judged irrelevant to the CIC Collection effort and were not copied

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PART VII

BIOLOGY AND MEDICINE

Genetics Research

1. Radiation, by acting upon germ cells, can bring about alteration of the genes, upon which inheritance depends. Precise estimation of the genetic effects of increased radiation on human populations is not possible on the basis of present information.[1/] Although recent studies have disclosed that certain earlier conclusions were based on experience of too limited scope, their results have also pointed to areas in which new or more accurate information is needed and to methods by which such information may be gained. The concerted attention of geneticists and biologists on these problems during the past two years has served to increase agreement on what needs to be done and to heighten the interest of competent scientists in undertaking the work.

2. Certain conclusions relative to the genetic effects of radiation are accepted with little or no divergence of opinion:

a. Mutations occur spontaneously, or naturally, at very low rates.

b. Mutations not identifiably different from those occurring naturally can also be induced by various chemical and physical agents, including radiation.

c. The frequency of radiation-induced mutations is roughly proportional to the cumulative exposure of the germ cells to radiation, and is relatively independent of the duration and intensity.

1/ Discussions estimating the possible genetic effects of weapon tests are to be found in the hearing of April 15, 1955, before the Joint Committee on Atomic Energy and in the statement of May 12, 1955, by members of the Advisory Committee on Biology and Medicine, quoted in Commissioner Libby's speech of June 3, 1955.

d. The great majority of mutations, spontaneous and induced, are to some extent detrimental, although the deleterious effects in a large fraction of all mutations do not show up for two or more generations.

e. Present information suggests that only a fraction of naturally occurring mutations are attributable to natural radiation.

3. Information necessary for good estimates of the genetic effects of radiation on humans is difficult to obtain for at least three reasons:

a. Direct observations on humans cannot provide sufficient information. It is not possible to use such experimental procedures as planned radiation exposures and matings. Generation times are too long, especially since observations extending over a number of generations are necessary to assess the effects of induced changes. The relatively small numbers of offspring per couple make genetic analyses difficult, and reliance must be placed on statistical approximations based on assumed similarities in large numbers of couples.

b. Species for which experimental procedures are appropriate differ among themselves and from man in ways which make it difficult to extrapolate from observed response in one species to predicted response in another. For example, experimental species differ in the following respects:

(1) The rates at which mutations are induced by radiation. For comparable doses, induced rates in mice are 15 times as great as in the fruit fly Drosophila, and many times greater still than in bacteria.

(2) The relative sensitivity to mutation at different developmental stages of the germ cells.

(3) Length of the period during which mutations may accumulate, from birth to the end of the reproductive period.

c. Great quantities of information must be collected and analyzed.

4. The Commission supports genetics research at an annual cost of approximately $2 million. The research includes a wide variety of investigations being performed under approximately 55 contracts.

5. In December 1955 the Advisory Committee on Biology and Medicine approved a number of recommendations made by its ad hoc genetics committee. These recommendations are being put into effect as rapidly as possible, and the following developments can already be reported:

a. The mouse genetics program at Oak Ridge National Laboratory is being expanded to investigate the rates at which mutations are induced by lower levels of radiation exposure. While earlier investigations have been made at 1,000, 600, and 300 roentgens, attention will now center on exposures of 150 roentgens, and possibly 75 roentgens.

b. The number of studies in the fields of human genetics and medical genetics increased from two to four during the quarter, and additional projects may qualify for support. These studies deal with the rates of spontaneous mutation and the frequencies of unfavorable genes already in the population. Such information is necessary for extrapolation from observations on experimental species to predicted effects of radiation on humans.

c. Genetics is sharing in the broad benefits expected from the new ability to grow cultures of human tissue for medical experimentation. Methods for studying the genetic effects of radiation on human cells in tissue culture, still in the planning stage a few months ago, have been perfected to the extent that quantitative results are already being obtained. By these methods it will be possible for the first time to make direct comparisons between responses of human cells and cells of other species under standardized experimental conditions, and thus make knowledge gained from animal experimentation much more directly applicable to man.

6. There is little likelihood that scientists will ever be able to determine with extreme precision the genetically harmful effects of low doses of radiation on human populations, even retrospectively. The uncertainty is inherent because mutations of "natural" origin and those caused by other factors are not identifiably different from mutations induced by radiation. Greater knowledge will nevertheless provide a sounder basis for regulating the exposure of human populations to radiation as the use of atomic energy expands.

Radiological Marine Biology Survey

7. As part of the safety precautions for the 1956 nuclear tests in the Pacific, the Commission will conduct two radiological marine biology open-sea surveys within and west of the Pacific Proving Grounds. The surveys will be made one month after the first and last shots in the series.

8. The purpose of the surveys is to ascertain the amounts of induced radioactivity resulting from bomb debris in plankton, fish, and the water at various depths and to determine how far westward the activity extends. Continuous radiological monitoring will be conducted while the ship is under way. At 25-mile intervals water samples will be taken from the surface to a 200-meter depth, plankton tows will be made, and fish will be collected. The Joint Task Force has assigned the destroyer escort USS WALTON for the first survey cruise.

9. The Commission also has entered into a contract with the George Vanderbilt Foundation at Stanford University, under which scientists will collect samples of water, plankton, marine invertebrates, and fish in the Caroline Islands. In addition to these investigations, land and marine biological surveys will be conducted on Eniwetok and Bikini Atolls and in their lagoons. Samples of water, lagoon life, and animal life on the atolls will be collected and analyzed for radioactivity.

Medical Resurvey of Marshallese

10. The medical team returned in March from the second periodic resurvey of the control group and the Rongelap people who were accidentally exposed to fallout from the nuclear detonation of March 1, 1954. The preliminary report of the survey team included the following information:

SECRET

a. There has been little illness among the people during the past year and they appear to be in good health and in a good state of nutrition. Most of the clinical findings were similar to those observed in previous examinations and occur with about the same degree of frequency in the Rongelap people as in the control group. None of the clinical findings noted in the Rongelap people appears to be related in any way to radiation effect.

b. Fifteen Rongelap people continue to show recognizable residual radiation skin lesions but all lesions showed some degree of improvement in this examination. In none of the cases was there any evidence of tissue breakdown or sign of malignancy. The plastic surgeon who accompanied the team on this survey did not feel that surgery procedures were indicated in any of the cases at this time.

c. Preliminary survey of the data shows that there is in most cases continued improvement in blood condition. Examination of the eyes revealed no lens opacities or other findings which could be directly related to radiation effect. Preliminary results of radiochemical analysis of urine revealed measurable activity. Additional analyses are being made.

11. While the medical team was at Majuro, a United Nations group visited the atoll. Nationals of Great Britain, India, Belgium, Guatemala, and China were in this group, which conferred with the Navy team on the status of the Marshallese. They appeared to be favorably impressed with the handling of the problem.

Radiation Exposure Data

12. There is a growing need for a better correlation of radiation doses with available data on the effects of human exposure to radiation. Sources of data on human exposure include some of the civil effects tests in Operation TEAPOT, the fallout on the Marshallese in Operation CASTLE, and the Hiroshima and Nagasaki bombings in 1945.

13. The more recent information suggests the need for reevaluating data on the Japanese. Various research groups, including the National Research Council, the Atomic Bomb Casualty

Commission, and the Oak Ridge and Los Alamos Laboratories, are contributing to such a study. The data in Japan will be evaluated to determine whether information on persons exposed, their locations at the time of exposure, and shielding effects are adequately known to plan a continental test series which would establish more exactly the amounts of radiation received by the Japanese.

Study of Radon Concentrations

14. To learn more about safe radon concentrations in uranium mining, three AEC representatives recently visited the gold mines in Johannesburg, Union of South Africa, and the uranium mine of the Union Miniere de Haut Katanga in the Belgian Congo.

15. Several features make the South African mines particularly useful in studying the effects of radon. At the present time the total population of workers in the South African uranium mines is approximately 270,000. This is possibly the largest single group of individuals in the world with common radiation exposure. Also important are the excellent medical control procedures and records maintained in this area.

16. It was determined by the AEC representatives that the concentrations of radon in a number of gold mines were in the range of our concurrently accepted maximum permissible concentration and that there appeared to be no unusual incidence of lung cancer in the mining population. The Government of the Union of South Africa was strongly urged to amplify these preliminary studies and to carry them to completion since it would contribute greatly to our confidence in the accepted safe level of exposure to radon.

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17. Underground workers in the Shinkolobwe Mine in the Belgian Congo are receiving radon exposures which exceed the maximum permissible level of the International Committee on Radiological Protection, without any apparent evidence of ill effects. Because underground working for uranium has been going on only for 12 years, it is probably too early to judge whether or not this degree of exposure is harmful. However, the quality and interest of the health and safety staff of Union Miniere should make it possible to maintain a continuing health study of the mining population in order to determine definitely the hazards of exposure to radon.

Pages 86-96 were judged irrelevant
to the CIC Collection effort and were
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APPENDIX "B"

DRAFT LETTER TO CHAIRMAN, JCAE

1, Transmitted herewith is the Atomic Energy Commission's Quarterly Progress Report for the period January - March 1956, which is intended primarily to update the Program Status Report, December 31, 1955. The next such report will cover the quarter ending June 30, 1956.

2. As in the past, we have prepared our report as two separate documents in order to facilitate the safeguarding of information on the weapons program.

2/21/85

PARTIAL DOCUMENT RECORD SHEET

Re. AEC 129/62

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

Document Pages 3-34 and 42-52 *

Enclosures _____

Attachments _____

Other _____

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

W. Tench
signature

9/15/86
date

* Folder Pages 47-78 and 86-96

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