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Serial No. 72
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MONTHLY STATUS AND PROGRESS REPORTS

FOR

AUGUST 1951

UNIQUE DOCUMENT # SAA20005017000

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Extract

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
SINGLE REVIEW AUTHORIZED BY: Sinesgalli 11/2/94	DETERMINATION [CIRCLE NUMBER(S)] 1. CLASSIFICATION RETAINED 2. CLASSIFICATION CHANGED TO: 3. CONTAINS NO DOE CLASSIFIED INFO 4. COORDINATE WITH: 5. CLASSIFICATION CANCELLED 6. CLASSIFIED INFO BRACKETED 7. OTHER (SPECIFY): Cover and pp 13-19 only
REVIEWER (ADD) NAME: H R Schmidt DATE: 12/6/94	

U. S. ATOMIC ENERGY COMMISSION

Washington, D. C.

Issued September 21, 1951

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III - BIOLOGY AND MEDICINE

Proposals Approved During August, 1951

The following number of research proposals were approved for renewal or negotiation during the month:

	No. of projects	Amount
Biology	8	$ 96,277
Biophysics	1	8,000
Medicine	11	538,843
Total	20	$643,120

Biology Branch

Radiation on dogs. A visit was made by the Chief of the Branch to the Naval Radiological Defense Laboratory (NRDL) in San Francisco and the University of California Veterinary School for the purpose of discussing projects on the effects of radiation on dogs that will be carried on by these laboratories. Within the next year about 280 dogs will be exposed to various levels of radiation at the Veterinary School in Davis, California. These animals will be maintained to determine the effects of radiation on life span and on the incidence of various diseases. The NRDL will study the effect of various types of stress such as work in combination with radiation on dogs.

Carbon 14. Counting techniques for C 14 are being continually improved. The organic group at the Radiation Laboratory of the University of California is using counters consisting of ionization chambers with vibrating reed electrometer to count C 14 routinely. They can count one disintegration per minute per milligram barium carbonate to an accuracy of one percent. The minimum amount of radioactive carbon that can be detected is 0.01 disintegration per minute per milligram of barium carbonate.

This accuracy in routine counting of C 14 permits the use of drugs and other organic compounds in human experiments at sufficiently low

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levels of activity that little radiation harm is possible. For instance, short-term human experiments can be performed with as little as one microcurie of activity taking into consideration the large biological dilution. Activity from 100 microcuries of C 14 labeled glycine fed to a human can be followed for 9 months.

Brookhaven conference on the chemistry and physiology of the nucleus. A conference was held at the Brookhaven National Laboratory on the chemistry and physiology of the nucleus. This was a well-planned conference divided into six sections covering 3 days, and was attended by more than 250 visiting scientists in addition to the staff of the Biology Department.

Dr. Felix Haurowitz (Indiana) gave evidence that the serum globulius has two sorts of specificity. The first is due to the number and sequence of amino acids in the peptide chain and is unchangeable and is gene determined in each animal species. The second is the changeable antibody function and is due to the surface configuration of the molecules. The latter appears to be determined by the injected antigens and not by genes.

A report was given by Dr. O. F. Binkley (Utah) on nucleic acids which may themselves act as enzymes. Dr. Joseph Weiss (Durham, England) gave an account of the effects of radiation on inorganic and organic chemical compounds. The effects of 10^6 roentgens on nucleic acids resulted in fragmentations of the nucleotides with liberation of free purines and inorganic phosphate. These results may be significant in visualizing the changes produced by radiation on living cells and nuclei.

Dr. Arnold H. Sparrow (Brookhaven National Laboratory) reviewed the sensitivity of the different stages in nuclear division in plant cells to radiation. Breakage and mutations occur more frequently at metaphase, and appear to be unrelated to the relative amounts of desoxyribose nucleic acid.

Dr. E. D. Delamater and Dr. Stuart Mudd (Pennsylvania) found by using both light microscope and electron microscope that bacteria possess nuclei, mitotic spindles, and chromosomes, like other cells.

Cataracts. All mice exposed even to the lowest neutron flux at Operation GREENHOUSE developed eye cataracts within 8 weeks after the operation. There is no certainty that these cataracts will be permanent.

Medicine Branch

Argonne Cancer Hospital. Construction on the Argonne Cancer Hospital after some delays last spring is progressing rapidly and completion is anticipated for approximately April 1, 1952. Plans for research programs to be carried out in this hospital are well advanced and will include among items of major interest to the Commission studies on individuals who received radium therapeutically and studies on the protective effects of shielding various organs during exposure to whole body

radiation with particular emphasis on efforts to obtain an active protective substance from normal tissues.

Research on beryllium poisoning. The University of Rochester Atomic Energy Project has developed a method for the production of a beryllium oxide fume by using a beryllium metal arc burning in an oxygen-argon atmosphere. The fumes consist of extremely small particles approaching 0.01 microns. Preliminary animal exposure studies showed that reasonable amounts of the material were deposited and retained in the lung. The finding of small quantities of beryllium deposited in the femur and none in the pulmonary lymph nodes appears to suggest that removal of the deposited material from the lungs is by solubility rather than phagocytosis. (See report UR-174.)

This is a real step forward in the Commission's efforts to solve the problem of chronic beryllium poisoning.

Control of beryllium hazards. The revised "Recommendations for Control of Beryllium Hazards," which are essentially the same as those issued last year, were sent by memorandum from the General Manager to Managers of Operations Offices and Washington Division Directors on August 10, 1951.

Production of ultra-violet light by ionizing radiation. In a report from the UCLA Atomic Energy Project (UCLA-127), Dr. Andrew H. Dowdy has been able to demonstrate the production of ultra-violet light in distilled water by ionizing radiation using the gamma rays of radium as a source. The production of ultra-violet light by ionizing radiation has been suspected for some time, but this is the first time that this process has been demonstrated.

Biophysics Branch

Radioactive fallout from BUSTER and JANGLE. Plans are being made for nationwide monitoring of radioactive fallout and air contamination during the fall series of tests in Nevada. While no health hazard is anticipated beyond the test area, these observations will assist in estimating fallout and in evaluating possible hazards in future tests, and in safeguarding sensitive industries such as the photographic.

The program will be coordinated by the New York Operations Office Health and Safety Division, and they will be prepared to issue statements and answer queries, based on observations to be made in 50 or more locations about the country. AEC laboratories, the U. S. Weather Bureau, and the U. S. Air Force are planning to participate in the collection and analysis of rainfall and dust samples, in plotting the passage of the radioactive clouds across the country, and in correlating the amount of radioactive material at the earth's surface with the degree of concentration in the air above.

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Permissible levels for radioactive contamination of drinking water. Emergency permissible levels for radioactive contamination of drinking water during a period of 10-30 days following an A-bomb blast have been suggested by the Division and accepted by the Federal Civil Defense Administration (see report for January 1951). Suitable field instrumentation has now been made available through studies at the Rochester University, AEC Project (UR-180). A convenient measurement kit has been assembled consisting of an 8-ounce metal container for the water to be tested, and two calibration standards with the radioactive material distributed on the inner surface of duplicate container lids. These standards are adjusted to give the same meter deflections (on commercially available survey meters such as civil defense monitors might have) as are produced by mixed fission products in water at concentrations of 3.5 microcuries per liter (judged safe for 10-day consumption) and 90 microcuries per liter (judged to be an acceptable risk for a 10-day period). Civil defense monitors can hence make simple determinations on the spot to ascertain the degree of radiological safety of drinking water.

Health physics research at Oak Ridge. Two members of the Biophysics Branch visited Oak Ridge to review the program of health physics research in the Laboratory, and general problems of radiation protection in the various plant processes. Of particular interest are some of the health protection problems posed by the use of the calutron (electromagnetic separator) in experimental studies. Among items of current research interest are a continuous monitoring device for radioactive contamination in drinking water, neutron measurement, and theoretical studies on the damage of tissues by fast neutrons, and a joint project with TVA on the uptake of fission products by fish in the contaminated White Oak Pond storage basin.

Civil Defense Liaison Branch

Collaboration with FCDA. The Chief, Civil Defense Liaison Branch, and the Chief, Test Activities Branch, Division of Military Application, met at Los Alamos and Albuquerque with four representatives of FCDA and the Santa Fe Manager of Operations, members of his staff, and the Test Director and staff members for discussions on the FCDA participation in Operation BUSTER this fall. From these conferences the FCDA program of participation has been arranged to include the following items:

1. Testing of backyard-type bomb shelters. Briefly, 20 shelters of two basic types will be placed and exposed during the operation in accordance with a detailed proposal submitted by the FCDA Research Coordination Group.

2. Participation of three (possibly four) FCDA-designated individuals in the test radiological safety program. This calls for the persons named to be present throughout the entire operation and to be available for a variety of types of duty with the test radsafety organization.

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3. Participation of some 21 FCDA-designated key individuals (including several Public Health Service representatives) as observers, in groups of four or five, at specified times throughout the operation.

4. Designation of an FCDA project engineer to serve on the staff of the Test Director for the purpose of coordinating civil defense requirements of the actual shelter tests, and preparing technical reports thereon at the termination of the operation.

The Federal Civil Defense Administrator and members of his staff met with the Commission for the purpose of discussing informally the highlights and progress to date of the FCDA program and evaluation of the usefulness of the information and materials provided by AEC and suggestions as to possible means of assistance by AEC in the future.

Interagency committee appointment. The Chairman, in response to the request of the Deputy Administrator, FCDA, has appointed Dr. Shields Warren, Director of the Division of Biology and Medicine, as a member of the Joint Planning Committee to develop overall policies and plans in achieving coordination of mutual civil defense matters. Other members of this committee will represent the FCDA and the Department of Defense. Mr. Robert L. Corsbie, Chief, Civil Defense Liaison Branch, will serve as Dr. Warren's alternate.

Glass and glass substitutes testing project. The Civil Defense Liaison Branch is collecting information on glass and glass substitutes for use in protective construction, both of AEC facilities and for general civil defense application.

Review of FCDA publications. During the month the following were reviewed by the Civil Defense Liaison Branch and other appropriate offices: an administrative guide for civil defense engineering services and a statement on the radiological hazard to be anticipated from various types of atomic attack.

Associated Universities, Inc., civil defense survey project. Dr. Lloyd Berkner, President of AUI, visited the Civil Defense Liaison Branch to discuss the FCDA-DOD-NSRB research survey and contract. The purpose of this survey is to furnish an evaluation of the impact of atomic and radiological and chemical warfare on a nation.

Review of new construction. During the month, Mr. Harry L. Bowman attended a number of conferences between representatives of AEC, Harris Associates, and AEC contractors. Harris Associates have been retained to examine the plans for Savannah River, Paducah, Fernald, and Rocky Flats. In the case of the last three mentioned, preliminary visits of Harris to the design offices have resulted in some changes. In subsequent conferences held in Washington, Harris' preliminary reports have been discussed. In the majority of instances, the AEC designers have successfully justified their proposals.

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Radiation Instruments Branch

Special electron tube development program. In July, 1950 the Branch solicited all AEC areas for requirements on three types of photomultiplier tubes then under development by the RCA Laboratories for the Bureau of Ships. Requests were received totaling approximately 200 photomultiplier tubes which were to be purchased under the Appraisal Stockpile Program upon completion of the development phase. Of the three types of tubes, development has been completed on only one. The second is in the final stages of development (now under AEC sponsorship) and the development on the third has been suspended indefinitely.

Radiation instruments research and development. The development of the Zamboni Pile (high voltage) battery has proceeded to the point where application tests in actual instruments have commenced. These units have approximately twice the voltage and ten times the current of the equivalent British-developed batteries.

Testing and evaluation. Three types of radiation measurement devices were submitted to the National Bureau of Standards for evaluation; two types were tested in order to obtain calibration and spectral dependence information on instruments which have potential civil defense applications; one type was submitted for tests on conformance to manufacturing specifications.

New industrial development. A demonstration was attended of a new high-speed decade counter tube employing an electron beam. The tube was developed by North American Phillips. The merits of the tube and possible use in nuclear instrumentation equipment are being investigated and a limited number of tubes may be purchased for appraisal.

Instrument appraisal program. During the month of August, 115 radiation-detection instruments valued at $20,517 were received in stock, and 38 instruments valued at $4,900 were shipped to AEC areas for inspection and evaluation. New equipment valued at $2,230 was ordered during the month.

Civilian defense. The following shipments of instruments were made on a loan basis in connection with civil defense training:

1. Two ionization chambers and one Geiger tube survey meter to Hopewell, Virginia;

2. One Geiger tube survey meter to Charleston, South Carolina;

3. One Geiger tube survey meter to Greenville, South Carolina; and

4. Sixteen ionization chambers and 16 Geiger tube survey meters to Food and Drug Administration.

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Survey of commercial manufacturing facilities. A draft of a questionnaire has been prepared for a proposed industry-wide survey of commercial manufacturers of nuclear instruments in order to maintain current information on the status of the industry. It is expected that the questionnaire will be distributed to approximately 90 manufacturers.

Publications. The shortage of Branch personnel has made it necessary to discontinue the scheduled monthly publication of Ra-Det. It is planned that the magazine will be issued from time to time by combining information readily at hand so that the editing will require a minimum of time and will not interfere with more pressing responsibilities. (End of [redacted] section.)

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