[redacted]

405170

M. W. Boyer, General Manager

September 11, 1953

[redacted]

John C. Bugher, M.D., Director
Division of Biology and Medicine

[redacted]

MONTHLY STATUS AND PROGRESS REPORT, AUGUST 1953
DIVISION OF BIOLOGY AND MEDICINE

(264)

SYMBOL: BMA:RON

Transmitted herewith is the Monthly Status and Progress Report for this Division covering the month of August 1953.

Enclosure:
Report

BEST COPY AVAILABLE

CC: J. H. Burchard

LANER

DOE 5650.2 III-12

CLASSIFICATION CANCELLED
BY AUTHORITY OF DOE/OC
JOSE DIAZ 4-16-81
REVIEWED BY DATE
Wilbur A. STRAUSER 4-17-81
REVIEWED BY DATE
By: DICK KOOGLE 6-10-87

Distribution of Enclosure:
#1 - Addressee
##2 - J.H.Burchard
#3 - Miss Laner
#4&5 - Div Files

[redacted]

ORGANIZATION & MANAGEMENT

[redacted]

[redacted]

[redacted]

OFFICE ▶	Adm	X-O	Director			
SURNAME ▶	O'NEILL	BROWN	BUGHER			
DATE ▶	8/11/53	9/11	9/14/53			

Form AEC-318

U. S. GOVERNMENT PRINTING OFFICE 16—62761-2

DOE ARCHIVES

US DOE ARCHIVES
326 U.S. ATOMIC ENERGY COMMISSION

RG DOE HISTORIAN (03M)
Collection 1132
Box 3363
Folder #23

(265)

[redacted]

[redacted]

[redacted]

MONTHLY STATUS AND PROGRESS REPORT

Division of Biology and Medicine

MONTH OF AUGUST, 1953

[redacted]

Weapons Test Activities

Radiation Telemetering - OPERATION CASTLE. ([redacted]) In connection with the coming series of test operations in the Pacific, participation of Division ~~operating~~ personnel has been requested by Joint Task Force 7 in order to make use of the radiological telemetering equipment of the Commission. The telemetering system which was first employed in the 1953 spring test series is to be used at fixed locations in areas of expected high radioactive contamination so that radiation intensity measurements may be supplied safely and quickly. Such data are necessary after a detonation in order to determine the earliest time of safe entry for recovery parties at the locations.

Research Activities

Effect of Toxic Substances on Cells. (UNCLASSIFIED) Since the effects of toxic materials on body tissue differ, it is necessary to understand the mechanism of action of these poisons on the body tissues at the cellular level. A unique study, which has been under way at the University of Rochester Atomic Energy Project, is concerned with the intimate dependence of the cell's metabolic activities on the special properties of the cell surface. This work indicates, at least in the systems studied, that some of the cell's most essential bio-chemical conversions take place without the entrance of the ingredients into the interior of the cell. Evidently, this is accomplished by action of enzymes which are fixed at the cell surface so that they can act on outside substances without leaving the cell and without the entry of the substances upon which they act.

Most of the work on this project has been with yeast cells and their turnover of organic phosphates, compounds which are of primary significance in the metabolism of carbohydrates. Uranium ions form a complex with certain groups (probably polyphosphates) on the surface of the yeast cells, and do not pass through the surface. Yeast so complexed with uranium fails to carry out the initial steps in sugar metabolism. Molybdate and tungstate in low concentrations similarly inhibit surface phosphatases and prevent the splitting and utilization of sugar phosphates

[redacted]

DOE ARCHIVES

in the medium. Analysis of the cell potassium, and study of the potassium-hydrogen exchange across the surface, have shown also that the stimulation of fermentation by the potassium ion involves only the most peripheral layers of the cell. This stimulation does not depend on any change in the internal potassium level or the rate of its exchange, but only on the external potassium-ion and hydrogen-ion concentrations. The most ready interpretation of these observations is that the phosphohexokinase reaction (initial step in glucose fermentation) actually takes place in the external medium immediately in contact with the enzyme at the cell surface. Experiments in progress indicate that a similar arrangement prevails for a number of the subsequent steps in the carbohydrate metabolic system. Application of these processes will be extended to the study of cellular phenomena ~~in~~ other micro-organisms, and ~~in~~ the organs of higher animals as the diaphragm and the intestine.

Mechanisms of Virus Infection. (UNCLASSIFIED) The mechanisms of virus infection are being investigated by a research group at the University of Colorado. The virus under study is the bacteriophage which destroys the common colon bacillus. Although the bacteriophage is a rather specialized type of virus whose behavior is not necessarily characteristic of all viruses, it is unusually convenient for laboratory study, since the infective processes can readily be followed in test tube mixtures of the virus and the host bacteria.

In such mixtures, the virus rapidly penetrates the bacteria cells and reproduces itself at the expense of the host cell materials. The bacterial cell finally ruptures and releases large numbers of bacteriophage to infect other bacteria, and this process continues as long as the bacteria supply lasts. The results of these experiments using radiation as a tool to alter the virus and its physiological effects have been making considerable contributions to the understanding of the basic physical mechanism of this infective process, as regards (1) the attachment of the virus to the bacterial surface; (2) the local breakdown of the surface and penetration of the virus into the interior; and (3) the basis for the different specific immunities of the several strains of bacteria to the several strains of bacteriophage.

Radiation Effects in Animals. (UNCLASSIFIED) Experiments at Oak Ridge National Laboratory are in progress to determine the biological effects of neutrons as compared with X rays in mice, guinea pigs, and rats. Cyclotron-produced neutrons and 250 KVP X rays were used to

DOE ARCHIVES

[redacted]

 [redacted]

irradiate the respective groups. The preliminary LD-50 (at 30 days) studies are near completion and will give data on cataract induction, and bone-marrow activity, as indicated by Fe-59 uptake in red blood cells and white cell counts. Tentative neutron/x-ray ratios obtained for acute lethality are: Mice, 1 rep neutrons, or 3.4 rep x-rays; Rats, 1 rep neutrons, or 3.0 rep x-rays; and Guinea Pigs, 1 rep neutrons, or 2.3 rep x-rays.

Detection of Radiation Injury. (UNCLASSIFIED) Investigators studying the effects of radiation in rats and enzyme activity at the University of Rochester Medical School have found a factor which may prove to be reliable as an indicator of the severity of radiation exposure. This possible indicator present in body fluids is the enzyme, desoxyribonuclease, which occurs in a neutral and in an acid form. During recent experiments, rats were exposed to 700 roentgens of whole-body radiation and observed within 24 hours. The acid "DN-ase" in the urine of rats showed a five-fold increase after irradiation. Under the same conditions, neutral "DN-ase" also increased and remained elevated. These findings imply that a significant method may be available to immediately detect levels of sublethal radiation exposure, and the extent of its biological damage in humans or animals. Finally, since one of the two enzymes presumably comes from the pancreas, the determination of urinary enzyme levels may assist in the early diagnosis of pancreatic malignancy, hitherto difficult to determine.

Subhuman Primate Studies. (UNCLASSIFIED) In cooperation with the National Institutes of Health, a number of research projects on the effects of irradiation on subhuman primates have been initiated recently. The University of Wisconsin is conducting one such study on the effects of total body irradiation upon learned and unlearned behavior in the monkey. This group is also interested in studying the effect of local ionizing radiations on cortical and subcortical centers in the brain of monkeys which have been tamed and adapted to test situations. These studies are to be continued on a relatively long-range basis, and it is expected that the information will be of value in determining whether the mental processes are seriously affected by radiation.

Radiation Instruments Program

High Intensity Probe. (UNCLASSIFIED) A demonstration was recently witnessed at the Naval Research Laboratory of a new high intensity probe being developed by Victoreen Instrument Company for use in their Roentgen Rate Meter. The probe is designed to extend the range of the Rate Meter to 1.8 megaroentgens per hour, and has possible applications in the new field of food irradiation and in instrumentation associated with kilocurie and megacurie gamma sources.

[redacted]

DOE ARCHIVES

[redacted]

[redacted]

Civil Defense Activities

Proposed Industry Analysis Project. (UNCLASSIFIED) Meetings have been held recently with ~~the firms of~~ Civil Defense Research Associates and Union Carbide and Carbon, Inc., to discuss the feasibility of a project submitted by Civil Defense Research Associates. The project was proposed in order to meet industry needs for criteria on protective measures applicable to plant building and plant complexes, and for new structures. This stems from requests which CDRA has received from representatives of several important industrial organizations to assist in obtaining information on resistive construction, dispersal, materials, camouflage, security measures and other information which would, in case of emergency, tend to reduce injuries to personnel and improve probability of continued production. Under such a plan, CDRA proposes to act as coordinator between the Commission and industry so that the receipt of pertinent information may be expedited for those in need for immediate use. The Federal Civil Defense Administration and possibly state civil defense organizations will be invited to contribute in this work. ~~and will be kept informed of progress.~~

~~The importance of the project warrants continued discussions, and consideration will be given as to whether recommendations for official AEC assistance will be made.~~

Federal Civil Defense Research Objectives. ([redacted]) Research projects of the Federal Civil Defense Administration connected with the effects of atomic detonations are necessary to adequately provide assistance in civil defense protective measures. The Commission has been asked to give guidance in establishing these research objectives, and also to discuss the proper utilization of funds appropriated for this research to FCDA. Under current FCDA policy, any expenditures for civil defense research by other agencies were to be reimbursed by FCDA through funds thus appropriated to them by Congress.

Accordingly, the problems were discussed at a meeting of Commission representatives, Federal Civil Defense, Armed Forces Special Weapons Project, Corps of Engineers-U. S. Army, and Bureau of Yards and Docks-U. S. Navy. Specifically, FCDA requested direction concerning (a) information on effects of atomic detonations now included in scientific and technical reports of past test series, and (b) the most efficient procedures to obtain such information. A special interest was indicated in shelters to give protection near Ground Zero (up to levels of 2,000 p.s.i.); dispersal of shelters and population; industrial, commerical, residential, and educational structures. Also, FCDA is giving consideration to the ~~policy of:~~ Retaining a consultant or consultants to review literature

[redacted]

DOE ARCHIVES

[redacted]

and make recommendations for further field test ~~participation~~; [and To ~~accept a longer warning period (1 or more hours) to initiate tactical~~ dispersal of people to shelters]

General

Specialized Training Programs. (UNCLASSIFIED) The exigent problems in the field of health [physics] related to atomic energy extend beyond the supply of presently trained and available personnel. Consequently, the various specialized training programs inaugurated by the Commission in previous years will be continued. The programs include:

1. Industrial Hygiene. This program is now in its second year and is being administered by the Oak Ridge Institute of Nuclear Studies during 1953. Eight candidates have been selected for one year of academic training to begin this fall. The first year's program in 1952 included four trainees who have completed the course of study.

2. Industrial Medicine. In the field of industrial medicine, eight applicants have been assigned for study during the 1953 academic year, as follows: University of Rochester - 4; Harvard University - 3; and the University of Cincinnati - 1. A second year of in-plant training at an AEC or contractor installation is offered after completion of the courses. Direction of this training will be handled by the University of Rochester.

The previous year's training included five candidates who finished the course of academic study. Two of these are now taking in-plant training for a year - one at Fernald plant (Cincinnati) and one assigned to work at both Brookhaven and Hanford. Two others are taking additional clinical training, and one has voluntarily discontinued the program.

3. Radiological Physics. Applicants are now being reviewed for radiological physics fellowships for special study in radiation protection and hospital physics. Administration of the program is under the Oak Ridge Institute of Nuclear Studies, and approximately 75 candidates will be selected for study in the coming academic year. The groups will begin training at one of the three locations, with no more than 25 at each: the University of Rochester, with field training at Brookhaven; the Vanderbilt University, with field work at Oak Ridge; and at the University of Washington in Seattle in cooperation with Hanford Works.

[redacted]

US DOE ARCHIVES
326 U.S. ATOMIC ENERGY COMMISSION
RG DOE HISTORIAN (DBM)
Collection 1132
Box 3363
Folder #23
DOE ARCHIVES