KSS-387

PROPOSED PROGRAM

Health Division of the Metallurgical Laboratory

July 1, 1945 to June 30, 1946

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L. O. JACOBSON AND R. S. STONE

The chief responsibility of the Health Division will remain the same as in previous years, namely to protect the health of the personnel working within the Metallurgical and Argonne Laboratories, and the public living in surrounding areas, from all hazards originating in the operation of the laboratories, and to make available to other parts of the Project and to "W" such information as is found to be of value. To achieve this purpose complete medical examinations must be given; attention must be paid to the prevention and treatment of ordinary work connected injuries and diseases; and in addition the hazards peculiar to the laboratory call for special attention. The intelligent and logical approach to the prevention, prophylaxis, detection and treatment of radiation or chemical injury stems from a complete knowledge and understanding of the basic and fundamental mechanism of its production. Such knowledge combined with the development of the ability to monitor, identify and isolate the chemical or radiation source involved permits us to establish tolerable doses on firmer grounds than before. In the past our efforts have of necessity been directed toward the answering of questions of immediate and practical importance regarding exposure to hazards from the standpoint of the laboratory and all DSM Project personnel and the public at large. Certain of these questions have been answered. Others are still being studied and their solution must be considered as a continuing responsibility of the Health Division to "W" since the information is needed for safe operation.

It seems advisable in view of the potentialities of nucleonics not only in the war but in the future of our country to keep the medical and biological fields astride of the advances being made in chemistry and physics. This can only be done by striving to understand the basic and fundamental problem of radiation damage and directing part of our effort in this direction as well as being familiar with the biological behavior of radioactive materials and chemicals concerned in present and future developments.

Any program proposed for the Metallurgical Laboratory for the fiscal year, July 1, 1945 to June 30, 1946, must, therefore, conclude: (a) Health service activities for any laboratory personnel and (b) Health research activities which have not yet been completed. In addition we feel it would be of great value to (c) extend the fundamental research in the Health fields.

In line with the above introduction the following program for the Health Division of the Metallurgical Laboratory from July 1, 1945 to June 30, 1946 is proposed:

I. Health Service Activity

A. Medical examinations of laboratory personnel; pre-employment, interval, transfer and terminal

B. Routine medical care of personnel

C. Clinical laboratory examinations for various types of damage to personnel exposed to either tolerance or larger doses of radiation or chemicals.

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DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
SINGLE REVIEW AUTHORIZED BY: DOE/HQ/OD Appt 1/1/92
REVIEWER (ADD): NAME: DC
DATE: 9/3/96
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):

D. Examination of body secretions and excretions for radioactive materials.

E. Monitoring of personnel for general and local exposures.

F. Surveys of laboratories for various degrees and types of radioactive or chemical contamination.

II. Research Activities.

A. Detection of incipient damage to personnel from chemically toxic materials or radiations by a study of metabolic disturbance such as:

(1) Pigment metabolism (Porphyrinns) already shown to be applicable to Uranium toxicity in humans.

(2) Leucocyte phosphorus metabolism--results of preliminary nature suggest that the alteration after invivo irradiations of various phosphorus containing constituents of leucocyte may be a good indicator of incipient damage from irradiation.

B. Development of simpler methods for monitoring excretions and secretions.

C. Further development of methods for studying damage to the hands from radiation.

D. Investigation of methods of prophylaxis and treatment of chemically or radiologically injured personnel.

E. Study of acute radiation effects -- external and internal in terms of lethal action, hematological and histological damage and others. These studies will be largely confined to product and fission products except as new materials under consideration become important to the Project. Since the location within the body of the internal radiators influences the effects, the distribution of these materials will be studied.

F. Study of Chronic radiation effects from external radiation. The object of these studies is to correlate previously known effects with our present series and to establish the tolerance dose on a more quantitative basis. Wherev er piles or large quantities of radio-active solids, liquids or gas are used external radiation is a serious problem.

1. External gamma rays - radium (NCI)
2. External x-rays (Chicago and N.C.I.)
3. External neutron beams (in cooperation with Clinton laboratories)

G. Study of chronic radiation effects from radio-active materials on and in the body. The object here is to find the tolerance dose for such materials according to their localization. To find the tolerance dose one must kno w the minimal effects from doses just above the tolerable dose. Alpha and beta radiations will be used and those which deposits in or on the following organs will be studied.

1. Bone — for Betas, probably Sr^{89}, for Alphas, product and radium.

2. Skin - for Betas, probably Sr^{89}, or P^{32}; for Alphas, product.

3. Digestive tract — since we wish to get the specific effect on this tract without complicating radiations from elsewhere, a poorly absorbed compound of some emitter such as yttrium will be used. When available product will be used as an alpha emitter.

4. Respiratory tract — Product as an alpha emitter and some emitter that is not too readily absorbed through the lung will be used.

The answers to the above four studies are badly needed because wherever product, fission products or other radioactive materials are used they may be inhaled, ingested or deposited on the skin.

H. Chronic effects of material whose toxicity is largely chemical. Various compounds of tuballoy are the main ones with which we are concerned at present but thorium and its compounds and other materials may need study. Such substances should be studied:

1. By ingestion

2. By inhalation

3. By injection

The determination of how those agents act would be a great step forward in discovering tests to demonstrate incipient damage and also in devising means of treating any individuals who may be damaged.

I. Mechanism of radiation and toxicological effects:

1. Physiological Methods such as:

a. Identification of toxic materials secondary to radiation.

b. The changes in the circulatory system.

c. The alteration of water balance.

d. The changes in the endocrine system.

e. The effect of cullular environment on radiation sensitivity.

f. Functional tests of organs by loading to capacity to determine reserve power.

2. Cytological and immunilogical methods, such as:

a. The changes in the lymphocyte and its precursors and their relation to immunological phenomena.

b. The comparative sensitivity of cells.

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3. Biochemical methods, such as:

a. The effects upon enzyme systems and other proteins studied both in vivo and in vitro. This is particularly important in the study of carbohydrate and protein metabolism. Nucleic acid metabolism should be given special consideration and should be studied intensively.

b. The use of radioactive tracers in the study of biological phenomenon and particularly with such problems as mentioned above.

J. Development of methods for using the newer radioactive materials as tracers as they become available for use on problems related to the Project as a whole.

K. Consideration of the use of new radioactive materials in treating disease.

L. Research and development studies on instruments and methods for measuring health hazards and the techniques of using same.

The instruments for Health monitoring purposes have not yet reached a satisfactory stage of development and production. Neutron measuring instruments in particular are in an unsatisfactory state. Product monitoring apparatus needs considerable improvement.

III. Personnel and space.

The program outlined above is not appreciably different from that submitted for 1944-1945. Most of the problems are long range ones. Hence the personnel and space requirements are essentially those already requested. The expansion of the laboratory health activities occuring concurrently with some contraction of other Metallurgical Project health activities allows an increase in our laboratory health personnel without an over-all increase in the health program as a whole. The space which we hope to have before July 1, 1945 should be sufficient for the 1945-46 program. It is conceivable that an expansion of activities along a promising line may be indicated and would then require further consideration of space and personnel.

The above constitutes the program anticipated for the next year. Undoubtedly new problems will arise and old ones seem less important. It is our aim to take care of our own problems, to try to foresee those of Hanford and those of other D.S.M. projects that are similar to our own and to cooperate with the medical office of the Manhattan district so as to avoid overlapping of service or research activities.

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