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WAR DEPARTMENT
CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER
MANHATTAN DISTRICT
OAK RIDGE, TENNESSEE

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CORPS OF ENGINEERS
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OAK RIDGE, TENNESSEE
REFER TO FILE NO. **BIDMX-1**

26 September 1946

Subject: Health Physics Program

MEMORANDUM to Colonel W. D. Fleming, District Medical Officer

1. Transmitted herewith, for your information, is one copy of Monsanto Chemical Company's Health Physics Program for the Fiscal Year 1947.
2. Any comments you may have regarding this program will be appreciated by this office.

K. C. BROOKS
Engineer (Civil)
Chief, Adm. & Const. Section, X-10

1 Incl:
1 - Subj. Program

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WAR DEPARTMENT
CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER
MANHATTAN DISTRICT
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File
URK 9/30/46

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1 Incl: *K9*
1 - Subj. Program

file

X-10 AREA HEALTH PHYSICS PROGRAM FOR FISCAL YEAR 1947

I. Introduction:

The operation of an air cooled pile and work with radioactive materials at Clinton Laboratories have introduced safety problems of a specialized nature. Radiation hazards from alpha and beta particles, gamma rays and neutrons may arise from the Pile, from isolated fission products, from irradiated materials, and from natural radioactive sources. These penetrating radiations produce their damage so insidiously and inconspicuously in contrast to explosives and other common safety hazards that personnel may be completely unaware of receiving a lethal overexposure. Thus it was necessary for Clinton Laboratories to depend on specialized knowledge of these hazards and efficient instrumentation to prevent a recurrence of the unnecessary injuries and deaths associated with radioactive industries in the past. Therefore, with the beginning of Clinton Laboratories operation in 1943, the Health Physics section was organized to make a study of penetrating radiations and to devise physical means of preventing damaging exposures to personnel employed in the X-10 area. In addition it was to determine tolerance levels and to make certain that the radioactive isotope concentration in the air and water discharge did not exceed safe levels.

II. Purposes and Objectives:

1. To eliminate excessive radiation hazards and radioactive contamination in the working areas and to maintain a safe radiation level in the neighborhood of the plant.
2. To provide a legal record of exposures received by personnel and the environmental circumstances responsible for the exposure.
3. To operate and maintain equipment that will accomplish the above.
4. To educate personnel as to possible radiation hazards and the protective measures necessary to avoid damaging exposures.
5. To train radiation surveyors.
6. To provide professional consultation service where new and special conditions of radiation hazards are encountered both in the plant and at other locations when requested.
7. To maintain an up to date record of all potentially hazardous radioactivity within the plant.
8. To design instruments for the detection and measurement of radiation.
9. To determine tolerance values for various energies and types of radiation exposure under various conditions.
10. To supply, calibrate and maintain radiation measuring equipment.
11. To study and accumulate data regarding the interaction of radiation with matter and to engage in other related research.

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12. To develop techniques for analysis of radioactive samples.

III. Policies:

A. Scope.

The X-10 Health Physics program is applicable to all operations in the X-10 area and effected adjacent area.

B. Responsibility.

1. The liability for exposure is shared jointly by the individual and supervision.
2. Operating and research supervision are responsible for the protection of all who work under their guidance.
3. It is the responsibility of the Health Physics section to report potential hazardous conditions in the plant area to top management, when necessary, to bring about corrective action.
4. It is also the responsibility of the Health Physics section to report all radiation overexposures to the person involved and his supervisor. |
/Dr.
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IV. Organization:

- A. The Health Physics Department reports to top management through the director of Health.
- B. The Health Physics Department is divided into two sections; the Service Section and the Research and Development Section.

1. The Health Physics Service Section provides:
 - a. on the job surveys and other services.
 - b. personnel exposure monitoring service.
 - c. radiation instrument supply and calibration services.
 - d. general area and off-area radioactivity monitoring services.
 - e. plant personnel radiation training.
2. The Research and Development Section provides:
 - a. the solution of special radiation Health Physics problems.
 - b. the development of special instruments.
 - c. the development of sampling techniques for Health Physics measurements.
 - d. the investigation of the reactions of the various radiations with matter (shielding and tissue).
 - e. provide physical, chemical and instrumental aid to the Biology Section of the Health Division.
 - f. the calculations and measurements in pure physics necessary for other developments in the field of Health Physics.

V. Records and Reports:

- A. Investigation is made of the circumstances and the cause of each personnel exposure detected which is greater than a one day tolerance. This investigation is made by the survey representative of the Health Physics section

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- assigned to the area where the individual receiving the exposure was working. The records of results of the investigation are placed in the Health Physics personnel file.
- B. A complete log is maintained in each building and work area of all measurements made by the Health Physics surveyors assigned to that jurisdiction.
 - C. Conspicuous events and trends as observed by individual surveyors are transmitted by secret report to the Health Physics section chief, the Medical Director, Survey Group leaders, all Section chiefs supervising work within the area surveyed, and to the Clinton Laboratories Central File.

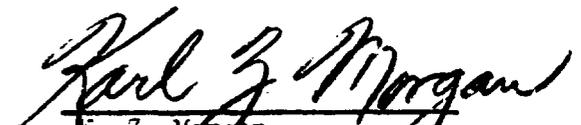
VI. Plant Committees:

- A. The Health Physics Department is represented by its chief on the Special Activity Hazards Committee of the company's Central Safety Committee. This committee meets periodically and establishes rules and procedures for the handling of radioactive materials. The committee includes representatives from all divisions of the plant. The committee does not act as an enforcement body for the rules and procedures which it has instigated, but it may amend these rules and does conduct a continuous review of problems arising from their institution. All potential radiation injuries or accidents are brought to the attention of the Central Safety Committee.

VII. Health Physics Activities Planned for the Fiscal Year 1946-1947:

1. To train personnel in Health Physics. Not only should persons who plan to become Health physicists learn the fundamentals of the field, but all persons interested in nucleonics - physicists, chemists and biologists - should familiarize themselves with some of the health aspects of radiation problems. If all persons working in the field of radiation had a full appreciation of and respect for Health Physics, more than half of these problems could be solved before they developed.
2. To improve the Health Physics instruments now available. Because of the rapid expansion in the field of nucleonics, it has been necessary in the past to use many instruments which were not completely satisfactory. It is necessary to conduct continuous research on the development and production of better instruments if we are to be certain that accurate and reliable data is to be obtained regarding radiation measurements and exposures.
3. To develop new Health Physics instruments and techniques.
 - a. A completely satisfactory instrument for neutron measurements is still lacking and is highly desirable.
 - b. No satisfactory instrument for detecting product in a wound has been developed.
 - c. Many other instruments are needed and should be developed.
4. To aid in the design of new buildings and in the development of new processes.

- a. In order to incorporate a maximum of radiation safety, the Health Physics section should be expected to check the plans of new buildings and of new remote control equipment to make certain that there is sufficient shielding.
5. To aid in the calculation and determination of tolerance levels.
 - a. It is desirable and necessary that tolerance levels be ascertained for various forms of external and internal radiation exposure. There is a variety of mathematical calculations by which one may arrive at a maximum permissible radiation exposure. The accuracy of each method of calculation depends in a large measure upon the assumptions made and the reliability of the constants used.
6. To analyze the Health Physics data obtained and to interpret the results.
 - a. A large amount of useful statistical data on the effects of various radiation exposures is becoming available. Health physicists should examine this data and determine any significant trends.
7. To assist other sites in the Manhattan Project in setting up Health Physics programs and to offer advice to these and other sites regarding Health Physics problems.
8. To assist in setting up rules and regulations for the safe handling and shipping of radioactive isotopes.
9. To confer with the Biology section.
 - a. To ascertain the instrumentation needs of the Biology section and to develop instruments better suited to obtaining biological data.
10. To conduct a definite research program, making special measurements and calculations in pure physics essential for other developments in Health Physics.
11. To make reports and to keep accurate records.
 - a. These functions are necessary in order to reduce radiation hazards and to serve as a legal record. One of the most important functions of Health Physics reports is to call to the supervisor's attention the existence of radiation hazards and to offer recommendations of procedures by which such hazards can be eliminated. The reports on personnel exposures are of obvious value in that each person is kept informed of his exposure record and is required to maintain it below certain limits. This data is of legal value in determining when and if a person is justified in seeking legal compensation for radiation damage.
12. To determine radiation problems associated with new developments. As the power pile, heterogeneous pile, betatron and other installations are developed, it is necessary that the Health Physics section keep abreast with their progress in that radiation problems associated with these new developments may be solved.


K. Z. Morgan
Health Physics Section