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CLINTON LABORATORIES

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Date: February 1, 1946

In Re: Health Protection Policy to be

Considered in Plans for Construction

of the New Heterogeneous Pile

TO: M. D. Whitaker

From: J. E. Wirth, M.D.

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Human Studies Project

MONSANTO CHEMICAL COMPANY
Clinton Laboratories

February 1, 1946

To: Mr. M. D. Whitaker

From: J. E. Wirth, M.D.

In Re: Health Protection Policy to be Considered in Plans
for Construction of the New Heterogeneous Pile

Present plans for the construction of a new pile make it necessary to review the policy regarding acceptable tolerances for beams of radiations from the pile and for gases emanating from the pile. The following factors are recommended for the contemplated heterogeneous pile at Clinton Laboratories.

- a. Tolerance for exposure of areas from 1 cm² and up shall be 0.1 r in any 24 hour period for gamma, beta or x rays, and 0.025 rep (0.01 n) for fast neutrons (200/cm²/sec.). The tolerance for slow neutrons shall be considered to be 1500 per square centimeter per second. Since the effects of these radiations are totally additive the sum of the percents of tolerance of all components must not exceed 100.
- b. Tolerance for exposure of areas less than 1 cm². The average intensity of radiation in any cubic centimeter shall be no greater than 0.1 r or equivalent as indicated above, per 8-hour working day from any beams or combination of beams. Beams smaller than 1 cm² may have their intensity calculated as if the energy absorbed were distributed through a cubic centimeter. (For example one might consider a segment of a beam 100 cm. long with a width of 1 mm. which would irradiate 100 mm³. 100 mm³ is 0.1 cm³, and, therefore, the intensity of the beams could be 10 times that of a beam 10 mm. wide. If two such narrow beams should irradiate any one cm³ then the intensity of each must be reduced to 1/5th of that of a full cm² beam).
- c. At the control desk and any permanent stations in or outside the pile building the combination of all radiations regularly coming from the pile shall not exceed 1% of 24-hour tolerance in any 8-hour period.
- d. In all other work areas the combination of all radiations regularly coming from the pile shall not be greater than 10% of tolerance.

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Mr. M. D. Whitaker

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February 1, 1946

e. Ventilation and control of seepage of gases from the pile must be such that the general radiation level for beta and gamma emitters does not exceed the tolerance noted in (d), and for dusts containing alpha emitters does not exceed 3.1×10^{-11} microcuries of alpha activity per cc. of air of the pile building. The value given represents the figure generally used for Plutonium and is the lowest tolerance of all alpha emitters.

f. Discharging or Intermittent Operations. No specific recommendation regarding the size and construction of the coffin can be made. In general the guiding principal should be that operating personnel including the crane operator should not receive radiation in excess of 0.1 r per day. Thus, the construction of the coffin and independent shielding of operating personnel should be such that there is a wide margin of safety. Also, it should be such that people working in the area do not have to have work times limited to short intervals of a half hour or less per day in order to prevent exposures greater than 0.1 r per day. From the health standpoint there is no objection to the use of large numbers of people for short intervals to accomplish a given job, but, in general, it is felt that this is a bad practice from the morale standpoint as well as from the difficulty of performing routine procedures under such requirements. In such cases the working time frequently has to be decreased by a factor of two in order to assure that no individual will receive an over-tolerance exposure any day.

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J. E. Wirth, M.D.
Medical Director

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