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April 8, 1952

H1-LB2 P13

A. C. Graves

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Shielded Flying Clothes for Sampling Aircraft Personnel, Operation Ivy.

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1. With any significant amount of ~~██████████~~ Mike shot, Operation Ivy, is expected to produce a ~~██████████~~ relative to gamma radiations with energies above ~~██████████~~. The major source of this soft radiation arises from the  $U^{239}$  formed by the capture of a neutron by  $U^{238}$ . The effect of relatively large amounts of such radiation is to decrease the size of cloud samples which can be collected by manned aircraft operating under a limited personnel radiation exposure. For example, it has been estimated that the sample size will be decreased by a factor of ~~██████████~~ if the Mike shot yield is ~~██████████~~ compared with the sample size obtainable from a pure fission bomb with a ~~██████████~~ yield.

2. Fortunately, it is possible to attenuate greatly the intensity of soft gamma-radiation with relatively little shielding material. The expected proportion of soft radiation for the Mike shot requires about five half-thicknesses of shielding to reduce the total flux within the aircraft to a level comparable with a fission bomb of the same energy. If one assumes that the shielding provided by the aircraft itself is equal to one half-thickness, only four half-thicknesses are required.

3. In the energy range of concern lead can be assumed to have an average half-thickness of about  $0.2 \text{ gm/cm}^2$ . Rough calculations indicate that it should be possible to design flight clothing which will afford a four or five

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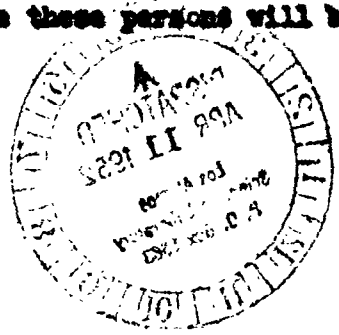
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half-thickness protection to personnel for a total distributed weight of less than fifty pounds. Such flight clothing should cover all of the body possible (including hands, feet, and most of head).

4. As first conceived, it was thought that development of the desired clothing could be accomplished as a cooperative program within this Laboratory with the help and consultation of people from AMC. The conclusion has been reached, however, that the whole job should be performed within AMC by experienced personnel who have detailed knowledge of what it takes to design and fabricate Air Force clothing of this type. Since it will be useful for any future thermonuclear shots besides Ivy and may be worthwhile even for continental shots, flight clothing developed and fabricated by means of funds supplied by the Laboratory should become and remain the property of the Laboratory.

5. Because of the marked increase in sample size which will result from the use of such shielded clothing, it is strongly requested that as soon as possible the Laboratory establish and support a program to develop and fabricate flight clothing for this purpose. It is considered important that such a program, if established at AMC, should be coordinated from a technical standpoint with the appropriate Los Alamos personnel as well as Col. K. H. Houghten, Special Weapons Command, since these persons will be directly involved in the use of the garments.



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