

MARSHALL ISLANDS FILE TRACKING DOCUMENT

Record Number: 136

File Name (TITLE): Pilat Protection Clothing Conference
Notes

Document Number (ID): 0064053

DATE: 7/1952

Previous Location (FROM): CIC

AUTHOR: JTF 132

Additional Information: _____

OrMIbox: 9

CyMIbox: 4

UNCLASSIFIED

TASK 132.4 - AF RAD-SAFETY

HEADQUARTERS
JOINT TASK FORCE 132
Washington 25, D. C.

0064053

7883-8

337477

21 July 1952

MEMORANDUM FOR RECORD

IVY

{Cy. 1B pt 1 of 3 pgs}

SUBJECT: Pilot Protective Clothing Conference

REF: B.4.9

1V067

1. A conference was held in Room 1201, Building T-3, AEC, on 2 July 1952, (1000 - 1330 hours) to determine the necessity for and feasibility of providing protection against soft gamma radiation expected to be encountered by sampling aircraft pilots during the MIKE phase of operation IVY. Representatives present were as follows:

- Dr. John Bugher, Chief, Division Biology & Medicine, AEC
- Dr. Walter D. Claus, Chief Bio-physics Br, Division Biology & Medicine, AEC
- Dr. Forrest Western, Asst to Dr. Claus
- Dr. Charles L. Bunhan, Chief Medical Branch, Division of Biology & Medicine, AEC
- Dr. Harold Plank, J-Division, LASL, Los Alamos, N. Mex.
- Mr. Pasquale E. Schiavone, H-Division, LASL, Los Alamos, N. Mex.
- Capt. Milton D. Sprinkel, TG 132.1, LASL, Los Alamos, N. Mex.
- Dr. Howard L. Andrews, Public Health Service, Wash., D.C.
- Col Cy Wilson, 12th Fighter Wing, Austin, Texas
- Maj. Lester S. Greider (Flt Surg), 12th Fighter Wing, Austin, Tex.
- Capt Wallace L. Hart, 12th Fighter Wing, Austin, Texas
- Lt. Col. James E. Crosby, TG 132.4, Albuquerque, N. Mex.
- Capt Edward E. Sims, Jr., USAF Surgeon General's Office
- Lt. Col. M. Dauer, Army Surgeon General's Office
- Lt. Col. G. M. McDonnell, Medical Branch, AFSWP
- Col. Karl A. Houghton, Staff Med. Officer, AFSWC, Albuquerque, N.M.
- Dr. Peter A. Cole, Hq USAF Operations
- Lt. Col. Allen S. Webb, Hq USAF AFOAT
- Maj. Henry G. Wise, Hq USAF AFOAT
- Col. William S. Cowart, Jr., Hq JTF 132
- Cdr Russell H. Maynard, Hq. JTF 132
- Lt. Col. Richard A. House, Hq. JTF 132
- Cdr Donald E. McCoy, Hq JTF 132
- Mr. Harold P. Lewald, Bar-ray Products, Inc.

AG file

F-3-4
F-4-6
F-10-1

COWART

Handwritten signature

2. Dr. H. Plank presented details of the computations which indicated the magnitude of the flux of soft radiation expected to be present during sampling operations for MIKE. This soft radiation includes characteristic gamma rays of approximately 73 Kev and several rays up to a few hundred Kev with the expectation that a considerable amount of the more energetic radiation would be degraded by scattering. Considering degradation of the hard components, it was assumed that the total flux of soft radiation could be treated analytically as if it consisted entirely of radiation of approximately 100 Kev average, with a half thickness value of approximately .2 mm of lead.

UNCLASSIFIED

DNA-84-04899

SECURITY INFORMATION

E-14

UNCLASSIFIED

Memorandum for Record
Subject: Pilot Protective Clothing Conference

21 July 1952

3. Dr. Plank also discussed the extreme departure from linearity of gamma measuring instruments, especially for energies in the neighborhood of 100 Kev. (This factor has the effect, where such soft gamma is present, of giving radiation exposure indications considerably in excess of the actual soft radiation present during the measurement period.)

4. Lt. Col. House presented transmission data obtained during a visit at Oak Ridge National Laboratory. This information was taken from tests (using an 85 Kev gamma source) run on various commercial protective materials, F-84G aircraft components and standard pilot flying equipment. (Incls 1 and 2)

5. Lt. Col. House discussed several possible solutions as outlined below:

a. Flying suit of several plies of leaded glass fabric or a suit of vinyl (.5 mm Pb Equivalent) sandwiched between ordinary or leaded glass cloth.

b. Wrap-around insert to parachute using lead impregnated vinyl or rubber or leaded glass fabric.

c. Loose shroud or wrap-around apron of above materials to be worn over the normal flying clothing.

d. Lead sheet (or above materials) placed in pockets over vital parts of the body.

(At this point, the conference recessed, during which time a display of various commercial protective materials was made available for inspection by personnel in attendance. This display also included a complete set of standard fighter pilot flying equipment.)

6. The conference was re-convened for an open-floor discussion of the foregoing presentations, with all members present participating. General conclusions were as follows:

a. .5 mm of lead protection would screen out (allowing approximately 13% transmission) sufficient of the soft gamma radiation to permit a two-fold increase in size of cloud sample collected per pilot. (General opinion of Dr. Bugher and staff and Dr. Plank.)

b. Sampling operations would be conducted on the basis of a 5 r (measured gamma) planned dose with the expectation that accidents or unforeseen circumstances would not result in doses in excess of 10 r (Opinion of Dr. Plank).

UNCLASSIFIED
SECRET

UNCLASSIFIED

Memorandum for Record
Subject: Pilot Protective Clothing Conference

21 July 1952

c. It is expected that for this operation only, and with specified limitations on re-exposure, sampling aircraft pilots will be authorized to receive a 20 r (measured gamma) dose during sampling operations. (Opinion of Dr. Bugher and staff.)

d. From a biological viewpoint, no eye hazard is anticipated for the situation obtaining during MIKE sampling. (Opinion of Dr. Bugher and staff.) From a psychological standpoint, protection in the form of a lead glass visor was considered desirable (Opinion of Col. Wilson and Maj. Greider, and accepted by the conferees in general).

e. The body extremities (head, arms and lower legs) present no primary radiation concern for the situation contemplated for MIKE. (Opinion of Dr. Bugher and staff.)

f. IT WAS AGREED BY ALL PRESENT THAT IF, AFTER PROCUREMENT, THE PROTECTIVE SUIT IS FINALLY DISCARDED BECAUSE OF OPERATIONAL DIFFICULTIES IN THE FORWARD AREA, NO REAL HEALTH HAZARD TO THE PILOTS EXISTS UNDER THE PROPOSED SAMPLING PLANS FOR CONDUCT OF OPERATIONS.

g. It was agreed by all present that the opinions expressed during this conference, the conclusions drawn and all commitments made by conferees were applicable only to the MIKE portion of Operation IVI.

7. Specific conclusions (all conferees) were as follows:

a. No special protective measures are necessary for arms, lower legs and for the head except as indicated above in regard to the eyes.

b. Protective materials equivalent to .5 mm of lead will be used as body protective cover in a manner operationally acceptable to the sampling aircraft organization commander.

8. Following the above conference, a meeting was arranged with Mr. Harold P. Lewald (representing Bar-ray Products, Inc., 209 25th St, Brooklyn, N.Y.) Telephone: Washington, DC, OLiver 0713 and the following:

- Dr. H. Plank
- Col. Cy Wilson
- Maj. L. S. Greider
- Capt. W. L. Hart
- Lt. Col. R. A. House

9. At this meeting the relative merits of lead glass fabric, lead impregnated vinyl and lead impregnated rubber were discussed from an operational and production viewpoint. It appears that rubber will hold less lead in suspension than an equal thickness of vinyl; that rubber is relatively stronger than vinyl when new; that rubber deteriorates much more rapidly than vinyl; that vinyl, having a low tensile strength, could be strengthened through backing by a fabric; that both rubber and

UNCLASSIFIED
SECRET

UNCLASSIFIED

Memorandum for Record
Subject: Pilot Protective Clothing Conference

21 July 1952

vinyl cloths, being non-porous, would be extremely uncomfortable to wear. On the other hand, an equivalent amount of lead glass fabric is stronger than either the rubber or vinyl materials, is relatively porous and deteriorates very slowly. It was also noted that production difficulties on the vinyl will probably preclude its use, whereas the lead glass fabric and the lead-impregnated rubber are readily available.

10. It was agreed by all present that a loose shroud (eight plies in thickness) of the lead glass fabric would satisfy the requirement for .5 mm of lead protection and could be made to fit over the head, drape part way down the back, and extend over the front and sides of the body down to a point just above the knees. This shroud could have quick release snaps so that it could be placed over the standard flying equipment and still retain the feature of quick removal in the event of bail-out. (If it develops that eight plies of lead glass fabric cannot be stitched together it may become necessary to use lead impregnated rubber.)

11. Col. Wilson agreed to fabricate a sample shroud from some comparably heavy material and to deliver the design to Bar-ray Products, Inc. for production of an eight-ply lead glass fabric prototype. Col. Wilson agreed to field test the prototype.

12. It was agreed by Mr. Lewald to obtain details of cost and production problems on the lead glass shroud and on a leaded glass visor to be fabricated in the form of the current standard visor. Mr. Lewald also agreed to get further information on lead or lead vinyl covering of the standard helmet in the event such would be desired. (Samples of helmet material had been previously furnished to Bar-ray Products Inc. for investigation.) Further, Mr. Lewald agreed to check on the possibility of fabricating a lead glass fabric or leaded vinyl hood to replace the standard pilot helmet in the event the visor and shielding modifications cause the standard helmet to be operationally undesirable due to increased weight.

13. Mr. Lewald agreed to obtain separate budget costs of the following:
- a. 16 sets of lead glass shrouds (8 ply) or leaded rubber shrouds.
 - b. 16 sets of leaded glass helmet visors
 - c. Modification of 16 standard helmets by addition of lead or lead impregnated vinyl coating.
 - d. 16 sets of 8 ply lead glass fabric or leaded vinyl hoods.

2 Incls:

1. Transmission curves for lead glass fabric
2. Transmission data for various materials.

R. A. HOUSE
Lt. Col., USAF
Tech. Op. Br., J-3

SECRET

UNCLASSIFIED

Attenuation of 85.4 Kev Gamma (from $^{69}\text{Tm}^{170}$)

Afforded by Various Materials

Material	% Transmission	
	Photo Electrons not Filtered Out	Photo Electrons Removed with 300 mg/cm ² Al Filter
Bar-Ray Leaded Glass (Material F)	10.5	7.0
F84G Canopy (Material G)	91.5	92.3
Helmet (Material I)	102.7	94.8
Helmet Visor	95.0	92.4
Lead Impregnated Rubber (1 mm Pb equivalent) (Material D)	16.1	7.3
Lead Impregnated Vinyl (.5 mm Pb equivalent) (Material E)	19.9	17.0
Aircraft Aluminum Skin (51 mils in thickness or .348 gm/cm ²)		95% (Not measured; taken from Al. Absorption graph)