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**HOME OFFICE**

**CIVIL DEFENCE**

**THE ATOM BOMB ITS EFFECTS & HOW TO  
MEET THEM**

**PART 3**

**“RADIATION”**

**FILM STRIP C.D. 33**

**LECTURE NOTES**



**LONDON : HER MAJESTY'S STATIONERY OFFICE**

**1953**

HOME LIFE

AND DREAMS

THE AUTHOR'S OWN LIFE AND HOW IT

WAS LIVED

BY

THE AUTHOR

LECTURE NOTES



LONDON: HER MAJESTY'S STATIONERY OFFICE

1952

## NOTES FOR THE INSTRUCTOR

### 1. THE INSTRUCTOR

The qualities required in a good instructor are as follows:-

- (i) Must be PURPOSEFUL
- (ii) KNOW the SUBJECT
- (iii) Be PAINSTAKING
- (iv) ENTHUSIASTIC
- (v) Have a DRAMATIC SENSE
- (vi) A PLEASING MANNER
- (vii) Must have the right ATTITUDE towards the class.

### 2. THE STUDENT

The student is largely dependent on his five senses for acquiring knowledge. If the training is to be most effective, therefore, it should be directed more or less simultaneously to as many of these senses as possible.

### 3. THE LECTURE

The Instructor should use every possible device to maintain the interest of his class, and to prevent boredom. Introduce drama, surprise and variety; encourage questions; etc.

The lecture should be short and, if necessary, broken up into small periods. The breaks may be made by means of visual aids, something dramatic, a few test questions or a summary.

### 4. THE FILM STRIP

The film strip is merely one of the visual aids to instruction and the lesson should be planned and prepared by previewing the strip in conjunction with the notes, so that the best use may be made of the strip in presenting the lesson.

The film strip should not be used as a substitute for demonstration. It should be followed, whenever possible, by demonstration and practical work. (This obviously will not apply to every film strip).

### 5. THE INSTRUCTOR'S NOTES

The notes given in this booklet are not as they stand, intended to be read to the class, but are designed to assist in the preparation of the lecture.

## HOW TO USE THE FILM STRIP

1. Screening and projection should be prepared and checked before the lecture.
2. The projector is best placed as close to the screen as the size of the class permits, and should be central to the screen to minimise distortion of the picture. It should be set high enough to project the image above the heads of the students. The projected picture can generally be raised or lowered by means of milled screws at the bottom of the projector. Before using the projector, make certain that the electricity supply is of correct voltage.
3. Focus the film strip on the screen at the beginning of the lecture. The "focus frame" included at the beginning of the strip is provided for this purpose. If a proper screen is not available, a clean sheet of white cloth can be used provided it is stretched free from wrinkles. Any white, opaque material or surface (e.g. a white wall) will do in an emergency. Total darkness is not normally necessary.
4. Orderly seating helps to create an attitude of attention and may prevent vision being obstructed. A rear row of seats should be at a distance from the screen not greater than 6 times the WIDTH of the projected picture. The front row should be at a distance not less than twice the DEPTH of the projected picture. The seats should be situated within an angle of  $30^{\circ}$  extending outwards from either side of the projected picture.
5. Film strips should be wound with the emulsion (or dull) side outwards, so that, when threaded, this dull side faces the lamp.
6. The projector should be properly maintained if it is to project the pictures as clearly and efficiently as possible. Lenses and glass aperture plates should be cleaned and polished regularly with methylated spirit or other suitable cleaning fluid, and finished off with dry chamois leather. Aperture plates should not normally be removed.

FILM STRIP CD 33

THE ATOM BOMB - ITS EFFECTS AND HOW TO MEET THEM

PART III

RADIATION

FRAME

- 1 One of the three effects of an Atomic Bomb burst is that of Nuclear Radiation and this effect is itself divided into Immediate Radiation and Residual Radiation. The radiations emitted by the bomb at the moment of detonation come into the first immediate category. The most important of these are Gamma Rays and Neutrons. The lethal range of the neutron is less than that of gamma rays.
- 2 Gamma rays are used medically for destroying tumours and other growths, they are, of course, carefully controlled to a very fine degree both in intensity and area irradiated.
- 3 When an Atomic bomb is detonated, gamma rays are emitted in all directions at a very high speed.
- 4 These rays have the power of penetrating the body causing death or injury of varying degree depending on the dose received.
- 5 The gamma ray dose received by human beings is governed by two factors, distance from the explosion and amount of protection available.
- 6 As the rays stream out, their density falls off very rapidly but at  $\frac{3}{4}$  mile there is a 50/50 chance of survival in the open.
- 7 At distances greater than  $\frac{3}{4}$  mile the energy and penetrating power fall off rapidly, and at a  $1\frac{1}{2}$  mile they are virtually harmless.
- 8 The second factor is Protection. For protection from gamma rays the denser the material the less the thickness required.

- 9 At  $\frac{1}{4}$  mile from ground zero protection from a lethal dose may be obtained from 7 inches of steel.
- 10 The same degree of protection can be obtained with two feet of concrete.
- 11 Three feet of well packed earth will give the same protection as the steel or concrete.
- 12 Anderson Shelters of the last war will afford definite protection depending on their distance from the explosion. With an additional covering of earth or concrete, they can be efficient to a substantial degree.
- 13 Into an area some  $\frac{1}{4}$  mile radius from ground zero may fall a quantity of particles called fission products. They are radioactive and emit gamma rays (Residual radiation).
- 14 The rising cloud following the explosion is also filled with these particles; they may be carried by the wind, and will be widely dispersed; some will fall to earth down wind. This is called "The Fallout" (Residual radiation).
- 15 Neutrons, which are emitted at the same time as the gamma rays, also contribute to the residual radiation, and a number of neutrons will reach the ground in the vicinity of the explosion, where they make certain materials radioactive.

Except in air bursts of about 500 ft. or below, the potential danger from this so called induced radiation is not likely to be serious, in comparison with the dangers from the fission products.

FRAME

- 16 Here we have a type of dose rate meter used by a reconnaissance party investigating the hazards due to residual radiation. Radioactive rays are measured in dose rates of Roentgens per hour.
- 17 It is possible for the radioactive dust of fission products to contaminate exposed food and water.
- 18 Provided the C.D. worker is adequately protected from gamma rays at the time of the explosion and an accurate record is kept of the dosage received, radiation is the least dangerous of the atom bomb's three effects.

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