

Mr. Duddell\* announced that since the last meeting the Council had under consideration the formation of a set of rules or precautions to be taken by X-ray workers to guard them against the dangers to which

\* W. Duddell, F.R.S., a Past President of The Röntgen Society—Ed. A.J.B.

they are subject. (This work has been completed and the recommendations, printed upon a card suitable for hanging upon the wall, together with an explanatory letter, is enclosed with this issue of the JOURNAL).

(From the minutes of the 1915-1916 session of the General Meeting of The Röntgen Society at the Institution of Electrical Engineers, Victoria Embankment, W.C.: *J. Röntgen Soc.*, 12:1, Jan., 1916.)

## THE RÖNTGEN SOCIETY

*Recommendations for the Protection of X-ray Operators.  
London, November, 1915.*

### The Röntgen Society

Dear Sir,

Although the dangers attending the irradiation by X-rays are now generally recognised, risks are often taken unnecessarily, through want of thought or knowledge of danger on the part of operators. The rapidly increasing number of radiographic laboratories and installations have brought into the field many workers of limited experience and there is fear that in the near future cases of X-ray dermatitis may develop among operators, nurses, and those working with X-rays generally, that would have been avoided by taking proper precautions.

The Council of The Röntgen Society have therefore formulated a set of recommendations (enclosed herewith), which if followed will give a large measure of protection from the known dangers attending the use of X-rays, and it is suggested that the card should be affixed in a prominent place in all departments where X-rays are generated.

Yours faithfully,

R. Knox,  
Hon. Sec.

The harmful effects produced by X-rays are cumulative and do not generally appear until some weeks or months after the damage has been done. It is to be noted that X-rays of any degree of hard-

ness are capable of producing ill effects, although it is commonly supposed that soft rays only are harmful.

It is undesirable that any X-ray treatment should be carried out except under the direction of a qualified medical practitioner experienced in x-ray work.

All X-ray tubes must be provided, when in use, with a protecting shield or cover which prevents the access of rays to the operators and which encloses the tube, leaving an adjustable opening only sufficiently large to allow the passage of a sheaf of rays of the size necessary for the work in hand. Even with this shielding the operator may not be completely protected in all cases (e.g., especially in screen work), and the use of movable screens, gloves and aprons is recommended.

Operators should be warned that shields obtainable commercially are often ineffective and tests of their opacity should be made.

Whenever possible the cubicle system should be used for X-ray treatment and the operator should be able to make all adjustments from a protected space.

When screen examination is required it is essential that the screen should be

covered with thick lead glass of proved opacity and that the screen should be independently supported and not held in the hands of the operator. If the hands are so used they should be properly protected.

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## ITEM II

INTERNATIONAL RECOMMENDATIONS FOR X-RAY AND RADIUM PROTECTION AS ADOPTED AT THE SECOND INTERNATIONAL CONGRESS OF RADIOLOGY IN STOCKHOLM IN 1928.\*

\* As reproduced in Appendix B, pp. 140-148, in "Roentgenology. Its Early History, Some Basic Physical Principles and the Protective Measures", by G. W. C. Kaye. Publ. by Paul B. Hoeber, Inc., New York, 1928.

The following recommendations adopted at the Second International Congress of Radiology in Stockholm in 1928 are designed to unify protective measures and to improve the working conditions of X-ray and radium operators in all countries. The recommendations deal only with the more essential matters involved, minor questions of detail being left to each country to elaborate. The question of seeking legal authorisation for such recommendations was also left to each country to deal with as appears to it best.

1. The dangers of over exposure to X-rays and radium can be avoided by the provision of adequate protection and suitable working conditions. It is the duty of those in charge of X-ray and radium departments to ensure such conditions for their personnel. The known effects to be guarded against are:

- (a) Injuries to the superficial tissues;
- (b) Derangements of internal organs and changes in the blood.

### I. WORKING HOURS ETC.

2. The following working hours etc. are recommended for whole-time X-ray and radium workers:

- (a) Not more than seven working hours a day.
- (b) Not more than five working days

The hand or any portion of the body of the operator should never be used to test the hardness of quality of the X-ray tube; any simple form of penetrometer can be easily arranged for this purpose.

a week. The off days to be spent as much as possible out of doors.

- (c) Not less than one month's holiday a year.
- (d) Whole-time workers in hospital X-ray and radium departments should not be called upon for other hospital service.

## II. GENERAL X-RAY RECOMMENDATIONS

3. X-ray departments should not be situated below ground floor level.

4. All rooms, including dark rooms, should be provided with windows affording good natural lighting and ready facilities for admitting sunshine and fresh air whenever possible.

5. All rooms should be provided with adequate exhaust ventilation capable of renewing the air of the room not less than 10 times an hour. Air inlets and outlets should be arranged to afford cross-wise ventilation of the room.

6. All rooms should preferably be decorated in light colours.

7. X-ray rooms should be large enough to permit a convenient lay-out of the equipment. A minimum floor area of 250 sq. feet (25 sq. metres) is recommended for X-ray rooms and 100 sq. feet (10 sq. metres) for dark rooms. Ceilings should be not less than 11 feet (3.5 metres) high.

8. A working temperature of about 18°C. (65°F.) is desirable in X-ray rooms.

9. Wherever practicable the X-ray generating apparatus should be placed in a separate room from the X-ray tube.

## III. X-RAY PROTECTIVE RECOMMENDATIONS

10. An X-ray operator should on no account expose himself unnecessarily to a direct beam of X-rays.

11. An operator should place himself