

● IRPA/INIRC Guidelines



ALLEGED RADIATION RISKS FROM VISUAL DISPLAY UNITS A Statement by the International Non-Ionizing Radiation Committee* of the International Radiation Protection Association

VISUAL display units (VDUs) have become a major element in the modern work environment as an interface between man and computer. The discussion as to whether work at VDUs can affect human health has been centered on different types of effects, such as eye damage or discomforts, neck and shoulder discomfort, different stress reactions, skin disorders and adverse reproductive outcomes. In this context, much concern has been expressed in the media in relation to the possibility of radiation hazards due to VDUs based on cathode ray tubes (CRTs). This aspect will be covered in the present document, while the reader is referred to other texts for a discussion on the influence of various ergonomic factors on health (see e.g. World Health Organization 1987).

A number of careful scientific studies have been focused on the measurement of electromagnetic radiation or fields due to the VDUs, while some limited attention has also been given to acoustic radiation; several publications also address the topic of health risk assessment (see reference list).

(1) Soft x-ray radiation is produced within the CRT. The glass material of the tube, however, effectively prevents any leakage of x-ray radiation outside of the tube during operation. Thus, x-ray radiation from VDUs is not detectable with normal measuring instruments.

(2) Ultraviolet radiation in the near region (UV-A) can be detected from certain VDUs. The levels are, however, insignificant compared to present occupational standards (10 W/m^2) (International Radiation Protection Association 1985) and also insignificant compared to emission from other sources (e.g. sunlight through windows). In one investigation, VDU operators were found to be exposed to lower levels of UVA than those not

working with VDUs, attributable to the fact that the former often draw the window curtains.

(3) Visible radiation can be measured and is necessary in order to perform the intended function of the CRT—to provide a visual display. Luminance levels recorded are far below current exposure limits, thus precluding (according to present knowledge) the possibility of pathological injury due to excessive exposure. There are ergonomic considerations of light emission from the display, such as flicker, contrast glare or readability. These are, however, not considered in this context.

(4) Infrared (IR) radiation is emitted from all warm bodies, and since all surfaces of the VDU are at room temperature or slightly above, IR radiation can be detected, although at levels far below any levels of concern for potential hazards.

(5) In the extremely low frequency and the radio-frequency regions, electric and magnetic fields have been detected. The dominant sources are the power supply and the vertical and horizontal sweep arrangements (at frequencies of some 50–80 Hz and 15–35 kHz, respectively). Compared to fields in many industrial or household situations, the fields around VDUs do not correspond to high exposure situations. These fields do not appear to represent any risk factor when evaluated by comparison with current standards, guidelines and recommendations for occupational exposure.

(6) In some countries, a number of VDU operators have experienced skin disorders. The relationship of these to VDU work is not known. Electrostatic fields at VDU workplaces have been suggested as a possible cause of skin disorders. Research conducted hitherto has indicated that the electrostatic charge of the operator might be a relevant factor. A relationship between electrostatic fields

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and skin disorders must, however, still be regarded as hypothetical.

(7) Airborne ultrasonic (acoustical) radiation is produced in VDUs as a result of mechanical vibrations generated in the core of the flyback transformer (responsible for the horizontal sweep of some 15–35 kHz). The sound pressure levels found are considerably below existing exposure limits (75 dB) (International Radiation Protection Association 1984). Some sensitive individuals may detect this sound or a subharmonic as an annoying factor.

Effects which have been suggested as caused by exposure to electromagnetic radiation or fields include adverse pregnancy outcome or cataracts. Comparison of the occurrence of cataracts or of adverse pregnancy outcome among VDU operators to those of controls have failed to show an excess occurrence due to VDU work.

In conclusion, and based on current biomedical knowledge, there are no health hazards associated with radiation or fields from VDUs. Thus, there is no scientific

basis to justify shielding or radiation monitoring of VDUs. However, since a large number of people are involved in VDU work, it is important that further knowledge is attained on certain areas where our knowledge must be regarded as incomplete. These areas include: (a) further investigations into the possibility that skin disorders may be related to VDU work, and if so, the factor(s) involved; and (b) the possibility of interactions between low frequency magnetic fields and biological systems. Considerations should be given to magnetic fields in various situations and should not be restricted to VDU work situations.

Measures should be taken to ensure that VDU work places are ergonomically well designed. This includes aspects of the VDU, the work station and work environment, as well as work organization. Visual screening examination is also valuable, in ensuring that the operator has adequate visual acuity, and that any corrective glasses are suitable for use at the VDU working distance.

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