

FAIL-SAFE WARNING LIGHTS

RpaVet statement

Veterinary practices need to be aware of the regulatory requirements under IRR17 (which also applied under IRR99) relating to the function of warning lights at any entrance to a controlled area.

The HSE position (ie IRR17) is that if ***reasonably practicable*** the ***gold standard*** function should be that if a warning light fails, then it should not be possible to make an exposure.

The initial challenge to this statement is based on Regulation 9:

Ref: IRR17 ACOP Regulation 9 (2) ACOP paragraph 126.

Sources of ionising radiation which can give rise to significant exposure in a very short time should be fitted with suitable warning devices which:

- (a) indicate for a radioactive source whether it is in or out of its shielding (or the exposure shutter is open or closed);*
- (b) indicate for an X-ray generator when the tube is in a state of readiness to emit radiation and, except for diagnostic radiology, give a signal when the useful beam is about to be emitted and a distinguishable signal when the emission is under way unless this is impracticable;*
- (c) for X-ray generators other than those used for diagnostic radiology, are designed to be automatic and fail-safe, ie if the warning device itself fails the exposure will not proceed.*

It has always been assumed that the diagnostic radiology clause exemption applied, so that fail-safe lights were not required.

Somewhat surprisingly, it now appears that veterinary use of ionizing radiation does not come under diagnostic radiology as referenced in the Regulations. This only applies to human usage – the logic of the exemption being that it is not acceptable to have to abandon eg a CT scan half-way through because of a warning light failure, with a totally inappropriate dose (many mSv) to the patient.

It is accepted that veterinary use of ionizing radiation certainly may be for diagnosis but the term has no legal standing with regards to IRR17. It is unfortunate that although there has been no change from IRR99, at no time had this been brought to the attention of the veterinary profession. It would perhaps take some legal scrutiny in either IRR99 or IRR17 to identify the distinction.

The inferred conclusion is that any animal dose is irrelevant and more importantly, the consequences of a failed procedure has no importance. This poses ethical and duty of care questions in that as a profession, we are bound to effectively do the best for our patients, carry out the wishes of the owner and fulfil their expectations. There are of course many instances where an abandoned procedure would be in direct conflict with professional duty (and could result in owner litigation and/or RCVS censure) and this cannot be allowed to happen.

All is not lost however, and there is a graded response to comply with the Regulations whilst maintaining professional integrity and minimizing expense.

It can be (successfully) argued that the gold standard fail safe requirement is not practicable in most circumstances. The following options should be considered:

- Duplicate light. Two lights (on the same circuit) – if one bulb fails it is reasonable to assume the other will be working and the warning is maintained. The failed bulb should be replaced as soon as possible.
- Fail-safe is surely not relevant where the operator by default has to be stood at an entrance to the controlled area (eg ducted exposure cable outside the room). There is no reasonable scenario where there could be inappropriate entry into the controlled area past the operator, whether the warning light was operational or not.
- Rigorous inspection protocol. Inspection of all warning lights immediately before an exposure is made, and results recorded. This is a less satisfactory method of compliance and may not stand up to scrutiny at an inspection.

LED lighting

Notwithstanding any of the above it must be recommended that all warning lights use LED bulbs. Tungsten or halogen bulbs are now outdated for the purpose. LED bulbs have an extremely long practical life and risk of failure is very low. It could be argued that if LED bulbs are in place then there is automatically a fail-safe compliance as the risk assessment concludes failure to be very unlikely. It is also preferable (and more economical) to have high output white bulbs and an appropriate red diffuser rather than a red bulb (usually less bright) and clear diffuser. Duplicate LED lights would be an aggressively super-safe option.

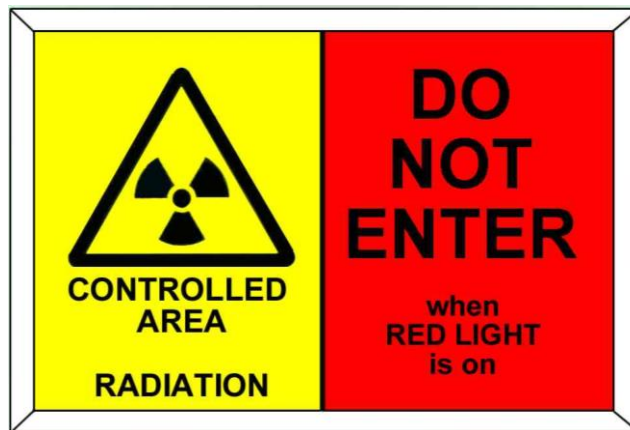
It should be emphasised that where there are multiple entrances into the controlled area a suitable fail-safe option must be in place.

Lighting options

The strict requirement is for the warning light to be visible when ionizing radiation is being emitted. In most circumstances this is somewhat complicated to achieve and the simplest solution is for a red warning light to be illuminated whenever the X-ray generator is made live. A neat, inexpensive LED bulkhead light is available (note this is an example only).



The single light is not helpful when a generator is left connected to the power supply throughout the working day (eg CT). Two-stage lights indicate when the power is connected (orange) and on preparation/exposure (red). There is usually a suitable legend differentiating warning of an active generator and a *do not enter* when ionizing radiation is being emitted.



The disadvantage with the 2-stage light is that there may be only a very brief interval between the red portion being illuminated and ionizing radiation being emitted. If the X-ray generator can easily be switched off between cases then the single stage light (duplicated or otherwise) may be more appropriate.

Note that the light combination is not inherently fail-safe compliant (unless fitted with LED bulbs).

In summary, the practice must have considered all available options for fail-safe operation and have a logical approach to the compliance method adopted.