

## **X-RAY FACILITY TIPS**

### ***Topic 1: Darkroom Fog***

The effect of fog on an x-ray film is usually subtle, but it can degrade the image quality (detail and contrast) to such an extent that the examination may potentially cause a mis-diagnosis and/or must be repeated. Fogging may be due to many factors including:

- \* Using film kept past its expiration date. Unexposed film may become fogged by gradual chemical deterioration, which is temperature dependent and therefore may be slowed by storing film in a refrigerator.
- \* Film exposed to stray radiation during storage.
- \* Film exposed to excessive heat or humidity during storage.
- \* Film exposed to certain chemicals during storage.
- \* Light leaks from the film packet.
- \* Indicator lights that are not red on processors, other electronic equipment, luminous dials on clocks, film processor controls, glow in the dark stickers, clock radios, glow in the dark flashlights, etc.
- \* Light leaks into the darkroom. The smallest light leak can fog film and haze images. Most often, you'll find leaks around dark room doors, through false ceilings of perforated tile, around light fixtures, fans, doors not all of one piece, plumbing fixtures going through a wall, and corners where two walls meet.
- \* Poor darkroom lighting conditions. Safelight filters and housing with holes and cracks and improper choice of filters with the film being used.

#### *Fog Test:*

The fog test should be performed semi-annually or following a change in safelight filter, light bulb or more frequently if problems are discovered.

With the darkroom door closed, regular lights out and safelight on, remove film from its wrapping or box. Place the unexposed film on the countertop at a normal working position. Place a coin on top of the unexposed film. Wait two minutes and then process the film. If you see the coin outline on the processed film, your darkroom is too bright or there is a light leak. Repeating the procedure with the safelight off will determine the source of the fog. If the fog disappears, then the problem was caused by the safelights. If the fogging remains constant, then the problem is being caused by a possible light leak into the darkroom. If the fog levels have been reduced but are still significant, then the cause may be due to a combination of problems.

Evaluating the presence of fog is best performed with a densitometer, phantom (a small set of teeth or bone), and fog test strip (opaque card). Place a phantom on the x-ray tube side of the cassette/screen/film. Make an exposure using technique factors (kVp,

mA, time) such that the film will not be completely black after processing. In the darkroom remove the exposed film from the cassette and place it on the countertop. Cover one half of the phantom image with the fog test strip for 2 minutes and then process the film. Measure the density with the densitometer of the unfogged (covered portion) and fogged portion of the image close to the edge separating the two portions if there is a visible difference in density between the two sides. The human eye can observe differences of 0.01 optical density (OD). If there is no defined line then there is no fogging problem.

The presence of chemically induced fog on your film may be approximated by visual comparison of an image using the current film and processing solutions with the same image on a film from a new box processed in fresh processing solutions.

*To find and eliminate light leaks into the darkroom:*

Close the dark room door(s) and turn off all lights. Let your eyes adjust to the dark for at least five minutes. Look for light leaks all around the room from top to bottom. Seal leaks with black masking tape or weather stripping. Use double doors, heavy curtains, towels, or draft stoppers as a last resort if the light leak can not be fixed. The darkroom should be evaluated at least annually for light leaks.

*Daylight loaders:*

Daylight loaders are commonly used with automatic dental film processors, eliminating the need for the darkroom. These systems provide light-tight boxes attached to the processor loading areas. Each box contains a port for placing exposed films (still in their wrappers or cassettes) in the box, and a viewing port with a filter similar to a safelight filter. The filter is designed for use in a room with low-level illumination; it may not provide adequate protection for a daylight loader used in a normally-illuminated room. Like the darkroom, the daylight loader may be evaluated for light leaks using the fog test described above. Daylight loaders should be evaluated for integrity at initial installation, and then semi-annually and following change of room lighting or viewing port filter.

*Safelights:*

Safelights are used to provide sufficient illumination in the darkroom so essential activities can be carried out safely without exposing the film. Safelights should use 15 watt frosted bulbs. They should be installed at a distance no closer than 4 feet from the work surface. Safelights that are closer than 4 feet may be directed away from the work surface or should use 7.5 watt frosted bulbs.

Safelight filters are selected to transmit light outside the normal spectral sensitivity range of the film that is used. Most films only have a reduced sensitivity to the light transmitted through the safelight filter; therefore, it is necessary to keep safelight illumination levels and film handling times to a practical, safe minimum. A safelight's effect on film can vary with the type of film being used. In general, red filters can be used for both blue and green sensitive film. Amber, yellow or orange filters can be used only for blue sensitive film. Green sensitive film as used in panoramic and

cephalometric exams is fogged by amber/yellow/orange filters. Amber/yellow/orange filters are appropriate for direct exposure (non-screen, intra-oral) film only. "Little red light bulbs" from photographic darkrooms need to be evaluated on a case by case basis. If there is any doubt as to the compatibility of the film and safelight, a fog test should be done.

Safelight filters tend to crack over time. To maintain good image quality, periodically check the safelight filters for scratches and cracks and replace them when any defects are found. If the safelight filter is scratched, cracked, or damaged, it may leak enough light to fog the film. If the safelight housing is regularly handled it should also be checked for holes and cracks.

#### **SOURCES:**

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