**SCREENS: VISIBILITY FACTORS**

**Laboratory Experiment #10-A**

**Procedure:**

**\*\*CAUTION:** MOST OF THE CASSETTES WILL NOT BE PRELOADED WITH FILM. IN THE DARK ROOM, CHECK TO BE SURE THAT ALL CASSETTES ARE PROPERLY LOADED WITH FILM PRIOR TO USING THEM. BE SURE THAT YOU LOAD ONLY XK (C-OMATK) FILM INTO THE OLD CALCIUM TUNGSTATE SCREENS. LIKEWISE, BE SURE TO LOAD ONLY T-MAT OR OG FILM FROM THE LEFT-HAND BIN INTO THE YELLOW RARE EARTH CASSETTES.

\*\*AT THE END OF THE LAB, DO NOT RELOAD ANY OF THE CASSETTES EXCEPT THE BLACK-EDGED LANEX REGULAR SCREENS.

Select those screens speeds available to you, and cross out those speeds not available to you, from the list below and on the next page.

For each exposure, place the loaded cassette TABLETOP and then place a knee phantom in the U-shaped sponge on the cassette, center and collimate for a typical knee. Do not change distance, collimation, centering, kVp, or mA if possible throughout the lab. Shoot the PAR speed cassette first, using 65 kVp and 5 mAs. Circle a portion of the knee *joint space* where it is wide enough to easily center the densitometer light. Measure this soft tissue area: It should be a medium gray density between 1.0 and 1.4 density. If it is not, adjust your technique and re-shoot the film until it is. Test out the screen technique factors listed below by adjusting the total mAs (preferably by changing the time only), and be sure to label each film with a lead exposure number. Circle the same spot in the knee joint space, and use the densitometer to measure the resulting density on each radiograph. Record your data in the “Density Measured” column.

**Fixed kVp = 65**

***Exp. Type of Technique Density***

***#­­\_\_\_ Screen/Film Change Factor Technique Measured***

A1 DuPont **Par** CaWO4 1X (Standard) 5 mAs \_\_\_\_\_\_\_\_\_

A2 Wolf **High** CaWO4 1/2X (Standard) 2.5 mAs \_\_\_\_\_\_\_\_\_

A3 **Direct Exposure** 50X 250 mAs \_\_\_\_\_\_\_\_\_

**Holder** w/XK Film

B1 Kodak **Lanex** 1/4X 1.3 mAs  **\_\_\_\_\_\_\_\_\_**

**Regular** w/T-MAT

or OG Film

B2 Kodak **Lanex** 1.33X “Regular” 1.7 mAs \_\_\_\_\_\_\_\_\_

**Medium** w/T-MAT

Or OG Film

B3 Kodak **Lanex** 5X “Regular” 6.5 mAs \_\_\_\_\_\_\_\_\_

**Fine Extremity**

w/**Double Screens**

w/T-MAT or OG Film

B4 Kodak **Lanex Fine** 6X “Regular” 7.8 mAs \_\_\_\_\_\_\_\_\_

**Extremity**

w/**Single Screen**

w/T-MAT or OG Film

1. If the listed technique change factors worked well, each density listed should be roughly within 25% of the “original” film in A1 or B1. Calculate the acceptable ranges as follows:

\_\_\_\_\_\_\_\_\_\_x 0.25 =\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_=\_\_\_\_\_\_\_\_

A1 Density “R” A1 R min

\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_=\_\_\_\_\_\_\_\_

A1 R max

**Acceptable range for “A” Series =**\_\_\_\_\_\_\_\_**to**\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_x 0.25 =\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_=\_\_\_\_\_\_\_\_

B1 density “r” B1 r min

\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_=\_\_\_\_\_\_\_\_

B1 r max

**Acceptable Range for “B” Series =\_\_\_\_\_\_\_\_to**\_\_\_\_\_\_\_\_

2. For Exposure A2, did cutting the technique to 1/2 the par speed technique maintain the density well (within the 25% range listed in #1 above)? IF NOT, to what factor would you recommend adjusting the technique when changing from Par to High Speed:

3. For Exposure A3, did increasing the technique 50 times the par speed technique maintain the density well (within the 25% range listed in #1 above)? IF NOT, to what factor would you recommend adjusting the technique when changing from a Par Screen to Direct Exposure:

4. For Exposure B1, did cutting the technique to 1/4 the par speed technique maintain the density well (within the 25% range listed for the *A Series* in #1 above)? IF NOT, to what factor would you recommend adjusting the technique when changing from a Par Screens to Rare Earth Regular Screens:

5. Compare the measured densities for Exposures B2, B3 and B4 to the *B Series* range in #1 above? Did these technique adjustments maintain the density within The bony thorax is normal. Series range? IF NOT, to what factor would you recommend adjusting the technique in each case?

***Recommended***

***Yes or No Adjustment***

Regular to Medium: \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Regular to Fine/Double: \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Regular to Fine/Single \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. As receptor speed increases, what happens to image density (if there is no adjustment in tech):

7. On the radiographs from the Regular Cassette and the direct exposure holder, select a different, much lighter homogeneous density “Area B” within the bone image. Circle this area on both films, and take densitometer measurements. Record these below in the blanks for “Area B”. For “Area A” below, copy the measurements from the Exposures B1 and B4 in the previous section for each film. Calculate the contrast ratios for each image by dividing the smaller density value into the larger.

Area A:\_\_\_\_\_\_\_\_\_\_

B4 Direct Exposure C = \_\_\_\_\_\_\_\_\_\_

2 Speed Area B:\_\_\_\_\_\_\_\_\_\_

Area A:\_\_\_\_\_\_\_\_\_\_

B1 Regular 400 Speed C = \_\_\_\_\_\_\_\_\_\_

Area B:\_\_\_\_\_\_\_\_\_\_

Compare and describe the measured contrast between these two systems:

8. In turn, hang the following exposures right next to B1. Can you visually see an obvious change in image contrast between:

A3 Direct Exposure and Regular Rare Earth:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B4 Extremity/Single and Regular Rare Earth:\_\_\_\_\_\_\_\_\_\_\_\_\_

B2 Medium Rare Earth and Regular Rare Earth:\_\_\_\_\_\_\_\_\_\_\_\_

9. **Generally**, as image receptor speed increases, image contrast \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. *Exposure Latitude* is defined as the margin for error you have in setting technique, and is always greater when there is longer gray scale in the image. Which of all the above receptor combinations would allow you the highest exposure latitude?