**SOURCE-IMAGE RECEPTOR DISTANCE**

**Laboratory Experiment #13-A**

**PART A: VISIBILITY**

**Procedure:**

Place a step-wedge penetrometer on one-quarter of a 14 x 17-inch 400-speed screen cassette, tabletop. Take four exposures, using the techniques and the focus-film distances listed below and label with lead markers.

Fixed = 58 kvp

Exposure #1: SID 20”, - 100 mA, 0.11 sec. (1.1 mAs)

Exposure #2: SID 40”, - 100 mA, 0.04 sec. (4 mAs)

Exposure #3: SID 30”, - 100 mA, 0.02 sec. (2 mAs)

Alternate techniques:

Fixed kVp = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #1 at 20” SID = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #2 at 40” SID and 4x technique =\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exposure #3 at 30” SID and 2x technique =\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Analysis:**

1. Circle a medium-density step on the penetrometer for each of the exposures and measure the radiographic density of each with a densitometer. Record these as the *Step A* densities for each exposure.

2. Compare Exposures #1 and #2. If technique had NOT been changed on #2, what would the effect of increasing SID have been on radiographic density? (Increase, decrease, no effect):

3. Why does this density effect occur?

4. Compare the radiographic density of the image produced at 20 inches SID with the images produced at the other SID’s by calculating the ∆D ratios below.

a. ∆D ratio of Exposure #1 (20”) with technique adjustment

Exposure #2 (40”)

= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. ∆D ratio of Exposure #1 (20”) with technique adjustment

Exposure #3 (30”)

= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. In 4a and 4b above, if the change ratios fell between 0.75 and 1.25, then the technique adjustments made using the “square law” come to within 25% of restoring the original density. Was this the case?

6. Based on #4a, how much would you estimate should total technique be increased to adequately compensate for doubling your SID?

7. Based on #5b, what technique adjustment would you make for increasing SID by 1.5 x 50 percent?

8. What technique adjustment would you make for *decreasing* SID to one-half the original?

9. What technique adjustment would you make for decreasing SID to 3/4 (half-way to 1/2) the original?

10. Note your *Step A* measurements from #1. Measure on the densitometer a lighter *Step B* for only Films #1 and #2 and record. Calculate the contrast for each exposure by dividing the smaller number into the larger, and record them.

11. Compare the contrast for Exposures #1 and #2 in #10. Did a change in SID have a *significant* (more than 0.3 or 25%) effect on image contrast? Can changes in SID affect the *ratio* of Compton scatter to photoelectric interactions in the patient?