QUESTION 8

You are the Radiation Safety Officer at an academic medical center. A month ago, a young woman was in an automobile accident and was brought to your emergency room for treatment of life threatening injuries. In order to initially assess her condition after the accident, the woman had multiple diagnostic x-ray exams. As a follow up to her initial treatment, the woman had additional exams to monitor her recovery. All of these exams were performed within the first week after the accident.

The woman has just discovered that she is pregnant. She was 2 months pregnant at the time of her accident. You are asked to estimate the fetal dose from these procedures in accordance with "NCRP 54, *Medical Radiation Exposure of Pregnant and Potentially Pregnant Women.*"

GIVEN: The following data are based on the most recent annual equipment surveys. All were procedures administered to the patient. The abdomen was not shielded.

Examination	Exposure	Exposure Location	Half Value Layer
2 Pelvic CT scans	1.2 rad/scan	Uterus	N/A
9 Pelvic Films[a]	0.550 R/film	Entrance Skin Exposure	3.5 mm Al
5 Cervical Spine Films[a]	0.220 R/film	Entrance Skin Exposure	3.0 mm Al
4 Head Films[a]	0.150 R/film	Entrance Skin Exposure	3.5 mm Al
3 Lumbar Spine Films[a]	0.440 R/film	Entrance Skin Exposure	3.0 mm Al
10 minutes Pelvic Fluoroscopic Exposure[b]	4 R/min	Entrance Skin Exposure	3.5 mm Al

[a] Views are Anterior/Posterior (AP) and 40 inches Source to Image Distance (SID)
[b] Posterior/Anterior (PA) projection.

Excerpted From

NCRP 54 Appendix A Table 4

Embryo (Uterine) Doses For Selected X-Ray Projections (mrad/R)[b]

Projection	Beam Quality (HVL) mm Al				
	2.0	2.5	3.0	3.5	4.0
Pelvic	212	283	353	421	486
Lumbar Spine	189	250	309	366	419
Cervical Spine/Head	<0.1	<0.1	<0.1	<0.1	<0.1

[b] Average dose to the uterus (mrad) for 1 Roentgen Entrance Skin Exposure

STATE ALL ASSUMPTIONS

POINTS

50 A. 1. Calculate the estimated fetal exposure from the diagnostic procedures based on the above information. **Show all work.**

2. Based on the fetal dose estimate that you calculated, what are the risks to the unborn child?

20 B. List **four** possible actions that your facility could have taken to reduce or eliminate exposure to the fetus had you known that the patient was pregnant. **Number your responses. Only the first 4 numbered responses will be graded.**

15 C. As the RSO for the facility, list **three** other actions or notifications you should recommend. **Number your responses. Only your first three numbered responses will be graded.**

15 D. Explain why the ratio of uterus dose to ESE increases as the HVL increases (as shown in NCRP 54 Table 4).