

RADIOLOGY

I. INTRODUCTION

The purpose of this manual is to standardize the examination procedures among the centers participating in the SOF study. It is intended to support both technologists and radiologists in their respective responsibilities by spelling out technical details and radiological aspects that may otherwise be left vague and inconsistent.

It is expected that all radiologists and technologists contributing to this study already have an in-depth knowledge and some experience in their respective fields. This manual can by no means be regarded as a training course in taking spinal x-rays. This manual simply points out details pertaining to this specific study that otherwise are likely to differ between centers. There is no claim that the proposed techniques are the only ones to yield acceptable results. Rather, this manual provides guidelines to make the results of all participating centers *consistent* and *comparable*.

II. X-RAY IMAGING TECHNIQUE AND EXAMINATION PROCEDURE

Lateral spine films (thoracic and lumbar) will be used to assess the incidence of spinal fractures. Since fracture incidence represents an outcome in this study, quality assurance for this area is very important.

High quality plain film radiography requires competent and consistent quality assurance. This manual contains information that will help to obtain optimum image quality. Quality assurance guidelines for three major areas are covered:

- technical specifications of the imaging technique
- details of the examination procedure
- quality control criteria to assess the image quality

Each of these procedures is of equal importance. To obtain consistent results, the technologist performing the examination must be aware of possible sources of error that may affect the quality and reproducibility of the spine films.

The following sections provide details separately for thoracic and lumbar examinations with respect to equipment specifications and procedures. Certification and criteria for image quality will be outlined in separate sections, and examples of good and poor image quality will be given.

The SOF coordinating center will review the quality of the radiographs during the study, and will notify the centers if problems with image quality are found. Possible sources of error and possible solutions will be suggested, but responsibility for the resolution of technical problems rests with the radiology facility and the clinical center.

During the study, questions regarding x-ray procedures should be directed to the SOF coordinating center (CC) in San Francisco. In addition, "problem cases" where the operator is unsure of the results of the quality of the image should be identified.

Questions regarding this manual or radiographic techniques should be directed to:

Clara Yeung
SOF Coordinating Center
74 New Montgomery, Suite 600
San Francisco, CA 94105
Phone: (415) 597-9271
FAX: (415) 597-9213
Email: Cyeung@PSG.UCSF.EDU

Please concentrate on image quality and optimum positioning of the participant. It is permissible to modify the parameters if this will improve quality, but the film/focus distance must not be changed.

II.A Thoracic Spine Measurements

Lateral Projection

Imaging Technique

- | | |
|-------------------------|--|
| • Imaging system | Bucky screen technique |
| • Focus size | less than or equal to 1.3 mm |
| • Total filtering value | greater than or equal to 2.5 mm A1-equivalent value (half layer) |
| • Scattering grid | r = 12 to 1 at 40 inches |
| • Film/Screen speed | 400 |
| • Film/Focus Distance | 40 inches (not variable!) |
| • Imaging voltage | 60-70 kVp |
| • Exposure Time | breathing technique; approximately 2 second exposure (phototiming is <u>not</u> to be done on this view) |

Film Size

7" x 17" lengthwise is recommended. Larger size film (i.e. 14" x 17") is acceptable if this is more convenient, provided that collimation is carried out as specified below.

Positioning

- Place participant on the table in the lateral position (left lateral if possible to reduce magnification of overlying heart shadow) with legs flexed for comfort and support.
- Place support under participant's head.
- Place both arms at right angles to anterior surface of body (if arms are raised higher, scapulae may superimpose upper thoracic vertebral bodies), and flex elbows for comfort.
- Place supports between knees and ankles and under knee next to table (for support and to aid in maintaining lateral position).
- Place lead shield over lower part of the participant to protect gonads.
- ***The following is one of the most important positioning instructions!! Do it with every SOF participant's x-rays!***

Place support under mid lumbar region to position long axis of spine parallel to table. Double check the horizontal position of the thoracic spine by feeling the spine with your hand.

- Adjust body to lateral position (shoulders, hips, knees, and ankles superimposed).
- Align midaxillary (coronal) plane of body to midline of table.
- To assure lateral position, stand at head of table and look down the participant's back and hips to make certain that there is vertical superimposition of shoulders and hips.

Central Ray

- Direct the central ray to level of 7th thoracic vertebra (T7). T7 is about two finger widths (1 in, 2.5 cm) below the tip of the scapulae when arms are elevated; top of cassette should be about 2 in (5 cm) above the shoulders to include the 7th cervical vertebra.
- Center cassette (in Bucky tray) to level of 7th thoracic vertebral body.

Collimation

- Adjust collimation: 1 cm or more collimation must be seen when using 7" x 17" film, with collimation directed to the spine to exclude as much unneeded anatomy as possible.
- When using larger size film, the size of the irradiated area should be kept to a minimum (approximately the same size as on the smaller size films).
- Do not over-collimate and thereby cut off the vertebral image. When in doubt, it is better to under-collimate than to over-collimate.

Participant Instructions

- Have the participant breathe quietly for exposure (this allows blurring of the overlying ribs and lung detail by motion). This requires complete immobilization of the participant and a long exposure time. Therefore, **phototiming is not possible on this view; manual technique is required.**

Special Considerations

- Include T2 (if possible) to T12 (required). In large participants T2, and T3 in extreme cases, may need to be excluded.
- Include T12 on both the thoracic and lumbar images.
- Careful collimation and placing the lead sheet on the table behind the thoracic vertebra aids in reducing radiation dose and scattered radiation.
- Simultaneous over and under-exposure in different parts of a film may indicate that the voltage setting is too low for the participant.

II.B Lumbar Spine Measurements

Lateral projection

Imaging Technique

- | | |
|--------------------------|--|
| • Imaging system | Bucky screen technique |
| • Focus size | less than or equal 1.3 mm |
| • Total filtering value | greater than or equal to 2.5 mm A1-equivalent value (half layer) |
| • Scattering grid | r = 12 to 1 at 40 inches |
| • Film/Screen speed | 400 |
| • Film/Focus Distance | 40 inches (not variable!) |
| • Imaging voltage | 80 - 90 kVp |
| • Exposure Time (manual) | less than 1 sec |
| (automated) | central photocell |

Film Size

11" x 14" lengthwise is recommended. Larger size film (i.e. 14" x 17") is acceptable if this is more convenient, provided that collimation is carried out as specified below.

Positioning

- Place participant on the table in lateral position (left lateral if possible) with legs flexed for comfort and support.
- Place support under participant's head.
- Place supports between knees and ankles and under knee next to table (for support and to aid in maintaining lateral position).
- Place lead shield over lower part of the participant to protect gonads
- Place radiolucent support under mid-lumbar region to position long axis of spine parallel to the table.
- ***The following is one of the most important positioning instructions!! Do it with every SOF participant's x-rays!***

Place support under mid lumbar region to position long axis of spine parallel to table. Double check the horizontal position of the thoracic spine by feeling the spine with your hand.

- Adjust body to lateral position (shoulders, hips, knees, and ankles superimposed).
- Align midaxillary (coronal) plane of body to midline of table.
- To assure lateral position, stand at head of table and look down the participant's back and hips to make certain that there is vertical superimposition of shoulders and hips.

Central Ray

- Direct the central ray to level of 3rd lumbar vertebra (L3). L3 is about two finger widths above the iliac crest.
- Center cassette (in Bucky tray) to level of 3rd lumbar vertebral body.

Collimation

- Adjust collimation: 1 cm or more collimation must be seen on the roentgen film, with collimation directed to the spine to exclude as much unneeded anatomy as possible.
- When using larger size film, the size of the irradiated area should be kept to a minimum (approximately the same size as on the smaller size films).
- Do not over-collimate and thereby cut off the vertebral image. When in doubt, it is better to under-collimate than to over-collimate.

Participant Instructions

- Have participant suspend respiration for exposure (after expiration to remove lungs from the field of view).

Special Considerations

- Include T12 to S1.
- T12 must be included on both the thoracic and the lumbar images.
- Careful collimation and placing the lead shield on the table behind the lumbar spine aids in reducing radiation dose and scattered radiation.

II.C Identification, Logging, and Shipment of Films

Identification

The x-ray films should include the participant's SOF ID Number, Acrostic, date of x-ray, clinic name, and side marker (left or right) imaged on the film. The full name may also be imaged on the film if this is required by the x-ray clinic (name will be held in strict confidence at the coordinating center.) Do not use any permanent marking pens on the film. If using stickers or labels please be careful not to obscure the film image.

Each participant's set of films should be placed in an individual paper jacket, which should be labeled with the participant's Acrostic and SOF Identification Number.

SOF X-Ray Form Clinic Worksheet

Immediately after each x-ray is taken, fill in the participant's X-ray Form Clinic Worksheet (see Appendix):

- name of participant
- SOF Identification Number
- date of the x-ray
- X-Ray Technologist ID number
- imaging voltage (kVp)
- exposure time(s)
- milli-amperage [mA] for manual technique only
- machine used for x-ray
- comments: note if multiple exposures were attempted and this is the best possible film

The participant's X-ray Form Clinic Worksheet is returned to the SOF coordinating center along with the x-rays.

Shipping

Please follow these shipping procedures:

1. Inventory all films being sent on the SOF X-Ray Shipping Log (see Appendix).

Note: The SOF X-Ray Shipping Log may be replaced by a form created at the clinical center provided it contains all the same information and logs only the films included in the current shipment.

2. Put each participant's films and SOF X-ray Form Clinic Worksheet into an individual paper jacket labeled with Acrostic and SOF Identification Number.
3. Put all paper jackets into a strong shipping envelope.

Note: The Coordinating Center does not provide x-ray shipping envelopes for clinical centers. Spine films should be packed in a durable mailing envelope. The green diamond border mailers and the kraft mailers are good for shipping x-rays. Each mailing envelope should not store more than five sets of spine films.

Please use durable tape to seal the envelope opening as well. Boxes may be used for large shipments.

A catalog for paper jackets and shipping envelopes can be ordered from Ames. The customer service number is 1-800-343-2040.

4. **Accumulated films should be shipped once every two weeks (twice a month).**
5. Use a second-day courier service (UPS or FedEx) for security and speed of delivery.
6. Fax or e-mail a report to Clara Yeung (cyeung@psg.ucsf.edu) indicating a new batch of x-rays has been shipped, and list these x-rays by participant ID number. This allows us to detect lost shipments.
7. The Coordinating Center will fax or e-mail a confirmation of receipt.
8. Send all films to:

Clara Yeung
SOF Coordinating Center
74 New Montgomery, Suite 600
San Francisco, CA 94105

Phone: 415-597-9271

III. CERTIFICATION AND QUALITY ASSURANCE

III.A Identification and Certification of SOF X-Ray Technologists

- Identify a local radiology QC officer at each clinic site for communication regarding x-rays. This person may either be a radiologist or the chief x-ray technologist and will be responsible for certifying technologists, creating and updating the List of Certified Technologists, and completing the SOF X-Ray Facility Certification Form.
- Provide this manual to the local radiology QC officer for the SOF study.
- All technologists taking x-rays for the SOF study must have a SOF ID number. Contact the local SOF Study Coordinator for this number BEFORE taking SOF x-rays.
- Technologists assigned to the SOF study should be experienced in taking spinal x-rays. At least 50 lateral spine x-rays taken over the course of the last year represents sufficient experience.
- All radiology technologists will need to be certified. After a thorough reading of this manual, technologists are required to pass a written exam, which should then be forwarded to the Coordinating Center for review. Use the shipping address in the section above.
- The first 5 lumbar and 5 thoracic spine films taken for the study by each technologist must be reviewed by the local QC officer. This review should be based on:
 - SOF imaging and positioning techniques
 - imaging quality criteria
 - examples of problematic or acceptable films

The technologist passes this review and is internally certified by the local QC officer if all films show that the SOF protocol was followed and the image quality meets the image criteria defined herein. If the review shows deficiencies in technique or image quality, the technologist should read the manual and review SOF procedures with the local QC officer. Five more SOF lumbar and thoracic spine films should be obtained and reviewed. Participants whose x-rays are judged to be of poor quality should be brought back for a repeat x-ray as soon as possible.

The local QC officer should continue monitoring the quality of all SOF films throughout the study and take appropriate action to correct any deficiencies noted.

III.B External Audit by SOF Coordinating Center

After successful internal certification of the technologists by the local radiology QC officer, send (see Appendix) (1) the signed X-ray Facility Certification Form, (2) the list of certified technologists, (3) the completed Technologist's Examinations, and (4) all x-rays reviewed for certification to:

Clara Yeung
SOF Coordinating Center
74 New Montgomery, Suite 600
San Francisco, CA 94105

Phone: 415-597-9271

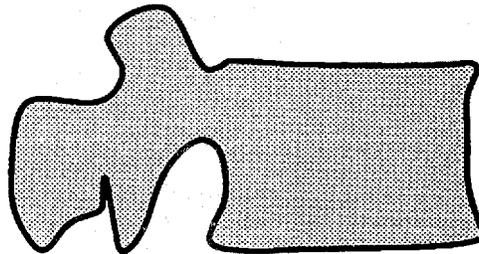
After review at the coordinating center, the CC will respond in writing to confirm the certification of the technologists. If problems remain, the CC will discuss those problems with the local QC officer. The SOF coordinating center will continue to review the quality of films during the study and will assess the performance of each technologist throughout the study.

IV. ASSESSING THE QUALITY OF LATERAL SPINE FILMS

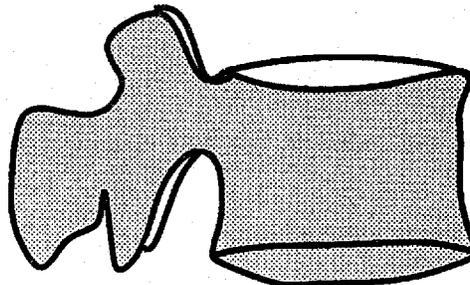
X-ray films must be of sufficient quality to allow for an accurate determination of morphometric measures such as anterior, mid, or posterior height or area of the vertebral bodies. The following criteria should be met to avoid errors caused by inappropriate projection of the vertebral contours (the spine has to be parallel to the table so that inter-vertebral spaces clearly show) or wrong technique (incorrect exposure level, short exposure times for the thoracic film):

Criteria of good image quality

- Vertebral endplate contours superimposed upon each other



optimum superposition



excessive obliquity

- Complete superposition of the posterior edges of the vertebral bodies
- Appropriate exposure (not too light or too dark) so vertebral contours and trabeculae are clearly visible
- Demonstration of the vertebral arches and inter-vertebral foramina
- Visualization of adjacent soft tissue within the collimation guidelines dictated above.
- Blurred rib contours (due to breathing technique) on lateral thoracic films.

V. ATLAS OF SPINE FILMS

Listed below are common sources of error and examples of how these errors lead to problematic spine images.

Common Mistakes

- Inappropriate positioning of the participant
 - spine not parallel to the table
 - spine rotated around the long axis
- Inappropriate centering of the x-ray beam (should be centered on T7 and L3 for thoracic and lumbar films, respectively)
- Exposure time too short on lateral thoracic film (resulting in sharp contours of the ribs obscuring the vertebrae)
- Inappropriate exposure level
 - overexposure (film too dark)
 - underexposure (film too light)

Since certain problems observed on a spine film may have several causes (e.g., both inappropriate positioning and inappropriate centering can result in imperfect superposition of the end plates) the foregoing is grouped by how the problem appears visually, with a listing of all the potential causes.

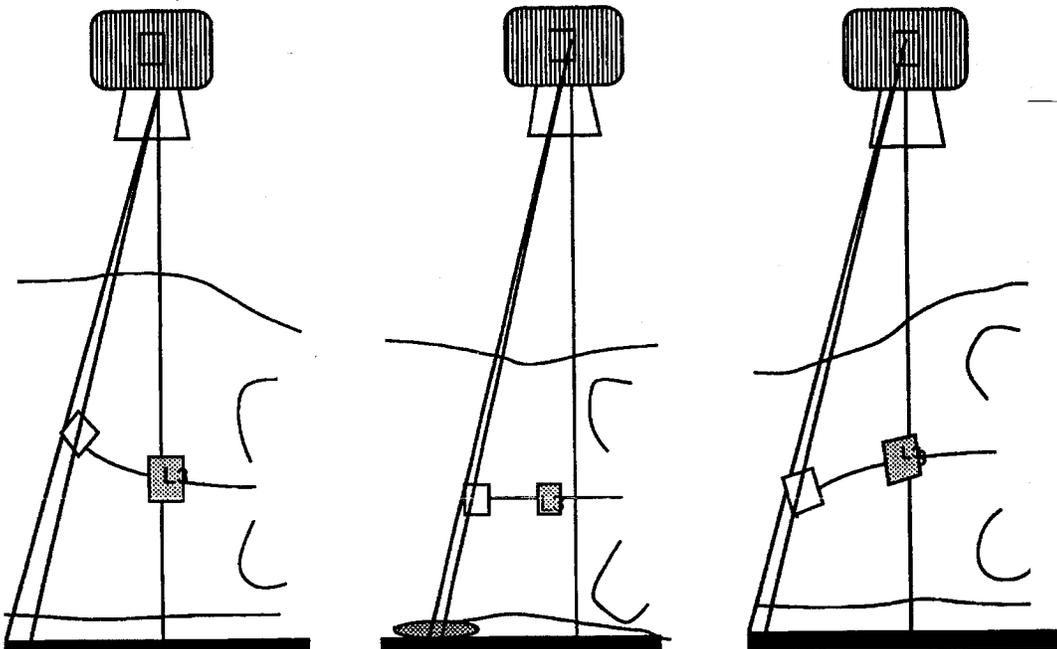
V.A Examples of Common Problems

- Imperfect superposition of vertebral endplate contours in superior spine



Causes

- Centering of x-ray beam is correct but superior spine is not parallel to table (curved upward)
- Participant is correctly positioned but centering of x-ray beam is inappropriate
- Centering of x-ray beam is correct but superior spine is not parallel to table (curved downward)



A

B

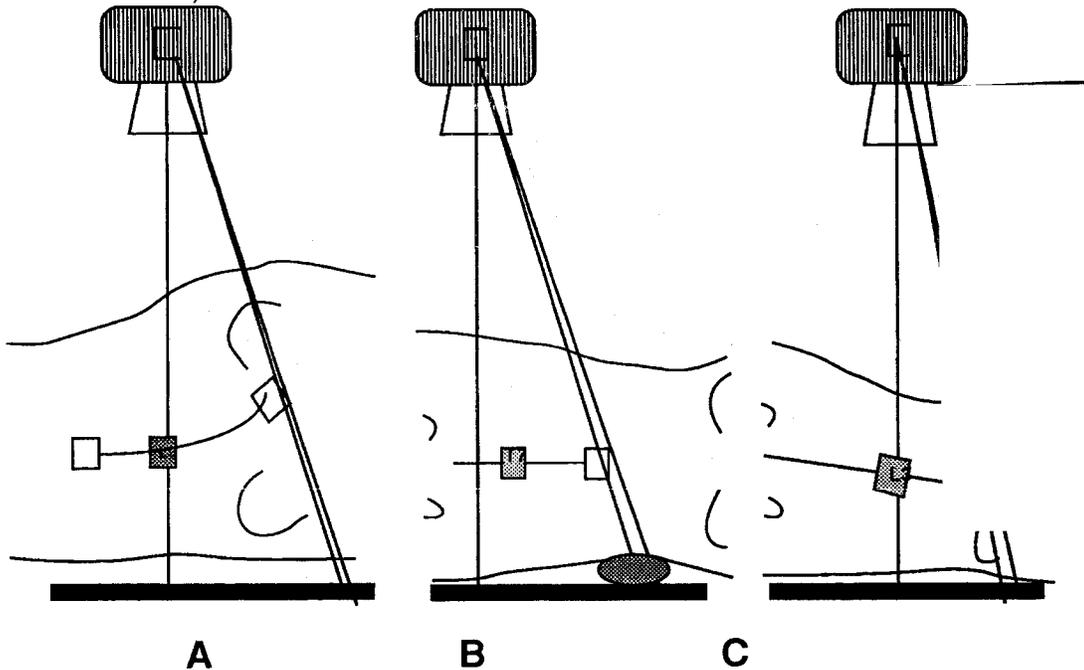
C

- Imperfect superposition of vertebral endplate contours in inferior spine

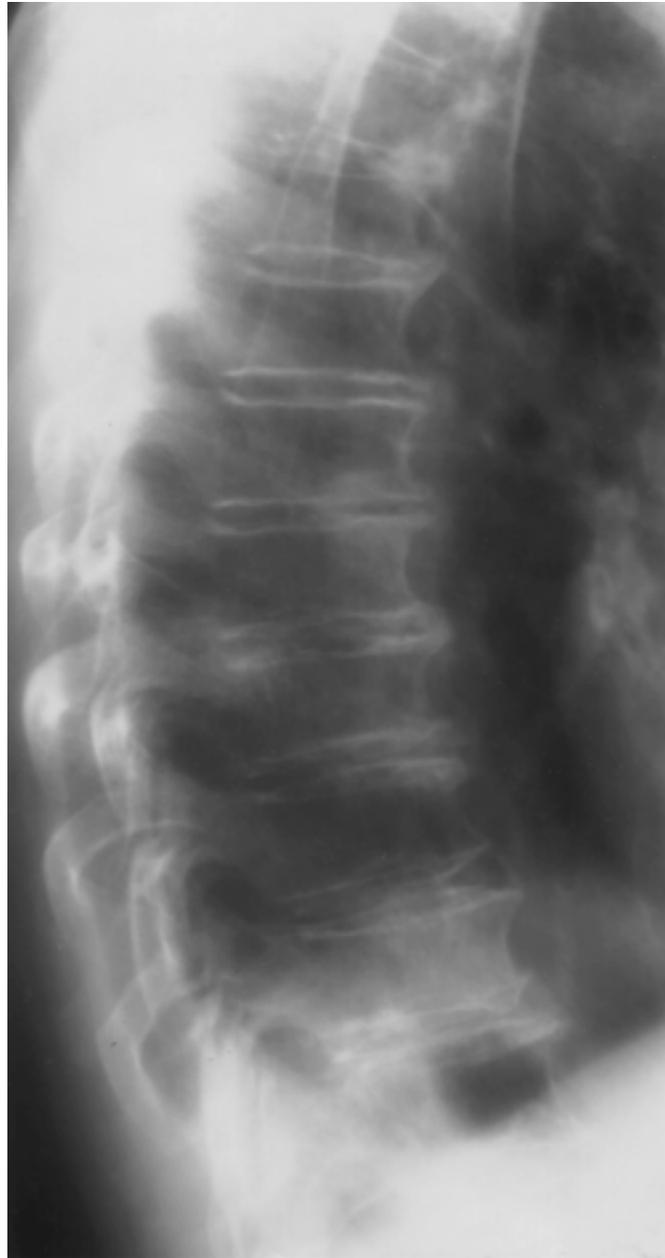


Causes

- A Centering of x-ray beam is correct but inferior spine is not parallel to table (curved upward)
- B Participant is correctly positioned but centering of x-ray beam is not appropriate
- C Centering of x-ray beam is correct but inferior spine is not parallel to table (curved downward)



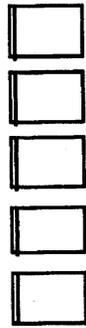
Example of imperfect superposition of vertebral endplate contours in the thoracic spine.



Example of imperfect superposition of vertebral endplate contours in the lumbar spine.



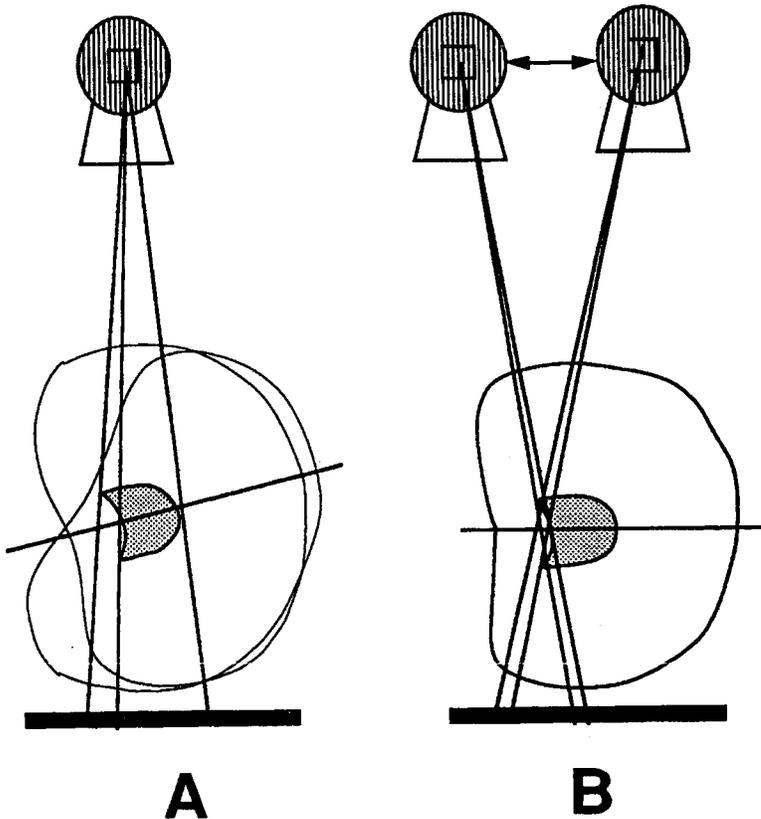
- Imperfect superposition of posterior edges of the vertebral bodies



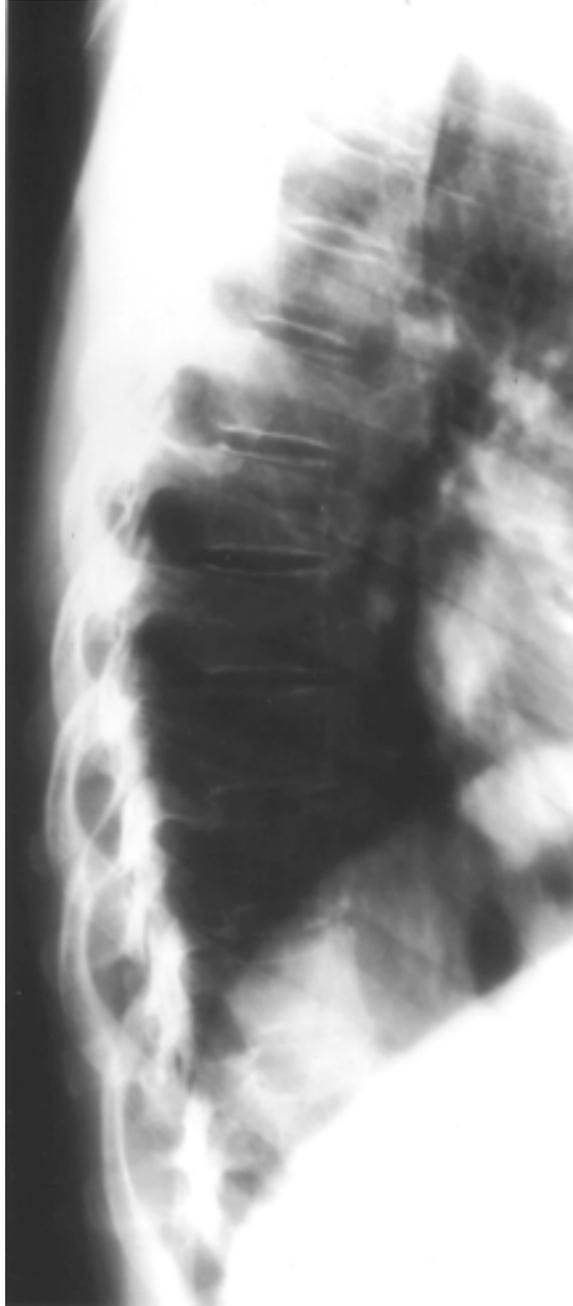
Causes

A Centering of x-ray beam is correct but participant is not positioned squarely on the side

B Participant is correctly positioned but centering of x-ray beam is inappropriate



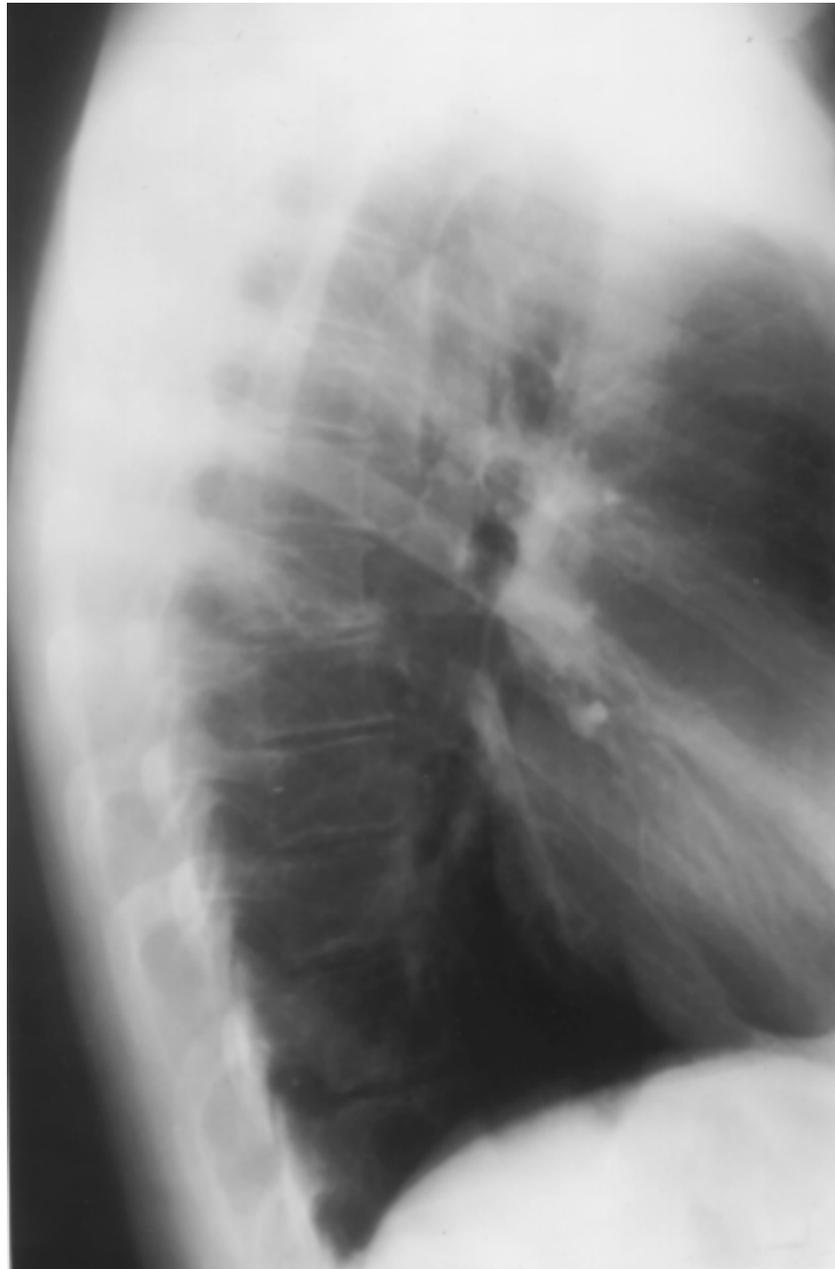
Example of an imperfect superposition of posterior edges of vertebral bodies in the thoracic spine.



Example of an imperfect superposition of posterior edges of vertebral bodies in the lumbar spine.



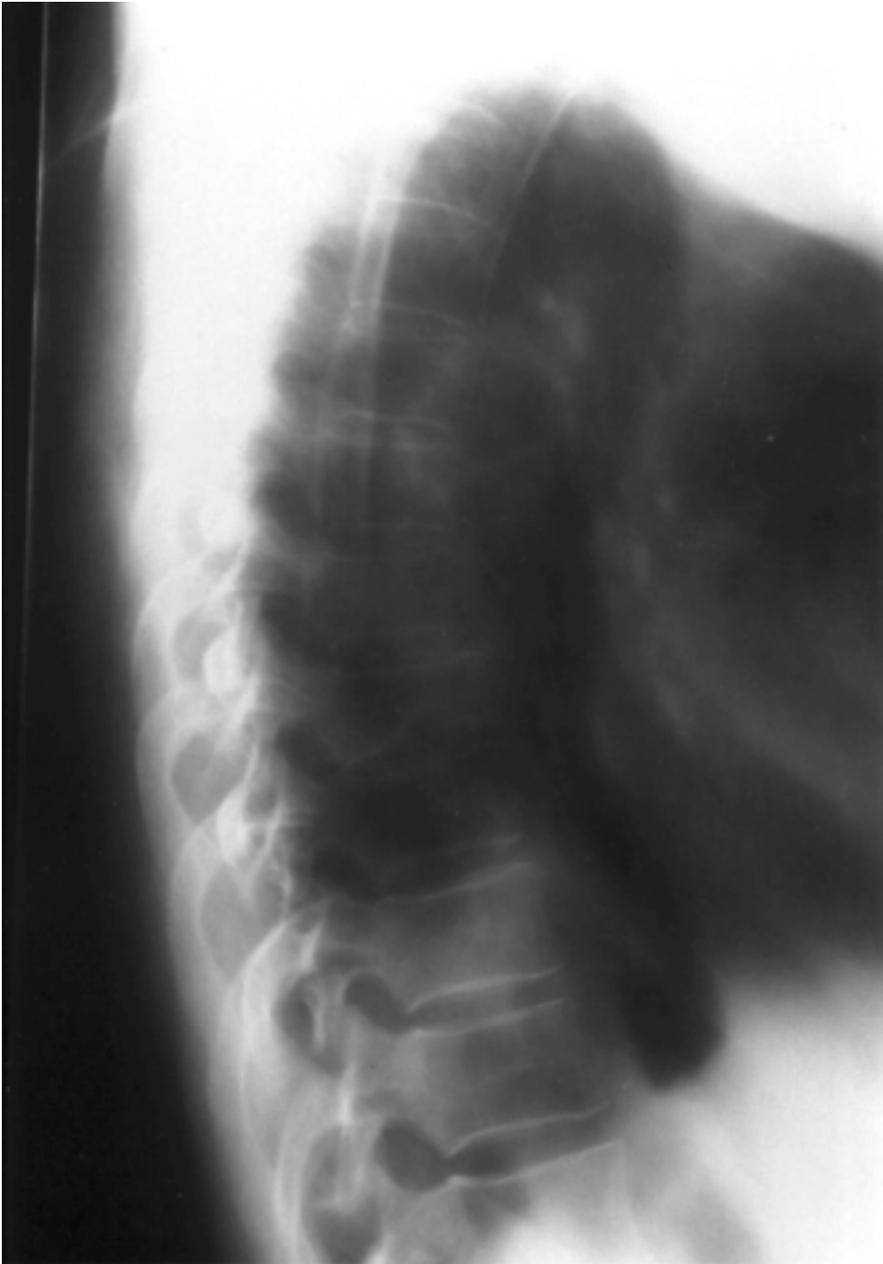
Example of too short an exposure time on the lateral thoracic films resulting in sharp contours of the ribs obscuring the contours of the vertebrae.



Exposure Problem: Film is too dark; the penetration is too high to see the vertebral contours.

Example of an inappropriate exposure level - overexposure on the lateral Thoracic spine film.

Cause: The amperage setting or exposure time setting is too high.



Exposure Problem: Film is too light; the penetration is too low to see the vertebral contours.

Example of an inappropriate exposure level - underexposure on the Thoracic spine film.

Cause: The amperage setting or exposure time setting is too low.



Exposure Problem: Film is dark in some parts and light in other parts making it difficult to see the vertebral contours.

Example of an inappropriate exposure level - underexposure and overexposure on the Lumbar spine film.

Cause: Marked overexposure and underexposure on a single film is usually a result of setting the voltage too low (too much contrast).



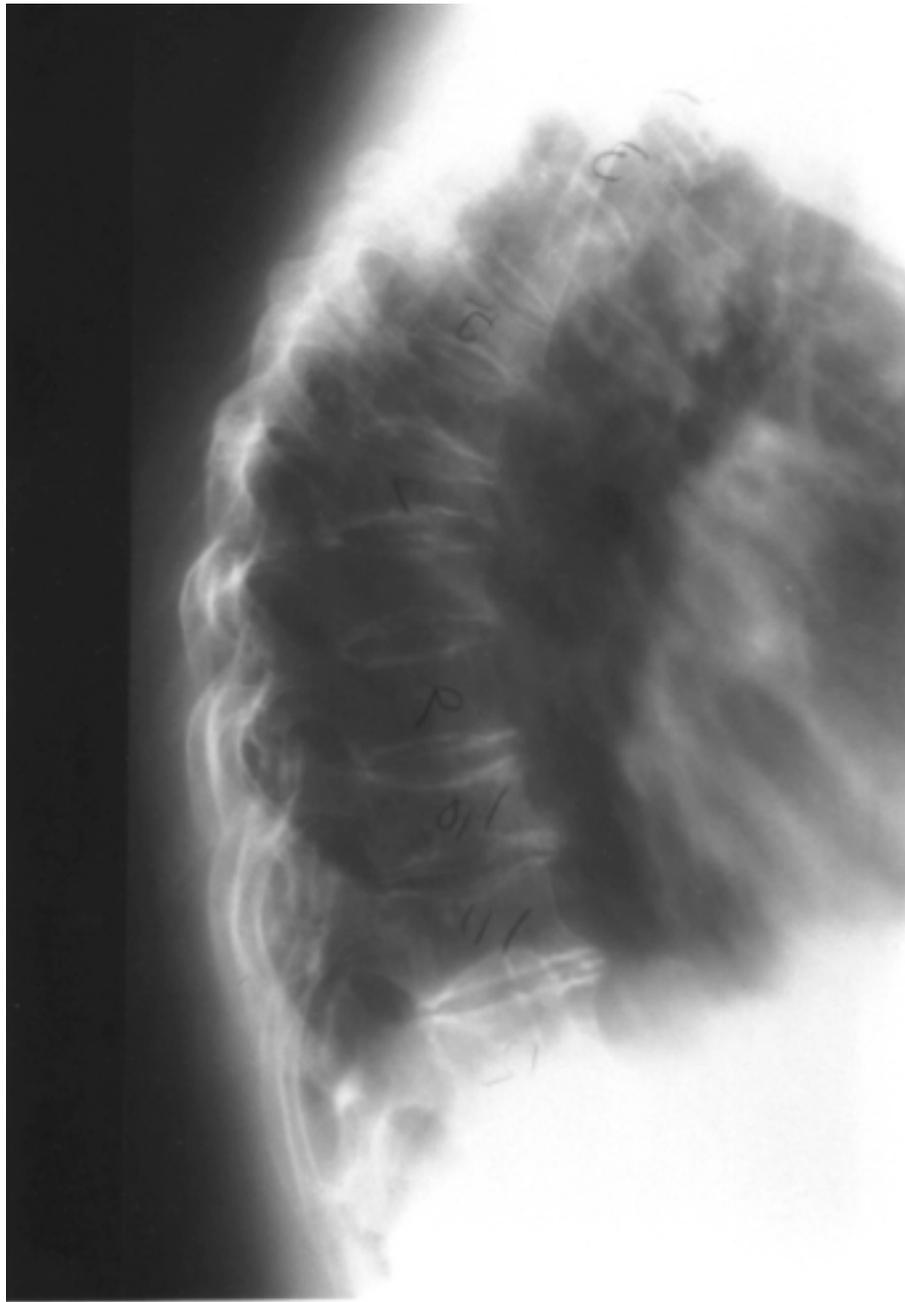
V.B Examples of Different Levels of Quality for Radiologic Films

The foregoing are examples of different quality radiologic films to use for comparison purposes. The films in the following examples are classified as good, acceptable, barely acceptable and unacceptable.

A good quality lateral thoracic spine film.



An acceptable quality lateral thoracic spine film.



A barely acceptable quality lateral thoracic spine film.



An unacceptable quality lateral thoracic spine film.



A good quality lateral lumbar spine film.



An acceptable quality lateral lumbar spine film.



A barely acceptable quality lateral lumbar spine film.



An unacceptable quality lateral lumbar spine film.



Acknowledgment:

This proposal for standard projections in radiological diagnostics are based in part on the recommendations issued by the Central Executive Board for Science, Research and Development of the Commission of the European Economic Community, Section for Medical Radiation Exposure, that were formulated at the International Workshop on "Optimization of Image Quality and Radiation Exposure of Patients in Radiological Diagnostics" (Oxford, Sept 27-29, 1988). Participant position and technical notes are adapted from R. Eisenberg, Radiographic Positioning (Little, Brown and Company; Boston/Toronto/London 1989).

APPENDIX A

SOF X-ray Protocol Summary

PHOTO COPY AS NEEDED

SOF X-Ray Protocol Summary

General (for both thoracic and lumbar films)

The primary aims in terms of quality assurance are to produce the best quality baseline x-rays and then to reproduce the same quality at follow-up.

Identification and Logging

1. SOF ID Number, Acrostic, date of x-ray, clinic name, and side marker (left or right) imaged on the film.
2. Complete the SOF X-Ray Form Clinic Worksheet and return it with the x-rays to the appropriate SOF personnel.

Participant positioning

- Participant on table in (left) lateral lying position
- Place lead side marker so that it is not in a vertebral body.
- Legs flexed for comfort and support
- Support under participant's head
- Support between knees and ankles and under knee next to table
- Lead shield over lower part of the participant to protect gonads
- **Support under midlumbar region** to position long axis of **spine parallel to table**. Double check the horizontal position of the thoracic spine by feeling the spine with your hand.
- Shoulders, hips, knees, and ankles superimposed
- Align midaxillary (coronal) plane of body to midline of table
- To assure lateral position, stand at head of table and look down the participant's back and hips to make certain that there is vertical superimposition of shoulders and hips.

Collimation

Collimation directed to the spine to exclude as much unneeded anatomy as possible

Do NOT over collimate and cut off the spine image

Thoracic Spine Measurements – Lateral Projection

Imaging Technique

- Imaging system Bucky screen technique
- Focus size less than or equal to 1.3 mm
- Total filtering value greater than or equal 2.5 mm A1-equivalent value (half layer)
- Scattering grid $r = 12$ to 1 at 40 inches
- Film/Screen speed 400
- Film/Focus Distance 40 inches (**not variable!**)
- Imaging voltage 60-70 kVp
- Exposure Time Breathing technique; approximately 2 second exposure (phototiming is **not** to be done on this view)

Film Size

7" x 17" lengthwise is recommended. Larger size film (i.e. 14" x 17") is acceptable if this is more convenient, provided that collimation is carried out as specified above.

Positioning

- Both arms at right angles to anterior surface of body
- Flex elbows for comfort

Central Ray

- Center on T7. T7 is about two finger widths (1 in, 2.5 cm) below the tip of the scapulae when arms are elevated; top of cassette should be about 2 in (5 cm) above the shoulders
- Inclusion of T2 (if possible) to **T12 (required)**.

Participant Instructions

- Have the participant breath quietly for exposure (manual technique)

Lumbar Spine Measurements – Lateral Projection

Imaging Technique

- | | |
|--|---|
| <ul style="list-style-type: none"> • Imaging system • Focus size • Total filtering value • Scattering grid • Film/Screen speed • Film/Focus Distance • Imaging voltage • Exposure Time | <p>Bucky screen technique
less than or equal to 1.3 mm
greater than or equal 2.5 mm A1-equivalent value (half layer)</p> <p>r = 12 to 1 at 40 inches</p> <p>400</p> <p>40 inches (not variable!)</p> <p>80 - 90 kVp</p> <p>less than 1 sec
central photocell</p> |
| <ul style="list-style-type: none"> <ul style="list-style-type: none"> <u>manual</u> <u>automated</u> | |

Film Size

11" x 14" lengthwise is recommended. Larger size film (i.e. 14" x 17") is acceptable if this is more convenient, provided that collimation is carried out as specified above.

Central Ray

- Center on L3 (about two finger widths above the iliac crest).
- **Include T12 (required) to S1**

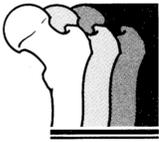
Participant Instructions

- Have participant suspend respiration for exposure (after **expiration**)

APPENDIX B

SOF X-ray Form Clinic Worksheet

PHOTO COPY AS NEEDED



MULTI CENTER
STUDY OF
OSTEOPOROTIC
FRACTURES

Date	Staff ID Number	SOF ID Number	Acrostic
____/____/____ Month Day Year			

X-ray Form Clinic Worksheet

Participant Name: _____

General information

Visit 8

Date of X-ray exam:

____/____/____
Month Day Year

X-ray Technologist (Staff ID#):

--

X-ray machine:

--

Thoracic Film

kVp:

--

Exposure time:

--

Milli-Amperage (manual technique only):

--

Comments: If multiple attempts were made and this is best possible image, please note this in Comments and send all films taken.

--

Lumbar Film

kVp:

--

Exposure time:

--

Milli-Amperage (manual technique only):

--

Comments: If multiple attempts were made and this is best possible image, please note this in Comments and send all films taken.

--

Film Shipment

Shipped to Coordinating Center

____/____/____
Month Day Year

Shipment includes thoracic spine film?

<input type="checkbox"/> Yes <input type="checkbox"/> No
--

Shipment includes lumbar spine film?

<input type="checkbox"/> Yes <input type="checkbox"/> No
--

Staff ID #:

--

APPENDIX C

SOF X-ray Shipment Log

PHOTO COPY AS NEEDED

APPENDIX D

SOF List of Certified Technologists

PHOTO COPY AS NEEDED

SOF List of Certified Technologists

I have read the SOF Radiology Operations Manual and have successfully undergone a review of my first 5 sets of x-ray films by a supervising technologist or radiologist at the facility where I work. I will adhere to the protocol as stated in the above-mentioned manual as closely as possible.

	Last Name	First Name	Staff ID No	Date	Signature
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Supervising Technologist Statement:

The above-listed individuals are qualified to perform the required x-ray examinations. I have reviewed 5 lateral thoracic and 5 lateral lumbar spine films of each of the above listed technologists and found them to be of good quality. No other technologists will be involved in this study. If personnel need to be added, certification procedures outlined in the manual will be followed.

Center _____

X-Ray location _____

Last Name, First Name _____

Position _____

Phone _____

Signature _____

Date _____

APPENDIX E

SOF X-ray Facility Certification Form

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SOF X-Ray Facility Certification Form
 Center _____ Date _____

	<u>Yes</u>	<u>No</u>	<u>If no, specify</u>
--	------------	-----------	-----------------------

A. Facility Imaging Technique

- | | | | |
|---|---|---|-------|
| The focus size of the x-ray device(s) is/are less than or equal to 1.3 mm | / | / | _____ |
| Total filtering amounts greater than or equal to 2.5 mm A1-equivalent (half value layer). | / | / | _____ |
| The scattering grid has a ratio of 12 to 1 at 40 inches | / | / | _____ |
| 400-speed film is used at the clinic | / | / | _____ |

B. Technologists Imaging Technique

- | | | | |
|--|---|---|-------|
| The film/focus distance will be 40 inches. It is critical to maintain this distance. | / | / | _____ |
| Exposure Level | | | |
| • lateral thoracic films will be taken at 60 - 70 kVp with long exposure (breathing technique). | / | / | _____ |
| • lateral lumbar films will be taken at 80 - 90 kVp with less than or equal to 1 sec. exposure (on expiration) | / | / | _____ |
| The kVp, exposure time (and mA for manual technique) will be recorded for each patient and film. The same settings will be used at all follow-up visits. | / | / | _____ |

C. Positioning

- | | | | |
|---|---|---|-------|
| The spine will be parallel to the table without rotation of the body to ensure optimal superposition of vertebral contours. | | | |
| • on lateral thoracic films T2 (if possible) to T12 (required) is included, with centering at T7. | / | / | _____ |
| • on lateral lumbar films T12 to S1 is included, with centering at L3 | / | / | _____ |

APPENDIX F

SOF Radiologic Technologist Examination

PHOTO COPY AS NEEDED

Name: _____ SOF ID#: _____ Date: _____

SOF X-RAY TECHNOLOGIST'S EXAMINATION FORM

November, 2001

1. Fill in the missing parameters for the SOF imaging technique for baseline and follow-up lateral spine x-rays.

Thoracic Spine

Imaging System	<u>Bucky screen</u>
Focus Size	<u>less than or equal to 1.3 mm</u>
Total Filtering	_____
Scattering Grid	_____
Film/Screen Speed	_____
Film/Focus Distance	_____
Imaging Voltage	_____
Exposure Time	_____

Lumbar Spine

Imaging System	<u>Bucky screen</u>
Focus Size	<u>less than or equal to 1.3 mm</u>
Total Filtering	_____
Scattering Grid	_____
Film/Screen Speed	_____
Film/Focus Distance	_____
Imaging Voltage	_____
Exposure Time	Manual _____
	Automated _____

Coordinating Center Reviewed By: _____

2. What film size is recommended for

Thoracic Spine _____

Lumbar Spine _____

3. Under what conditions is it OK to use a larger film size?

4. Please list the missing criteria of good image quality for SOF.

a) _____

b) _____

c) _____

d) _____

e) _____

f) Blurred rib contours (from breathing technique) on thoracic film

5. Please fill in the blanks:

Optimum thoracic technique includes:

_____ lateral lying position.

Place both arms _____

Use supports _____

Check the horizontal position by _____

Check the lateral position by _____

Center the central ray and cassette to _____
_____ collimation should be visible.

Include levels from T _____ to T _____.

Assure that T _____ is seen in both _____ and _____ images.

Reduce radiation scatter by _____.

6. Optimum lumbar technique includes:

Position long axis of spine _____.

Use radiolucent supports to _____.

Check the horizontal position of the spine by _____
_____.

Check the Lateral position by _____
_____.

Center the central ray and cassettes to L _____.

Reduce radiation scatter and exposure by _____
_____.

Include levels from _____ to _____.

7. True or False?

(Circle)

The participant should always breath quietly for thoracic exposure.

T F

Never use phototiming for thoracic exposure.

T F

The participant should hold his breath after expiration for a Lumbar exposure.

T F

Never use phototiming for the lumbar spine.

T F

8. What are two common causes of imperfect superpositioning of vertebral endplate contours?

a) _____

b) _____

9. What are two common causes of imperfect superpositioning of posterior edges of a vertebral body

a) _____

b) _____

10. What is a common cause of:

a) a film being too dark to see vertebral contours?

b) a film being too light to see contours?

c) a film being simultaneously too dark and too light to see contours?

11. (Intentionally left blank for SOF Visit 8.)

12. What information must be typed clearly on the X-Ray plate ID?

a) _____

b) _____

c) _____

d) _____

13. If stick-on labels with additional information are used, where should they be placed?

14. Who is the QC officer for the SOF study at your X-Ray facility?

15. Has this QC officer reviewed your first five sets of SOF X-Rays for quality?

Yes No Don't Know

16. Where are the SOF X-Ray manuals kept at your facility?

17. If a participant's follow-up X-Rays appear to be of poor quality, what should you do?

18. Is the SOF X-Ray protocol summary (Appendix A) posted by your X-Ray machine?

Yes No Don't Know

APPENDIX G

SOF X-ray TELEFORM

PHOTO COPY AS NEEDED



Spine X-ray

Office Use Only									
SOF ID#					Acrostic			Staff ID#	

1 Did the participant have a thoracic spine x-ray?

Yes No →

↓

Why? Participant unable Refused Other

Describe: _____

Date of thoracic spine film:

--	--

Month

--	--

Day

--	--	--	--

Year

2 Did the participant have a lumbar spine x-ray?

Yes No →

↓

Why? Participant unable Refused Other

Describe: _____

Date of lumbar spine film:

--	--

Month

--	--

Day

--	--	--	--

Year

