

University of Pennsylvania
Environmental Health and Radiation Safety

**Cabinet X-ray System
Radiation Safety Manual**

(Reviewed: May 2013)

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I. INTRODUCTION

The term "cabinet x-ray system" means an x-ray system with the x-ray tube installed in an enclosed, interlocked cabinet.

II. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Use of x-ray equipment in Pennsylvania is regulated by the PA Department of Environmental Protection (DEP). The DEP has established regulations which must be followed by all individuals operating energized (x-ray) equipment. These regulations are found in Title 25 Chapters 219, 220, and 227 of the Pennsylvania Code and are available for review in the Environmental Health and Radiation Safety (EHRS) office, or on the DEP website at <http://www.pacode.com/index.html>.

III. ENVIRONMENTAL HEALTH AND RADIATION SAFETY (EHRS)

EHRS is responsible for ensuring that radiation and radioactive material is used safely at Penn and associated facilities (e.g., Wistar Institute, CHOP). EHRS staff perform a safety check of each cabinet x-ray unit at installation and annually (at a minimum). If service is provided on the unit that would make changes to the arrangement, number, or type of components in the system contact EHRS for an additional safety check prior to use. [PA 227.12a]

IV. CABINET X-RAY UNITS

A. Unit Registration

All analytical energized equipment must be registered with EHRS prior to use. This can be done by contacting EHRS, and must be done at the time of equipment installation. [PA 219.131-2]

B. Unit Acquisition

It is the responsibility of the clinical personnel to notify EHRS upon acquisition of any new x-ray equipment. Authorized EHRS personnel will conduct a radiation safety survey on all new units prior to use.

C. Unit Relocation, Disposal, or Transfer

EHRS must be notified prior to relocation, disposal, or transfer of ownership of cabinet x-ray equipment. Relocation includes moving equipment to a different room within the same building. EHRS will also ensure that proper notifications to State Agencies are made. [PA 219.131-2]

V. WORKER RESPONSIBILITIES

A. Radiation Safety Training

All the persons using the x-ray diffraction equipment must attend the radiation safety training specific to this type of equipment. This training is provided on the EHRS website at <https://www.ehrs.upenn.edu/radiation-safety/topics/radiation-safety-training>

B. Operational Training

Additionally, all the persons operating the equipment must receive the following instructions from the Primary Investigator and demonstrate competence in the following areas:

1. Significance of the various radiation warning and safety devices incorporated into the equipment, or the reason they have not been installed on certain pieces of equipment, and the extra precautions necessary if the devices are absent or bypassed.
2. Operational and emergency procedures.

VI. SAFETY DEVICES

Cabinet x-ray systems may not operate unless the following conditions are met:

1. All openings are securely closed.
2. Each access door to the cabinet has an interlock that terminates the exposure whenever that door is opened.
3. A warning label should be posted on the cabinet unit which states, "Caution Radiation - This Equipment Produces Radiation When Energized", or words containing a similar warning (these labels are available through EHRS). [PA 219.159]

VII. RADIATION LEVELS & DOSIMETRY

The radiation levels are measured by EHRS at least annually, and must not exceed 0.5 milliroentgen per hour (mR/hr) at 5 centimeters from the surface of the unit for it to be routinely operable. Therefore, personnel dosimetry badges are not required during routine use.

VIII. IMPORTANT PHONE NUMBERS

University of Pennsylvania, Environmental Health and Radiation Safety:

Monday – Friday during business hours **(215) 898-7187**

On-Call Physicist for assistance after hours **(215) 573-6626**