

University of Pennsylvania
Environmental Health and Radiation Safety (EHRS)

**Electron Microscope
User Guide**

(Reviewed: May 2013)

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I. INTRODUCTION

The term "electron microscope" includes any equipment utilizing the wave characteristics of electrons that have been accelerated by an electric field to visualize the microscopic structure of material. [PA 227.2]

II. PA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Use of energized 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 using 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 performs a radiation safety check of each electron microscope annually (at a minimum).

IV. ELECTRON MICROSCOPES

A. Unit Registration

All analytical energized equipment including electron microscopes must be registered with EHRS. It is the responsibility of the clinical/research personnel to notify EHRS upon acquisition of any new energized equipment. This can be done by contacting EHRS and must be done by the time of equipment installation.

EHRS registers all energized equipment with the DEP, as required by state law. The State charges an annual registration fee to the University for this equipment. The fee will be billed to the respective departments after payment by EHRS. [PA 216.2]

B. Unit Relocation, Disposal, or Transfer

EHRS must be notified prior to relocation, disposal, or transfer of ownership of an electron microscope. Relocation includes moving electron microscopes to a different room within the same building. EHRS will ensure that proper notifications to State Agencies are made. [PA 216.2, 219.131-2]

V. WORKER RESPONSIBILITIES

A. Radiation Safety Training

All the persons using electron microscopes 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. ELECTRON MICROSCOPE WARNINGS

A. Signs

A warning label should be posted on the electron microscope which states, "Caution Radiation - This Equipment Produces Radiation When Energized", or words containing a similar warning. These labels are available through EHRS. [PA 227.31]

B. Personnel Exposure Monitoring

Electron microscopes do emit a low amount of radiation. In compliance with the As Low As Reasonably Achievable (ALARA) mandate precautions should be taken when operating this equipment to minimize the low personnel dose:

1. Limit unnecessary time in close contact with the unit.
2. Do not leave the unit "on" when it is not in use.

The radiation levels are measured by EHRS, 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 is not required during routine use. [PA 227.32]

VII. IMPORTANT PHONE NUMBERS

University of Pennsylvania, Environmental Health and Radiation Safety:

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

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