

Requirements When Using Handheld Analytical X-ray Equipment

One of the most significant technological advancements in the X-ray instrumentation market has been the emergence of handheld battery-powered X-ray fluorescence (XRF) analyzers. Analyzers are used in many applications, such as a screening tool for lead, mercury, cadmium, chrome, and other elements in products. These devices offer greater detection capabilities and are less expensive than bench equipment. The devices using X-ray tube sources are inherently safer than their counterparts by using radioactive sources that are subject to licensing and hazardous material transportation regulations.

The popularity of handheld units is driven by their portability and their ability to analyze, identify and characterize a wide range of elements rapidly, along with the fact that little technical expertise is needed to operate them. Nevertheless, since these devices produce ionizing radiation, it is imperative that radiation safety requirements be followed. This fact sheet offers a review of the Pennsylvania regulations and requirements.

Registration of X-ray Equipment

By regulation under 25 Pa. Code Chapter 216.2, handheld units that utilize an X-ray tube must be registered as radiation-producing machines with the Department of Environmental Protection's (DEP) Bureau of Radiation Protection within 30 days of acquisition.

Exemption Request for Operation

An important safety requirement applies when using these devices. Because most handheld open-beam units do not have a safety device (interlock) as required by 25 Pa. Code, Chapter 227.11a, the registrant is required to apply to DEP for an exemption from this regulation prior to use. Proper training in the operation of this device is paramount, but other considerations also need to be adhered to, such as:

- Mandated training must be provided to the operators, and documented records must be maintained. (25 Pa. Code, Chapter 227.14)
- Safety device inspection and checks, e.g., lights and LCD readouts, shall be performed at least annually and documented for review by the department. (25 Pa. Code, Chapter 227.12a(e))
- Operating procedures shall be written and available to operators of the analytical equipment. (25 Pa. Code, Chapter 227.13a(a))
- Emergency procedures shall be written and available to operators of the analytical equipment. (25 Pa. Code, Chapter 227.13a(d))
- A written radiation safety program based on the radiation protection principles that are as low as reasonably achievable shall be developed, documented and implemented. The radiation protection program shall be reviewed at least annually. (25 Pa. Code, Chapter 219.5 and 10 CFR 20.1101)
- Analytical X-ray equipment shall be labeled "CAUTION RADIATION – THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED" or words having a similar intent. Unless the device produces high intensity X-rays, no further labeling is required. (25 Pa. Code, Chapter 227.11a(f)(2))
- Personnel dosimeters, preferably finger and/or wrist dosimeters, are required to be worn during operation. Exposure records shall be maintained by the facility and available to the operator. (25 Pa. Code, Chapter 227.14(b))
- The registrant must maintain control of the device at all times to prevent theft or operation by an unauthorized user. (25 Pa. Code, Chapter 219.132)

A registrant should apply to the department for exemption by written request to the appropriate regional office that oversees the facility location. Reference the table below for the appropriate regional address.

Region	Phone	Region Headquarters	Counties Supervised
East	484-250-5950	2 East Main St. Norristown, PA 19401-4915	Bucks, Chester, Delaware, Montgomery, Philadelphia, Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, and Wyoming
Central	717-705-4700	909 Elmerton Ave. Harrisburg, PA 17110-8200	Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, York, Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, and Union
West	412-442-4000	400 Waterfront Drive Pittsburgh, PA 15222-4745	Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington, Westmoreland, Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, and Warren

References

Pennsylvania Code Title 25 Regulations, www.pacode.com.

For more information, visit www.dep.state.pa.us, keyword: Radiation, or call the Bureau of Radiation Protection at 717-787-3720.