



## Ohio Administrative Code

### Rule 3701:1-68-04 Non-medical analytical systems.

Effective: June 30, 2023

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In addition to the applicable rules in this chapter and Chapter 3701:1-38 of the Administrative Code, handlers of analytical systems will comply with the following:

(A) Analytical systems will meet the following equipment standards:

(1) Open-beam analytical systems will;

(a) Provide an automatic shut-off feature that prevents any part of a person's body from being exposed to the primary x-ray beam path; or

(b) Request a variance from the director to include:

(i) The reason a device or an automatic shut-off feature cannot be used; and

(ii) A description of the alternative methods that will be employed to minimize the possibility of an accidental exposure, including procedures to assure that the operators and others in the area will be informed of the absence of safety devices.

(2) Analytical system installed after February 10, 2006, will be provided with a readily visible warning light labeled with the words "X-RAY ON" or symbols having a similar intent, and be located near the x-ray source and its controls and be illuminated when the x-ray source is energized. In addition, open-beam analytical system will be provided with a readily discernible indication of:

(a) X-ray source power "on-off" status located near the x-ray source housing, if the primary beam is controlled in this manner; or

(b) Shutter "open-closed" status located near each collimator on the x-ray source housing, if the primary beam is controlled in this manner.



(3) Except for gauging units, open-beam analytical systems installed after February 10, 2006, will have warning devices, or a system of warning devices, such as lights with fail-safe characteristics.

(4) All analytical systems will conspicuously display a clearly legible label or labels bearing the radiation symbol and the words "CAUTION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED" or appropriate words having a similar intent, near any switch or control that directly energizes the unit. Open-beam analytical systems will have an additional warning label on or near the x-ray housing with the radiation symbol with the words "CAUTION - HIGH INTENSITY X-RAY BEAM" or appropriate words having a similar intent.

(5) Each x-ray source housing installed on or after August 1, 2011 will be equipped with an interlock that shuts off the radiation beam when the housing is opened. For each x-ray source housing installed prior to August 1, 2011 and not equipped with an interlock, administrative controls will be instituted to include that the power will be disconnected before any disassembly.

(6) Unused beam ports on x-ray source housings will be secured in the closed position, or mechanically blocked.

(7) All analytical systems other than open-beam analytical systems will be supplied with a protective cabinet which limits leakage radiation measured at a distance of five centimeters from any external surface such that it is not capable of producing a dose in excess of 2.5 microsievert (0.25 millirem) in one hour.

(B) Handlers of analytical systems will comply with the following radiation safety obligations:

(1) The facility's individual responsible for radiation protection (IRRP) will document and implement operating procedures relative to radiation safety. The IRRP will be qualified in accordance with paragraph (H) of rule 3701:1-68-02 of the Administrative Code. The IRRP will assure and document that all operators of analytical systems have received appropriate training. No individual will be permitted to operate analytical systems in any manner other than that specified in the procedures unless such individual has obtained written approval of the IRRP.



(2) Any temporary alteration to safety devices, such as by-passing interlocks or removing shielding will be recorded. This record will:

(a) Contain such information as date the alteration was made, type of alteration, length of time alteration remained in place, and signature of the individual who made the alteration and the individual who restored the safety device to the original condition; and

(b) Be approved, and signed in advance for a specified period of time by the individual responsible for radiation protection, and posted near the x-ray source housing with the signatures of approval.

(3) Except as specified in paragraph (B)(2) of this rule, no operation involving removal of covers, shielding materials or x-ray source housings or modifications to shutters, collimators, or beam stops will be performed without ascertaining that the x-ray source is off and will remain off until safe conditions have been restored. The x-ray source power switch, in conjunction with appropriate interlocks, will be used for routine shutdown in preparation for repairs.

(C) In addition to the radiation protection obligations in rule 3701:1-68-02 of the Administrative Code, handlers of analytical systems will comply with the following:

(1) The local components of an analytical system will be located, arranged, and include sufficient shielding or access control such that no radiation levels exist in any area surrounding the local component group which could result in a dose to an individual present therein in excess of the dose limits given in Chapter 3701:1-38 of the Administrative Code. These levels will be met at any specified radiation source rating.

(2) Radiation area surveys of all analytical systems will be performed and the results recorded to confirm compliance with paragraph (A) of rule 3701:1-38-14 the Administrative Code:

(a) Upon installation;

(b) Following any change in the initial arrangement, number, or type of local components in the system;



(c) Following any maintenance requiring the disassembly or removal of a local component in the system;

(d) During the performance of maintenance and alignment procedures if the procedures obligate the presence of a primary beam when any local component in the system is disassembled or removed;

(e) Any time a visual inspection of the local components in the system reveals an abnormal condition; and

(f) Whenever personnel monitoring reports show an unexplained increase over the previous monitoring period or the readings are approaching the limits specified in rules adopted pursuant to Chapter 3701:1-38 of the Administrative Code.

(3) Analytical systems will be evaluated and the results recorded at least every six months by individuals qualified according to paragraph (H) of rule 3701:1-68-02 of the Administrative Code, unless the system has been locked out and tagged "DO NOT USE."

(a) The evaluation will verify:

(i) Proper functioning of each interlock and warning light; and

(ii) Each tag and label is legible and properly affixed in the appropriate location.

(b) If an interlock or light is not functioning properly, it will be immediately labeled as defective and repaired or replaced within seven calendar days.

(4) Finger or wrist radiation monitoring devices will be provided to and will be used by:

(a) Operators of open-beam analytical systems without provisions for engineering controls as provided in paragraph (A)(1) of this rule; and

(b) Personnel maintaining analytical systems if the maintenance procedures include the presence of an external radiation beam when any local component in the analytical system is disassembled or



removed.

(D) Handlers of gauging units will be exempt from the obligations of paragraphs (C)(2)(c) to (C)(2)(e) of this rule.

(E) Handlers of hand-held analytical systems will:

(1) Be exempt from the obligations of paragraphs (A)(1) and (A)(3) of this rule;

(2) Obligate the IRRP to document and implement safe operating procedures to include, but not be limited to:

(a) Using specific administrative controls to prevent unauthorized access or use of the system;

(b) Assuring that the system remains in direct control of the authorized operator;

(c) Banning individuals from holding a sample in their hand during irradiation;

(d) Operating of software, trigger locks and proximity sensors;

(e) Using analyzer stands when the sample fits or when the part does not completely cover the beam port;

(f) Taking precautions during irradiation to prevent exposure of the operator or other individuals;

(g) Establishing and maintaining a restricted area of at least three feet opposite the side of the sample being exposed;

(h) Having alternative engineering and administrative safety controls that effectively prevent personnel exposure to the primary beam; and

(i) Requiring operators to wear assigned ring badges on the hand closest to the primary beam.