

**Application for Approval of Alternate Safety Measures for
Open Beam X-ray Devices Lacking a Safety Device**

The following applies to certain open-beam x-ray systems; including but not limited to hand materials / alloy analysis x-ray systems frequently used by radiographers, metal fabricators, refineries, environmental metals analysts, and other fields where the composition of a material is of interest. The use of these devices is commonly referred to as Positive Materials Identification or PMI.

According to OAC 252:410-13-51, all open beam x-ray systems must have a safety device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to shut off when any part of an individual's body enters the primary beam path.

Note: Pressure or proximity switches that only allow x-rays to be produced when the x-ray device is in contact with an object do not fulfill this requirement.

Per OAC 252:410-13-51(b), Alternative safety measures are subject to DEQ approval.

According to OAC 252:410-13-32(a)(1) finger or wrist dosimetry is required for individuals working with open beam x-ray systems without safety devices.

The permit applicant or permittee seeking approval of alternative safety measures should submit the following information to DEQ:

1. The reasons precluding use of a safety device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to shut off when any part of an individual's body enters the primary beam path.
2. A description of the safety features present on the x-ray system that is to be permitted.
3. A description of any additional safety measures that will be implemented, how they will serve to protect all individuals against accidental radiation exposure.
4. Procedures for use of safety features present on the x-ray system and any additional safety measures that will be implemented.
5. A description of the radiation dose monitoring program that will be provided for individuals operating the x-ray system, including how the dosimetry is to be worn.
6. A copy of training documents addressing the risks of misuse of the x-ray system and instructions for safe operation. Equipment manufacturer's manuals addressing these issues may be used, if available.

Note: A ring or wrist dosimeter will be required unless the work environment would make it a hazard or evidence can be provided that there is no risk for accidental exposure to the full or partially transmitted primary x-ray beam. If implemented properly, ring dosimeters may be approved by DEQ as alternative safety measures. If an exemption from dosimetry is granted due to work hazards, additional safety measures similar to those described below may be required. Please consider snag related safety issues when selecting dosimetry. Quarterly exchange of dosimetry devices is common.

Alternative Safety Measures When
Ring or Wrist Dosimeters are a Safety Hazard

The DEQ will approve the alternative safety measure based on a finding that such alternative safety measure will adequately protect all persons against accidental exposures. Additional safety measures, if sufficient, may also support exemption from finger and wrist dosimetry requirements. Please specify in your submission if you are seeking exemption from finger and wrist dosimetry requirements.

Acceptable alternative safety measures include the following:

1. A robust radiation safety program requiring 16 hours of initial radiation safety training for operators which complies with OAC 252:410-3-32(c). An audit program must also be implemented where the RSO will make and document an observation of the use of the x-ray device on average 1 out of every 10 days of use. These records must be maintained and available for DEQ inspectors.

OR

2. Use of accessories, either from the manufacturer, or custom fabricated that would make inadvertent exposure less likely when working with thin or small samples. These accessories are subject to DEQ approval per OAC 252:410-13-51(b).

OR

3. Certifying that the x-ray system will be used only to analyze large dense samples

Use of other measures not listed above may be considered for DEQ approval.