



Whole Body X-ray Security Scanners—Guidance from MO Radiation Control Program (rev. 2/2/2022)

Whole body x-ray security scanners have been utilized by the federal Transportation Security Administration (TSA) at airports since the early 2000's, and more recently similar units have begun to be installed at prisons, jails, and detention centers nationwide, and within Missouri specifically. The purposeful application of x-rays (a potentially harmful agent) on human beings has traditionally been allowed only for medical procedures under the direction of a licensed practitioner of the healing arts, where the goal has been the diagnosis or treatment of injury or disease in the person receiving the primary exposure.

However, the goal is different for whole body security scanners. Here the objective is the application of a relatively small amount of radiation (without specific medical oversight or direction) to an individual, in order to help detect and eliminate security risks to the population of the facility as a whole. There is still a risk/benefit consideration, but one of a different sort. As stated on FDA's website: "*Since general-use x-ray systems emit ionizing radiation, the societal benefit of reliably detecting threats must be sufficient to outweigh the potential radiation risk, if any, to the individual screened. The dose from one screening with a general-use x-ray security screening system is so low that it presents an extremely small risk to any individual.*"

This issue has been studied by various professional radiation safety groups since the early 2000s, including the Food & Drug Administration (FDA), Health Physics Society (HPS), American Association of Physicists in Medicine (AAPM), and National Council of Radiation Protection (NRC). Following the research and guidelines of these entities, the Missouri Radiation Control Program does find that use of these security scanners for their intended purposes is consistent with the Missouri Radiation Control law 192.400-192.510, RSMo, provided certain conditions are met. The machines must be installed and used according to manufacturers' specifications; their use must be periodically inspected by DHSS-approved Qualified Experts in Radiation Safety; facility staff must be provided adequate training; and facility procedures must be implemented to ensure that utilization and exposure to both facility staff as well as individuals being scanned are As Low As Reasonably Achievable, taking into consideration the scope and goals of the machines' use to ensure safety.

Radiation safety considerations pertinent for both facility policy development and Qualified Expert evaluation:

1. Under what circumstances is this unit used at the facility? Are there criteria for which inmates/detainees get scanned, and when? For example, everyone who is booked into the facility initially, or after a visitation, or after returning to the facility after work release or court, etc. (Some of this may not be applicable depending on the policy and practice of the particular facility.)
2. Are only inmates/detainees scanned, or also facility staff or visitors; if so, under what circumstances are staff or visitors scanned?
3. What is the estimated workload, once usage of this machine is fully implemented (approximately how many people will likely be scanned on a weekly or monthly basis)?
4. Are juveniles/minors scanned at the facility? If so, are any additional safeguards or monitoring measures in place?
5. Operational control—what training is provided to operators of this unit, and what safeguards are in place that only trained or certified staff can operate it? Who will be designated Radiation Safety Officer and periodically review policy and take overall responsibility for the radiation safety of facility and staff?
6. Signage, controlled areas, and personnel monitoring—are there appropriate marked or physical exclusion zones, radiation area signage, personnel dosimetry for facility staff or area monitoring? (Depending on anticipated workload and number of operators, etc.)
7. Is there any record-keeping mechanism for each individual scan enabled by the system? (Either passive, where a record is kept of each scan, or active where a record is saved only if the operator purposefully chooses to do so?)

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Regulatory Mandate for use of Whole Body Security Scanners in Missouri/Compliance with ANSI/HPS Standard: In compliance with statutory mandates of 192.410, RSMo for DHSS comprehensive policy for elimination of unnecessary radiation and 192.430 statutory requirement to keep radiation machines safe, **both facility and the Qualified Expert** conducting periodic inspection are responsible to **ensure that the facility remains in substantial compliance with ANSI/HPS (American National Standards Institute/Health Physics Society) Standard N43.17-2009**. Compliance includes (1) Assurance of Exposure Dose Limitation; (2) Operator Training; (3) Preventative Maintenance/Calibration; (4) Radiation Surveys; (5) Records & Documentation.

Guidelines and questions to help ensure radiation safety:

- Inmates/detainees should be the primary individuals scanned. Though there may be some circumstances when a non-inmate (staff or visitor) needs to be scanned, these instances should be kept to a reasonable minimum.
- Obviously, the usage of the unit must be limited strictly to security purposes as designed and following facility policy. These units were not designed and cannot be used for medical diagnosis or other inappropriate purposes.
- Training should be provided to all operators to include both proper utilization of the machine, as well as the basics of radiation safety. These units may be of an open design, and use backscatter radiation. As such, the potential for increased exposure to operators and non-trained individuals can be greater than that of a baggage scanner. To ensure minimal exposures, operators should be trained in radiation safety before they can operate the unit, and a periodic refresher should also be provided (at least annually.)
- Secure areas: The area around the scanner should have some type of delineation to mark an exclusion zone where individuals not being scanned are kept clear from. This zone should be at an area where the scatter radiation exposure from the machine is equivalent to background radiation, typically about 6 feet from the scanner.
- Preventative Maintenance: To ensure that the unit is operating according to manufacturer's specifications, a periodic calibration should be implemented, often on an annual basis. Included in this may be a radiation survey around the area of the scanner. However, this calibration typically would NOT be a substitute for periodic inspection by a Qualified Expert in Radiation Safety, where the goal is not compliance with manufacturer tolerances, but a regulatory review and evaluation of safe operating procedures for the facility as a whole.
- The facility should maintain a way to track the exposures to individuals. This may be a feature of the unit operating system, or at least a hard copy scan log. Regardless, the facility should keep a record of the total number of exposures an individual receives in case questions arise or an exposure reconstruction needs to be calculated for liability purposes.
- Personnel radiation monitoring (dosimetry) should be considered for facility staff, or at least an area monitor around the machine control booth.

If facility staff or others have additional questions, please contact the Missouri Radiation Control at MRCP@health.mo.gov

Sincerely,



John Langston, Administrator
Bureau of Diagnostic Services (MO Radiation Control & CLIA Programs)

Documents reviewed in preparation of this document:

- <https://www.fda.gov/radiation-emitting-products/security-systems/products-security-screening-people>
- <https://www.health.harvard.edu/diseases-and-conditions/are-full-body-airport-scanners-safe>
- https://www.aapm.org/pubs/reports/RPT_217.pdf
- https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=Body%20Scanners%20Report%202017%20%28002%29_9de3196e-0867-4f78-97ae-343f923e1c45.pdf
- <https://radiationsafety.ca/radiation-use-in-correctional-and-other-facility-security/>
- <https://hps.org/publicinformation/ate/q11397.html>
- https://www.herca.org/uploaditems/documents/Fact_figures_Body_scanners.pdf