



Company Name: _____ Job Site Location: _____

Date: _____ Start Time: _____ Finish Time: _____ Foreman/Supervisor: _____

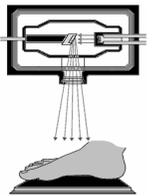
Topic 537: X-Rays

Introduction: X-Rays were accidentally discovered by a German Physicist in 1895. Because of the contrast that is displayed between bones and tissue when x-rays are directed through the body, they were being used in orthopedic and dental medicine within months of their discovery. In industry, x-ray radiographs are used to detect flaws in castings that are inaccessible to direct observation and to measure the thickness of materials. The use of x-rays has undergone considerable development over the years, and has culminated in highly sophisticated equipment that can display the density of products in tractor trailers and shipping containers, or they can be used to find defects in the welds of pipes.

Following are safety guidelines for the use of radiographic x-ray equipment in the workplace:



- **The penetrating power of x-rays** makes them a potential health hazard. Exposure of body cells and tissue to large doses of radiation from x-ray equipment can result in abnormalities in DNA that may lead to cancer and birth defects. Always follow the operating instructions and regulations when working with or near x-ray equipment.
- **Employees must utilize the appropriate** personnel monitoring equipment, such as film badges, pocket chambers, pocket dosimeters, or film rings, and employers must require the use of such equipment by all employees that may become exposed to high levels of radiation.
- **Areas where high levels of x-rays are present** must be restricted to only those employees involved in the operation of the x-ray equipment. A restricted area means any area where access is controlled by the employer for the purpose of protecting individuals from exposure to radiation.
- **All employees or personnel** working in or frequenting any portion of a high radiation area must be informed of the occurrence of that radiation in those areas that are affected, and must be instructed in the health problems associated with exposure to such radiation. Employees and personnel must also be instructed in the safety precautions or devices needed to minimize exposure.
- **Caution signs, labels, and symbols** must utilize the conventional radiation caution colors (magenta or purple on yellow background). The correct warning symbol that must be used in high x-ray radiation areas is the conventional three-bladed design. Each high x-ray radiation area must be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words "CAUTION HIGH RADIATION AREA".
- **A current copy of the operating procedures** that are applicable to the work must be conspicuously posted in such locations as to insure that employees working in or frequenting x-ray radiation areas will observe these documents on the way to and from their work area, or keep such documents available for examination by employees upon request.
- **Any activity which involves the use** of radiographic X-ray equipment must be performed by competent persons specifically trained in the safe and proper operation of such equipment.
- **A disconnecting means must** be provided in the electrical supply circuit. The disconnecting means must be operable from a location readily accessible from the X-ray control panel. For equipment connected to a 120 volt branch circuit of 30 amperes or less, a grounding-type attachment plug cap and receptacle of proper rating may serve as a disconnecting means.
- **When more than one piece** of radiographic x-ray equipment is operated from the same high-voltage circuit, each piece or each group of equipment as a unit must be provided with a high-voltage switch or equivalent disconnecting means. This disconnecting means must be constructed, enclosed, or located so as to avoid contact by employees with its live parts.
- **X-Ray equipment must** be provided with a means to indicate when it is energized unless the equipment is effectively enclosed or is provided with interlocks to prevent access to live current-carrying parts during operation.
- **Each area where high radiation x-rays are** located must be equipped with a control device which must either cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirems in 1 hour upon entry into the area, or it must energize a conspicuously visible or audible alarm signal in such a manner that the individual entering and the supervisor of the activity are made aware of the entry. In the case of a high radiation area established for a period of 30 days or less, such control devices are not required.
- **The limit of employee exposure to rems** (roentgen equivalent man) produced by radiographic x-ray equipment must never be exceeded. The limit for the whole body, head and trunk, active blood forming organs, lenses of the eyes, or gonads is 1 ¼ rems. The limit for hands, forearms, feet, and ankles is 18 ¾ rems. The limit for the skin of the whole body is 7 ½ rems.
- **The limits are for exposure** to the concentrations specified for 40 hours in any workweek of seven consecutive days. In any such period where the number of hours of exposure is less than 40, the limits specified may be increased proportionately. In any such period where the number of hours of exposure is greater than 40, the limits specified must be decreased proportionately.



Conclusion: Radiographic x-ray producing equipment should only be used for its specifically intended purpose. Always use x-ray equipment in the manner which it was designed to be used. Utilize these safety guidelines when working with or near radiographic x-ray equipment in the workplace.

Work Site Review

Work-Site Hazards and Safety Suggestions: _____

Personnel Safety Violations: _____

Employee Signatures:

(My signature attests and verifies my understanding of and agreement to comply with, all company safety policies and regulations, and that I have not suffered, experienced, or sustained any recent job-related injury or illness.)

Foreman/Supervisor's Signature: _____

These guidelines do not supersede local, state, or federal regulations and must not be construed as a substitute for, or legal interpretation of, any OSHA regulations.