

rays are generated, but also persons present in adjoining quarters, if the walls, ceiling and floor of the radium- or roentgen-room are not properly insulated with lead or other absorbing material preventing the penetration of primary and secondary roentgen-rays.

Often repeated occupational exposures to usually more or less small doses of roentgen-rays sustained over prolonged periods occur in several occupations. There are first the individuals engaged in the manufacture and testing of roentgen-tubes who are apt to be subjected to such hazards (male and female workers engaged as technicians, engineers, physicists, testers) (Laborde and Leclercq). Roentgen-rays are produced during the manufacture of roentgen-tubes, especially when the tubes are evacuated, a procedure requiring several hours, during which an electric current of high tension is passed through the tubes (bombardment of the thermionic valve). Workers engaged in this operation are exposed to roentgen-rays if not protected by lead shields of proper thickness corresponding to the tension of the electric current applied. During the early years of the roentgen-tube industry when the dangers connected with the exposure to roentgen-rays were not adequately known and appreciated, it was a common practice among the men testing the new roentgen-tubes for proper hardness of the rays produced to use their left hand for a test object. Occupational exposure to roentgen-rays is sustained by physicists, engineers and mechanics engaged in the construction, installation and repair of roentgen-apparatus. Similar and even greater hazards existed, particularly during the early period of roentgenology, for physicians, dentists, technicians, and nurses using roentgen-rays for diagnostic and therapeutic purposes. In spite of numerous and effective precautionary measures introduced, the danger from exposure to secondary rays, especially during the performance of fluoroscopic work, still persists to a certain degree, while the introduction of shielded tubes, lead glass screens, and remote control has removed largely any exposure of the operators to direct irradiation, particularly during the administration of roentgen-therapy.

The application of roentgen-rays in modern industry for radiographic and spectroscopic examinations has widened greatly during recent years the circle of potentially exposed individuals, such as metallurgic engineers, plumbers, builders, ammunition experts, textile chemists, crystallographers, physicists, industrial engineers, rubber chemists, automobile tire testers, experts of pearls, diamonds, and paintings.

Some of the apparatus designed for industrial purposes are portable apparatus which are set up wherever needed, while others are large, stationary roentgen arrangements of industrial laboratories using powerful, high voltage apparatus. The degree of hazard to which the operators of roentgen-equipment of industrial laboratories are exposed evidently depends to a large extent upon the working conditions present, that is, the type and amount of precautionary measures taken or possible under the circumstances prevailing. The