luminous paint to dials, by which hand painting could be eliminated. He also noted that these new methods required each worker to handle twice the quantity of radium, with an evident tradeoff between reduced ingestion and increased risk from external radiation.

The investigation of the 31 plants revealed only some 250 workers who were directly exposed to radioactive material at the time of the visits. The investigators estimated that during the 16 years of luminous dial painting in the United States, fewer than 2,000 individuals had been involved in the work (Stewart 1929).

A description of the working conditions in the dial painting industry, after the tipping of brushes by mouth had been stopped, is available from a survey made of a number of plants (Bloomfield and Knowles 1933). The dial painters were reported to have used 50-500 μg of radium each day, and their measured external radiation dose was found to be 0.7-46 cGy/yr in the various plants. The average radon level in the plants was 51×10^{-8} Ci per 10 m^3 of air (approximately 10 m^3 of air is inhaled in a working day) or 51 pCi of radon per liter; the dust in the air contained 26×10^{-10} Ci of radium per 10 m^3 or 0.26 pCi of radium per liter. These values are useful for comparison with other potential sources of radon and radium contamination.

The dial workers were not the largest of the radium-exposed populations, but individuals who worked in the dial painting industry have been the easiest to find and study for several reasons. The publicity that arose when the hazards of the industry were realized brought to the attention of the public and the workers the potential hazard of dial painting. Further, all industrial concerns maintain employment records, and these records, when available, have been an important source of names of employees. Also of value was the fact that the employees knew many of their coworkers and were able to identify them when employment lists were not available. Company photographs also proved to be useful in tracing employees, because individuals identified in a given picture often knew the names of others present when the photograph was taken (Figure 6).

For reasons like these, the largest known group of radium-exposed individuals is the dial workers; for epidemiologic purposes the female workers are the most valuable. Most of the workers were female, and many of them were of similar age when they were first hired. Table 1 summarizes the numbers of the workers in the industry who had their radium body contents measured, grouped by the time of first employment. Table 1 also gives the average age at employment and the average initial systemic intake of ^{226}Ra of those hired in each time period.