In addition, 2,781 women were identified as being exposed to radium but were never measured. Of this group 893 are known to be deceased. Among the deceased are 49 deaths coded to breast cancer. Thirty-five of these deaths, or 71%, were among dial painters. In this unmeasured group, 1,544 women (56%) were known to have been dial painters. However, an additional 755 women are not identified as to the type of radium exposure; they had 9 of the 49 breast cancer deaths. Thus, the true numbers of dial painters and breast cancers among dial painters are not known. (This unidentified group is from the U.S. Radium Corporation plant at Bloomsburg, Pennsylvania.) Nevertheless, the dial painters apparently had more breast cancer deaths than would be expected by their number in the exposed population.

The observations on female breast cancer can be extended to include incident cases by means of the SNOP file. The file contains information on a total of 265 radium-exposed individuals who were diagnosed with breast cancer. Of these, 245 were dial workers; of the dial workers, 212 were dial painters. The total number, 265, is three times the number (86) of measured and unmeasured breast cancer deaths. Without doubt, breast cancer is elevated among the radium cases, but the cause is unknown.

As indicated earlier, the SNOP file is incomplete. For example, death certificate records indicate that 67 dial painters died as a consequence of breast cancer (32 measured and 35 unmeasured cases), but only 28 of these are listed in the SNOP file. If less than half (28 out of 67) of the individuals who died from breast cancer are in the SNOP file, then the true number of incident cases may be much greater than the 265 cases discussed above. With time and manpower, all of the medical files of each of the more than 6,000 radium cases could be examined to bring the SNOP file up to date, not just for breast cancer but for all conditions listed.

Leukemias

Radiation-induced leukemias are known to appear shortly after exposure, are known to be easily induced when red marrow is the target, and have been an expected consequence of radium deposition in bone. However, they have not been seen in excess in any cohort of radium cases. The definitive study of leukemia incidence in female radium dial workers was published by Spiers et al. (1983), who examined a population of 2,696 female dial workers who started work before 1970. Nine leukemias were found, while the expected number from natural causes was 7.97.