(Stehney and Lucas 1956). This method substantially improved the accuracy of the estimation of retained body burden of radium. Previous measurements of the radon collected in a 1-L flask required an assumed respiratory volume. The new method was first tested by Lucas in 1950. The basal metabolic rate mouthpiece and the helmet originally used were considered unsuitable for the collection of data from large numbers of elderly individuals, and a new system was devised that used well-designed, easily sterilized face masks and pressure-assisted breathing (Lucas 1991).

The radium content of an individual was measured in 1950 by the method developed by Evans, in which a Geiger counter was placed directly behind the seated subject. Marinelli proposed that the Geiger counter be replaced by the recently developed NaI(Tl) crystal. Further, he suggested that the spectrum of gamma-ray energies detected by the crystal be examined to determine the region where the best signal-to-background ratio could be obtained.

Both of these concepts had the potential to increase markedly the sensitivity of the measurements, but neither could be applied without considerable effort. Sodium iodide crystals were not readily available, and those acquired (primarily from the Harshaw Chemical Company, Cleveland, Ohio) were small and often flawed. Further, although these crystals produced light flashes proportional to the gamma energy lost within the crystal, the electronic circuitry required to analyze and count the light pulses was unavailable.

Single-channel pulse height analyzers were designed and built by using the facilities of Argonne's Instrumentation Division, located at that time at Site A in the Argonne Woods Forest Preserve. The RPY Division and the BIM Division were in 1950 still located at Site B. C.E. Miller headed a team consisting of H. May and Rowland, who were moved to Site A to build and test three single-channel analyzers that saw years of use for radium and many other types of measurements.

Subsequently, both Miller and May worked to seal the NaI(Tl) crystals in aluminum cans suitable for analysis. They developed close relations with the Harshaw Chemical Company, which brought the RPY Division larger and better crystals. The growth of crystal size with time allowed two crystals used in 1952, one 1.25 in. in diameter by 0.5 in. thick and the other 1.25 in. in diameter by 2 in. thick, to be replaced in 1956 by a crystal 8 in. in diameter and 4 in. thick.

In 1952 the RPY Division purchased a set of four multichannel analyzers from the Canadian Marconi Company (location unknown). These