curve expected for the mixture of neptunium L x-rays was constructed from an extrapolation of known L x-ray energies tabulated by Compton and Allison[13] and the relative intensities given for uranium by Allison.[14]

Using the counting efficiencies assumed in the above discussion the neptunium L x-rays are emitted in ca. 100 percent of the alpha disintegrations and the 62 kev gamma rays, in ca. 60 percent.

Internal conversion of a gamma-ray whose energy is insufficient to excite the K electrons (binding energy, ca. 120 kev) may take place in the L shell where the binding energy is much less (ca. 24 kev), if enough energy is available. The subsequent occupation of the vacant L electron state by another electron is accompanied by the characteristic L x-radiation of the product element. The energy of the electrons in the case of the conversion of 62 kev gamma rays is about 35 kev. Such electrons are not energetic enough to pass through the 3 $mg.cm.^{-2}$ mica window of the Geiger tube described above and would not have been detected.

The half-life of americium has been determined by Cunningham[15] to be 510 ± 20 years. The value is based on specific activity measurements carried out on the ultra-microchemical scale.

III. Nuclear Properties of Am^{242}

The production of Am^{242} by the thermal neutron irradiation of Am^{241} has been mentioned in Section II. The existence of the isotope was first indicated by the formation of an isotope of curium (at. no. 96), Cm^{242}, under conditions expected to result in the formation of Am^{242}, i.e., the radiative capture of thermal neutrons in Am^{241}. The emission of negative beta particles, in Am^{242}, with a half-life short compared to the total time of irradiation, results in the observation given above.