The first detection and half-life measurement of the actual process of beta particle decay of Am^{242} was achieved by Manning and Asprey in samples investigated soon after termination of irradiation in the Argonne pile.(10) A decay curve obtained in recent experiments at this laboratory is given in Figure 6 for the Am^{242} beta particles. A long-lived background activity is present due to the electromagnetic radiations from Am^{241} and the radiations arising in a long-lived isomer of Am^{242} to be described later. The predominant activity due to 17-hour Am^{242} consists of the beta particles whose aluminum absorption characteristics are shown graphically in Figure 7. <Fig. 6 <Fig. 7

A sample of thermal-neutron-activated Am^{241} was carefully purified and allowed to stand for several months. At the time of purification the 17-hour Am^{242} should have been completely gone from the sample. A combined plutonium and neptunium fraction was then removed from the sample and purified by oxidation-reduction cycles. Samples of the neptunium-plutonium fraction were observed to contain beta-particle activity which decayed with a 2.0 day half-life. The aluminum absorption characteristics of the beta particles were entirely consistent with those of Np^{238} (16) whose half-life is 2.0 days (Figure 8). <Fig. 8

Np^{238} is a "shielded" isotope in the sense that it is not produced by either negative beta particle emission or by orbital electron capture, the hypothetical parents of Np^{238} by these processes being Pu^{238} and U^{238}, respectively. Each of these is stable with reference to the process by which it would produce Np^{238}. Since the Np^{238} was observed to grow in the irradiated americium sample, a long-lived Am^{242}, decaying by the emission of alpha particles must be responsible:

$$Am^{242} \xrightarrow[long]{\alpha} Np^{238}.$$

After allowing time for restoration of the Am^{242}-Np^{238} equilibrium