We were fortunate that the separation efficiency of our crude "K^- beam" system was so poor that it let in large numbers of negative pions, as well as some negative muons. That permitted us to be the first to see the now well-known "muon-catalyzed fusion reactions." We thought at first that we had discovered a new particle that decayed into a muon, but it was soon apparent that the negative muon was forming a tightly-bound p-d-μ molecular ion, in which the p and d quickly fused to make ^{3}He plus energy, which internally converted to eject the muon, so the process could be repeated. (We found two cases in which successive fusions were catalyzed by the same muon.)

We were surprised to see the reaction happen so very often in our "pure" hydrogen with only one part deuterium per 5000 ordinary hydrogen atoms. The answer was that the reduced mass effect had the proper sign to make muons captured on protons become neutron-like objects which quickly transfer muons to deuterons at their first collision. The μ-d system then quickly captured another proton to form the molecular ion. We thought for an exciting hour that we might have solved the energy problems of the world by going to very low temperatures, where conventional wisdom said one had to go to many millions of degrees. Although we were quickly disabused of that motion, a recent resurgence in interest in catalyzed fusion has centered on experiments with d-t fusion, and several groups have found surprisingly high yields of 14 MeV neutrons per negative muon. Steve Jones, at Los Alamos, finds an average number of catalyzed reactions of the order of 150 per muon. Since each reaction yields 17 MeV, the energy released is thus about 2.5 GeV, which is within a factor of about 10 of what it takes to produce a muon. So we were originally over-optimistic, but not by such a large factor as we've thought for the past 29 years.

Before the 10-inch chamber was operated, I became convinced that if we were ever to do the kind of strange-particle physics that liquid hydrogen chambers should permit, we'd need a very large chamber. My first guess was 50 in. by 20 in. by 20 in., but I soon realized that because of the magnetic field, the particles would fan out more in the horizontal direction than the vertical. So we could exchange some unneeded depth for extra length, and the chamber