produce Ar^{37} at these low levels in a tank of perchlorethylene in an undergound mine; these other effects constitute an undesirable background. Alvarez[4] made a thorough analysis of these unwanted effects in his original proposal some years ago. In general, background effects may arise from cosmic ray muons, from fast neutrons from the surrounding rock wall, and from nuclear reactions arising from internal contaminations in the liquid.

Cosmic ray background effects underground arise by the $Cl^{37}(p,n)Ar^{37}$ reaction from the protons produced in muon interactions. The magnitude of this background effect can be calculated from measurements made at a depth of 25 m.w.e.[5] where the nucleonic component is essentially eliminated, and the Ar^{37} is produced by muons. At this depth an Ar^{37} production rate of 210 atoms per day was observed in 3000 gallons of CCl_4. Below this depth the Ar^{37} production should decrease with the product of the muon intensity and the cross section for star production by muons. The following table lists the muon intensities[6] and cross sections[7] used to calculate the Ar^{37} production by muons at 1800 and 4000 m.w.e.

Table I

Depth below surface, m.w.e.	Muon intensity μ's cm^{-2} sec^{-1} $ster^{-1}$	Muon star production cross section, cm^2/nucleon	Ar^{37} production rate per day for 10^5 gallons C_2Cl_4
25	2×10^{-3}	3×10^{-30}	6500 (measured)
1800	2×10^{-7}	17×10^{-30}	3.5
4000	6×10^{-9}	22×10^{-30}	0.14