than 0.4 atoms per day. Whereas the above analysis would predict a rate of 1.3 Ar^{37} atoms per day in 16,000 liters of tetrachloroethylene. Additional measurements will be performed to derive a more accurate value for the muon background effect in the 380,000 liter detector. However, for the present we must use a rate of 0.06 Ar^{37} atom per day as the best estimate of the cosmic ray background. The upper limit on the Ar^{37} production rate of 0.5 atom per day upon which the limit for the solar neutrino flux is based, is then a factor of 8 above the cosmic ray background.

The next most serious background effect arises from fast neutrons (energy above 1 MeV) produced by spontaneous fission of uranium and (α,n) reactions in the surrounding rock wall. These neutrons penetrate the wall of the tank producing protons by the $Cl^{35}(n,p)S^{35}$ reaction, which then form Ar^{37} by the $Cl^{37}(p,n)Ar^{37}$ reaction. The rock in the tank room is low in uranium and thorium. Measurements of various samples of the rock by gamma scintillation counting gave the following compositions: uranium 0.2 to 5 ppm and thorium 1.3 to 24 ppm. The magnitude of this fast neutron background effect has been measured with a radiochemical fast neutron detector. Neutron detection depends upon observing Ar^{37} produced by the $Ca(n,\alpha)Ar^{37}$ reaction. The detector consists of flat tanks (60 cm by 90 cm and 10 cm thick) containing a calcium nitrate solution (20 percent Ca). Argon-37 is removed by purging the tanks with helium. The argon is purified and counted as already described. The efficiency of this detector and that of a similar tank filled with tetrachloroethylene has been measured with Pu-Be neutron source. The efficiencies were as follows: calcium nitrate tank 3×10^{-3}, and tetrachloroethylene tank 2.4×10^{-7} atoms Ar^{37} per neutron. Measurements were performed with the neutron detectors in the room prior to building the 380,000 liter tank. The fast neutron background effect for the large tank was then estimated from its