Future Plans

In past experiments the tank was exposed for periods of several ^{37}Ar half lives to obtain a rate nearly equal to that of secular equilibrium. Since the data obtained indicate that there may be fluctuations in the ^{37}Ar production rate, it is desirable to make shorter exposures and thus define more closely the time of any fluctuation. We believe it is possible to make measurements every 35 days with counters that have backgrounds that are nearly zero for ^{37}Ar-like events. For a period of one year we plan to purge the tank every 35 days, and to search for possible fluctuations. This procedure will have the added advantage of essentially doubling the number of recorded counts per year which will result in a higher statistical accuracy in the ^{37}Ar production rate. Run no. 40 is the first run in this series, five runs have been made to date.

The cosmic ray background of 0.08 ^{37}Ar atoms/day (equivalent to 0.4 SNU) is an important correction that must be applied to the measured ^{37}Ar production rate in the solar neutrino detector. We plan to perform a series of measurements with tanks of C_2Cl_4 and also with a radiochemical fast neutron ^{40}Ca detector at various depths underground to obtain a better value for the cosmic ray muon background. In addition direct measurements of the ^{37}Ar production by muons have been made using accelerator beams at 8.5, and 200 GeV.

Jacobs[10] has proposed that neutrinos are not detected by the present solar neutrino detector because the ^{37}Ar produced by neutrino capture does not rapidly become a neutral argon atom, but is chemically bound or retained in polymers. Although these argon binding processes are extremely unlikely,[11] an experiment testing their existence is in progress. Tetrachloroethylene labeled with ^{36}Cl (7 millicuries) has been synthesized and will be placed in a 50-liter iron tank to measure the rate of generation of ^{36}Ar. Periodically the tank