Discussion

The upper limit of 1.7 SNU given above can be compared to the rate calculated for the standard model of 5.8 SNU $\pm$30%. The low Z model[5] forecasts a rate of 1.4 SNU that is consistent with our result. Several authors have discussed the reasonableness of the low Z model in terms of the evolution of the solar system[6] and the possible collection of high Z matter on the solar surface from the galaxy.[7] There are many other solar model calculations that give low solar neutrino fluxes. These models and other possible explanations of low neutrino fluxes are discussed in various excellent review articles.[8]

It is of interest to note that a number of the experimental runs were timed to search for neutrino fluxes from astronomical events. Run no. 32 was performed to search for a neutrino flux corresponding to the unique pulse recorded by Lande and his associates in their water Cerenkov counters in the Homestake Mine.[9] We concluded from our measurements that if the set of pulses observed by the water Cerenkov counters were produced by anti-neutrinos, then the flux of neutrinos was lower by at least a factor of four.[9] Since the large solar flare of August 2, 1972 occurred during the exposure period of run 27 we decided to search for increased ^{37}Ar production which might result from the large solar flare of July 15, 1974. However, run 35, which corresponds to this flare, is one of the low ones, but with a large statistical error. Run no. 38 was performed to search for a neutrino flux from Nova Cygnus 1975. If we assume the 36 atoms observed in run 38 were produced by this event, we estimate an integrated flux of neutrinos of 6×10^{10} cm^{-2}. For this estimate we have used a neutrino capture cross-section of 3×10^{-40} cm^2, the average cross-section for neutrinos with a Maxwell-Boltzmann energy distribution having an effective temperature corresponding to kT = 10 MeV. This is not a very meaningful limit since current thinking on nova bursts does not consider a nova to be an intense pulsed neutrino source.