background effect from (α,n) reaction with sulfur is negligibly small, approximately 10^{-5} Ar^{37} atom per day.

It has been concluded from this examination of background processes that the sensitivity of the experiment can be improved by a factor of at least five without being limited by known background processes. The most serious restriction is from cosmic rays, and work is in progress to better evaluate the magnitude of this background.

There are several possible means of improving the over-all sensitivity of Ar^{37} detection. These may be listed as follows.

1. Lower counter backgrounds by performing the measurements underground. An appreciable part of the counter background could arise from gamma radiation from the environment, and from cosmic ray interactions. If it is shown that the background arises from internal beta contamination, it will be necessary to find pure materials or use more careful cleaning techniques during counter assembly.
2. Use smaller counters with a correspondingly lower background counting rate. The size of the counter is now limited by the volume of the argon sample that is counted (0.5 cm^3). Most of this volume is air argon that arises either from inleakage of air, or from sources within the tank. Sources of this air argon are being actively sought. However, in the event that this source cannot be eliminated then one could consider argon isotope separation to remove the Ar^{40}. The isotopes of argon could be separated by gas phase chromotography using a sufficiently long charcoal column.
3. Employ various techniques to distinguish the Ar^{37} decays from background processes that may arise from the walls of the counter. The possibilities are: (a) use an internal anticoincidence counter; (b) provide a grid