in the liquid into the helium gas phase.

Helium in the tank is circulated through an argon extraction system and returned to the tank. Again, flow is maintained by a pair of eductors operating from the liquid pumping system. These provide a helium flow rate through the argon extraction system of 310 liters per minute. The components of the argon extraction are shown schematically in Figure 1. Helium leaving the tank first passes through a baffled condenser at -40°C to condense the bulk of tetrachloroethylene vapors. The remaining tetrachloroethylene or any trace amounts of water that may be present are removed by a molecular sieve (dehydrated zeolite) absorber. Argon is finally removed from the helium by a charcoal absorber held at liquid nitrogen temperature (77°K), and then the helium is returned to the tank.

The apparatus was built 1490 meters underground (approx. 4400 m.w.e.) at the Homestake Gold Mine at Lead, South Dakota, U.S.A. The arrangement of the tank, pumps and argon extraction system in the mine is shown in Figure 2. The tank was set below the access tunnel, and a water tight door was provided between the tank chamber and the pump room. This arrangement permits flooding the tank chamber with water to form a fast neutron shield around the tank. Background effects from cosmic ray muons, fast neutrons and internal natural alpha emitters will be discussed later.

Ar^{37} Recovery Efficiency Tests

The recovery efficiency of the system for removing argon from the liquid was tested by two methods. A measured volume of isotopically pure Ar^{36} was placed in the tank by introducing it into the helium gas stream at the point shown in Figure 1. It was then dissolved in the liquid by operating the pumps and eductors. The Ar^{36} was recovered from the tank by operating the system at the fixed helium gas flow rates stated earlier.