

## NuSAG Questions for Braidwood

June 21, 2005

- 1) It seems that the  ${}^9\text{Li}$  background is one of the most difficult ones. KamLAND experience suggests that the probability of  ${}^9\text{Li}$  formation (as well as high multiplicity neutron production) is much larger for the relatively rare “showering muons” (more than  $10^6$  photo-electrons in KamLAND) than for the “standard muons.” Thus, if one can separate the two classes of muon events, one can (as in KamLAND) veto the showering ones much longer, thus reducing the  ${}^9\text{Li}$  background substantially. Can this be done in your detector?
- 2) Expand on the background expected from  ${}^9\text{Li}$ . KAMLAND has a number but how does it extrapolate with depth (muon energy)?
- 3) Some data are presented for the variation of absorbance vs. time for Gd-loaded scintillators. Are data available for possible deterioration of the scintillation light output of the scintillator vs. time?
- 4) As an exercise and to understand the importance of various overburden patterns, please provide a calculation of the background for twice as much overburden over the far detector as was assumed so far. (This is NOT a suggestion to go deeper!)
- 5) What are the safety considerations related to moving a detector full of scintillator on the surface?
- 6) What are the safety considerations relating to (lack of) escape routes in the shafts?
- 7) Does the cost quoted for the civil engineering of the shafts include all safety precautions for personnel working underground? A similar exercise for a shallower shaft at CERN was estimated at around \$30M for a single shaft.
- 8) Please provide some information that will indicate the ruggedness of the engineering to make it possible to move the detectors between sites. How big are the expected dynamic loads encountered during movement compared to the static loads that enter for the normal engineering design?
- 9) What detector parameters (volume? PMT gain? energy calibration? other?) must remain constant, and to what level, when the detectors are moved for this cross-calibration to work?