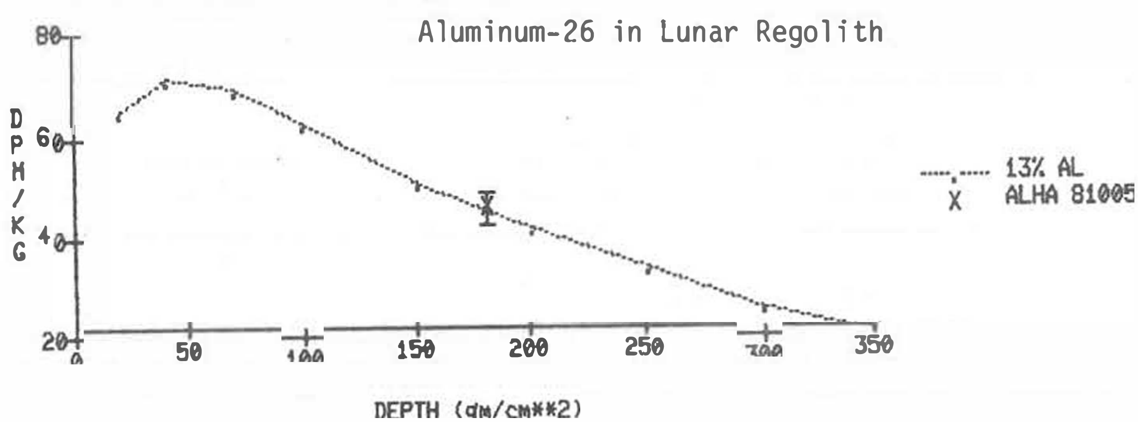
ALUMINUM-26 CONTENT OF ALHA 81005. J. C. Evans and J. H. Reeves, Geosciences Research and Engineering Department, Battelle, Pacific Northwest Laboratories, Richland, Washington 99352.

Since it was determined in preliminary examination that ALHA-81005 may be of lunar origin, there has been considerable interest in its recent cosmic ray exposure history. If the meteorite is of achondritic origin it is likely to be saturated in ^{26}Al at 100-130 dpm/kg.[1,2] Conversely, if the sample was excavated from the moon by a large impact, the exposure age should be very short before recapture in the earth-moon system. As part of the preliminary examination effort, the 23 gm main mass of the sample was hand-carried to Richland, Washington for one week of nondestructive gamma ray analysis at the Battelle Northwest multiparameter gamma ray spectrometry laboratory. One week of counting yielded an ^{26}Al content of 46 3 dpm/kg. This result is intermediate between the two possible cases discussed above and is thus subject to a variety of interpretations. The situation is further complicated by the possibility of long terrestrial age since it is an Antarctic specimen. In order to sort out the full bombardment and decay history of this unique sample, several other isotopic measurements such as ^{36}Cl, ^{10}Be, and ^{53}Mn will be required. The ^{26}Al measurement is consistent with the following interpretations.

1. Achondritic origin--
   In this case the sample either has a relatively short cosmic ray exposure age (500,000 y) or a very long terrestrial age (1.1 m.y). The latter is a bit unlikely since the longest terrestrial age seen to date is only 700,000 y.[3] Obviously some combination of the two is also possible.

2. Lunar origin--
   Several possibilities exist for a lunar origin. The sample could simply have been saturated at shallow depth on the moon and spent a short time in space and in the ice. That situation is illustrated in Figure 1.[4] The sample would be excavated in that case from a depth of only one meter which is rather shallow for an impact large enough to throw it into space. If excavated from a significantly greater depth then the situation becomes essentially the same as for the achondritic case, i.e., a time in space of at least 500,000 y which does appear a bit long for a spatial residence time of lunar ejecta.



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The ^{26}Al content measured in this sample is thus a bit improbable for either a lunar or achondritic origin. Additional measurements of other isotopes should therefore prove extremely interesting.

References

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