Appendix A

The AVR was designed for an operating life of 3 years, not the 20 it turned out to be. The main purpose was to establish the feasibility of a continuously fuelled reactor. It was not instrumented to measure core exit temperatures and the existence of bypass flows was not considered important in this application. Analysis methods at the time were still crude and the hot gas temperature was estimated from the measured cold gas inlet temperature. Although some attempts were made to obtain a more accurate estimate, it still depended on not optimally placed thermocouples and the bypass flow prediction needs complicated 3-dimensional modelling only possible since the advent of supercomputers and other techniques.

Hot spots in reactors are defined as small areas of relatively high power compared to the average. In LWR's, these need to be prevented as it can cause local fuel cladding failure. For HTR's with ceramic fuel, this is of lesser importance since the graphite material as well as the fuel can withstand large temperature differences. In pebble bed reactors, the random movement of spheres can cause small power deviations, but analysis has shown these to be of minor importance.

For over 30 years, the German fuel manufacturer has continuously improved the quality of the coated particle fuel. This was done by reducing the amount of free uranium in the graphite, by switching from BISO to TRISO fuel and by improving the quality of the SiC layer in the TRISO fuel. The latest fuel was tested for the HTR Modul and from 88 000 particles not a single one failed in the irradiation test. PBMR fuel is to be manufactured to the same standard as the latest German production fuel.