

Kashiwazaki–Kariwa, IC failure due to electro migration

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In 2001 a failure of control rod transponder circuit boards at Kashiwazaki-Kariwa Nuclear Power Station Unit 5 (Japan) rendered the control rods inoperable. Following detection of the defective cards, an analysis revealed that the failure mechanism was aluminium wire breakage in the ICs caused by electro migration (the transport of metal atoms induced by high electric current). Aluminium grain size was too small which increased susceptibility to electro migration. The affected ICs had been manufactured between 1985 and 1990.

Failure analysis methods and manufacturing quality control and testing have been improved. This effect is potentially more significant in more modern ICs where the level of miniaturisation is much greater.