



Lab. No. CR-2005-00058

23 March 2005

### REPORT ON THE CARDOX SYSTEM

I, Dr Tay Ming Kiong, Analyst, certify that at about 9.50 a.m. on the 14th day of March 2005, there were submitted to the Centre for Forensic Science by Mr Walter Fernando of Ureka Asia Pte Ltd, an application, dated 11 March 2005 for approval for the use of the "Cardox System". Mr Walter Fernando brought several documents describing how the system functioned and prior approvals accorded in the United Kingdom.

The supporting documents included:

- 1) Cardox International Limited Product Brochure describing the high pressure rock/concrete breaking system
- 2) Cardox and Hydrox Approval No. 101 HSE(M) File Reference L.11.7/1 dated 13 October 1995 issued by Health and Safety Executive under the Health and Safety at Work etc Act 1974, The Mines and Quarries Act.
- 3) Charging of Cardox Tubes Underground, a memo dated 6 December 1998, issued by Mr B Langdon, HM Inspectorate of Mines Chief Inspector.
- 4) Certificate on Cardox Cartridge F57, Certificate Number RSACS/0311486/2, dated 11 August 2003, issued by Royal and SunAlliance Certification Services
- 5) Tests on Cardox for the Reinstatement of Approval for use in Coal Mines, dated October 1990, issued by D H Pickering of HSE Research and Laboratory Services Division.

On studying the above documents, the Cardox System was found to be based on a tube containing liquid carbon dioxide which is electrically heated to produce high pressure gaseous carbon dioxide. This expanding gas cracks and breaks rock, concrete or other material along natural and/or induced fracture lines or drilled holes. The tube can be recharged and re-used. The Cardox System is therefore based on high pressure due to rapidly expanding carbon dioxide and does not contain high explosives or low explosives. The Cardox System does not contain explosives as defined in the Singapore Arms and Explosives Act, Chapter 13.

The Cardox System should be transported, stored and used by suitably trained and qualified professionals in the right conditions.

This report was handed to Mr Walter Fernando  
at 1145 a.m/p.m on 23-3-05

Mdky  
Dr Tay Ming Kiong  
Criminalistics Laboratory

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