

VIROTEC

**A TEN-YEAR STORY
OF SUCCESS**

**IN ENVIRONMENTAL
REMEDiation**

Lee Fergusson



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1. INTRODUCTION TO VIROTEC

1.1 History and corporate profile

This book was originally published as a research paper titled: “Commercialisation of environmental technologies derived from alumina refinery residues: A ten-year case history of Virotec”, and formed part of the ATF-06-3 project on the “Management of Bauxite Residues” for the Department of Resources, Energy and Tourism (DRET), Commonwealth Government of Australia. As such it also represented part of the overall commitment of the Australian Government towards the Asia-Pacific Partnership on Clean Development and Climate as it related to the management and reuse of caustic alumina refinery residues (ARR).

The purpose of the book is twofold: firstly, to present a technical and operational overview of the technologies of Virotec, including commercial development pathways and case examples of applications; and secondly, to provide an overview of environmental and waste treatment problems in the Asia-Pacific region, and to project the volumes of chemical reagents and ARR required to treat them. Virotec thus provides a concrete example of how to commercialise environmental remediation and waste treatment technologies derived from the conversion and safe reuse of ARR. Since 2000, Virotec has researched, developed and commercialised a range of technically engineered environmental and industrial waste solutions derived from utilising and augmenting the specific physical and chemical properties of alumina refinery residues. These solutions provide evidence of how a sustainable industrial future can be achieved through the conversion and reuse of this type of solid waste.

In order to coherently chronicle the ten-year commercial trajectory of Virotec, this book explores the operational and commercial origins (Section 1) and technical origins of the company, highlighting early successes and research (Section 2). The document charts the steps Virotec has taken to move beyond research and development into successful business operations. As a result of this commercialisation, Virotec provides environmental and waste services in the following four industry categories: 1) ViroFlow Technology, which treats contaminated industrial wastewater, and treats and reclassifies hazardous industrial solids, sludges and sediments; 2) ViroSoil Technology, which treats heavy metal and hydrocarbon-contaminated soils, and remediates and revegetates contaminated industrial sites; 3) ViroMine Technology, which treats solid and liquid waste generated from mining, including tailings dam wastewater, waste rock and tailings, and revegetates mine sites; and 4) ViroSewage Technology, which treats municipal sewage effluent and biosolids, and creates compost. As will be shown in this book, Virotec’s technologies also treat obnoxious odours, industrial gaseous wastes, stormwater, and a range of other environmental problems and wastes across many diverse industries.

At the heart of the book, Sections 3, 4, 5 and 6 highlight a number of particularly intractable environmental problems and present a series of industrial case studies, which together summarise the various industrial and municipal applications of Virotec’s four technologies. Section 7 provides a summary of other industrial areas of developmental interest to Virotec, and Section 8 documents the main types and volumes of waste generated by or currently stockpiled in Australia, Canada, China, India, Japan, South Korea and the United States of America (members of the Asia-Pacific Partnership) and projects the volumes of chemical reagents derived from ARR that would be required to effectively treat the waste.

Virotec began operations in 2000. Prior to that time, Virotec was a mining company, Tin Australia Ltd, with mining and lease interests in Queensland and New South Wales. Following the successful treatment of one of its tailings dams using newly trialled technology derived from ARR in 1999-2000, Virotec focused its efforts on researching, developing and commercialising the technology, which initially centred on the treatment of mining wastewater. Virotec has since become a leader in providing effective, sustainable solutions which deal with intractable environmental remediation and waste treatment problems (Gold Coast City

Council, 2006; Fergusson, 2007a). Its proven, patented technologies enable companies and public utilities to meet strict government regulatory waste treatment standards, reduce future corporate and social liabilities and help safeguard the environment. Virotec's four technologies benefit many different industries, including mining and metals processing, metals finishing and other manufacturing industries, municipal sewage and biosolids treatment, property development and marine dredging, and timber preservation. Virotec's products and services have gained regulatory approval in Australia, Italy, Laos, Portugal, South Korea, United Kingdom and the United States of America (e.g., Thomas, 2004).

Until 2008, the Virotec business operated through a group of companies which was headed by a London-based, publicly listed company on the London Stock Exchange trading under the symbol "VTI" (Trench, 2004). As a result of a corporate takeover of the company's parent, Virotec International plc, by the Hydrodec Group plc in June 2008, Virotec became a management-owned company with offices in Mobile, Alabama (USA), Gold Coast (Australia), and Newcastle (United Kingdom). Virotec had "spun-off" other non-core sustainable technologies into several companies, including ImperativePlus Pty Ltd, an advisory firm which helps other companies build corporate and operational sustainability (Moncrief, 2007; Wells, 2006a, 2006b) and the Hydrodec Group plc, a UK publicly listed company of the London Stock Exchange, which reprocesses and reuses spent transformer oils using technology developed jointly by CSIRO and Virotec.

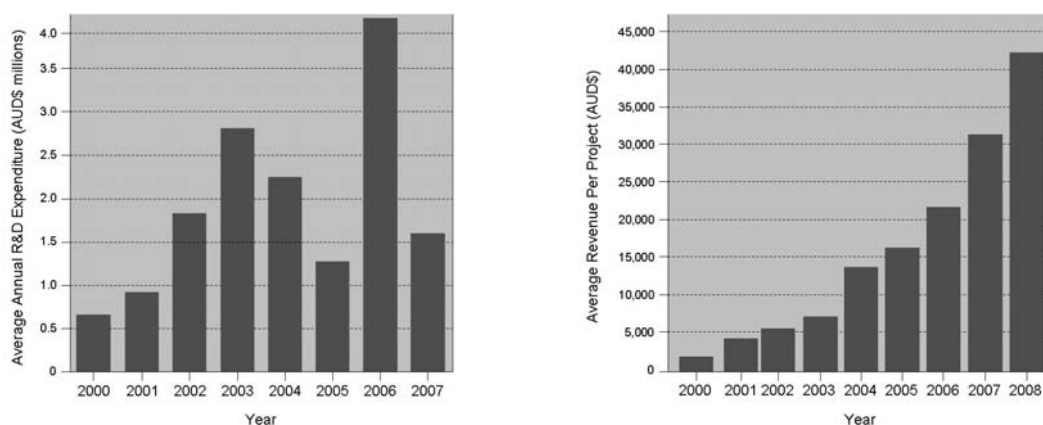


Figure 1 (left): Average annual research and development expenditure on Virotec technologies, 2000-2007 (in AUD\$ millions).

Figure 2 (right): Average yearly dollar value of Virotec projects, 2000-2008 (in AUD\$).

Virotec's business activities include the following elements: a) research and development into more than 20 different sources of ARR from around the world; b) a global initiative to reduce the levels and volumes of industrial waste generated from alumina refining; c) sustainability models and programs; d) international publications in refereed, scientific journals and technical papers and presentations; e) regulatory approvals to implement its technologies; f) patent protection for technology innovations; g) development and commercial deployment of discrete environmental remediation and waste treatment technologies organised by market type; and h) the commercial sales and marketing of a range of safe, chemical reagents used in implementing the above technologies.

These and other elements of Virotec's business are presented in Sections 1 and 2. As shown in Figure 1, from 2000 to 2007 Virotec spent a total of \$15.5 million on research and development of its technologies. This figure does not include research and development grants and subsidies from governments and other sources. The majority of this expenditure