

Johnson Matthey plc (Mr John Smith), Lonrho plc (Mr Dave Smith) and Rustenburg Platinum Mines (Mr van Rensburg). Local institutions that provided photographs include Cosmopolitan magazine, the Diamond Information Centre, Miltos Manufacturing Jewellers (Mr Miltos Voyiatzis), and SA Jeweller (Ms Alice Weil). A very special word of thanks goes to Professor Morris Viljoen for providing copies of his photographs and diagrams collected during, and produced subsequent to, his visit to the Noril'sk/Talnakh area of Russia.

I also wish to thank the staff of Mintek for their help and encouragement, particularly the President, Dr Aidan Edwards, and Mr Paul White, the Manager of the Information and Educational Programmes Division, who decided that Mintek would publish this work. Dr Edwards, a long-time friend and colleague, also encouraged me to broaden the scope of this work, and kindly agreed to write the foreword, for which I thank him very sincerely. A very special word of appreciation and acknowledgement must go to Mr Antony Cowey, who undertook the very onerous and time-consuming, but extremely meticulous task of editing the entire original manuscript. My sincere appreciation goes also to Mr Ian Cumming and the staff of the Reprographic Section, whose attention to detail in the typesetting, design, and printing contributed materially to the tone of the entire work. In this regard, I also acknowledge the help of Dr Herman Steyn for so willingly playing 'postman' in conveying the various chapters of the work between Pretoria and Mintek. My thanks also go to Dr Peter Johnson for scrutinizing the scientific veracity of the information in Chapter 4, and to Ms Taryn Biggs for checking the data in Appendix III.

Lastly, but by no means least, my very sincere thanks to my dear wife and family, for their understanding and encouragement during the many long hours that this work consumed, robbing them of time during which we could have pursued much more enjoyable family undertakings together.

C.F. Vermaak

Pretoria  
31 January 1994

CONTENTS

	Page
CHAPTER 1. INTRODUCTION	
1.1. Identification	1
1.2. Early History	1
1.3. Modern Applications	1
1.4. Scope and Standards of this Review	2
1.5. Units	2
CHAPTER 2. SOURCES AND RESOURCES	
2.1. The Republic of South Africa	3
2.1.1. The Merensky Reef	8
2.1.2. The UG2 Chromitite Layer	10
2.1.3. Resources of the Merensky Reef and UG2 Chromitite	10
2.1.4. The Potgietersrus Limb	11
2.1.5. Other Deposits in South Africa	18
Chromitites below the UG2	18
The Insizwa nickel-copper deposits	19
The Uitkomst nickel-copper deposit	19
2.2. Russia	21
2.2.1. The Noril'sk-Talnakh Deposits	23
The layered complexes	23
The deposits	26
2.2.2. The Deposits of the Kola Peninsula	26
2.2.3. Economics	26
2.3. Finland	29
2.4. Zimbabwe	35
2.5. The USA	40
2.5.1. The Stillwater Complex	40
2.5.2. Other PGE Deposits in the USA	43
2.6. Canada	45
2.6.1. The Sudbury Basin	45
2.6.2. The Lac des Isles Deposits	46
2.6.3. Assessment	46
2.7. People's Republic of China	47
2.8. The PGE in the Sedimentary Cycle	49
2.8.1. The PGE in Gold and Heavy-mineral Placers	49
2.8.2. Major Placers of the World	51
The Urals	51
Colombia	53
South Africa	55
Ethiopia	55
Australia and Tasmania	55
The USA	55
Canada	55
The Far East and Oceania	56
The Rest of America	56
2.8.3. The PGE in Argillaceous Sediments	56
2.9. PGE Resources of the World	57
CHAPTER 3. PRODUCERS AND PRODUCTS	
3.1. South Africa	63
3.1.1. The Rustenburg Group	63
3.1.2. The Impala Group	64
3.1.3. The Lonrho Group	66