

WATER RESEARCH COMMISSION

GENERIC SIMULATION MODEL FOR OPENCAST MINE WATER SYSTEMS

Table of Contents

List of Tables	(ii)
List of Figures	(iii)
List of Symbols	(iv)
Acknowledgements	(ix)
Executive Summary	(x)
1. INTRODUCTION	1
2. LITERATURE REVIEW	4
2.1 Physical spoils properties	4
2.2 Water migration through spoils	6
2.3 Pyrite oxidation	11
2.4 Geochemistry of neutralisation	24
2.5 Aqueous phase chemistry	32
2.6 Microbial action	38
2.7 Oxygen migration in the spoils environment	40
3. HYDROLOGICAL ASPECTS OF MODELLING OPENCAST MINE WATER SYSTEMS	54
3.1 Generation of runoff files	55
3.2 Soil Conservation Service (SCS) model	55
3.3 Kinematic flow model	59
4. DEVELOPMENT OF THE GENERIC MINE WATER MODEL	66
4.1 Modelling approach	66
4.2 Conceptual presentation of mine workings	66
4.3 Water balance aspects	71
4.4 Spoils water quality aspects	80
5. GEOCHEMICAL CHARACTERISATION OF OPENCAST MINE SPOILS	105
5.1 Physical and hydraulic properties of spoils	105
5.2 Geochemical tests for the prediction of drainage quality	105
5.3 Practical application to case studies	106
6. DEMONSTRATION OF THE MINE WATER MODEL	124
6.1 Description of Mini-pit	124
6.2 Modelling of pit water balance	124
6.3 Modelling results	128
7. CONCLUSIONS	132
BIBLIOGRAPHY	134
APPENDIX A : PARAMETER TABLES FOR SCS BASED HYDROLOGICAL MODELLING	