The Character, Origin and Significance of the Howards Basalt, within the Cambrian Tyndall Group, Western Tasmania

Helen J. Scott
BAppSc

University of Tasmania

A research thesis submitted in partial fulfilment of the requirements of the Degree of Bachelor of Science with Honours

School of Earth Sciences
November 2000
Abstract

The Howards Basalt forms a minor mafic unit in the basal Lynchford Member of the Cambrian Tyndall Group. The unit is andesitic in character, and occurs most frequently as a monomictic breccia, strongly altered by chlorite, sericite and haematite.

The unit was formed by the eruption of lava both explosively and effusively, in an extensional and subaqueous environment, to produce five main facies.

The Howards Basalt can be geochemically correlated with the Suite III rocks of the Mount Read Volcanics, which include the high K Que-Hellyer footwall volcanic rocks, and the shoshonitic Lynch Creek Basalt.

The Howards Basalt occurs on the Comstock - Mt Lyell prospective horizon, on the same stratigraphic horizon as the Henty deposit. It is also thought to have formed in a similar fashion to the Spillway Basalt, which occupies another favourable horizon. The mode of emplacement of the Howards Basalt unit may have been conducive to mineralisation.
Acknowledgments

😊 First of all I have to thank my supervisors: Dr Jocelyn McPhie & Wally Herrmann
😊 The government for the money (scholarship)
😊 All the other students for putting up with me
😊 The guys at Goldfields – Mike (thanks for the maps, logs and other little bits and pieces), Bruce (thanks for helping me with the saw and the truck) and Scott & Dale (thanks for laying out all that core and cutting those samples for me)
😊 My computer, and other associated bits of technology (for working most of the time)
😊 The soccer ball and kicking partners (for relieving stress in the last coupla months)
😊 My Mum (for putting up with me even though I never told her enough about what was going on)
😊 And last, but not least, my Dad (for the technical expertise when the puter decided not to work)

"Reality is nothing but a collective hunch."
- Lily Tomlin
Chapter 1: Introduction .............................................. 1
  1.1 Aims and Significance ............................................. 1
  1.2 Location .............................................................. 1
  1.3 Methods ............................................................. 4
  1.4 Previous work ....................................................... 5
  1.5 Outline ............................................................... 6

Chapter 2: Regional Geology ................................. 7
  2.1 Lithostratigraphy and Tectonic History of Western Tasmania ... 7
  2.2 Mount Read Volcanics .......................................... 8
    2.2.1 Tyndall Group (TG) ........................................... 9

Chapter 3: Local Geology ................................. 11
  3.1 Introduction ....................................................... 11
  3.2 Stratigraphy, Facies, and Structure Between the South Henty Fault and the Great Lyell Fault ........................................... 11
    3.2.1 Central Volcanic Complex ............................... 12
    3.2.2 Tyndall Group .................................................. 13
      Comstock Formation .............................................. 15
Chapter 4: Textural and Lithofacies Characteristics of the Howards Basalt

4.1 Introduction ............................................................................... 18
4.2 Alteration and Deformation ......................................................... 22
4.3 Facies Descriptions ................................................................... 25
  4.3.1 Type 1 Monomictic Breccia Facies ............................................... 25
  4.3.2 Type 2 Monomictic Breccia Facies ............................................... 25
  4.3.3 Polymictic Breccia Facies .......................................................... 25
  4.3.4 Coherent Basalt Facies .............................................................. 27
  4.3.5 Volcaniclastic Sandstone Facies .................................................. 27
4.4 Internal Stratigraphy and Relation to Associated Units .................. 27
4.5 Interpretation ............................................................................ 28

Chapter 5: Petrography and Geochemistry of the Howards Basalt

5.1 Introduction ............................................................................... 31
5.2 Petrographic Analyses ................................................................. 31
5.3 XRF Analyses ........................................................................... 32
5.4 Carlo-Erba Analyses ................................................................. 33
5.5 Short-wave Infra-red Spectral Analyses ......................................... 33
5.6 Geochemical Plots - Discrimination and Comparison to other Mount Read Volcanic Successions ......................................................... 34
5.7 Interpretation ............................................................................ 40
Chapter 6: Discussion .............................................................. 41

6.1 Tectonic ......................................................................................... 41
6.2 Regional Correlations ............................................................ 41
6.3 Eruption Style and Setting ............................................................ 41
6.4 Implications for Mineralisation ..................................................... 44

Chapter 7: Conclusions ........................................................... 45

References ..............................................................................46

List of Abbreviations ........................................................................ 49

Appendices .............................................................................. 50

A- Drill core logs .............................................................................. 50
B- ............................................................ 120
   1- XRF analyses ........................................................................... 121
   2- Carlo-Erba analyses and recalculations .................................. 122
   3a- Short-wave infra-red spectrum stack .................................... 123
   3b- PIMA Results ........................................................................ 124
C- Literature Review - Fire Fountain Basalts .................................. 125
D- Rock Catalogue ............................................................................ 151