



Belle-Brook Holdings Ltd

Mobilisation Features and Environmental Mobility of Gold across New Zealand

Lachlan Stewart¹

¹. University of Adelaide, Honours program 2010

Supervisor: Frank Reith

27/11/10

Contents:

1. Abstract	3
2. Introduction	3
3. Site Descriptions	7
3.1 Parker Road	9
3.2 Kawarau gorge	9
3.3 Arrowtown	9
3.4 Shanty Town	10
3.5 Reefton	10
3.6 Orepuki beach placer	10
3.7 Echunga	11
4. Methods	11
5. Results	13
5.1 Parker Road QPC	13
5.2 Parker Road Gore lignite measures	15
5.3 Shanty Town	16
5.4 Kawarau gorge	18
5.5 Arrowtown	19
5.6 Reefton	20
5.7 Orepuki beach placer	21
5.8 Echunga	22
6. Discussion	23
7. Conclusion	31
8. Acknowledgements	31

9. References	31
10. Figures	34
11. Supplementary Figures	50

1. Abstract:

Gold from localities across New Zealand; including Southland, Central Otago, the West Coast, and the South Coast, were studied using scanning electron microscopy. Sites were chosen based on contrasting relationships of environments to compare and contrast the fine micrometer and nanometer scale features present on the gold. Using the latest equipment for subsurface imaging, that included a focused ion beam scanning electron microscope, gold mobilisation features were indentified. Features include gold precipitation and aggregation structures, dissolution and fluvial transport damage, as well as nano-particulate formation seen on samples from every site. Secondary features are present on all of the sampled gold grains and are the result of remobilisation, aggregation and dispersion of the samples while in the supergene environment and not the result of prior processes. Nano-particulate dispersion is discussed as the possible source for gold precipitation and aggregation due to its high reactivity and gold's natural affinity towards itself. Nano-particulates are also identified as the gold form resulting from the etching of underlying gold and the principle feature by which gold nano-particulates are created and subsequently dispersed.