NZIMMR's fine-gold research, Westland, New Zealand

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New Zealand Institute for Minerals to Material Research (NZIMMR) is undertaking a Government-funded research initiative under MBIE's Regional Economic Development programme. This initiative includes an assessment of 'fine-gold' potential on the West Coast of South Island, with an initial focus along the current West Coast beach systems.

Ephemeral 'heavy-mineral-leads' within the beach systems are known to contain fine-grained gold and other minerals of economic interest and have been targeted since the 1860s by hand methods, suction- and bucket-ladder dredges, hydraulic elevators, stamper batteries (cemented raised beaches) and, more recently, by hydraulic excavators. Although gold-recovery circuits have varied widely over time, gold within leads includes a variable but significant proportion (<50 – 100%) that is very small and/or highly flattened. This component has proved notoriously difficult to recover in many cases and significant losses (up to >50%) are recorded from many operations.

The heavy-mineral-leads also contain concentrations of several potential cross- or co-commodities, including Fe- and Fe-Ti-oxides, garnet, zircon, REE and others, being investigated in a parallel NZIMMR research stream.

A total of 24 samples up to 80 litres in size have been collected from 7 locations during an initial round of sampling between Okarito in Central Westland and Granity in North Westland. The tails from two different styles of beach-gold recovery plant were also collected for analysis.

Samples are transported to a dedicated processing facility set up by NZIMMR near Greymouth, where they are split to separate representative samples for XRF and ICP-MS analysis by accredited laboratories. The remainder is processed at NZIMMR's facility to generate gold- and heavy-mineral concentrates. Gold is being quantitatively and qualitatively analysed to delineate grain-size and grain-shape trends and possible relationships to plant recovery and losses in processing plants.

Dynamic interaction between active tectonics, distributary systems and coastal and marine processes in Westland effectively makes the West Coast beach systems a renewable, multi-commodity resource. Efficient exploitation of the resource and substantial benefits to the West Coast region could be gained by better understanding of the nature and distribution of the various commodities within these deposits, and the most suitable technologies to recover them.

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