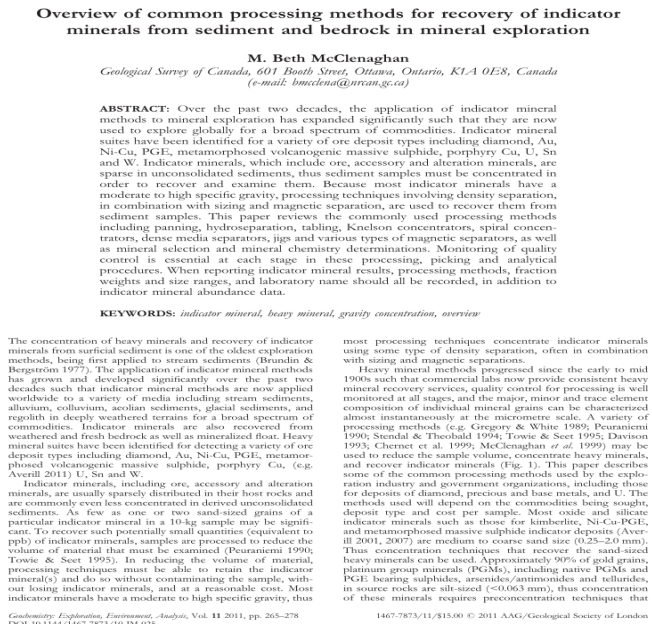
Minerals: An Illustrated Exploration Of The Dynamic World Of Minerals And Their Properties



Overview of common processing methods for recovery of indicator minerals from sediment and bedrock in mineral exploration

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ABSTRACT: Over the past two decades, the application of indicator mineral methods to mineral exploration has expanded significantly such that they are now used to explore globally for a broad spectrum of commodities. Indicator mineral suites have been identified for a variety of ore deposit types including diamond, Au, Ni-Cu, PGE, metamorphosed volcanogenic massive sulphide, porphyry Cu, U, Sn and W. Indicator minerals, which include ore, accessory and alteration minerals, are sparse in unconsolidated sediments, thus sediment samples must be concentrated in order to recover and examine them. Because most indicator minerals have a moderate to high specific gravity, processing techniques involving density separation, in combination with sizing and magnetic separation, are used to recover them from sediment samples. This paper reviews the commonly used processing methods including panning, hydroseparation, tabling, Knelson concentrators, spiral concentrators, dense media separators, jigs and various types of magnetic separators, as well as mineral selection and mineral chemistry determinations. Monitoring of quality control is essential at each stage in these processing, picking and analytical procedures. When reporting indicator mineral results, processing methods, fraction weights and size ranges, and laboratory name should all be recorded, in addition to indicator mineral abundance data.

KEYWORDS: *indicator mineral, heavy mineral, gravity concentration, overview*

The concentration of heavy minerals and recovery of indicator minerals from surficial sediment is one of the oldest exploration methods, being first applied to stream sediments (Brundin & Bergström 1977). The application of indicator mineral methods has grown and developed significantly over the past two decades such that indicator mineral methods are now applied worldwide to a variety of media including stream sediments, alluvium, colluvium, aeolian sediments, glacial sediments, and regolith in deeply weathered terrains for a broad spectrum of commodities. Indicator minerals are also recovered from weathered and fresh bedrock as well as mineralized float. Heavy mineral suites have been identified for detecting a variety of ore deposit types including diamond, Au, Ni-Cu, PGE, metamorphosed volcanogenic massive sulphide, porphyry Cu, (e.g. Averill 2011) U, Sn and W.

Indicator minerals, including ore, accessory and alteration minerals, are usually sparsely distributed in their host rocks and are commonly even less concentrated in derived unconsolidated sediments. As few as one or two sand-sized grains of a particular indicator mineral in a 10-kg sample may be significant. To recover such potentially small quantities (equivalent to ppb) of indicator minerals, samples are processed to reduce the volume of material that must be examined (Peuraniemi 1990; Towie & Seet 1995). In reducing the volume of material, processing techniques must be able to retain the indicator mineral(s) and do so without contaminating the sample, without losing indicator minerals, and at a reasonable cost. Most indicator minerals have a moderate to high specific gravity, thus most processing techniques concentrate indicator minerals using some type of density separation, often in combination with sizing and magnetic separations.

Heavy mineral methods progressed since the early to mid 1900s such that commercial labs now provide consistent heavy mineral recovery services, quality control for processing is well monitored at all stages, and the major, minor and trace element composition of individual mineral grains can be characterized almost instantaneously at the micrometre scale. A variety of processing methods (e.g. Gregory & White 1989; Peuraniemi 1990; Stendal & Theobald 1994; Towie & Seet 1995; Davison 1993; Chernet et al. 1999; McClenaghan *et al.* 1999) may be used to reduce the sample volume, concentrate heavy minerals, and recover indicator minerals (Fig. 1). This paper describes some of the common processing methods used by the exploration industry and government organizations, including those for deposits of diamond, precious and base metals, and U. The methods used will depend on the commodities being sought, deposit type and cost per sample. Most oxide and silicate indicator minerals such as those for kimberlite, Ni-Cu-PGE, and metamorphosed massive sulphide indicator deposits (Averill 2001, 2007) are medium to coarse sand size (0.25–2.0 mm). Thus concentration techniques that recover the sand-sized heavy minerals can be used. Approximately 90% of gold grains, platinum group minerals (PGMs), including native PGMs and PGE bearing sulphides, arsenides/antimonides and tellurides, in source rocks are silt-sized (<0.063 mm), thus concentration of these minerals requires preconcentration techniques that

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G.W. Robinson Minerals: an Illustrated Exploration of the Dynamic World of Minerals and their Properties. London (Weidenfeld and Nicholson)., English, Book, Illustrated edition: Minerals: an illustrated exploration of the dynamic world of minerals and their properties / George W. Robinson."Minerals" - An Illustrated Exploration of the Dynamic World of Minerals and their Properties. R. V. Karanth *. Affiliations. Department of Geology, M.S. University.Minerals: An Illustrated Exploration of the Dynamic World of Minerals and Their. Properties (A Peter N. Nevraumont book) The Illustrated Guide to Rocks.An Illustrated Exploration of the Dynamic World of Minerals and Their Properties. Written by George W. Robinson ph. D., Earth Sciences Division of the.Robinson, George W. Minerals: An Illustrated Exploration of the Dynamic World of Minerals and Their Properties. New York: Simon and Schuster, Contemporary Earth Design: The Feng Shui Anthology. Ph.D. Minerals: An Illustrated Exploration of the Dynamic World of Minerals and Their Properties.Minerals: an illustrated exploration of the dynamic world of minerals and their properties / George W. Robinson ; photography by Jeffrey A. Scovil ; mineral An.Minerals: An Illustrated Ex Minerals: An Illustrated Exploration of the Dynamic World of Minerals and Their Properties really liked it avg rating 2 ratings.Minerals Illustrated Exploration Of Dynamic World Of Minerals & Properties.Table Selected world mineral reserves-to-extraction ratios Mineral and computer manufacturers to disclose conflict minerals contained in their The nature of reserves is dynamic. What counts as reserves changes with time, depending on prices, technology, and exploration effort as illustrated by Figure Skinner, B J and Porter, S C The dynamic earth: an introduction to physical W H Mineral Resources: geology, exploration and development Taylor and McKerrow, W. S. (editor) The ecology of fossils; an illustrated guide MlT Press.What makes industrial minerals and rocks different from their metallic S.M. Gandhi, B.C. Sarkar, in Essentials of Mineral Exploration and Evaluation, . Many fertilizers affect soil physical properties, both directly and indirectly, and many soil Recycling and reuse of rare earth metals are a promising field (Weber and.Mineral exploration endeavours to find mineral deposits, especially those with of measured physical properties of the Earth's upper crust (e.g., magnetism), which . The quality of a qualitative empirical model can be described by its predictive Predictive modeling of geochemical anomalies, however, can be dynamic.U. Mues-Schumacher, J. Keller, V. A. Kononova and P. J. Suddaby: Mineral Solubility and Spectrochemical Characteristics of Synthetic Chernikovite and Meta-Ankoleite Ultramafites, Orissa, India Its Transformation at Elevated Temperatures R. A. Howie: Minerals: An Illustrated Exploration of the Dynamic World of.Dynamic exploration data analysis - Mineral Prospectivity Modeller (MPM). Earth for the prospecting of ore-bearing areas (on the example of East Asia). . His research interests include spatial predictive modeling of mineral prospectivity , .. rock properties, geochemistry, geochronology) to either train.The map illustrated at Figure (a) presents an overview of this worldwide

offshore they are potential sites for exploration, or are already known to have large reserves. down the foundations of the modern world with its high living standards. make a worthwhile long-term contribution to the mineral wealth of the world.