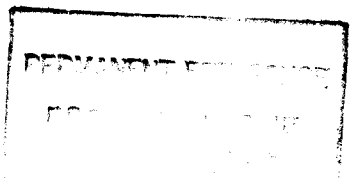

STREAM SEDIMENT GEOCHEMISTRY OF THREE RIVER BASINS OF SRI LANKA WITH SPECIAL EMPHASIS ON GEOCHEMICAL RATIOS AND GEM POTENTIAL

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Stream Sediment Geochemistry of Three River Basins of Sri Lanka with Special Emphasis on Geochemical Ratios and Gem Potential

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ABSTRACT

Recent scientific investigations have revealed that about 25% of the total land area of Sri Lanka is gem bearing (Dissanayake & Ruapasinghe 1995). However the gem industry in Sri Lanka is still based on traditional mining methods. Therefore only a few areas are still mined. Developing and application of scientific tools in gem exploration as well as mining and processing is therefore nationally important.

This study was mainly focused on studying some important geochemical aspects such as concentration levels, distribution, behaviour of major and trace elements in stream sediments of Sri Lanka and to study the use of geochemical ratios in identifying gem bearing areas.

For this study stream sediments samples were collected mainly from Kotmale Oya and Menik Ganga basin. Samples, collected from Walawe Ganga basin, were used as a reference set and data of previous surveys were also used in statistical analysis. Gem bearing sediment samples and samples from gem source rocks such as skarn

and pegmatites were collected mainly from the study areas. Samples were analyzed using the X ray fluorescence technique. International standards were analyzed and repetitions carried out to maintain the accuracy and precision of analysis. The data were treated with the use of statistical software.

The results of the study revealed that different elements are concentrated in different size fractions of sediments. K, Al, Mn, Rb, Ni and Sr concentrate in the –63μm fraction and concentration decreases towards higher grain sizes. Nb and Cr are found in the +125-177 μm fraction while the highest concentration of Si was found in the +177-250 μm fraction. Zr accumulates in the +63-125 μm fraction. The accumulation of clays, and heavy minerals, which contain these elements, in different fractions may be the factor behind this distribution pattern.

When comparing element concentration in the studied basins no major difference in element concentrations were observed except, low Rb and high Fe concentrations in Kotmale basin and high Cu and Zr concentrations of Walawe basin.

It was also noted that major elements have been depleted with reference to upper crustal levels while trace elements have been enriched. High leaching rates of major elements and accumulation of major elements during sedimentation process may account for this result.

Both factor analysis and correlation coefficients show that major and trace elements behave according to their ionic potential. Elements having high ionic potentials and low ionic potentials show close relations with the other elements of the particular group.

Studying the relationship with element ratios and gem potential reveal that ratios between elements of similar ionic potentials have good relationships with gem potential. Among the studied ratios Rb/Sr+Ba/Sr ratio can be used in discriminating areas according to their gem potential more effectively. The predicted potentials by this newly identified ratio are comparable with field observations. This new ratio can therefore be applied for gem exploration after field trials.