EXECUTIVE SUMMARY

Contract No: - RG/NR/96/01

Title - Development of new methods for gem exploration – Application of Rb/Sr ratio.

Research Institute - Faculty of Applied Sciences,
Sabaragamuwa University of Sri Lanka

Chief Scientific Investigator - Prof. M.S. Rupasinghe

Co investigator - Prof. C. B. Dissnayake

Research Assistant - Mr. Pradeep Nalaka Ranasinghe

Date of Award - 01st May 1997

Date of Completion - 28th February 2000

Total Allocation - Rs. 461,234.00

Total Spent - Rs. 164,463.00

No. of Research Assistants - 01

Period of Service - 20 months

Technical Assistants - No

The research assistant of the project has completed his thesis and submitted final corrections. As mentioned in the 01st progress report (01/05/1997 – 31/07/1997) following changes were made to the methodology mentioned in the original proposal

i. Slight changes were made to the sampling areas, mentioned in the original proposal
ii. Number of sediment samples was reduced and four size fractions of the same sediment sample were analyzed instead.
iii. Gem gravel samples and gem source rock samples were also collected.
iv. Data of the previous studies carried out by the investigators were used as reference.

SUMMARY

Title - Development of new methods for gem exploration – Application of Rb/Sr ratio.

Research Institute - Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka

Chief Scientific Investigator- Prof. M.S. Rupasinghe

Period of Contract - 03 years (01st May 1997 – 30th April 2000)

Background & Objectives

Gems bring a large proportion of the annual total foreign exchange of Sri Lanka. Although suitable conditions for gem mineralization is found in most parts of the island, gemming is mainly confined to Ratnapura, Elahera and Okkampitiya gem fields. Locating gem deposits and identification of gem bearing areas are done using traditional and 'heresay" methods. So that developing scientific methods to identify gem bearing areas and gem deposits is nationally important. Rb/ Sr ratio of stream sediment ratio of stream sediment has been identified as a powerful tool in identifying gem bearing areas. However as the behavior of Rb/Sr ratio has not been fully explained, it was difficult to practically apply it and further refine it. Therefore this study aimed at studying the behaviour of Rb, Sr and other associated major and trace elements in stream sediments, gem bearing gravels and gem source rocks and to further refine the ratio using other similar elements.

Experimental Methods

Kotmale Oya, Walawe Ganga and Menik Ganga were selected for stream sediment sampling. Stream sediments of were collected at about 1Km intervals and at depth about 50-100cm. Gem bearing gravel samples of Ratnapura, and Okkampitiya gem fields and gem source rocks samples of above three river basins were also collected. These samples were washed dried and powdered. X ray fluorescence analysis was carried out for powder pellets. International standards were used in quality control of analysis. Data of the previous studies, carried out by the investigators, were used as reference.

Results

Variation of major and trace element concentrations with grain size were studied in order to identify the best size fraction for studying. K, Al, Ti increases towards finer fractions while Si content increases in the coarse fractions. Rb, Sr Ni,. Got highest concentrations in the finer fractions. Zn, and Zr have the highest concentrations in the +63 –125 fraction.

Therefore main emphasis was given to –63 fraction.

When considering the major element concentrations of the Kotmale Oya, Walawe Ganga and Menik Ganga river basins, a slight increase of Fe and a slight decrease of Na, K, and Ca can be seen in the Kotmale Oya basin which receives the highest rainfall and hence highest leaching rates. A slight increase of Cu can be observed the Walawe basin. Generally a marked difference in major and trace element concentration could not be observed between and stream sediment and gem bearing sediments of gem pits. Major elements Si, Ca, K, Mg and Na have been depleted in stream sediments of all three basins with respect to upper crustal values. Fe, Mn and P have been get enriched in stream sediments. Al and Rb have high enrichment factors only in –63 fraction.