

International Training Course on Uranium Exploration

by P.M.C Barretto

As part of its Technical Assistance Programme for developing countries, the IAEA has conducted a series of training courses in prospecting for nuclear raw materials – for example, in 1974 a regional course on uranium and thorium prospecting was held in India, and an interregional training course on uranium geochemical prospecting methods was held in Austria in 1975.

In September 1977, another interregional training course on uranium geochemical prospecting methods was held at Skofja Loka, Slovenia, Yugoslavia. Twenty-four delegates from Afghanistan, Algeria, Argentina, Bolivia, Chile, Colombia, Czechoslovakia, India, Indonesia, Malaysia, Philippines, Portugal, Sri Lanka, Turkey, Venezuela and Yugoslavia participated in the four-week training course. The Federal Republic of Yugoslavia acted as host for the course.

The Skofja Loka area was selected because it contains sedimentary rocks with known uranium mineralization, and presented ideal conditions (soil, drainage and topography) for uranium geochemical surveys. In addition, the participants could benefit from a technical visit to a very interesting type of uranium mineralization near the town of Gorenje Vaz.

Several well-known geologists, such as Dr. A. Grimbert (France) and Prof. Ian Nichol (Canada) were present as guest lecturers. In the first week the lectures dealt with the basic concepts of geochemical exploration for uranium, as well as preparing the participants for the field work. In addition to specific topics on geochemistry and uranium behaviour in the natural environment, the lectures also covered other topics of interest, such as world uranium resources and demand, types of uranium deposits and technical advances in exploration equipment.

A visit to the Zirovski Vrh uranium mine was made, where the participants saw different techniques for mining ore bodies with complex structure and rapid change in grade concentration. At the end of the mine tour, there was a lengthy discussion of radiometric control of uranium ores, and the advantages and disadvantages of different methods

The second week was spent entirely on reconnaissance level sampling of stream sediment and surface water in an area of approximately 300 km². About 900 stream sediments and water samples were collected during this period by 12 groups of participants, each group consisting of two trainees. Their work was supervised by three field instructors.

The third week was used to carry out a detailed survey over areas with newly discovered uranium anomalies. The work included line cutting for sampling, measurement of radon-222 concentration in soil-gas, soil sampling, total counts and gamma-ray spectrometric readings at more than 200 sites. Spring and stream water were also sampled for radon determination and heavy minerals were collected for uranium analysis.

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In the last week, a visit was made to Joseph Stephan Institute's reactor and analytical laboratory facilities in Ljubljana. The participants also visited the Regional Computing Centre in Ljubljana, where they were introduced to various procedures of computer data processing of geochemical data and its interpretation.

The last day of the training course was used in analysing the results of the reconnaissance and detailed exploration phases with the help of manually, as well as computer-drawn, maps.

In addition to the above programme, informal lectures were given during the course of the field work and on several evenings. The planning of the survey was discussed every day before going to the field. Training course certificates were presented to the participants at the end of the course.

All the proposed objectives were reached. The work accomplished reflected the genuine interest and enthusiasm of the heterogeneous group of participants in carrying out the various tasks. The atmosphere was that of close co-operation and friendship.

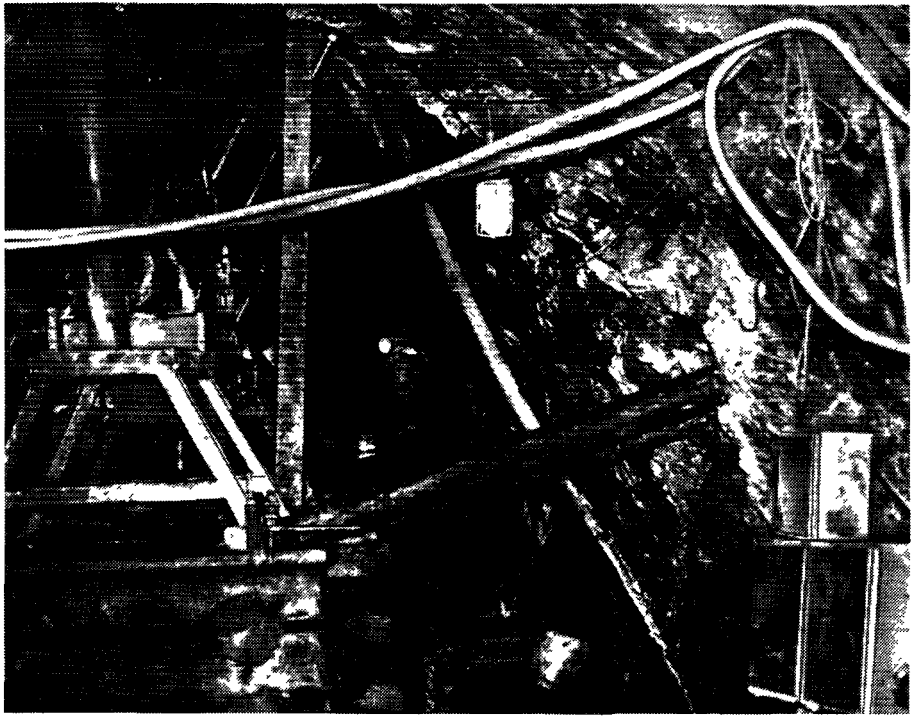
The Geological Survey of Ljubljana (Geoloski Zavod Ljubljana) and the Zirovski Uranium Mining Company (Rudnik Urana Zirovski vrh) fully supported the field and office work. They contributed in no small way to the success of the course. Also some manufacturers of radiometric equipment loaned several field instruments without which the field training would not have been possible.

Although the main purpose of the training course was to provide training in the use of geochemical techniques in the various stages of uranium exploration, the work accomplished by the trainees provided a positive contribution to the uranium exploration programme of the host country. In addition to prospecting a large area (300 km²) where several anomalies were indicated at reconnaissance level, it provided an orientation study from which the Geological Survey of Ljubljana can select the most effective uranium geochemical techniques for their geological environment.

Another interregional course on uranium prospecting will be held in Golden, Colorado, USA, in September–October 1978.



Training course participants preparing to enter the Zirovski Vrh uranium mine in Yugoslavia
For many of the participants, this was their first visit to an underground uranium mine
Photos IAEA/Barretto

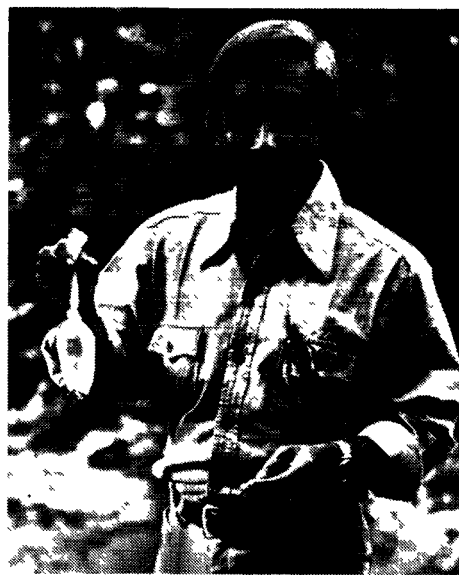




Trainees from Turkey, Sri Lanka, Bolivia and Venezuela, using modern equipment and techniques, measure the uranium thorium and potassium concentrations of the soil during a grid survey. Their equipment consists of two different types of gamma-ray spectrometers and a field scintillometer.

▲ Participants inside the Zirovski Vrh mine. Guest lecturer Prof. Ian Nichol of Canada is in the centre.

◀ Upward inclined drilling towards uranium zones from the lower level of the mine. This operation is designed to map the mineralized structures.



▲ A stake is pounded into the ground to make a hole for measuring the amount of radon in the soil gases. After the stake is removed, the probe of the radon monitor is inserted into the hole and the soil gas is analysed for alpha activity. Measuring the radon in soil gases is one of the techniques used for prospecting for uranium in areas covered by a thick overburden of soil.

◀ Mr. Mohamed Tauchid, technical director of the training course, demonstrates how to collect surface water samples for uranium analysis.

A curved, elongated panning tool (instead of the classical gold pan) is used to collect heavy minerals from stream sediments for uranium analysis. ▶

