

Dr. Aminul Huq, Adviser on Intra-Regional Training at the Colombo Plan Bureau, explained the technician training programme which the Bureau has been implementing since 1964. The programme is promotional in nature and the chief activities thus far have been a series of regional colloquia, national seminars and country workshops to focus attention on the problems relating to the education and training of technicians. Some major projects have emerged as a result of the colloquia, and one of them is the Staff College for Technician Education in Singapore. The objective of the Staff College is to improve the quality of technician education and training by meeting the need for technician teachers and educators, and the need for senior staff in technician education.

Byung Don Min from the Atomic Power Department of the Korea Electricity Company gave a paper on "Nuclear Manpower and Training Problems in a Developing Country", and Professor Byung Hun Lee of the Hanyang University gave a paper entitled "Objective of Nuclear Science Education for Undergraduates and Professionals in Korea". The participants, taking note of the nuclear and electronic facilities in Korea, made a request that the Government of Korea offer some fellowships to other countries in that region.



REPORT OF A JOINT IAEA/NEA SYMPOSIUM, VIENNA,
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The symposium was attended by 187 participants and seven observers representing 40 countries and one international organization.

Exploration of Uranium Ore Deposits

The projected demand for uranium over the next quarter century indicates that the discovery of new uranium reserves must rise from a recent annual rate of about 40 000 tonnes to between 200 000 and 300 000 tonnes per year by the early 1990's. It is estimated that by the year 2000 some \$20 000 million will have to be spent on uranium exploration.

The IAEA Symposium on the Formation of Uranium Ore Deposits, held in Athens in May 1974, made an important contribution to understanding the geological basis of uranium deposits. Finding sufficient uranium reserves for future needs, however, is not only a financial and geological problem, but also a technological one. The IAEA and the Nuclear Energy Agency of OECD felt that it was a suitable time to convene another symposium to evaluate uranium exploration techniques and to consider what action may be necessary to initiate further research and development.

At the 1976 symposium, it became clear that progress is being made in the development of improved methods for finding poorly exposed or concealed ore bodies. High-sensitivity airborne gamma-ray spectrometry, which was something of an unproven novelty four years ago, at least in the eyes of some, has become an accepted technique that is now being applied on an extensive scale throughout North America, and its use is beginning elsewhere. Attention is now beginning to focus on how to extract maximum information from the results of these surveys and how to combine this information with other geoscience data.

There is an obvious great concern about how concealed mineralization can be located, demonstrated by the interest in radon methods and by attempts to make the fullest possible use of non-specific geophysical methods.

One paper gave a general review of airborne gamma-ray spectrometry and outlined a technique for obtaining maximum data with greatest accuracy for large airborne gamma-ray detection systems. Other papers dealt with car-borne and ground-portable gamma-ray spectrometry.

Two reports by staff members of the Geological Survey of Canada discussed the effects of line spacing on airborne gamma-ray spectrometry data. The Canadian airborne survey is designed to produce contour mappings of regional radioelement distribution and has proven to be a useful exploration tool that could be applied in other similar geographic areas.

In the session on radon surveying, various radon measurement techniques were reviewed. In the past few years there has been some controversy over the relative effectiveness and cost of emanometric techniques as compared to alpha-track methods. In the session on geochemical surveying, several papers were presented by representatives of the Geological Surveys of Canada, USA and Finland. The paper from Finland described the use of till in geochemical exploration. A paper on non-radiometric geophysical methods by the U.S. Geological Survey attempted to demonstrate that known geophysical methods, not used until now for uranium exploration, can have important applications.

Several papers described new drilling instrumentation and logging systems. One paper discussed californium-252-based borehole logging systems for *in situ* assaying of uranium ore. Another paper noted that gamma-ray logging could be much more widely applied in areas where petroleum drill holes exist.

Case histories were presented on IAEA/UNDP project work in Greece and Turkey, showing how integrated exploration techniques, primarily geochemical and radon, had helped define new areas which had later proved to have uranium mineralization at depth where no direct surface expressions were evident. A paper of considerable interest to all participants gave a case history of the discovery and development of the Jabiluka uranium deposits in the East Alligator River region, Northern Territory, Australia. Other papers describing case histories of recent work were presented by participants from Uruguay, Italy, India and Israel.

The work being done in Canada on uranium resources evaluation was described. This approach, consisting of data inventory, geological studies, statistical relationships and field studies, is of great value in estimating the potential of new areas, and it may be included in future work by the IAEA on evaluation methods. A report on a geostatistical study of drilling density in Wyoming solution fronts dealt with the problem of how much drilling is required to estimate uranium reserves in a given region. By studying the problem in a variety of actual drilling programmes, an improved approach in certain areas can be achieved.

Under the heading of research and development, an interesting paper on the use of LANDSAT images in uranium exploration was presented. Alteration of minerals associated with the passage of uranium-bearing groundwater through sandstone and conglomerate is widespread and extremely subtle. For geologists involved in the search for uranium deposits, LANDSAT images contain a great deal of useful information which can be extracted through computer processing. Additional features of the local geology can also be obtained by computer enhancement of day and night thermal images.