TRAINING CENTRES IN LATIN AMERICA

Early last year the Brazilian representative on the Board of Governors of the International Atomic Energy Agency - supported by the Governors from Argentina and Guatemala – proposed that a study should be made of the possibility of setting up one or more atomic energy training centres in Latin America.

On the Board's recommendation, the Director General of the Agency appointed a fact-finding team to make an on-the-spot study. Headed by Dr. Norman Hilberry[1], Director of the Argonne National Laboratory (USA), the team included experts whose services had been made available by Member States and IAEA staff members[2]. The remainder of the team was made up of observers from the Pan-American Union[3], technical experts[4] and an adviser on economic matters assigned to the mission by the United Nations Economic Commission for Latin America[5].

After having visited 17 Latin American countries[6], the team arrived in Vienna and drew up its report.

In drafting this report the team was invited to consider the following points:

(a) The need for establishing one or more regional training centres;

(b) Existing facilities that are being or could be used for training, together with technical data concerning them;

(c) The general scientific technological and industrial conditions of the countries visited insofar as they have a bearing on their training needs and capabilities.

Taking as a basis the experience both of some of the world's largest atomic energy training centres and of smaller, multi-purpose centres, the report observes that the training function of such centres has been successfully accomplished "only because of their success in fulfilling their second function, which is to serve as principal centres of research and development in the major scientific and technical areas of interest in the peaceful utilization of atomic energy." It says that "the creation of a body of specialists is a first and most essential step in any atomic energy programme" and that "the quality and size of this group in turn depends upon the quality, the vigour and the variety of the research and development activities upon which they are engaged while in training, for it is only through active participation in such research and development activities that they become trained."

Basic Definition

This idea, which is developed in the report, leads to the definition of a training centre for atomic energy personnel as "an establishment equipped with the facilities and apparatus necessary for active research in the atomic energy field and staffed with experienced scientists capable of providing courses on atomic energy techniques, 'on the job' research and development experience."

Attention is called to the fact that it is possible to consider two types of training centres: "integrated centres" involving major disciplines, such as life sciences, physical sciences and the appropriate engineering fields, or "specialized centres" to meet the needs in a limited field. The report adds that whatever type of centre is to be considered, its success will always depend directly upon the quality and character of the basic training given in the universities. To strengthen the universities and to help them in changing over from the old emphasis on lecture work to the modern laboratory approach in science and engineering is therefore vital.

Having laid down these premises, the report points out that in Latin America "the present situation constitutes a vicious circle. Few students choose scientific

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1925 Doctorate in physics at University of Chicago.
1925-30 instructor in physics at New York University and assistant professor from 1930.
Took part in the University of Chicago Cosmic Ray Expedition for studies in the mountains of Peru in 1941.
In December 1941 he became assistant to Dr. Arthur H. Compton who was directing the wartime Metallurgical Project. Active in the work of team led by Dr. Enrico Fermi that led to the first controlled nuclear reaction on 2 December 1942.
He participated in the design and construction of the Oak Ridge reactor and the Hanford reactors and the series of research reactors developed by the Argonne National Laboratory, and also on the design and development of the prototype submarine reactor.
Fellow of the American Physical Society and the New York Academy of Science.
Author of many scientific papers on cosmic ray phenomena, physical optics and the discharge of electricity through gases.
Argonne is America's senior atomic energy research and development installation, and the national training centre. It is operated by the University of Chicago for the US Atomic Energy Commission.

2) *Prof. Mario E. Bancora, Director of Technical Supplies, IAEA.*
Mr. Alfred Carcasses, Deputy Director, Nuclear Research Centre, Saclay, France.
Mr. Harold Sheard, Technical Adviser on Overseas Relations, Atomic Energy Research Establishment, Harwell, England.
Mrs. Ulrika Schiller, Administrative Officer, IAEA.

3) *Mr. Luiz Cintra do Prado, University of São Paulo, Brazil.*
Mr. John K. Rouleau, Chief, Inter-American Branch, Division of International Affairs, United States Atomic Energy Commission.

4) *Dr. James W. J. Carpender, Prof. of Radiology, University of Chicago and Argonne Cancer Hospital, United States of America.*
Mr. French T. Hagemann (chemistry and physics), Associate Director, Chemistry Division, Argonne National Laboratory, United States of America.
Mr. Nathan H. Woodruff (isotope applications), Scientific Representative to Latin America, United States Atomic Energy Commission.

5) *Mr. Francis Silvart, Economic Commission for Latin America (United Nations), Santiago, Chile.*

6) *In the order in which they were visited: Brazil, Paraguay, Uruguay, Argentina, Chile, Peru, Bolivia, Ecuador, Colombia, Venezuela, Dom. Republic, Haiti, Panama, Costa Rica (incl. the Inter-American Institute of Agricultural Science at Turrialba), Nicaragua, Guatemala and Mexico.*

or development engineering careers in the majority of Latin American countries. There are few opportunities open for them at home in these fields. As a result little or no staff is being developed with which to expand atomic energy activities. In this situation the governments, generally hard-pressed for funds, have little or no incentive to provide facilities and create jobs which there is no certainty could be used or filled."

Breaking the Vicious Circle

While noting that "the establishment of an integrated training centre or centres may be the best hope for breaking this vicious circle", the report states that "the laboratories in Latin America would find it impossible to supply adequate staff even to start such a centre and any large contribution towards such a staff that they might make would present a serious check on their present healthy growth."

The experts observe that "during perhaps the first decade, therefore, the success of such a centre (or centres) would depend to a great extent on the number and quality of the scientists and engineers who could be secured from abroad."

This conclusion answers the fundamental question raised in the terms of reference of the mission, as it clearly states the "need" for establishing a regional training centre or centres in Latin America and, at the same time, points out that the Agency and other international or national agencies could usefully participate in such a project.

The data collected by the mission make it evident that although Latin American countries have shown keen interest in atomic energy and projects have already been started by a number of governments, only few of these countries now have facilities that could be used for co-operative training. These are: Argentina, where rapid strides are being made in building up an integrated atomic energy centre in the Buenos Aires area; Brazil, which has set up a physical science nuclear laboratory and a radio-biology centre from which much may be expected; and Mexico, where nuclear science courses are to be provided by the University of Mexico.

Regarding a choice between "specialized centres" or "integrated centres", the report says that "in the long run there is no question that the integrated centre is the preferable one. The interplay of interest and research contributions between scientific and engineering disciplines is becoming increasingly important and is most effective in an integrated centre. Specialists trained in such an atmosphere have a broader and more flexible command of their fields. Due to the availability of many different disciplines, a wide and complex variety of development projects can be successfully undertaken." On the other hand, "costs for establishing such a centre are high and the operating costs are bound to be large. Moreover, the problem of staffing such a centre in its initial stages is tremendous and unless this is accomplished successfully the whole project is imperilled."

"Specialized centres," the report says, "stand a much higher chance of being staffed successfully. They are inherently smaller, and consequently costs for facilities and equipment are much less. In addition use might be made of existing facilities. If the field of interest chosen for such a centre corresponds to a strong regional need, such a centre will also serve to break the vicious circle at least in its own field. This example will lead eventually to progress in other fields and the break will spread."

It is stated that "one of the specialized atomic energy training centres to be established might well be in the field of radio-botany. Agriculture is a major source of income throughout Latin America. There are many agricultural schools and experimental stations throughout the region and also the Inter-American Institute of Agricultural Science at Turrialba, Costa Rica."

As the report says, "agriculture is in a real sense applied botany. The rate of agricultural advances can be enhanced by expanding basic botanical understanding and knowledge. Much of this knowledge is lacking. This is an area in which the atomic energy field provides particularly powerful investigative tools."

Conclusions

The authors of the report conclude that "a training centre in radio-botany should provide vitally needed knowledge and vitally needed specialists to all the agricultural installations in Latin America. A training centre like this might provide an excellent model upon which to base training centres in other areas."

The report recommends that:

1. The Agency should meet the requests of Latin American universities by, for example, supplying equipment and sending experts;
2. At least one specialized training centre should be established as soon as possible. "Taking as an example the field of radio-botany, such a centre would provide trained specialists in radio-botany to agricultural institutions throughout Latin America and also provide basic research results vital to agriculture..." The cost of new facilities might be of the order of $7 500 000, with an annual budget of approximately $650 000. Staff required: 40 scientists and 175 employees;
3. Whenever it appears feasible to gather necessary staff of high creative ability and established productivity and when funds can be made available for facilities, equipment and operating costs, at least one integrated atomic energy training centre should be established completely equipped with all the special facilities which are characteristic and essential to such an establishment. Approximate cost of the facilities $40 000 000; annual budget $7 500 000. Staff required: 250 scientists and engineers, approximately 500 supporting personnel and possibly 450 administrative and operating personnel.