

Mr. Upendra Goswami retired on 31 December 1974 as Deputy Director General for the IAEA Department of Technical Assistance and Publications. He joined the Agency in 1958 to



set up the technical assistance programme, and over the years worked out the various procedures to implement it and consolidate it to its present organizational capacity.

Fifteen Years of Technical Assistance

by Upendra Goswami

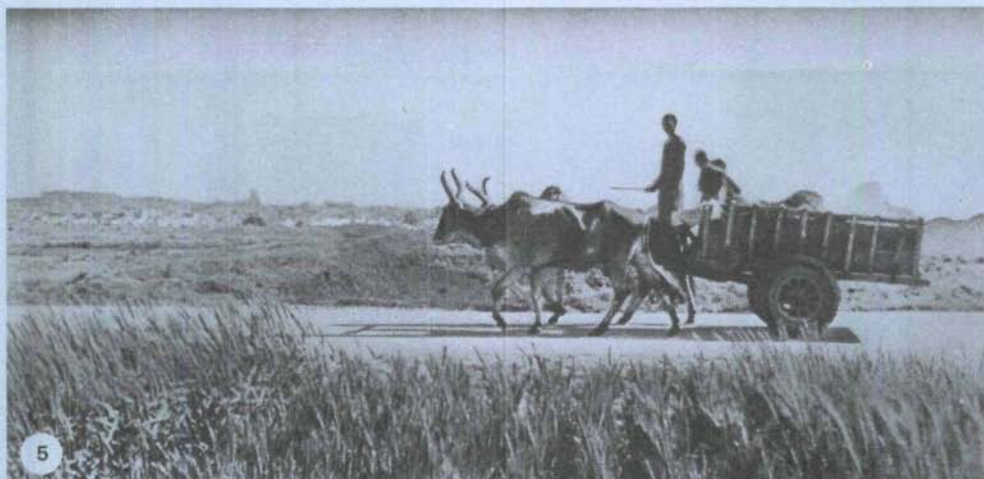
The first steps taken in the direction of the IAEA's present technical assistance programme were the so-called PAMs (Preliminary Assistance Missions) — teams of 5 - 8 Agency staff members and scientists, who visited countries interested in developing their atomic energy programme, working with the following terms of reference:

The teams should undertake a technical survey in the field of nuclear energy ... The survey should cover the activities, plans and aspirations, in the nuclear field, of the countries visited ... Special emphasis should be paid to ways in which the Agency would, in the future, be of assistance to the visited countries.

Within the terms of reference stated above the survey should cover specifically:

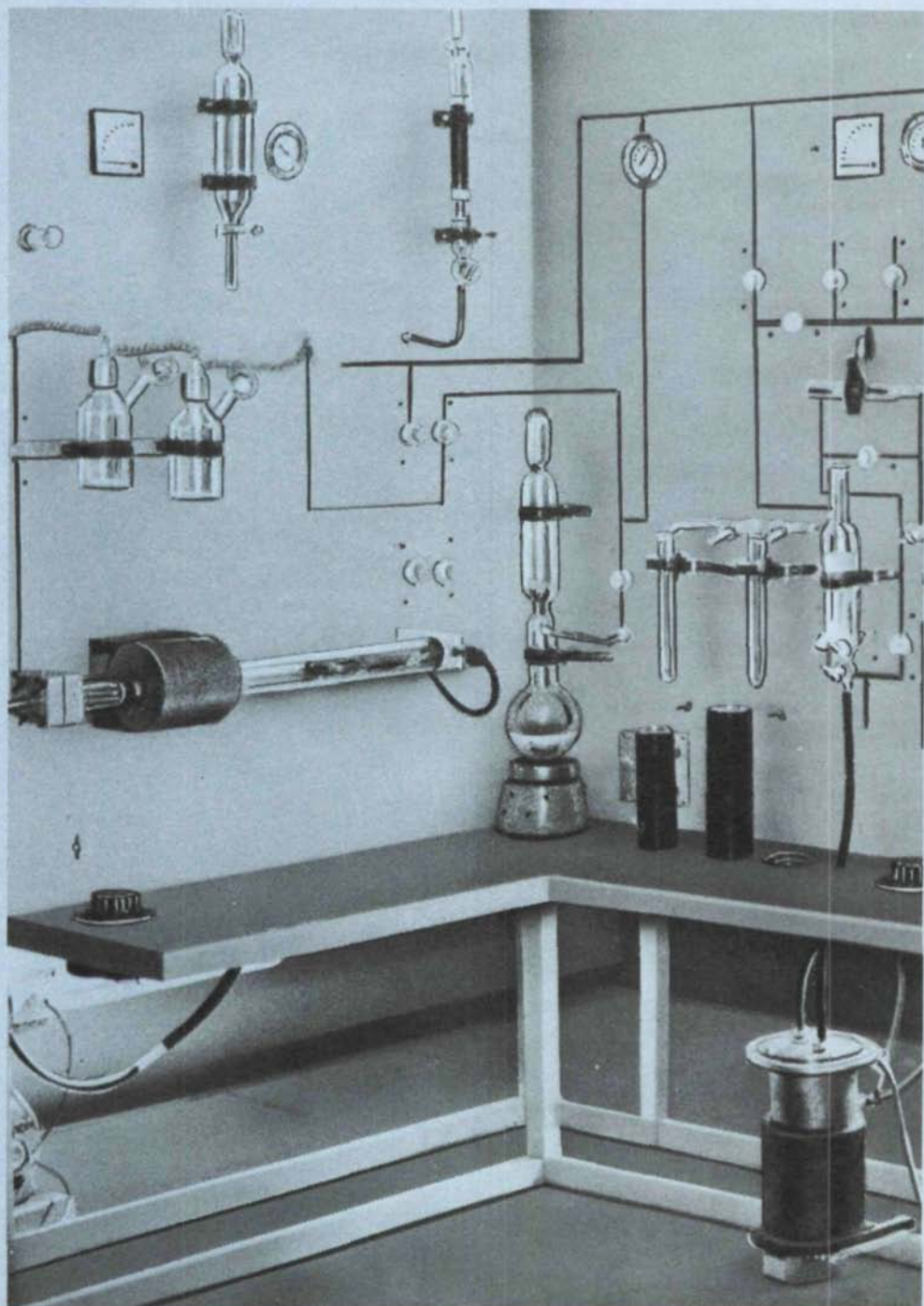
- (1) *The application of isotopes in agriculture, biology and medicine;*
- (2) *The development of research programmes;*
- (3) *The training of necessary technical manpower;*
- (4) *The development of health and safety standards;*
- (5) *The availability and development of raw material resources;*
- (6) *The development of reactor projects and programmes;*
- (7) *The industrial and economic conditions in so far as they have a bearing on the applications of atomic energy.*





- 1 Technical Assistance provided for many countries the basis for their own nuclear research. The Director General of IAEA, Dr. Sigvard Eklund (second from right), signing agreements for the supply to Mexico through the IAEA of a Triga Mark III research reactor and the necessary fuel for its operation from the United States.
- 2 Participants of a training course on the Application of Radioactive Isotopes in Soil Plant Relations at the University of Ankara in 1963. Such training courses and fellowships granted to scientists from developing countries have always been an important part of the IAEA's Technical Assistance Programme. Photo: UN
- 3 Hydrological Investigations with radioactive isotopes under the Agency's Technical Assistance Programme, such as this on Lake Chala in Kenya help solving hydrological problems and questions of water rights and utilization. Photo: IAEA
- 4 Members of the first IAEA Preliminary Assistance Mission to Burma, Indonesia, Sri Lanka and Thailand, visiting the building projects of the Siriraj Hospital and Medical School of Bangkok. Photo: IAEA
- 5 In India short-stemmed wheat mutants have been produced under a research contract with IAEA. Their shortness enables them to withstand bad weather. Photo: IAEA
- 6 The fight against the Mediterranean fruit fly was one of the large projects of Technical Assistance financed by UNDP with IAEA as executing agency. In a laboratory in Costa Rica a technician prepares medium in which sterilized male fruit flies are reared. Photo: UN





This equipment for benzene synthesis was developed, constructed and put into operation by an IAEA Technical Assistance Expert at the Instituto de Asuntos Nucleares in Bogotá, Colombia. This project, to measure Carbon-14 for groundwater dating, was funded by the Agency's 1973 Regular Budget. Photo: IAEA

Within the terms of reference the missions would:

- (a) Collect the needed information as stated in the terms of reference;*
- (b) Advise, if requested, the countries visited on the general features of their atomic programmes;*
- (c) Advise them of areas in which the Agency might give assistance according to their programmes;*
- (d) Assist, if requested, the countries in drafting requests to the Agency for technical assistance;*
- (e) Submit a report to the Director General containing the collected information, indicating to the Director General the needs of the visited countries in developing their nuclear programmes, and advising how the Agency might help to satisfy these needs.*

Under these conditions, the following PAMs were undertaken:

January/February 1959	to	Burma, Indonesia, Sri Lanka, Thailand
June/July 1959	to	China, Japan, Korea, Philippines, Viet-Nam
June/July 1959	to	Argentina, Brazil, Venezuela
October/November 1959	to	Afghanistan, Iran, Iraq, Turkey, Yugoslavia
May/June 1960	to	Greece, Ivory Coast, Mali, Morocco, Sudan, Tunisia
October/November 1960	to	El Salvador, Guatemala, Mexico, Paraguay, Peru
March/April 1961	to	Dahomey, Ghana, Liberia, Nigeria
November/December 1961	to	Argentina, Brazil, Chile, Colombia, Ecuador
April/June 1962	to	Cameroon, Ethiopia, Gabon, Kenya, Libya, Madagascar, Tanzania, Togo, Uganda, Zaire

These were periodically sustained by Follow-up Missions to further the close co-operation between the IAEA and the national atomic energy commissions and to help the latter to get an appropriate share of the national budget for their own programmes.

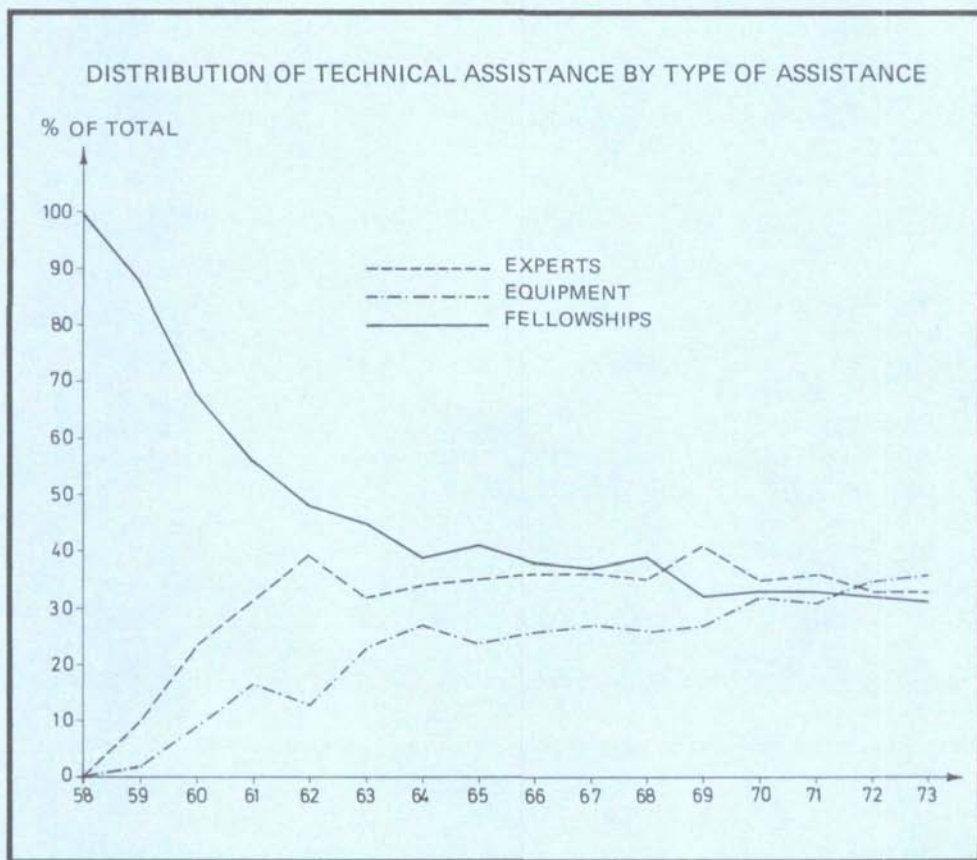
While some countries which were in the programme from the very start wasted many of their efforts and still have not reached a satisfactory level of scientific and technological development, the majority – and above all those which faithfully adhered to the plans originally worked out with the help of the missions – have gradually developed really gratifying and quite sophisticated programmes in the peaceful uses of atomic energy.

From these early beginnings the Agency's complex technical assistance programme has developed providing, up to the end of 1973, technical assistance amounting to nearly \$51 million to 93 countries. Of these, \$22 million (43%) were funded from the Agency's own resources, \$ 18 million (35%) from UNDP and \$11 million (22%) from gifts in kind.

Overall, a total of \$17 million (34%) was spent on over 2000 expert assignments, \$14 million (27%) were provided in the form of technical and scientific equipment, and \$20 million (39%) covered the cost of nearly 5000 fellowship awards, research grants and scientific visits.

It can be seen from the following graph that, in the first two years, technical assistance was almost exclusively granted in the form of fellowships. Starting in 1960, however, and

certainly as an outcome of the PAMs, the expert component began to play a bigger part, reaching its peak in 1969, when it amounted to 41% of the total activities. Since then it has again slightly decreased to 33% in 1973. On the equipment side we have had a steady increase over the years, culminating in 36% in 1973. Correspondingly, a steady decrease on the fellowship side has brought this component to its lowest percentage figure of 31% in 1973.



This trend is the natural outcome of the fact that the large contingent of national scientists trained through the IAEA over the years requires more and more equipment to execute the work for which it has been prepared.

While early assistance started mainly with basic expert advice in the fields of isotopes in agriculture and medicine and radiation protection, as well as fellowship training in basic sciences such as physics, chemistry, engineering and isotopes in medicine and agriculture, over the years the full scope of peaceful uses of atomic energy has developed in a large number of countries where overall planning has led to highly sophisticated programmes in applied science and technology. The following survey of the last five years of technical assistance has shown a marked increase in the fields of development of natural resources, engineering and technology and isotope applications in industry.

Field	1969 % of total	1970 % of total	1971 % of total	1972 % of total	1973 % of total
General atomic energy development	2	2	3	3	3
Nuclear physics	13	11	12	9	10
Nuclear chemistry	10	9	4	8	6
Prospecting, mining and processing of nuclear materials	4	4	10	9	9
Nuclear engineering and technology	14	16	14	16	16
Application of isotopes and radiation in agriculture	30	30	30	26	25
Application of isotopes and radiation in medicine	9	9	9	10	9
Application of isotopes and radiation in biology	4	3	4	6	3
Other fields of application of isotopes and radiation	8	10	9	9	14
Safety in nuclear energy	6	6	5	4	5
Total	100	100	100	100	100

With a movement in a number of countries towards developing their own nuclear power programme, this trend is expected to continue and to become even more pronounced in the future.

Finally, it can be said that through judicious planning and application of the funds of the Agency's own programme, these investments have acted as "seed money" for about 20 large-scale, long-term UNDP projects in 15 countries, for which the IAEA is at present executing agency. The fact that these large-scale projects have become possible at all shows how far these countries have come since the early PAMs, how they have succeeded in organizing their own national atomic energy programme over the years, so that they have truly become the Agency's partners in its attempts to promote the peaceful uses of atomic energy.

THE FUTURE

So much for the past. About the future, predictions are always hazardous, and particularly so when it affects as many as 70 countries which receive technical assistance from the IAEA in one form or another. One can only make a rough guess.

Obviously the Agency's involvement in nuclear power projects in developing Member States will increase both in volume and depth. Hitherto the Agency has only been able to assist such projects marginally. One hopes that in future it will be able to offer assistance to these projects from the initial stages through to their final conclusion, covering all the three stages of

- (1) the preparation and procurement phase,
- (2) the construction phase, and
- (3) the operating phase.

The assistance will not follow a set pattern and one hopes that a pragmatic approach to meet particular needs, based on a joint assessment of the situation by the IAEA and the requesting Government, will yield satisfactory results.

There will be a considerable increase in the training activities of the Agency in regard to nuclear power projects covering all the phases of project formulation, procurement of equipment and supplies, construction and operation. This will have to be a joint effort by the Agency and some of the countries which have large nuclear power programmes of their own.

The future demand for uranium, estimated to be three or four times the existing demand by 1980, will, it is hoped, warrant concentrated investigation of what were formerly considered to be economically marginal deposits of uranium ore, and more attention and funds will have to be devoted to the completion and updating of overall mineral resource surveys. The facilities and funds made available to carry out uranium resource surveys are expected to grow rapidly with the development of atomic energy programmes, and the expanded use of nuclear power in the developed and developing countries alike.

In the more advanced among the developing countries, with sizable nuclear power programmes, the need for projects leading to fabrication of fuel elements will be felt and projects similar to the one of the kind the Institute for Nuclear Technology in Romania will have to be taken up for implementation. In some countries with a large industrial base, projects based on various industrial application of nuclear energy, including the use of large radiation sources for radiosterilization and polymerization of monomers, electron beam treatment of surface coatings and textiles, and the use of radioactive tracers and other nuclear techniques in industrial production and environmental monitoring, will figure prominently in the technical assistance programmes of the IAEA in future years.

All these projections are based, however, on the basic assumption that the atomic energy authorities in the developing Member States will retain their initial vigour and organizational competence. Close co-operation between the atomic energy authorities on the one hand and those in charge of power production (such as the utilities, water and power commissions), industry (both in the public and private sector), and the authorities in charge of promoting agricultural development, will be essential if this vigour and competence are to be maintained. Some dangers lie ahead in these purely organizational aspects of atomic energy development unless these problems are attended to in time. One can only hope that they will be.