highlights of 1969

NPT nears completion
power past the teething age
agricultural techniques proved
new medical method
gains ground

Part of a complex of seven waterfalls which reduce the Parana River, Brazil from a width of four kilometres to about a hundred metres. The possibility of measuring the flow rate with isotopes is being considered. Photo IAEA/Payne

Among advances noted in 1969 was significant progress in ratifications of the nuclear Non-Proliferation Treaty (NPT). An appraisal of atomic power indicated that nuclear reactors for generating electricity have overcome their teething troubles and are now accepted as being commercially ready to assist in meeting growing requirements. Evidence of contributions to the world's food needs came from reports of the succes of plant mutations induced by radiation and the effectiveness of the sterile insect technique against pests. Medical sources reported rapid progress in laboratory techniques for clinical medicine and research without irradiating the patient.

Many of the higher level discussions within the Agency centred around measures suggested to keep organization in line with modern developments and to meet responsibilities foreseen when NPT comes into force. Consultations with Member States are expected to lead to proposals for amendments to the Statute to increase representation on the Board of Governors, progress has been made towards fuller effectiveness of the safeguards system, and major nuclear powers have assisted investigations of the use of nuclear explosives for peaceful purposes.

As the year began 84 nations had signed the Non-Proliferation Treaty and five had ratified it. Although the number of signatures had increased by only nine at the end of the year, considerable interest was shown in the later months and the number of ratifications is now growing.

In preparation for the responsibilities which will be undertaken by the Agency under the Treaty a Division of Development within the Department of Safeguards and Inspection is concentrating on research and on systems analysis. Non-nuclear weapon States have expressed

their hopes for developments to keep the cost of effective safeguards as low as possible by rationalizing and simplifying procedures, concentrating on points of maximum importance and using instruments and devices for mechanizing the operations and diminishing the possibility of industrial espionage. The Agency is making progress in these aspects. Useful recommendations were made by a group of consultants provided free of cost by Canada, Denmark, Hungary, USSR, UK and USA and three panel meetings were held with the aim of developing and rationalizing the system. Co-operation in UK resulted in development of a technique for plutonium verification.

Safeguarding experience was extended under operations resulting from agreements placing facilities under Agency safeguards control. The system now covers 73 reactors in 31 countries. All Member States in Latin America, Africa south of the Sahara and in South East Asia and the Far East which possess reactors have now placed them under Agency safeguards. Pakistan placed its first nuclear power plant under the system during the year and consultations are in progress for India to follow suit with its first power plant.

As the year ended a panel meeting was being held in Tokyo on Safeguards methods and techniques, attended by experts from ten countries, Euratom and ENEA. An Agency expert was completing a six-months research and development assignment in USA. A symposium at Karlsruhe in July 1970 will review progress.

Technical assistance

While giving due attention to safeguards requirements, the Agency is also concerned with maintaining a proper balance with its other activities. Technical assistance for developing countries, though still hampered by lack of funds which meant that 46 out of 115 requests could not be met, continues to be a main concern. Assistance provided from the Agency's own resources, totalling in value $977 000, provided aid for 46 countries. Of this $532 300 was for services of experts and $444 700 for equipment. This expenditure is taken from voluntary contributions to the General Fund; other sources are gifts from Govern-

ments such as equipment, fellowships and services of experts administered by the IAEA, and the technical assistance component of the UN Development Programme.

Experts, who served in 53 countries, numbered 157 and about 300 fellowships for training abroad were awarded. A dozen seminars, training courses and study tours altogether had 172 participants. Of these fourteen took part in a study tour, financed by UNDP, of Czechoslovakia, Poland and USSR to obtain experience of methods in practice for managing nuclear wastes.

While not part of the technical assistance programme, the research contracts placed give useful support, as well as advancing knowledge, since two-thirds of the $303 000 spent was used in laboratories of developing countries.

Nuclear power

One of the conclusions reached at an IAEA symposium in Prague during November was that operating experience with nuclear power stations since 1954, when the first USSR reactor started working, had largely overcome the initial teething period and that efficiency comparable with conventional systems can now be anticipated. Forecasts for the world's nuclear generating capacity indicate that about 110 000 megawatts will be installed by 1975 and more than 300 000 in 1980. The IAEA publication "Power and Research Reactors in Member States" lists 479 reactors operating by the end of 1969, 105 of which are power reactors.

Interest in many countries was demonstrated by the fact that 72 participants in a survey course held by the Agency were drawn from 35 countries. They received the latest information on all types of reactors, reviewed technical and economic aspects, implementation of programmes, fuel cycles, regulatory questions, desalination, agro-industrial complexes and future developments expected. A symposium in Istanbul considered economics of nuclear power and the factors influencing the contribution it can make to progress in developing countries. In these and other meetings the stringent methods employed to ensure safe operation were fully discussed.

Food and agriculture

Notable advances reported from the application of atomic energy in food and agriculture, promoted by a joint division operated by the Agency and the Food and Agriculture Organization (FAO) included the success of radiation induced mutants for better crops and proof of the efficacy of the sterile insect method of combating pests.

Sweden is providing funds for the Agency to carry out mutually agreed projects in developing countries. Here Mr. Lennart Petri, Swedish Ambassador to Austria and Resident Representative to the Agency (left), is discussing arrangements with Mr. Upendra Goswami, Deputy Director General in charge of Technical Assistance, after signing the agreement.
On the right is Mr. O. H. Lloyd (Technical Assistance Division).

The use of radiation to improve characteristics of crops has now resulted in 80 new varieties being made available to growers and superior crops covering millions of acres being grown throughout the world. The advantages are improved resistance against disease and weather, higher protein content, increased yield and economic benefits. An important contribution is by this means being made to the "Green Revolution" throughout the world.

Impressive results were reported from the UNDP project administered by the Agency to demonstrate the effectiveness of the sterile insect technique against the Mediterranean fruit fly in Central America and from other experiments in Italy and Spain. The Agency's laboratory at Seibersdorf near Vienna has improved its ability to rear and sterilize large numbers of these insects and has made progress in research connected with other damaging insects, among them the olive fruit fly and the tsetse fly.

Collaborative programmes of experiments to gain information on fertilizers, including those used for tree crops, and research to further preservation of food have continued. Programmes have been initiated to ascertain the effects of chemicals used at all stages of food production and to increase the protein content of various foods.

The United Nations Advisory Committee on Application of Science and Technology recommended the application of atomic energy in food and agriculture as meriting increased support by both the Agency and FAO.

Medicine

In medical work attention was drawn to rapid developments of nuclear techniques which can be used in small laboratories with comparatively simple equipment and which eliminate contact between the patient and radioactivity. A symposium dealing with *in vitro* procedures using radioisotopes in clinical medicine and research attracted 200 specialists from thirty countries, and the information presented showed a surge of interest in this type of activity and its usefulness for both developing and developed countries.

The possible uses of radiation for sterilizing and preserving live tissues, and the influence this could have on transplantation surgery, was discussed internationally for the first time at a panel meeting in Budapest attended by world specialists in radiobiology, irradiation techniques and surgery.

In collaboration with WHO a symposium was organized in Athens on radiation induced cancer. Its participants came from more than 20 countries and reviewed current knowledge on radiation biology and the nuclear methods used to combat cancer. A panel meeting in Vienna on isotope procedures in diagnostic haemotology reached agreement on certain methods of diagnosing blood diseases by means of radioisotopes and on standard techniques in the labelling of red cells.

Emphasis was placed throughout the year on the necessity for setting standards in all countries on the use of radiation and radioisotopes and for producing codes of practice to ensure protection. The IAEA work in establishing and improving calibration of instruments for measurement of radiation was considerably advanced in December by the gift from USA of a 3000 curie cobalt source and its ancillary equipment.

Miss Laili Roesad, Indonesian Ambassador to Austria and Resident Representative to the Agency, after signing an agreement under which USA is to supply through IAEA enriched uranium for use in a research reactor.

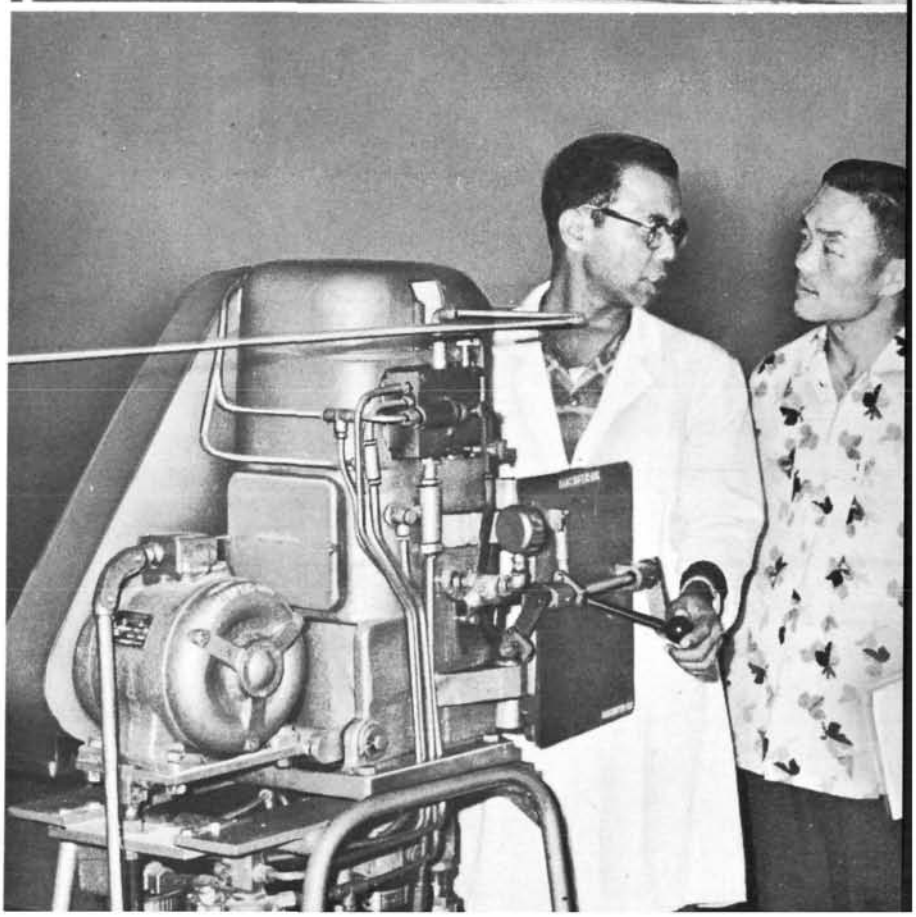

Photo taken at the food irradiation laboratories at Trombay, India, during a visit by scientists from South-East Asia. Photo: Indian AEC

Safety guides and legislation

Advice was provided to several countries for framing legislation and safety regulations. A study group arranged with the International Labour Organization and WHO brought experts from 18 countries and produced the main features of recommended legislation for radiation protection. Recommendation for solving nuclear insurance problems were drawn up by a panel of experts. Another panel drew up guidelines for preparing safety reports, to supplement the Code of Practice for Safe Operation of Nuclear Power Plants.

The Board of Governors authorized the Director General to promulgate a code of practice for safe operation of critical assemblies and research reactors. It forms part of the Safety Standards recommended to Member States for incorporation into legislation.

At a symposium on the handling of radiation accidents also organized in conjunction with WHO it was shown that the record of incidents in nuclear establishements compares well with those in other types of industry. Another symposium dealt with safety aspects in "hot" facilities which handle highly radioactive materials. It was held in France with the help of the Commissariat à l'Energie Atomique. A manual on the safety aspects of such laboratories was published by the Agency.

Information

Preparations have been completed for the Agency's International Nuclear Information System to start operating in April 1970. This is a co-operative venture in which Member States will prepare descriptions of information published and report them to the IAEA, which in turn will establish a master file. Copies of the master file will be distributed as a source from which information can be extracted to meet the needs of particular nuclear programmes. The essential data will be in a form that can be directly fed into computers for rapid searching and retrieval. A contract completed with Euratom, who will deliver a dictionary of descriptive terms, a manual of instructions on its use and a set of computer programmes for processing terms received will save time and avoid duplication of effort.

Radiation in industry

In a number of countries advice and assistance was given on the use of nuclear techniques for industrial purposes. A symposium in Munich emphasized progress in the use of high energy radiation and accelerators for a number of processes including composite wood plastics, concrete and chemical production.