the first year of ten

Yearbooks will record 1970 as the year of inauguration of the Second Development Decade. The Director General of the International Atomic Energy Agency, Dr. Sigvard Eklund, is quoted elsewhere in this issue of the Bulletin as expressing the hope that the ideals implicit in these high titles will be fulfilled. This article records some significant developments related to the work of the IAEA during the year.

The Statute of the Agency lays down two cardinal principles for its work. It is to "seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world," and to ensure so far as it is able "that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose." Each programme of the Agency is devised with these objectives in mind.

It is now a matter of history that the Treaty on the Non-Proliferation of Nuclear Weapons (the NPT) entered into force on 5 March 1970. This Treaty lays upon the Agency a new responsibility for safeguarding nuclear materials intended for peaceful use in non-nuclear weapon States Party to it; at year-end 99 countries had signed and 65 had ratified it or acceded to its terms, including three nuclear weapon States — the USSR, the United Kingdom and the USA — which are not bound to accept safeguards under the Treaty, but have accepted other obligations under it.

Independently of the NPT, Agency safeguards are already applied to ten nuclear power stations with a combined electrical generating capacity of 2 900 megawatts, and to 68 other reactors.

In recognition of the new responsibility laid on the Agency by the NPT the Agency's Board of Governors set up a committee open to all Member States to advise it on the content of the agreements to be negotiated and concluded between the IAEA and non-nuclear weapon States Party to the Treaty, and on the question of safeguards costs. By the end of December, 24 governments had entered into the negotiation of such agreements.

The draft agreement drawn up so far in outline by the Safeguards Committee is characterized by a new feature: independent verification by the Agency of the findings of national systems of control of the use of nuclear materials. Dr. Eklund pointed out in his address to the General Assembly of the United Nations in December that this concept "might have wider application, for example if an agreement were to be made regarding conventional arms, or measures taken against pollution."

With respect to the actual techniques of safeguarding the peaceful uses of nuclear energy, a symposium organized by the Agency and held in July at Karlsruhe, in the Federal Republic of Germany, showed that substantial progress has been made in methods of systems analysis, techniques of verification based on correlation of data relating to the nuclear fuel cycle, and new instruments. Panels of experts which met during the year drew up recommendations to the Agency on the technical objectives of safeguards work, principles of inspection of nuclear facilities, requirements for information on the design of nuclear installations in order to apply safeguards to them effectively, and verification of nuclear materials.

The NPT contains provisions relating to the peaceful uses of nuclear explosive devices — for example, for major earthmoving projects for which the energy of an underground nuclear explosion could be used. In March, the Agency convened the first international meeting on the peaceful uses of nuclear explosions, enabling a remarkable exchange of information which had not previously been available internationally. At the end of November, a panel of experts met to consider the international observation of nuclear explosions used for peaceful purposes in the context of the NPT, and to draw up recommendations for a framework for the implementation of appropriate procedures. As this issue of the Bulletin went to press another expert panel was meeting to consider practical aspects of the applications of contained peaceful nuclear explosions for industrial purposes.

The Range of Activity

The Agency's safeguards work and the discussions concerning the peaceful uses of nuclear explosions were thus given a fresh impetus by the entry into force of the NPT. But the activities of the Agency range far more widely than this. The Bulletin last year reported on a number of meetings, for example, relating to nuclear energy and the environment; and this was the subject of a special report. This article need only recall one statement, made by Professor Ivan Zheludev, Deputy Director General, Department of Technical Operations, at the

opening of the New York Symposium on Environmental Aspects of Nuclear Power Stations, in August: "No industry has shown such a preventive approach to pollution control as has the nuclear industry."

The Agency maintained its position as a major scientific publishing house. Seventeen symposia and conferences were convened during 1970, in addition to the series of meetings of panels of experts, and during the year the Agency published 25 volumes of proceedings; four volumes in the Safety Series; 22 technical reports; three volumes in the Bibliographical Series; four technical directories; two volumes in the Legal Series; two scientific journals and a number of other publications, including the IAEA Bulletin.

Such publications are of obvious value in assisting the flow of information relating to the peaceful uses of nuclear energy. This is also the purpose of the International Nuclear Information System (INIS), which began operation in May 1970. INIS has been described in detail previously; briefly, it is a computer-based information clearing service for publications in the nuclear sciences. At the end of the year 36 countries and eight international organizations were taking part in work on the development of this system.

Aid to Development

Technical assistance under the regular programme of the Agency and with support from the United Nations Development Programme was made available to some 60 countries during the year. By the end of November 138 experts and 11 visiting professors had carried out technical assistance assignments, equipment costing $629 300 (not including the value of equipment provided "in kind") had been delivered, and 354 fellowships (not counting awards for training at the International Centre for Theoretical Physics, Trieste) had been awarded for individual studies.

During the same period 11 regional and inter-regional training courses were organized and conducted by the Agency. In addition, the Agency arranged an advanced summer school on reactor physics, two visiting seminars in Asia and the Far East, and three study tours — one on *in vivo* radioisotope measurement techniques in medicine, which visited Czechoslovakia, Denmark, Sweden and the USSR, one on the use of isotopes and radiation in agricultural research, in the USSR, and one on the industrial applications of radioisotopes and radiation, in Canada and the United States.

More resources were devoted to providing technical assistance in agriculture than in any other discipline during 1970. Considerable assistance was given in the industrial applications of radioisotopes and radiation, and a growing number of projects were carried out in respect of prospecting, mining and processing of nuclear materials.

Contributions to the technical assistance programme by Member States in 1970 reached almost 85 per cent of the target of $2 million — the highest ever. The target for contributions has now been raised to $2.5 million, and by the end of the Agency's General Conference in September the President of the Conference, Dr. Vikram A. Sarabhai, of India, was able to announce that 52 countries had already pledged

to contribute a total of $1 191 126. Dr. Sarabhai noted that a number of countries were not then in a position to anounce their contributions, and took the amount pledged at that stage as "an encouraging sign."

From plant crops to the moon

The joint FAO/IAEA Division of Atomic Energy in Food and Agriculture continued work on many programmes aimed at improving food crops to feed a hungry world, and at meetings throughout the year experts reviewed the uses of nuclear techniques in agriculture. A symposium in June drew attention to the fact that crop plants, especially cereal grains, are the basic food of many people who live in the less developed countries and are thus the main source of protein in their diet; but such plant sources generally have a low content of essential amino acids and are thus commonly inadequate to meet nutritional needs. It was announced at this symposium that the Federal Republic of Germany was to contribute aid worth more than three quarters of a million dollars to support a joint FAO/IAEA research programme aimed at increasing the protein content of such crops by the use of nuclear techniques.

In 1969 nuclear power went to the moon, when a nuclear generator was put in place to provide electricity for scientific experiments associated with the United States' space programme. In April 1970 energy from a nuclear device was used for the first time to power a cardiac "pacemaker" inside a human being — a Frenchwoman. Similar devices have been developed for use in relief of certain cardiac complaints in other countries, and some have since been used, following years of research with animal "patients" to test safety and reliability.

But when most people think of nuclear power it is in the context of electric power generation. Nuclear power is being used to an ever greater extent to provide the energy needed for development of industry and the raising of living standards throughout the world. At the end of 1970 installed nuclear generating capacity totalled 24 000 MWe; projections for the rest of the decade indicate that by 1980 installed nuclear-powered electrical generating capacity could be about 330 000 MWe, about 15 per cent of total generating capacity at that time.