

In 1975, 170 nuclear reactors were in operation throughout the world. About two-thirds of these were located in non-nuclear-weapon countries. By the end of 1976, the number of facilities in these three categories monitored by the Agency had risen to more than 300. According to the Agency's 1976 annual report, the quantities of nuclear material covered by safeguards were as follows: 14,553 kilograms of plutonium; 2,979 kilograms of uranium-235 with more than 20 percent enrichment; 1,337,763 kilograms of uranium with less than 20 percent enrichment; and 5,336 tons of slightly-enriched uranium. This gives an indication of the importance and extent of the safeguards applied by the Agency.

As already noted, the nuclear safeguards arising from the NPT apply to raw materials and all fissionable products - in other words, to the entire nuclear-fuel cycle. Before the NPT came into effect, a number of countries had concluded nuclear co-operation agreements with each other. It is now common practice for the Agency's safeguards to complement those that supplier countries required of recipients in the earlier bilateral agreements. Moreover, a number of countries still co-operate in the area of nuclear development with states that have not signed the NPT, and so co-operation agreements take the form of trilateral agreements to which the Agency is a party in order to ensure that the safeguards are applied and respected. If the recipient country later signs the NPT, the provisions of the trilateral agreement are in many cases suspended and the recipient country falls under the NPT nuclear-safeguards system.

A number of countries, though they are not signatories to the NPT, have agreed to the application of safeguards to some of their nuclear facilities. As indicated in the Agency's 1976 annual report, only five countries without nuclear weapons or major nuclear facilities are as yet uncovered by the Agency's safeguards, and even in these countries several facilities are, in fact, operating under them.

Because of the increase in nuclear co-operation and the transfer of technology, the interpretation to be given to Paragraph 2, Article III, of the NPT had to be considered very seriously. In it, the countries that are parties to the treaty agree not to supply "equipment or material specially designed or prepared for the processing, use or production of special fissionable material" to any non-nuclear-weapon country unless these materials or products are subject to the Agency's

safeguards. In the second quarter of 1974, a group of member countries began unofficial consultations on this subject. The explosion of a nuclear device by India in May 1974 came at the right time to underline how important it was to clarify the above provision as soon as possible.

Suppliers group

In June 1975 a number of countries called the Nuclear Suppliers Group met in London. The group consisted of Belgium, Britain, Canada, Czechoslovakia, France, Italy, Japan, the Netherlands, Poland, the German Democratic Republic, the Federal Republic of Germany, Sweden, Switzerland, the United States and the Soviet Union. The purpose of this meeting was to discuss the most appropriate way of defining the principles of moderation to which supplier countries should adhere in matters of technological transfer.

In a document dated September 21, 1977, and made public at the beginning of 1978 (in the March-April 1978 issue of *Survival*), the supplier countries agreed on a set of guidelines to govern the implementation of their policy on the export of nuclear materials. They also drew up a basic "trigger" list of the items to which safeguards would automatically be applied in the event of transfer. This basic list includes entire reactors, several components required to manufacture nuclear fuel or build nuclear reactors or uranium-enrichment plants, and a number of important materials such as heavy water and nuclear-quality graphite, which are indispensable for the operation of certain types of reactor.

These provisions are also aimed at protecting supplier countries against the possibility that recipient countries might reproduce transferred technology by their own means or export it to a third party. The control measures (upon which agreement by the supplier countries took several years of consultation) will become part of the International Atomic Energy Agency's safeguards. In this way the Agency will, it hopes, be able gradually to exert sufficient pressure to ensure that certain countries will eventually place all their nuclear activities under its control.

Monitoring

The main monitoring methods used by the IAEA are material accountancy, containment and surveillance. The Agency does not concern itself with the activities of facilities as such but with the location and flow of nuclear materials. The territory monitored is divided into material-balance areas (MBAs). Key-measurement points

Some agreement to application of safeguards by non-signatories