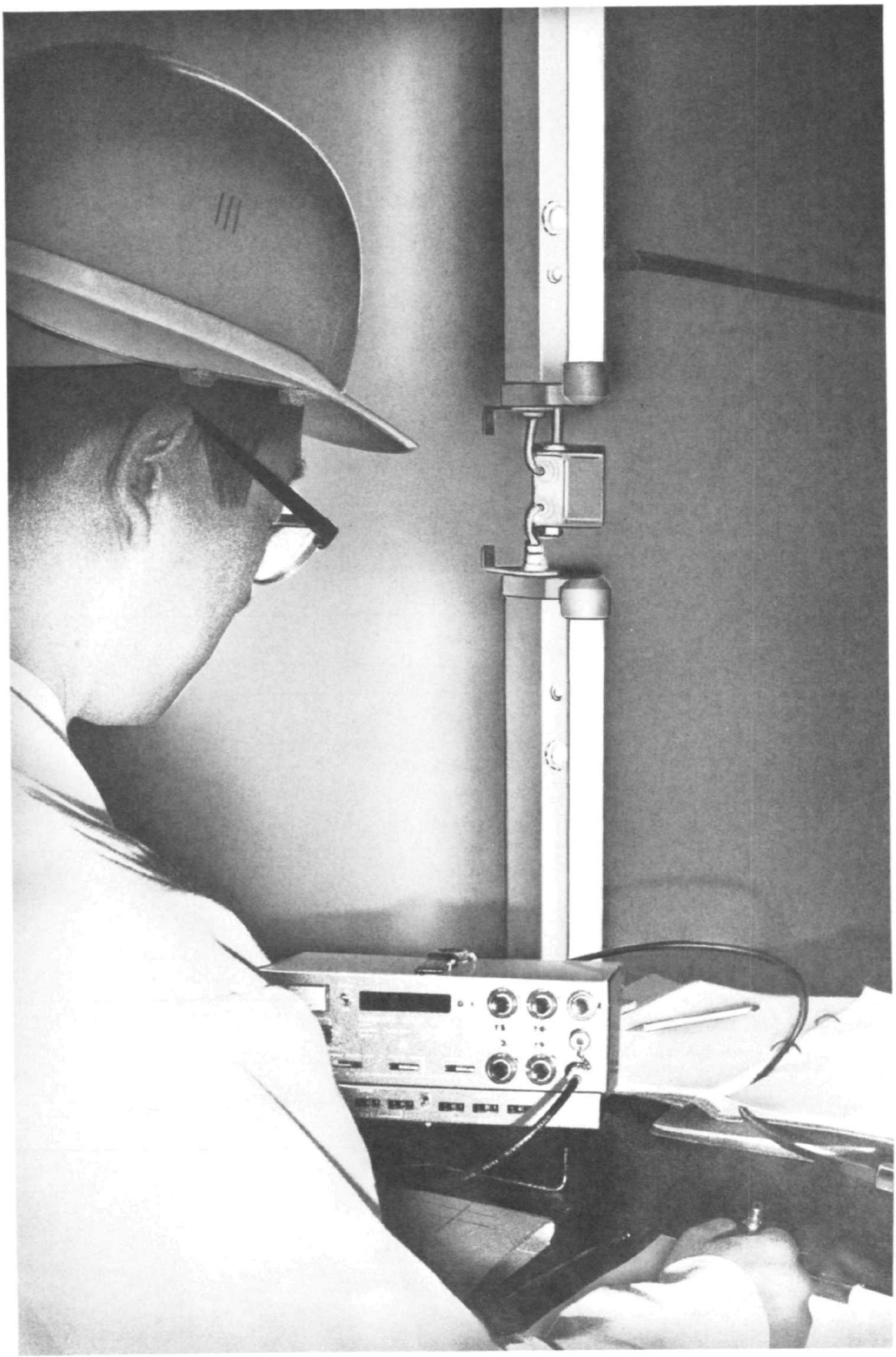


Safeguards and non-proliferation

The IAEA and efforts to counteract the spread of nuclear weapons

by Dr Hans Blix

At the beginning of the 1960s, President Kennedy prophesied a world with between 15 and 20 nuclear-weapon States. Yet the number has not increased since 1964, and today there is not a single new State openly professing a desire to develop nuclear-weapon capacity. An overwhelming majority of States in the world – 124 – have committed themselves to the general Treaty on the Non-Proliferation of Nuclear Weapons (NPT) or to the Latin American Tlatelolco Treaty.

Given the record, it seems justified to say that the efforts to restrain the spread of nuclear weapons to additional countries have been successful.

A large number of States may have found the nuclear weapons question relatively academic because the nuclear option has seemed so remote to them. They have probably taken the view that by acceding to the NPT they could contribute towards a general restriction of nuclear weapons. Perhaps, too, they may have felt their actions could help to put some pressure on nuclear-weapon States to negotiate disarmament agreements, in keeping with Article VI of the NPT. Another probable expectation is that NPT affiliation might help in obtaining certain benefits – under Article IV of that Treaty – in the form of technology transfer for the peaceful uses of nuclear energy.

Other States may have found the issue more complex, and may have had to engage in close deliberations of security and military policy. Some of these States may have come to the conclusion that it would be more dangerous to acquire nuclear weapons, or retain the liberty to acquire them, than to renounce the option: Possession of nuclear weapons might, for example, provoke an arms race with neighbouring countries, or in the event of a crisis, it might prompt a neighbour or major power to undertake a pre-emptive strike against the nuclear weapons.

Overall, a State's conclusions in this matter will hinge on a number of factors: its geographical situation; the existence or absence of tension in the region; the risk of neighbouring countries retaining the option or in the possibility of their renouncing it; alliance relationships that extend nuclear weapons protection to countries not owning such weapons, or guarantees by the major powers not to use nuclear weapons against a State which is free of them; and the risk of confronting tactical nuclear weapons in a military conflict.

Such deliberations – which have prompted a very large number of States to pledge themselves expressly and in a legally binding manner not to obtain nuclear weapons – doubtless also have a crucial bearing on the continuing tenability of the non-proliferation treaties and on the prospects of more States acceding to them.

The unwillingness of some countries to commit themselves by treaty to not acquiring nuclear weapons supposedly has been due to their not seeing any paramount advantage in doing so – at least not yet. It should be noted, however, that none of these countries has declared the intention of developing nuclear weapons.

The NPT aims to prevent more States from equipping themselves with nuclear weapons, but the world's attention in matters of non-proliferation goes a good deal further than that. With varying degrees of concern, it observes all levels of development – from attempts and capacity to enrich uranium or produce plutonium in special laboratories or reprocessing plants to the accumulation of fissile material of military quality and preparations for test explosions.

There is certainly no lack of effort to persuade these non-affiliated States to refrain from developing nuclear weapons and to commit themselves to this by treaty. The stick – an embargo on technology transfer – has been more assiduously used than the carrot in this connection. Only accession to the NPT and acceptance of IAEA safeguards throughout the nuclear energy sector seem capable of opening the door.

Dr Blix is the Director General of the IAEA. This article is adapted from his address earlier this year to the Paasikivi Society in Helsinki, Finland.

At nuclear facilities they visit, inspectors audit accounts regarding fissile material.

It deserves re-emphasizing that the first and most important obstacle to the proliferation of nuclear weapons is a matter of political judgement and determination.

Eventually, nuclear-weapon-free zones may prove to be attractive solutions to some of these States. However, they do not offer any easy solutions. This was clearly demonstrated at a recent UN Committee on the subject which did not arrive at any conclusive result.

Inducements for non-proliferation

Even if the stick seems most in evidence, carrots do exist. NPT Parties with nuclear power programmes have no difficulty whatsoever in importing nuclear power technology. On the contrary, producer countries vie with each other to supply them on favourable credit terms. The restraint also observed vis-à-vis NPT States in the matter of enrichment and reprocessing plants comes in for a certain amount of criticism, but it is of fairly limited practical importance in a situation where there is a glut of enrichment capacity and reprocessing does not seem to be economically very attractive.

Other and smaller inducements exist in the form of technical assistance specially provided for NPT countries, mainly in the non-power nuclear energy sectors. Many developing countries, after all, do not yet have the infrastructure to interest them in nuclear power.

Whereas the IAEA makes no distinction between NPT and other countries in its technical assistance programme, extrabudgetary assistance can be specially earmarked by donor countries for the benefit of NPT countries. This option is exercised to a certain extent. It is hard to gauge the potential importance of such assistance as an incentive for NPT affiliation, but there are cases of NPT-affiliated developing countries complaining that they are not rewarded with sufficient assistance.

A matter of political judgement

It deserves re-emphasizing that the *first and most important* obstacle to the proliferation of nuclear weapons is a matter of political judgement and determination, as it emerges from assessments of political and security conditions, of benefits possibly accruing from NPT affiliation, and of drawbacks possibly connected with retention of the nuclear-weapons option.

Should considerations of this kind lead a State to conclude that it needs nuclear weapons – and if that State has an adequate industrial infrastructure and is prepared to commit sufficient resources – the rest of the world is unlikely to be able to do more than delay acquisition of nuclear weapons by attempting to block the transfer of the relevant technology, equipment, and materials. This in itself, of course, can be important.

National security policy and the estimate a country makes of its need for energy security are influenced, as I mentioned earlier, by the behaviour of the surrounding world – neighbouring countries and the major powers. Policy which leads to détente in a region will make that region less disposed to resort to nuclear weapons. Alliances, security guarantees, and mutual guarantees between neighbouring countries to refrain from acquiring nuclear weapons are therefore important. And, of course, a nuclear disarmament agreement would be a great encouragement to non-nuclear-weapon States to commit themselves to such a position.

Restrictions on the transfer of sensitive technology are a *second barrier* to nuclear-weapons proliferation. Transfer of non-sensitive technology – especially nuclear power stations – has until now been unrestricted where NPT States are concerned, even though this naturally leads to a build-up of technical and scientific competence, infrastructure, and technical capacity. Such experience, it has been argued, might be of use later on in the production of weapons.

The general aim of various restrictions currently in place is to block the transfer, among other things, of sensitive technology – especially the kind of technology needed to produce materials used in the manufacture of nuclear weapons, that is, highly enriched uranium and plutonium. However, States which feel themselves subjected to unfair restrictions may draw the conclusion that, for the sake of their own energy security, they are obliged to develop their own technology, including the technology for enrichment and, possibly, reprocessing. If States developing their own technology then decide against inviting the IAEA to inspect it, export restrictions will definitely have defeated their own ends.

A *third barrier* to the procurement of nuclear weapons could perhaps be said to consist in formal, legal accession to the NPT or the Tlatelolco Treaty. There are, of course, cases of a State defaulting on its treaty obligations. However, it is more common for States to be sincere in their intentions of abiding by the commitments they make. The formal commitment, then, constitutes a "legal threshold" even if the interests which once prompted accession may have diminished or disappeared.

Safeguards cannot prevent a violation of obligations ... any more than bank or company audits can prevent a misappropriation of funds. All they can do is expose infringements or arouse suspicions – in effect, sound the alarm.

Application of IAEA safeguards

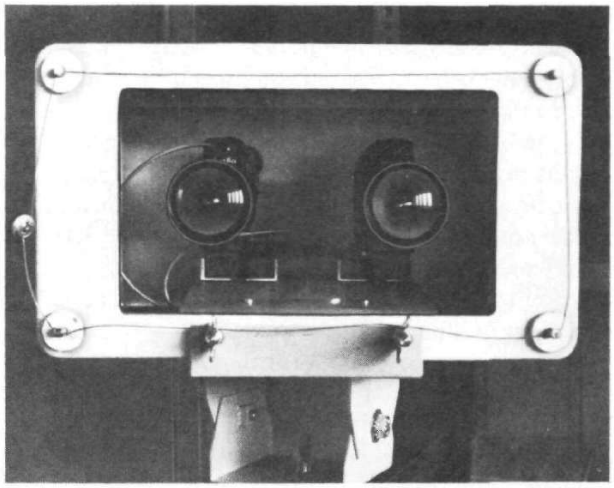
This brings me to the *fourth barrier* to proliferation: inspection of the nuclear energy sector through the application of IAEA safeguards. This is done in countries which consent to it under the terms of the NPT, the Tlatelolco Treaty, or other safeguards arrangements. Allow me to briefly describe how these safeguards operate, and within what framework.

States have every reason to organize their own system for the control of all nuclear material and nuclear energy facilities in their territories, so as to make sure that no fissile material goes astray and no facilities are misused. Under the safeguards agreement concluded between a State and the IAEA, regular reports are sent to the IAEA concerning material under safeguards. The agreements also entitle IAEA inspectors to inspect all facilities containing safeguarded nuclear material, the purpose being for IAEA inspectors to verify on the spot the data previously supplied to the Agency. These inspections are carried out by a growing body of IAEA inspectors, at present numbering about 170.

Safeguards involve a complex process of interaction between field activities and various measures at IAEA headquarters. The results of each inspection, and the conclusions drawn by the IAEA from a number of inspections, are conveyed to the State concerned by means of statements designed to inform it whether, for instance, problems have occurred or anomalies have been found. The IAEA compiles an annual summary of its findings in the form of a Safeguards Implementation Report, which is presented to the Agency's Board of Governors.

Very simply, safeguards can be said primarily to involve an audit by the inspectors of accounts concerning fissile material at the plants they visit. Measurements are taken on the spot and samples sent for analysis to the IAEA laboratory outside Vienna, Austria to make sure that the information supplied is accurate – for example, that a certain fuel element actually contains the material stated. The inspectors also check that the stationary IAEA equipment at the facilities is in working order and has not been tampered with or modified. This includes seals, automatic cameras (including television cameras continuously monitoring operations in the inspectors' absence), and automatic fuel-bundle counters for on-load fuelled reactors.

All the report data collected, including the millions of pictures taken by stationary cameras, are then subjected to a partially computerized analysis at IAEA headquarters in Vienna. Properly balanced inspection activities lead to the discovery of discrepancies, or anomalies as they are called, all of which are carefully investigated to ascertain the causes – a counter fault, or an oversight resulting, for example, in an accounting error; cameras out of order; broken seals; etc. All in all, these various measures, which are handled by well-trained inspectors and other personnel, provide the IAEA with firm ground to stand on when compiling its annual Safeguards Implementation Report to the Board of Governors.



Automatic cameras and special IAEA protective seals are among the safeguards measures used.

It goes without saying that safeguards verification must be independent and sufficiently thorough to be credible. Only then can they create the confidence which is their purpose. Naturally, no one wishes to spend more of the taxpayers' money than is necessary for this purpose and naturally everyone would like the safeguards operations to be organized and run with maximum efficiency. This being said, however, it is certainly better that they are a bit too thorough than a bit too shallow. They must be credible, not cosmetic. The current annual cost of safeguards is around US $30 million, which must be viewed as a very modest sum for the world's first verification system in the field of arms control.

Benefits, limits of safeguards

Safeguards cannot prevent a violation of obligations – the diversion of fissile material – any more than bank or company audits can prevent a misappropriation of funds. All they can do is expose infringements or arouse suspicions – in effect, sound the alarm. The inspectors are not police officers with physical powers of prevention. All they can do is report. If they should be denied admittance, they can only report the fact.

By submitting the whole of their nuclear energy sector to impartial international inspection, States can inspire great confidence on the part of the rest of the world in the exclusively peaceful nature of their programmes.

But this has never yet happened. Nor has the IAEA yet identified any diversion of fissile material, and this, we hope and believe, is because nothing of the kind has occurred in any safeguarded nuclear programme.

If the IAEA should rate inspection opportunities so poor at any given country's nuclear installation that it would be unable to draw any positive conclusion as to whether or not diversion had occurred, then the Secretariat would report this fact to the Board of Governors and take various steps towards the creation of better inspection facilities.

By submitting the whole of their nuclear energy sector to impartial international inspection, States can inspire great confidence on the part of the rest of the world in the exclusively peaceful nature of their programmes. And through the IAEA, States obtain useful verification of the efficacy of their own control system.

In international debate, the IAEA is sometimes accused of weakness on the grounds that it cannot *prevent* the diversion of fissile material. *All* international supervision of compliance with disarmament or arms limitation agreements is necessarily confined to observation and reporting. Its fundamental purpose is to *verify* that the State honours its commitments, thereby creating security. In order for this to succeed, the inspection must be so thorough and comprehensive that it would expose any violation of commitments. The realization that the revelation or suspicion of any such infringements can be expected to result in diplomatic, economic, or political countermeasures by neighbouring States or the major powers can also be expected to act as a deterrent, though the potency of this can only be judged in the individual case.

Another limitation in IAEA safeguards – as with any other possible arms control verification procedure – is that it can make no predictions regarding the possible future intentions of an inspected State. The safeguards system reports on the current situation. Most measures needed in order to produce nuclear weapons take some time to complete, however, and so the first signs of any such development must give the rest of the world an opportunity of reacting with the means at its disposal.

Another limitation of safeguards is that in a particular country the IAEA may only be invited to apply safeguards to certain facilities or certain material, other facilities and materials being exempt from inspection. This, however, is not the case for the large number of countries which have acceded to the NPT or the Tlatelolco Treaty, because those States undertake to submit *all their nuclear activities,* both present and future, to IAEA inspection. IAEA safeguards accepted outside these multilateral agreements – usually under bilateral nuclear co-operation agreements – can relate to specifically enumerated facilities or nuclear material. In cases of this kind, of course, the IAEA *can only issue statements concerning the peaceful use of those particular facilities or that particular material.* It cannot furnish any statements whatsoever concerning activities not subject to safeguards.

Safeguards are today an essential precondition for imports of nuclear power technology, uranium fuel, and many different kinds of material for the nuclear energy sector. Without IAEA safeguards, the existing market in this sector would be unworkable.

It is perhaps worth asking what point there is in covering only part of a State's nuclear programme. One advantage is that an exporting State can be assured that the material or technology it has exported is being applied for peaceful purposes. And one can always hope that the importing State will consent to a gradual enlargement of the scope of safeguards later on.

The safeguards activities of the IAEA are unique. This is the first instance in history of sovereign States inviting an impartial international organization to audit their accounts and carry out inventories and other inspections on their own territory. There is no question of any coercive infringement of sovereignty. The States agree with the IAEA, as a matter of self-interest, on the application of safeguards, so as to give their neighbours and the rest of the world complete assurance that their nuclear energy activities are being exclusively applied for peaceful purposes.

In fact, safeguards are today an essential precondition for imports of nuclear power technology, uranium fuel, and many different kinds of material for the nuclear energy sector. Without IAEA safeguards, the existing market in this sector would be unworkable. All exporters want to be sure that their civilian exports will only be used peacefully.

Upcoming NPT review

The NPT, which has led to the application of IAEA safeguards worldwide, is coming up for its Third Review Conference this year. The Treaty has received growing criticism, but most of this has come from a few States which have been unwilling to accede to it. The main point of criticism is that, whereas the non-nuclear-weapon States have honoured their undertaking to refrain from acquiring nuclear weapons, the nuclear-weapon States have been unsuccessful in their efforts, under the Treaty, to reach agreement on nuclear disarmament.

There has been criticism to the effect that the Treaty is "unequal" and that most of the advantages were reserved for one side. Thus, it has been argued that the non-nuclear-weapon States make "sacrifices" while the nuclear-weapon States reap the benefits. Although the latter cannot be exempted from criticism for their inability to agree on the nuclear disarmament to which

the NPT refers, I think it is inaccurate to call the Treaty "unequal" and to characterize as "sacrifices" the commitments entered into by the non-nuclear-weapon States in their own best interests. The pledge given by nuclear-weapon States to try to reach an agreement on disarmament is not a direct *quid pro quo* for the pledge given by other States to abstain from nuclear weapons. As I have already noted, those pledges were doubtless prompted mainly by other considerations of security policy, general policy, or economic policy.

There can be no doubt that concrete disarmament measures in the nuclear-weapon sectors, and above all a comprehensive test-ban treaty, would be the best guarantee for continued adherence to the NPT. Measures to facilitate technology transfer – for example, a significant increase in the amount of technical assistance received by developing countries through the IAEA – could also help to alleviate the criticism.

Safeguards in nuclear-weapon States

The IAEA is not involved in questions relating to "vertical proliferation", but for the sake of completeness I would like to address the safeguards which four of the five nuclear-weapon States have spontaneously invited the IAEA to carry out in respect of facilities or fissile material in their peaceful nuclear energy sectors. The USA, the United Kingdom, France, and – several months ago – the Soviet Union have concluded safeguards agreements of this kind with the IAEA.

Obviously, these agreements are not aimed at preventing the proliferation of nuclear weapons, because the States concerned already have them. One intention has been to counter some of the criticism which says that the nuclear-weapon States have benefitted by being spared the expense and intrusion inspection entails. Benefits of this kind, however, should not be exaggerated. However, it is of considerable value that these inspections will give the IAEA an opportunity to gain experience in applying safeguards to certain types of facilities that have not yet come to be widely used by non-nuclear-weapon States.

Potentially, the most important aspect of the acceptance of IAEA safeguards by nuclear-weapon States is that it shows their readiness to submit important installations within their territory to impartial inspection. Even though the four agreements differ in scope and structure, the precedent is obviously the same.

I believe it is extremely valuable for the international community – as well as the nuclear-weapon States themselves – to gain experience of impartial inspection in these countries through the IAEA. The question of verification is usually a major stumbling block in arms talks. A certain fund of experience is now being built up, admittedly within the peaceful sector and with reference to identified installations. There is no talk of any general right of inspection within the territory of either nuclear-weapon or non-nuclear-weapon States.

Dr Blix, IAEA Director General.

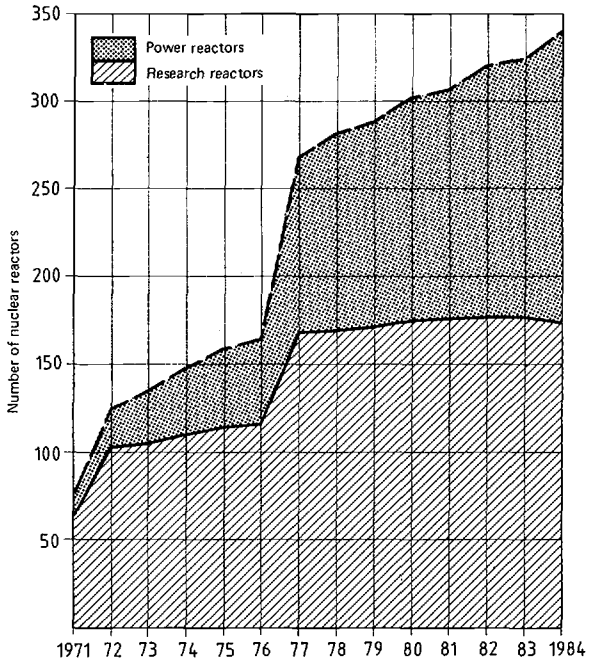
The Soviet journal *International Affairs* commented in July 1982 that "the importance of the IAEA safeguards system consists in its constituting in many ways a prototype for the organization of inspection in other fields of arms control, especially where nuclear weapons are concerned".

What might be examined would be the potential usefulness of this type of verification in connection with an agreement on a cut-off or restriction in the production of fissile material, that is, enriched uranium and plutonium. At present, such production necessarily takes place in facilities of the type which the IAEA has now gained experience in inspecting. It is to be hoped that the nuclear-weapon States themselves consider the potential usefulness of the IAEA safeguards techniques and institutions in such a connection. This – possibly unrealistic – hope makes it doubly essential for us to develop and consolidate our safeguards activities.

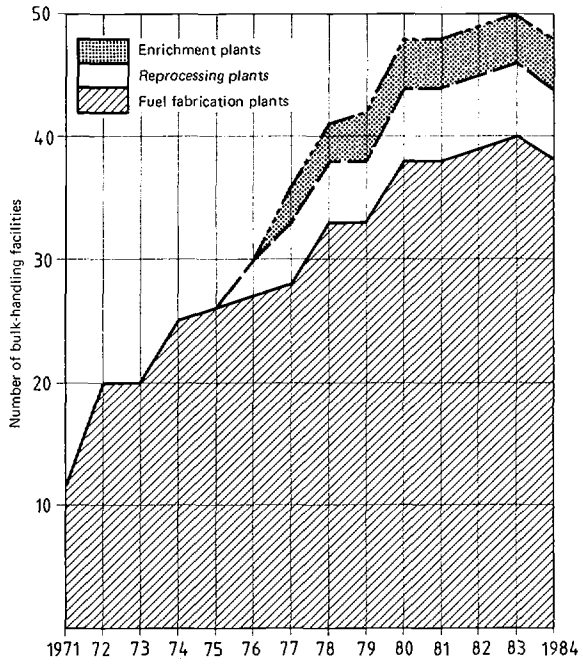
Potentially, the most important aspect of the acceptance of IAEA safeguards by nuclear-weapon States is that it shows their readiness to submit important installations within their territory to impartial inspection.

Safeguards

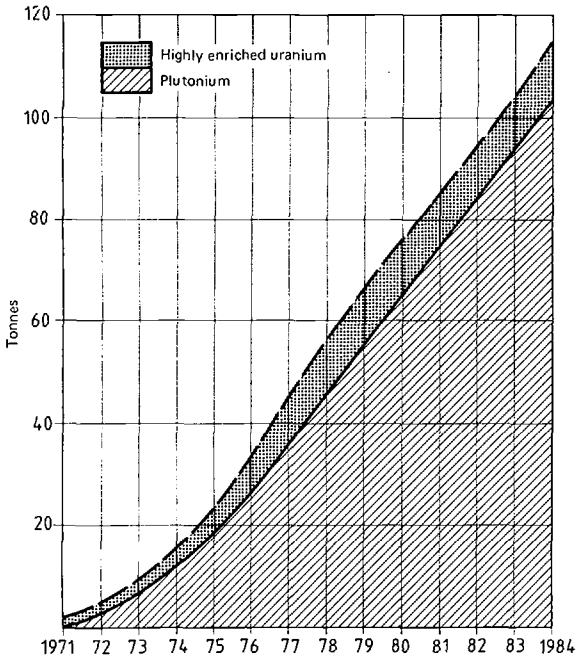
Nuclear reactors under safeguards in non-nuclear-weapon States



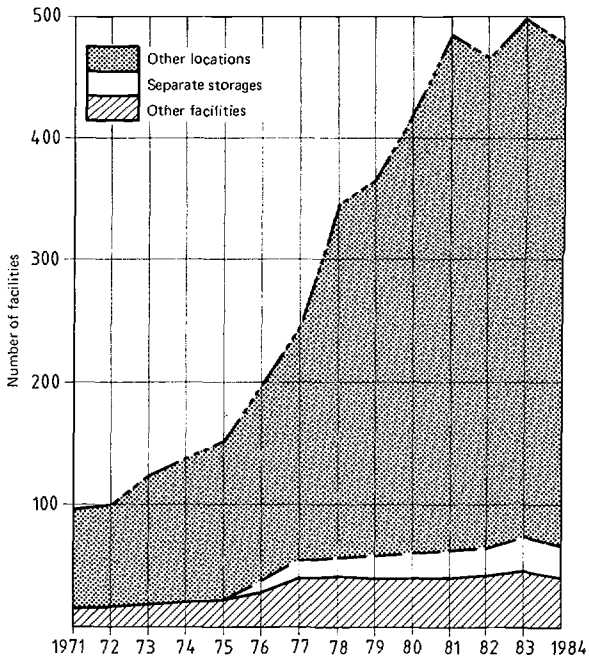
Bulk-handling facilities under safeguards in non-nuclear-weapon States



Amounts of plutonium and highly enriched uranium under safeguards in non-nuclear-weapon States



Separate storage facilities, other facilities and other locations under safeguards in non-nuclear-weapon States



As these charts show, application of IAEA safeguards in non-nuclear-weapon States has grown considerably over the past decade. Fuller details of safeguards and other Agency activities will be contained in IAEA's *Annual Report* for 1984 to be issued this September.