

Nuclear safeguards: evolution and future

David Fischer

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NUCLEAR SAFEGUARDS were first publicly proposed in a November 1945 declaration by US President Harry Truman, UK Prime Minister Clement Attlee and Canadian Prime Minister William Mackenzie King. The three allies said that they would be willing ‘to proceed with the exchange of fundamental scientific literature about atomic energy’, but only when ‘it is possible to devise acceptable, reciprocal and enforceable safeguards acceptable to all nations’ against its destructive use.¹ By the end of 1959, the US had concluded agreements with 42 countries to co-operate in the peaceful application of atomic energy. These agreements required the use of safeguards—initially by the US, but, later, in many cases, by the International Atomic Energy Agency (IAEA).²

Safeguards were institutionalised regionally in 1957 with the creation of the European Atomic Energy Community (EURATOM),³ and internationally with the establishment of the IAEA. In Latin America, Argentina and Brazil have also set up a bilateral safeguards system, administered by the Argentina–Brazil Agency for Accounting and Control of Nuclear Material (ABACC). ABACC and the IAEA co-operate closely in applying safeguards, each retaining, however, the ability to verify independently compliance with their joint safeguards agreement.⁴ Since 1967, nuclear weapon-free zones have been set up by treaty in several regions.

These safeguards aim to verify that nuclear material and technology are only used for purposes permitted by their charters. All of the charters (with the exception of EURATOM’s)⁵ prohibit the diversion of safeguarded nuclear material to nuclear weapons or to other nuclear explosive devices,⁶ or go further and ban all non-peaceful uses of nuclear energy.⁷ The treaties call on the IAEA to verify compliance with these restrictions.

The IAEA and EURATOM

The main international safeguards applied today are those of the IAEA. This is an autonomous, intergovernmental body controlled by a General Conference, comprising, as of the end of 1999, the 131 member states of the IAEA, and a 35-nation Board of Governors.⁸ The IAEA reports on its work to the UN General Assembly and the Security Council.

Like the IAEA, EURATOM, which is the nuclear branch of the European Union (EU), owes the development of its safeguards regime largely to US policy requirements. In the early 1950s, the leading Western European states shared the general belief that nuclear power would be the energy of the future, that it would free them from dependence on Arab oil, and that it would be the driving force behind a united Europe. To launch a nuclear power programme, though, Western Europe would have to draw heavily on American nuclear fuel and technology, which would only be available under certain restrictions. Consequently, they equipped EURATOM with safeguards that met American demands.

In 1958, the framers of US nuclear policy were divided. Some wanted the country's nuclear exports to Western Europe to fall under the safeguards of the IAEA (largely an American creation), while others backed EURATOM safeguards as a means of strengthening the unity of Western Europe and its bonds with the US. The latter carried the day.

In the late 1960s, it became urgent to decide what safeguards should apply in non-nuclear weapon states parties to the Nuclear Non-Proliferation Treaty (NPT), which had been opened for signature in 1968 and which required full-scope safeguards for such states. Anxious about the nuclear potential of West Germany, the Soviet Union successfully resisted Western European attempts to retain EURATOM's safeguards monopoly. The IAEA, EURATOM and EURATOM's non-nuclear weapon states agreed in 1973 to amalgamate the safeguards that the two agencies would apply in these countries. This opened the way for EURATOM's non-nuclear weapon member states to ratify the NPT in 1975. In so doing, they also renounced the right to acquire nuclear weapons and accepted joint verification of this decision by EURATOM and the IAEA.⁹ The integration of the two safeguards operations was taken further in 1992 by an agreement between the Secretariats of the two organisations 'on a new partnership approach'. This move has already reduced by nearly 25% the number of inspections that the IAEA carries out in these states. Today the size and cost of the two agencies' safeguards operations are roughly comparable.

As the EU expands, so too does the coverage of the IAEA–EURATOM agreement. EURATOM’s safeguards are comprehensive in the case of the EU’s 13 non-nuclear weapon states, but only apply to the civilian nuclear activities of its two nuclear weapon states: France and the UK.

Growth of IAEA safeguards

The Agency’s safeguards initially encountered mistrust and resistance, especially from its developing country members, but also from the Soviet bloc and some West European states intent on protecting EURATOM. In the mid-1960s, the coverage of IAEA safeguards began to expand as a result of the US decision to transfer to the IAEA responsibility for safeguarding its nuclear exports to non-European Economic Community (EEC) countries and of the 1963 Soviet decision to give IAEA safeguards full Eastern bloc support. This change of policy probably reflected the *détente* in East–West relations that followed the resolution of the 1962 Cuban missile crisis, the fact that China turned into the Soviet Union’s harshest critic after the latter had helped it to make ‘the bomb’, and, above all, Soviet concerns about the Federal Republic of Germany (FRG)’s emerging nuclear programme. By 1968, the IAEA was able to draw up safeguards covering almost every type of nuclear plant.

When the NPT came into force in 1970 it became urgent to construct a safeguards system covering the entire nuclear fuel cycles of the non-nuclear weapon states that would soon join the Treaty. The Agency’s Board approved the new system in 1971.¹⁰ By the beginning of the 1980s, almost all industrialised countries and many developing nations had joined the NPT, and, with the exception of the nuclear weapon states, most of them had placed all of their nuclear material under IAEA safeguards, as required by Article III of the NPT.¹¹

In 1991, it was discovered that Iraq was conducting an extensive nuclear weapons programme, undetected by IAEA safeguards, even though it had foresworn nuclear weapons when it ratified the NPT in October 1969. This led to a fundamental review of the existing (1971) system. Henceforth, the IAEA should be able to monitor both the nuclear and nuclear-related activities of a state, and not just (as heretofore) the individual nuclear plants declared to the Agency.

Despite the Iraqi setback, the early 1990s marked a high point in the evolution of the NPT and international acceptance of IAEA safeguards mainly because of the unexpected end of the Cold War. At the 1995 quinquennial NPT conference the parties agreed to an indefinite extension of the Treaty. By this point all except three

of the countries that had significant nuclear programmes (India, Israel and Pakistan) had acceded to the NPT or to one of the regional accords banning nuclear weapons.¹²

Since then, however, there have been threats to the non proliferation regime. North Korea has been in violation of its IAEA safeguards agreement for the past seven years. At the end of 1998, UN Special Commission (UNSCOM) and IAEA inspectors were banned from Iraq,¹³ and, earlier the same year, India and Pakistan damaged the emerging norm against nuclear testing enshrined in the 1996 Comprehensive Nuclear Test Ban Treaty (CTBT). In 1999, the US Senate rejected ratification of the CTBT, which the international community has been striving for since the 1950s. In addition, moves towards nuclear disarmament, envisaged in Article VI of the NPT, have ground to a halt. Until early 2000, the Russian Duma had failed to ratify the second Strategic Arms Reduction Talks (START) Treaty, despite encouragement from the government. And pressure is mounting in the US for a nationwide anti-ballistic missile defence system, endangering a cornerstone of nuclear disarmament, the 1972 Anti-Ballistic Missile (ABM) Treaty.

Many nations have helped to promote IAEA safeguards, but their effectiveness has largely depended on American initiatives and support. This dependence has become of critical significance at a time when some US political leaders appear to be turning away from collective security as a mainstay of foreign policy and towards US technical supremacy in a world in which it has become the supreme power.

Three phases of IAEA safeguards

Phase one: IAEA safeguards face an uphill struggle until the mid-1960s

In January 1959, the Agency's Board of Governors approved the first agreement for the application of safeguards, covering a small Japanese reactor and its fuel. However, several members of the Board vigorously opposed the agreement. Although the Soviet Union was engaged in a Cold War propaganda contest with the West, it genuinely doubted the wisdom of a global diffusion of nuclear technology. It likened IAEA safeguards to a 'spider's web', designed to ensnare developing countries and to stifle their scientific and technical progress. Some of the leading EEC countries saw IAEA safeguards as a potential threat to EURATOM. India and its 'Third World' supporters believed that nuclear power was the energy of the future and were mistrustful of international controls on their infant nuclear programmes. They would accept IAEA safeguards only when it became clear that this was the price they would have to pay for obtaining access to US civilian nuclear technology.

As proof of the need for an agreed and standardised system, proponents cited the lengthy discussions on safeguards for the small Japanese reactor. The Board of Governors approved the first IAEA safeguards system in 1961, but many Western European countries only went along reluctantly. The accompanying directive on the work of IAEA inspectors showed how far the Board had to go to get the document accepted. For instance, the IAEA would have to give at least one week's notice of each routine inspection. The government concerned would stipulate the port or airport through which inspectors must enter and leave the country and the routes that must be followed in that state. It also had the right to insist that the inspectors be accompanied everywhere by national officials.

In 1963, the Soviet Union unexpectedly expressed its full support for IAEA safeguards. As a result, the Agency's Board was soon able to approve a system that covered all types and sizes of nuclear plants (except enrichment facilities).¹⁴ Canada, the UK and the US could now turn to the IAEA to monitor the use of the nuclear reactors that they were supplying to India, Japan and several other countries.¹⁵ These safeguards were designed to apply to individual supplies of plants and fuel, rather than to the entire fuel cycle of a non-nuclear weapon state. Nonetheless, they provided the NPT (under negotiation from 1965) with a tested verification system on which to build the comprehensive safeguards foreseen in Article III of the Treaty. But the five non-nuclear weapon states, which were then members of the EEC (now the EU), also insisted on preserving EURATOM safeguards.

Phase two: the NPT's entry into force and comprehensive IAEA safeguards

The NPT entered into force on 5 March 1970. According to Russia, the main objective of the Treaty was to enable other parties to keep an eye on their former enemy, the FRG, which was building plants capable of producing nuclear weapon material: plutonium and enriched uranium. Some of the Federal Republic's neighbours shared Soviet apprehensions; some countries in East Asia felt the same about Japan. But Germany, Japan and other non-nuclear weapon states with substantial nuclear energy activities were determined that the NPT should not impair their nuclear industries' right to engage in all non-military nuclear activities, including reprocessing spent fuel to recover plutonium and the enrichment of uranium. They also sought to ensure that safeguards should not be unduly intrusive, especially since the NPT would not require their nuclear weapon state rivals (France, the UK and the US) to accept any safeguards whatsoever. In the eyes of the non-nuclear

weapon states only the application of safeguards to the nuclear industries of their nuclear weapon state competitors would 'level the playing field'.

The NPT would have little value if it were not accepted by the leading non-nuclear weapon states: the FRG, Japan, and some other non-nuclear weapon state members of the EEC. It was therefore imperative to take account of their concerns. Human inspections would have to be kept to a minimum in order to reduce opportunities for industrial espionage, and safeguards would only be applied to nuclear material in nuclear plants which the government concerned had declared to the IAEA. In normal operations, the Agency's inspectors were to have access only to a limited number of previously agreed 'strategic points' in declared nuclear facilities in the country concerned. The last two limitations proved crucial.

It was also agreed that a comprehensive new safeguards system reflecting these concepts should be drawn up as soon as possible. A good reason for speed was that the NPT required its non-nuclear weapon state parties to negotiate and conclude full-scope safeguards agreements with the IAEA—a process to be completed within 18 months of their accession to the Treaty. It would also become illegal for any NPT party to supply nuclear material and technology to a non-nuclear weapon state not party to the NPT, unless the nuclear material itself or that resulting from the transaction was under IAEA safeguards.¹⁶ In practice, this meant that the US could no longer legally supply fuel for Belgian, Italian and West German reactors or for other plants in EURATOM non-nuclear weapon states until all those nations had ratified the NPT and accepted full-scope IAEA safeguards.¹⁷

The Agency's Board of Governors approved the new system in 1971.¹⁸ But it was not until 1975–76 that the EEC non-nuclear weapon states and Japan ratified the NPT. These ratifications were made possible by the conclusion of agreements that dovetailed IAEA safeguards with those of EURATOM and the Japanese verification system respectively. Almost all industrialised states and a wide range of developing countries, therefore, were able to ratify the NPT and to accept comprehensive safeguards before the end of the 1970s. But the leading absentees in 1980, and until the early 1990s, included two nuclear weapon states, China and France, and several leading developing countries in regions then marked by intense political tension and regional rivalry: Argentina, Brazil, India, Israel, Pakistan, and South Africa.

Phase three: the 1980s and 1990s

The end of the Cold War transformed relations between the leading nuclear states, redrew the political map of Eastern Europe and the former Soviet Union, and,

as a result, laid the ground for major advances in nuclear disarmament. In addition, the transformation of internal politics and of relations between erstwhile enemies or rivals made it possible for Argentina and Brazil to renounce their nuclear weapon options and for South Africa to give up its nuclear weapons, leaving only India, Israel and Pakistan as significant nuclear absentees. These political developments also encouraged the creation of new nuclear weapon-free zones in Africa and, by force of example, in Southeast Asia, and helped strengthen and clarify the Treaty for the Prohibition of Nuclear Weapons in Latin America.¹⁹ By 1995, the NPT seemed to be coming close to universality and IAEA safeguards appeared to be nearing the point at which they might cover all the nuclear activities of the non-nuclear weapon states.

The 1995 Conference on the Review and Extension of the NPT extended indefinitely the duration of the Treaty. Its full-scope safeguards agreements were also made permanent (except in the unlikely event that the state party concerned withdrew from the NPT). The Conference reaffirmed the commitment of the NPT states—in particular the nuclear weapon nations—to work towards total nuclear disarmament, to conclude a CTBT no later than 1996, and to finalise a convention to ban fissile material for nuclear weapon purposes. The prospects for a world free of nuclear weapons, in which IAEA safeguards would verify compliance and maintain confidence, had never seemed brighter.

Nonetheless, IAEA safeguards were facing serious challenges. The 1991 revelation that Iraq (a long-standing party to the NPT and to a comprehensive safeguards agreement with the IAEA) had been able to establish clandestinely an impressive nuclear weapons programme came as a severe shock and disclosed a major defect in the 1971 system. That system had proved effective in verifying that no diversion of nuclear material was taking place in the stocks and plants that parties had declared to the IAEA, but it had failed to detect Iraq's undeclared nuclear activities.

In 1992–93, it became clear that North Korea was also conducting undeclared nuclear activities and had produced and separated plutonium. In this case, however, the IAEA, applying some of the lessons learnt from its experience in Iraq, detected traces of the undeclared plutonium, and, consequently, a potential violation of Pyongyang's safeguards agreement with the Agency. It also received satellite images from the US showing two undeclared nuclear facilities of the type usually used to store nuclear waste. The IAEA called on North Korea to open the plants to special inspection. Pyongyang refused, and the IAEA reported to the Security Council that

the country was in violation of its safeguards agreement. As a result of US intervention and its willingness to arrange for the supply of two American-designed power reactors, North Korea agreed to halt its suspect programme and eventually to dismantle its suspect nuclear plants. Most of the political heat was thus taken out of the dispute between the IAEA and North Korea. Nevertheless, at the end of 1999, the Agency had still not been able to inspect the installations and Pyongyang was still in violation of its safeguards agreement.

With the end of *apartheid* in 1991, and the beginning of multiracial democracy, the government of South African President F.W. de Klerk also reversed its nuclear policy. It unobtrusively scrapped its small arsenal of six nuclear warheads (plus one that was under construction), acceded to the NPT, and, in record time, concluded a comprehensive safeguards agreement with the IAEA. South Africa then sent the Agency the required 'Initial Report', listing all of its nuclear material and plants. At the request of the IAEA General Conference, the Agency's Secretariat verified the completeness of the document. In 1993, President de Klerk disclosed that South Africa had indeed manufactured and subsequently dismantled a small nuclear arsenal. The IAEA accepted the South African government's invitation to verify that the arsenal no longer existed and that its nuclear weapons programme had been terminated.²⁰ South Africa thus became the first nuclear weapon state to renounce and dismantle a nuclear arsenal.²¹

These events, and, particularly, the IAEA's failure to detect the Iraqi programme, prompted the Board of Governors to begin a radical review and to revise the IAEA's 1971 NPT safeguards system. In the first stage of this review, the Board and the member states took a number of individual measures to strengthen safeguards without formally seeking any additional authority or touching the 1971 safeguards document. These so-called 'Part 1' measures, agreed in 1995, included:

- a requirement that states should submit information about the design of new nuclear plants much earlier than had been the practice since 1971;
- a directive to the Secretariat to make full use of its existing but unused power to conduct special inspections anywhere in a state with comprehensive safeguards;
- arrangements to give the Agency access to national intelligence information;
- an agreement by EU states to provide full information about all exports and imports of certain nuclear equipment and non-nuclear material;
- the use of certain environmental sampling techniques, which had already been tried out in Iraq; and

- the reaffirmation by the Security Council of its support for the IAEA in case of a safeguards violation.

In May 1997, the Board approved a major strengthening of the 1971 system, which greatly extended the scope and intrusiveness of safeguards. The new 'Model Protocol Additional to the Agreements between States and the International Atomic Energy Agency'²² was designed to remedy the weaknesses of traditional instruments, but not to replace them. The 1971 system verified that no diversion of nuclear material took place at individual plants and stores that the non-nuclear weapon states had declared to the IAEA and which had thus come under safeguards.²³ The modified 'Strengthened Safeguards System' would seek to verify that there was no diversion of nuclear material *anywhere* in the state concerned—in other words, the new system would assess the state as a whole. The Agency was now also in a position to look actively for undeclared nuclear activities.

To enable the IAEA to widen its focus in this manner each non-nuclear weapon state would be required (as in the past) to provide comprehensive information on all the nuclear material that it held, produced and received, as well as on all its past, present and future nuclear and nuclear-related activities, ranging from uranium mining to waste disposal, regardless of whether or not these activities involved the use, production or processing of nuclear material. For instance data must henceforth be provided about the location and operation of all facilities that manufacture enrichment plants or their major components, even though such facilities would not normally contain any nuclear material.

This expansion of the scope and intrusiveness of verification applied equally to the IAEA's rights of access. Inspectors were now to enjoy 'complimentary access' to any part of a nuclear plant (not just previously agreed 'strategic points'), any location in a nuclear centre and any installation conducting 'nuclear-related' activities.

It is expected that the expanded flow of information and improved access, as well as better use of regional systems and advanced verification technology, will enhance the effectiveness of safeguards. Thus the strengthening of nuclear safeguards will enable the IAEA to redirect verification resources towards those countries where questions persist about the completeness and correctness of declarations. The integration of safeguards also has the potential to increase the efficiency of safeguards. Under the label 'integrated safeguards', the Agency and member states are currently evaluating proposals to reduce the need for routine inspections to such an extent that the net cost of applying safeguards will not increase, despite the growing

workload. For the Agency's Board of Governors, cost has always been an important consideration: indeed for 20 years the IAEA has had to live within the confines of a 'zero-growth' budget. 'Integrated safeguards' could result in a major shift in its activities: away from nuclear material accounting towards a more proactive approach that verifies a state's compliance based on information from a wide variety of sources, random checks and state level evaluations.

Non-nuclear weapon states bring the strengthened system into effect for themselves by signing and ratifying a standard additional protocol to their comprehensive (INFCIRC/153) safeguards agreements with the IAEA. By the end of December 1999, 46 states had accepted the strengthened system by signing additional protocols. They included all the EU's 13 non-nuclear weapon states (Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and Sweden), as well as Australia, Canada, Indonesia, Japan, the Republic of Korea and almost all of the states in Eastern Europe. The nuclear weapon states are expected to apply relevant clauses of the strengthened system to the civilian nuclear plants that they have already voluntarily placed under safeguards. All five nuclear weapon states have signed an additional protocol.

It will probably take a few years before the strengthened system becomes law in all non-nuclear weapon states that have, or plan to have, significant nuclear plants. Nonetheless, if a state in this category unduly delays its acceptance of the new system it may arouse mistrust about its motives.

The new system should be considerably better than its predecessor in detecting any clandestine attempt to acquire nuclear weapons, but much will continue to depend on the competence and commitment of the IAEA Secretariat and the resources that states make available to it. Secret transfers of complete weapons or fissile material from one party to another (if they take place) are more likely to be a challenge to the authorities in the country of origin than to international inspectorates. The IAEA would be more directly on trial if a nation that had accepted comprehensive safeguards attempted, like Iraq, to put together a large clandestine complex to produce fissile material and to 'weaponise' the product.²⁴

One should also ask how probable it is that any other nation would try to copy Iraq, and, if it did, how much better are contemporary nuclear export controls than those of the 1970s and 1980s? A fair comment would be that it is difficult to identify any state that might have the incentive and the means to follow Iraq,²⁵ and that is not already the subject of much more intense scrutiny than Baghdad

was in the 1980s. North Korea is in the process of becoming dependent on Western nuclear technology and fuel. A detected move towards a secret bomb would politically be very risky for South Korea and Taiwan. Iran, the most frequently cited candidate, would jeopardise its improving relationship with Western Europe. And if Iran 'went nuclear', Russia could hardly continue its nuclear supplies. Unless the relevant Security Council resolutions are lifted there is little chance of Iraq rebuilding its shattered nuclear programme. The nuclear non-proliferation regime would be more at risk if there were a breakdown in co-operation between China, Russia and the US, which is the basis for effective non proliferation.

Future prospects and problems

Despite the achievements of recent years, IAEA safeguards face several problems. The perennial challenge is the shortfall in resources needed to deal with growing demands on the system, such as the mounting stocks of separated plutonium from the reprocessing of civilian spent fuel. These inventories may already exceed those in nuclear arsenals and in other military stocks.

Other sources of safeguarded fissile material result from current projects—in particular, the Trilateral Initiative between Russia, the US and the IAEA—to place former military material under the Agency's supervision in order to verify that it remains permanently in civilian hands. The highly enriched uranium released by this process can be rendered militarily unusable by 'blending it down' into fuel for nuclear power reactors. It is much more difficult to make plutonium harmless or to develop means of storing plutonium pits under international auspices without risking the disclosure of sensitive information about weapons design.

It is always possible that one or more of the non-nuclear weapon states will renounce commitments made under the NPT or regional treaties and will openly seek to acquire nuclear weapons (in other words, to 'break out'). This has become unlikely in Europe, Latin America and the Caribbean. In Africa, Central Asia, Southeast Asia and the Pacific, the incentive has been fading and non proliferation institutions are multiplying. The Middle East and East Asia remain the regions where mistrust and hostility run deep and technical capacities are advancing.

A potentially more damaging threat comes not from 'rogue states', but from the country that has done more than any other to foster IAEA safeguards and the regime on which they depend. The bombing of the former Yugoslavia without a prior Security Council mandate, growing domestic support for the deployment

of anti-ballistic missiles, and, in particular, the Senate's rejection of the CTBT, might indicate that the US is turning away from internationally agreed objectives and operations and is placing more reliance on its own superior military strength and a compliant NATO. So far, however, there has been no perceptible change in US policy towards the IAEA and no weakening of American support.

In the past, the scope of IAEA safeguards has partly depended on the extent to which the world planned to make use of nuclear power. Apart from a few states in East and South Asia and Eastern Europe, nuclear power is not a growth industry. The future prospects for safeguards are thus more likely to depend on progress in nuclear disarmament than on the spread of nuclear power.

The prospects for 'a treaty on general and complete disarmament under strict and effective control' (a goal of Article VI of the NPT) are probably distant. The role of the IAEA in such a treaty can only be speculative at this time. New regional nuclear weapon-free zones may come into force, but it is likely that most of the countries joining them would already be parties to the NPT, and it is unlikely that there would be any need for significant additional safeguards.

Two developments in nuclear arms control may have a more immediate effect. The first, which has already been discussed, is the intention of some nuclear weapon states to place significant amounts of former military fissile material under IAEA supervision (for instance, the Trilateral Initiative). The second is the proposed convention to ban the production of fissile material for nuclear weapon purposes. Negotiations have still not started, although preliminary studies have been made of the additional safeguards that such a convention might require. At a minimum, all reprocessing and enrichment plants should be put under safeguards or shut down. At the upper end it might be desirable to safeguard all civilian nuclear operations of the nuclear weapon states. Since verifying that Germany and Japan are not producing material for nuclear weapons requires that their entire nuclear industries be safeguarded, it could be argued that the same should apply *a fortiori* to the nuclear weapon states' industries, which, from the start, were also designed to produce material for nuclear weapons.

David Fischer, as a South African diplomat, took part in the drafting of the Statute of the IAEA from 1954–56. From 1957–82, he was in charge of external relations for the IAEA, eventually as Assistant Director General.

Endnotes

¹ This was the gist of a Three Nation Agreed Declaration on Atomic Energy. See Bernard G. Bechoefer, *Postwar Negotiations for Arms Control*, The Brookings Institution, Washington, DC, 1961, p. 33.

² Congress of the United States, 'Background Material for the Review of the International Atomic Energy Policies and Programs of the United States', Report to the Joint Committee on Atomic Energy, vol. 3, US Government Printing Office, Washington, DC, 1960, p. 897.

³ The nuclear arm of the EEC and its successor, the EU.

⁴ ABACC is broadly modelled on EURATOM, and its relationship with IAEA safeguards was forged by an agreement similar to that concluded in 1973 between EURATOM and the IAEA. The Quadripartite Agreement between Argentina, Brazil, ABACC and the IAEA was concluded in December 1991 and entered into force in March 1994.

⁵ The EURATOM Treaty stipulates that its safeguards are to verify that nuclear materials 'are not diverted from their intended use as declared by the users' (Treaty of Rome, 25 March 1957, Article 77). This wording reflects the fact that, when the Treaty was negotiated, France was well on its way to becoming a nuclear weapon state. It was, therefore, impossible to stipulate that all nuclear material in the EEC be used only for peaceful purposes or that EURATOM safeguards should verify fulfilment of this stipulation. However, the effect of another clause in the Treaty of Rome, as well as of the IAEA–EURATOM 1973 Safeguards Agreement and the ratification of the NPT by all the EU's non-nuclear weapon states, is that EURATOM safeguards (together with those of the IAEA) verify that there is no diversion of nuclear materials to nuclear weapons or other nuclear explosives in any of the EU's non-nuclear weapon states.

⁶ The NPT, for example. This prohibition implicitly leaves open the possibility of using nuclear energy in reactors that propel submarines or surface warships.

⁷ Article II of the IAEA Statute seeks to ensure that nuclear material and activities with which it is associated are not used 'in such a way as to further any military purpose'. Article I of the Latin American Treaty of Tlatelolco is ambiguous on this point.

⁸ In 1999, the IAEA's Board and General Conference approved an amendment to the Agency's Statute that, when it comes into force, will increase the Board's membership to 41 states.

⁹ The FRG had already renounced the right to make atomic, biological and chemical weapons when it signed the Treaty on the Western European Union in 1954, although there were still some uncertainties about the scope and status of this renunciation.

¹⁰ Known by the number of the IAEA document in which it was published, INF/CIRC/153.

¹¹ As of June 2000, more than 50 NPT member states are still in breach of their Treaty obligations because they have not concluded the required safeguards agreement. See 'Statement to the Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons' by the IAEA Director-General, Mohamed ElBaradei, New York, 24 April 2000.

¹² The NPT's ban on nuclear weapons does not apply to the five states that had made and exploded nuclear weapons before 1 January 1967. Aside from the end of the nuclear rivalry between NATO and the defunct Warsaw Pact, other factors promoting nuclear disarmament were, of course, also at work, including profound political changes in South Africa and Latin America.

¹³ Meanwhile, the IAEA has been allowed back into Iraq to perform routine inspections under its safeguards agreements. But it has been barred from resuming inspections under the relevant UN Security Council resolutions.

¹⁴ At the time, enrichment technology was confined to the nuclear weapon states and was not exported.

¹⁵ The model safeguards document for safeguards agreements covering individual facilities is known by its IAEA document number, INF/CIRC/66/rev.2.

¹⁶ The five non-nuclear weapon states of the EEC had signed the NPT, but they did not bring it into force until 1975. Consequently, there were no IAEA safeguards in those countries for several years. A period of grace was tacitly granted to allow them to continue importing nuclear material and plants without IAEA (but under EURATOM) safeguards until they had completed the process of ratification and the safeguards agreement between those states, EURATOM and the IAEA had been brought into force in February 1977.

¹⁷ The countries were Belgium, Italy, the FRG, Luxembourg and the Netherlands, which were subsequently joined by eight more European states. In practice, the Soviet Union, as well as the US, tacitly accepted that the

EURATOM nations concerned should have a reasonably long grace period for negotiating the agreement with the IAEA. When the discussions ran into problems and delays, which they frequently did, the US would put pressure on the EU—and presumably Moscow would put pressure on Washington.

¹⁸ Known by its IAEA document number, INF/CIRC/153.

¹⁹ At the end of 1999, five nuclear weapon-free zones were in force or in gestation: the Antarctic Treaty; the Tlatelolco Treaty in Latin America and the Caribbean; the Rarotonga Treaty in the South Pacific; the Pelindaba Treaty in Africa; and the Bangkok Treaty in Southeast Asia. The Tlatelolco Treaty had been amended and could no longer be interpreted in such a way as to permit its parties to carry out nuclear explosions for peaceful purposes. The nations of Central Asia were negotiating a treaty to establish a nuclear weapon-free zone in that region. Unfortunately, no progress had been made in the regions that most need such treaties: the Middle East and South Asia.

²⁰ David Fischer, *History of the International Atomic Energy Agency, The First Forty Years*, IAEA, Vienna, 1997, pp. II0–III.

²¹ Eventually, the three former Soviet republics—Belarus, Kazakhstan and Ukraine—would follow the South African example and give up the nuclear weapons they inherited when the Soviet Union collapsed.

²² Also known by its document number, INF/CIRC/540.

²³ The non-nuclear weapon states were legally obliged to declare all their nuclear plants and stocks to the IAEA, but the 1971 safeguards system did not seek assurance that they had done so. It would have been impossible for an international body with a staff of 200 inspectors to carry out a ‘blind search for undeclared facilities’, as the IAEA Director-General, Hans Blix, put it. Only national intelligence operations involving satellite observation could effectively undertake targeted searches, and, until 1991, national intelligence services were not prepared to share the results of such activities with any international body.

²⁴ The IAEA is now assessing methods of detecting ‘weaponisation’.

²⁵ Since Iraqi President Saddam Hussein expelled UNSCOM inspectors in late 1998, and the US and the UK launched a new series of aerial attacks against Iraqi targets, neither the IAEA nor the now defunct UNSCOM has been able to deploy inspectors and verify that the Iraqi government has not revived its nuclear weapons programme. However, the Security Council has replaced UNSCOM with the UN Monitoring, Verification and Inspection Commission (UNMOVIC)—headed by Hans Blix—and both the US and the UK are actively seeking to reintroduce inspections in Iraq.