

Part C—Improving the Existing System

DEFINING THE REQUIREMENTS FOR A VERIFICATION REGIME

PREVIOUS CHAPTERS HAVE OUTLINED CURRENT EXPERIENCES WITH nuclear nonproliferation verification, and discussed the problems inherent in the present international system. The lessons of these experiences can be used to suggest improvements to existing verification systems, and to create better systems in the future.

The set of principles and methods proposed in this part of the book is perhaps one of many possible sets that could improve the current system. However, improvement will only occur when states recognize that the present situation is not healthy, that some verification efforts have failed, and that verification could easily fail in the future if drastic changes in attitude and practice do not occur. This recognition is incumbent only upon states parties to the international agreements, but they must be made fully aware of the need to convince their own people of the strengths and weaknesses of the verification mechanism, and the degree to which it can assure that the treaties to which they are parties are sustained.

This chapter defines the purpose of verification, sets forth the principles according to which the ideal verification system shall be established and run, and establishes the prerequisites for a properly working verification system. Subsequent chapters propose changes to existing systems, and point the way to creating new verification systems.

Defining the Purpose of Verification

For the purpose of this discussion, the purpose of verification in the nuclear nonproliferation area is defined as “to detect, prevent, and give warning to states’ activities that are contrary to their international obligations.” This definition can be divided and discussed in five parts:

1. **Verification of non-diversion.** This refers to the task of ensuring that known sites, facilities, equipment, and materials are not being used or diverted for the production of fissile materials not under secure and accounted guardianship. This is an elaboration of the requirements of Article III of the Nuclear Non-Proliferation Treaty (NPT).
2. **Detection of illicit activities.** This refers to the task of detecting, with as high a probability as possible, any illicit activities that contradict the first part of this definition. This statement concerns negative verification, as encompassed by INFCIRC/540 or under the IAEA Action Team’s mandate in Iraq, to try and reach conclusions concerning the absence of banned nuclear materials or activities.

3. **Detection of nuclear testing.** The third part of the definition is a corollary to the second part of the definition (detecting illicit activities). It is judicious to allocate this specific responsibility as a separate part, in order to emphasize the specific requirements of the Comprehensive Test-Ban Treaty (CTBT).
4. **Deterrence.** The fourth part is to deter states, by conducting highly professional and effective verification, from conducting activities that are contrary to their international obligations.
5. **Give warning.** The fifth part is to warn other states that there is a possibility, based either on direct or circumstantial evidence, or on the evident lack of cooperation, that the state whose activities are being verified is developing nuclear weapons and/or has in its possession undeclared nuclear material. The suggestion that warning should be a part of the verification system was made by the UN: "The increased salience of the early warning function of verification should be recognized."¹

Principles for the Establishment and Application of Verification Systems

The following italicized principles are suggested as a basis for governing the establishment and performance of verification systems. They draw from and take into account, in part, the "Sixteen Principles for Verification," which were formulated in 1987–88 by the United Nations Disarmament Commission (UNDC) and adopted by the UN General Assembly in 1988.² However, in several cases the principles discussed here significantly differ from the UN principles (a more complete treatment and analysis of the UN's "Sixteen Principles" may be found in Appendix 2).

- 1) *Verification is not an aim in itself.*

Rather, verification is the means of trying to ascertain that a state had not carried out proscribed activities. Forgetting this principle—that is, emphasizing the means, rather than the ends of verification—could lead to the illusion that all that should be done, has been done.

- 2) *Adequate and effective verification could require the employment of different and varied information gathering techniques, such as national technical means, international technical means, and internationally accepted inspection procedures, including on-site inspections.*

The adoption of INFCIRC/540, the Model Protocol, recognizes that positive verification activities are insufficient for providing the necessary assurance that an inspected state is not producing fissile material for use in nuclear explosives. Negative verification, which is more difficult than positive verification, requires much more sophisticated equipment and the use of additional

information to direct the inspectorate to the proper place, site, or facility. Such information could be obtained through national technical means (NTM) and internationally available technical means, open sources, and analyses provided by nongovernmental organizations.

- 3) *All states have equal rights to participate in the process of international verification of agreements to which they are parties. All regional states have equal rights to participate in the process of regional verification of agreements to which they are parties.*

Equality of rights among states is a very practical principle. If mutuality and reciprocity are not assured, asymmetry would cause the state that is not granted equal rights to distrust the verification mechanism, and to impose unilateral restrictions on the verification teams' freedom of action. Enabling the states to fully participate in the inspection activities not only brings trust to the system, but also opens up all states to all mechanisms and techniques of verification. In turn, this mutuality creates a better understanding of the verification activities.

- 4) *Adequate and effective verification arrangements must be capable of providing, in a timely fashion, clear and convincing evidence of non-compliance. Continued and thorough effort to ascertain compliance is essential to building and maintaining confidence among the parties to treaties or agreements.*

Detecting evidence of noncompliance is the goal of all verification organizations. However, suspicions based on incomplete and possibly inaccurate data are insufficient to determine whether noncompliance has occurred. The more unambiguous the evidence, the better chance that the result of verification will be accepted. Therefore, the techniques and methods employed by the inspection teams must be as efficient and foolproof as possible.

- 5) *Verification of compliance with the obligations imposed by treaties or agreements is conducted with the explicit consent of the parties, and the acknowledgement that states have the sovereign right to enter into such arrangements, or desist from doing so.*

Verification must be conducted properly, with the strictest professionalism, and with the attitude that the state is the host of the activity. However, when a state has been found to be in contravention of its international obligations, the verification organization should do all it can to resolve the issue. Even in these cases, however, the sovereign rights of the state must still be observed.

- 6) *The effort put into verifying each state should be the amount required for this state, taking into account not only its size, and the number of*

nuclear sites, installations, and facilities on its territory, but also the assessment—based in part on the information available from NTM and other sources, on past cooperation and transparency history, and on the verification experience with this state—on the effort needed for verification.

This principle directly contradicts the much-mentioned and discussed principle of nondiscrimination. While nondiscrimination sounds very nice, its application leads to trouble and the inefficient expenditure of significant funds and other resources.

The real issue is not the nondiscrimination among parties to a treaty or an agreement, but the nondiscriminatory application of verification. A better means of verification is for resources to be allocated according to need, beyond the basic level needed to accomplish routine, positive verification objectives. Additional resources would be determined by special factors, including past experience, information based on NTM, and the need to resolve inconsistencies. Although this procedure could result in disagreements, it could, at the same time, lead to an efficient operation, giving the world a better feeling of security.

A discriminatory approach to implementing verification agreements is a controversial but necessary improvement for existing and future nonproliferation regimes. Because of its importance and controversy, the sixth principle is discussed in greater detail in chapter 11.

- 7) *The strongest possible statement made at the conclusion of a verification effort is that “no evidence was detected of noncompliance by [the Member State].” No absolute clearance is possible under any circumstances.*

It may be possible to determine the absence of materials and activities at specific sites and in very small states, but in large countries this is an almost impossible task. It is also very difficult, technically, to assess the non-existence of clandestine, illicit nuclear activities in states that have a significant, overt nuclear program. Therefore, no organization can give any state a completely clean bill of health. A conclusion by the verifying organization that “nothing untoward has been uncovered” should be good enough, provided that it is accompanied by a report on the effort put in the verification and the results obtained. Still, one has to be wary of false-negative findings, which can be misleading and bring on disaster.

- 8) *Only technical people, taking into consideration only technical data, should make technical judgments of the results of the technical verification efforts.*

There is a grave danger in letting non-technical people interfere with and voice opinions about the technical findings of verification activities. If technical impartiality is not maintained, the verification system could fail, both in the present case and in terms of its overall image and reliability. Only technical people should be allowed to judge technical issues. The outcome of these judgments should then be presented to the political level, alongside with an explanation of the results and, when necessary, an interpretation of any ambiguities.

- 9) *In the case that clear and unambiguous technical data could constitute a basis for or otherwise lead to an accusation of noncompliance, the burden of proof falls upon the inspected state. Ambiguity, however, calls for further investigation by the inspectors. The state may assist in clarifying the situation.*

When an unequivocal technical result points to the culpability of the state, that state must either admit to the facts, or provide a technically acceptable and verifiable explanation that exonerates it from blame. Should the state fail to do so, the verification organization must report its findings to a higher political authority according to its rules. In the case of ambiguous situations, or when the state points out the ambiguities to the verification organization, then the verification organization should further investigate the results until it reaches a satisfactory conclusion.

- 10) *Confidentiality of verification data shall be maintained provided that the data relates to matters of national security or commercially sensitive issues, or when its publication can be considered a breach of state privacy. However, information relevant to the purpose of verification, particularly that which relates to a breach of compliance, cannot be held confidential.*

Transparency should be a part of the culture of the verification organization. The disclosure of information that pertains to verification issues would enhance the deterrent value of verification. A system where everything is kept secret is prone to rumors and cover-ups. With certain exceptions, all must be transparent and available for scrutiny and possible criticism by member states. The public must also be informed.

- 11) *Verification organization personnel shall adhere to a strict code of conduct that denotes and limits their non-professional interaction with personnel and other interested parties from inspected states. Inspectors shall also enjoy all privileges and immunities similar to those accorded to UN officials.*

It is imperative that verification staff and inspectors be above board and not put themselves in a situation where they could be either compromised, or placed under moral pressure not to take actions that that would be uncomfortable to their hosts. On the other hand, the inspectors must enjoy the utmost immunities, and be protected from any possibility or threat of bodily harm, so that they will be able to perform their duties.

Essential Preconditions for Successful Verification

These eleven principles only guide the design and implementation of the best possible verification regime. Three basic preconditions—transparency, professionalism, and political backing—are needed to make it work.

Transparency

The inspected state must cooperate with the inspectors and offer the transparency that is necessary in the activity area that is being verified, in order to fulfill the purpose of verification. This basic requirement has been shown to be essential in three significant cases: South Africa, Iraq, and North Korea. The IAEA was able to conclude that South Africa's initial declaration was complete, only after it received complete information from South Africa, including evidence and information related to the dismantlement of its nuclear weapons program. In contrast, the IAEA Action Team's activities in Iraq were shown to be the exact opposite. Iraq volunteered little information, engaged in concealment activities, and many times acted contrary to its obligations. The North Korean case was (and still is) unresolved, mainly because of the unwillingness of North Korea to supply the IAEA with answers to legitimate safeguards questions.

As a prerequisite, transparency raises issues related to the motivation of states for joining treaties or entering into agreements that include verification requirements. If the verification system is good enough, then the behavior of the inspected state will eventually disclose whether it joined the treaty or agreement in good faith. Alternatively, the state may have joined for some ulterior motive, such as to try and deflect accusations, to purchase equipment and materials that would otherwise be proscribed and difficult to come by, or to obtain other benefits, while proceeding on nuclear weapons R&D projects.

If the state in question has nothing to hide, then its motivations for joining the treaty or agreement are unimportant. Under these circumstances, the state would have no problem in offering complete transparency. If the state did have something to hide, then it would try and limit the inspectorate's activities, while at the same time subtly try to convince the inspectors that it is indeed offering full transparency. Thus, the verification organization can use transparency as a benchmark to judge the reliability of the data and information supplied by the inspected state.

If the verification organization finds transparency to be lacking, the matter should be resolved between the state and the organization, or brought

before policy-making organs of the organization. If found to be lacking in transparency, the state in question should be warned, or in severe cases, reprimanded.

Nevertheless, as recommended in the eleven principles discussed above, transparency is limited to the purpose of the treaty or agreement in question. The state has the unquestionable right of protecting its vital commercial and security interests.

Professionalism

The verification work must be done in the very best professional way, and with the utmost respect to the sovereignty of the state being verified. Any lack of professionalism would undermine the verification effort, since it could then happen that the inspections will be concluded with a false and biased report.

There are many aspects to this requirement. The first is obvious: if the inspectors do not know what they are doing, if they do not have the proper procedures or equipment, or if they lack the knowledge needed to interpret their findings, then the data and its subsequent interpretation could lead to gross errors. Such circumstances could culminate in either a false indictment or a false exoneration.

Determining what constitutes “professionalism” depends on the methods of verification being employed. For example, for positive verification activities, it is a relatively simple matter to train inspectors to carry out routine activities. The information to be verified probably will be readily available, and the inspection procedures and equipment will be well established and tested. Whether the inspectors are capable of fulfilling all field duties and subsequent reporting activities will be readily apparent.

When the duties of the inspectors include negative verification, the inspectors have to be much more knowledgeable and ready to confront unexpected situations and issues. Their equipment needs are more varied. They must be better trained and exercised, including simulations, if they are to be ready to make judgments and reports that accurately reflect the situation in the field.

The requirement for professionalism does not end with collecting data in the field. Interpreting and crosschecking the collected data, as well as the provision of laboratory analyses, require great professionalism. In extraordinary cases, where there is a possible ambiguity in the data’s interpretation, it could happen that a body of first-rate professionals would have to be convened to sit in final technical judgment.

Professionalism also has aspects involving human relations, especially in the context of dealing with the representatives of the inspected state. They face many possible pitfalls, both benign and threatening. Only a strict code of conduct and the strict adherence thereto, together with the fulfillment of all technical requirements, will assure the professionalism of the inspectorate.

Backing

The verification effort must be backed by an impartial and fair political system. This is the main lesson of the behavior of Russia and France's representatives at the UN Security Council regarding the issue of Iraq during the latter part of the 1990s. The guiding force of that behavior was political, and the disregard of technical data was manifest.

When the political bodies try to use (misinterpreted) data and assessments for their own ends, the results are disastrous. Such situations should be avoided at all costs. A political decision, while both possible and legitimate, should not be based on misinterpreted data and information.

Sufficient backing creates a legitimate interface between the political and technical bodies, where technologists try to convince the political bodies of the correctness of their stance, and the political bodies should give full support to the verifiers.

To avoid the possibility of using misinterpreted information for political ends, the verifiers must present solid and clearly stated data and interpretations. The organizational opinions presented to their respective governing bodies must be purely technical. The professional staff should also have the best outside professional backing, if necessary.

Similarly, political decisions and interpretations should be left to the UN Security Council, and not to verification organizations. The political bodies of the IAEA, the CTBT Organization (CTBTO), and the UN Monitoring, Verification, and Inspection Commission (UNMOVIC) should only judge the verification effort purely on a professional basis, and leave the political overtones to the Security Council.

These clearly delineated responsibilities only work when there is transparency in the verification activities and the decision-making process. The verification organization should be transparent to all its constituent parts, and the technical judgments should be well based and fully justified. There is no reason for the inspectorate to withhold data or information from the political bodies, provided that this information does not affect national security or otherwise contain state confidential information. The data and information should enable states to draw their own conclusions.

Is Timeliness a Prerequisite?

"Timeliness" is a requirement of verification under INFCIRC/153, which states that "the objective of safeguards is the timely detection of diversion of significant quantities of *nuclear material*."³ Nevertheless, should timeliness be a basic requirement of verification? The immediate answer that comes to mind is affirmative. However, upon further reflection, that conclusion is not so categorical.

The purpose of demanding timeliness of verification is to enable an early and effective response to any untoward fact uncovered by the verifiers. What would be the effect of discovering evidence of noncompliance?

- In the case where a state is innocent, timeliness is not an issue. The inspected state would probably do all it could to prove its innocence.
- In the case where the state is guilty, the state would either make a show of transparency while hiding the true facts, or it would admit its guilt. However, the fact that a state is found to be guilty would rarely influence its decision to go on developing nuclear weapons. Timeliness would serve both as a factor in enhancing deterrence and an early warning signal. However, since the common premise is that states are behaving themselves, timeliness should be of no importance as to when this warning occurs.

Timeliness may not be a factor in either false-positives that cannot be shown to be false, or false-negatives, where clandestine activities go undetected. However, a major purpose of creating a better verification system is to minimize the circumstances in which such results occur.

Increasing the time intervals between successive inspections would have the effect of reducing verification costs. These two conflicting goals have to be taken into account when optimizing the inspection regimes.

¹ "Verification in all its Aspects, Including the Role of the United Nations in the Field of Verification," Report of the Secretary General, A/50/377, September 22, 1995, paragraph 243.

² UN General Assembly, Resolution A/RES/43/81 (B), December 7, 1988.

³ INFCIRC/153, paragraph 28.

THE DIFFERENTIAL APPROACH TO VERIFICATION

DISCUSSION OF THE SIXTH VERIFICATION PRINCIPLE—THAT VERIFICATION activities should be applied in a differential manner in order to achieve better operation—excites much controversy. The implementation of this principle no doubt would lead to the differentiation among states and charges of discrimination.

However, a differential approach is essential. A differential approach means recognizing that all possible resources should be brought to bear by the verification organization when there are indicators of illicit activities. Under such circumstances, appearances of discrimination should take second stage.

It is not a simple matter to determine a set of possible indicators that could be used to inform and decide upon the appropriate verification effort in a given state. For example, “trust” is an ephemeral concept that is bound by time and circumstance. To be sure, trust plays a role in state-to-state relationships in the diplomatic world. It is a factor that helps a state determine whether or not to demand that international norms, including verification obligations, be rigidly applied to other states. There is certainly a tendency towards trusting and supporting close allies, as well as trusting those states where extensive commercial ties exist. There is also a tendency for a state to be more lenient with those it trusts, and not to insist upon a strict verification mechanism under most circumstances. Compromises will be more easily reached with the trusted state, and its friends will be more likely to oppose or prevent sanctions against it for infringements that seem minor at the time.

Such describes the case in Iraq in the late 1970s and early 1980s, where the evidence concerning the potential use of the Osiraq reactor for producing plutonium was disregarded. This scenario also perhaps describes the present case of Algeria, where the very limited “full-scope” verification agreement is being accepted without question.¹

Trust, therefore, is not a clear factor in determining the necessary level of verification. Instead, it would be better to employ “distrust” as a factor, and only in the context of adding weight to more empirical factors described below.

Determining a State’s Commitment

A state’s commitment may be tested in part by its willingness to undertake its most basic obligations under treaties and agreements. For example, consider the possible commitments of a non-nuclear weapon state in its application of the requirements of the Nuclear Non-Proliferation Treaty (NPT). Three steps of application can be taken to evaluate the prime steps towards the “complete” implementation of the NPT by a state: (1) ratification of the NPT; (2) conclusion of an INFCIRC/153-type safeguards agreement with the

International Atomic Energy Agency (IAEA) within 180 days of ratification; and (3) conclusion and ratification of a safeguards agreement according to the Additional Model Protocol (INFCIRC/540).

States that have not undertaken these three steps should not be considered in good standing in the NPT. For example, if a state does not ratify the Additional Model Protocol, then any undeclared facility or activity in that state could go undetected. Therefore, the possibility that such a facility or activity does, in fact, exist cannot be ruled out.

The 53 states that have not signed or brought into force a full-scope safeguards agreement also should not be considered as being NPT-members in good standing.² Arguably, quite a few of these states are either too poor or lack the technical means to achieve any kind of nuclear capability. However, for these states the burden is minimal; states with no significant nuclear activities have a limited exemption from intrusive inspections for as long as their status remains the same. They should, therefore, have no difficulty in concluding safeguards agreements with the IAEA.

A number of states that have failed to ascribe to this basic undertaking are quite capable or wealthy enough to launch a nuclear campaign. Their failure to conclude any sort of safeguards agreement should preclude them from being accepted as equals in any NPT members' meeting, such as Preparatory Committee Meetings or the NPT Review Conference, held every five years.

Operational and Technical Information Factors

There are also operational and technical metrics that can be used to determine the degree of verification effort needed under a discriminatory system. The quantity of nuclear installations and the extent of activities in any non-nuclear weapon state is an obvious, but not the only, factor. Indeed, given the other factors discussed here, the size of a state's nuclear program may be totally irrelevant to the issue of whether it is living up to its nonproliferation commitments.

Other operational and technical factors include:

- **Discrepancies between the state's declaration and inspectors' actual findings.** Many discrepancies between a state's declaration and inspection findings could be uncovered during inspections, or afterwards during the process of checking the data and writing the inspection reports. In most cases, it can be expected that such discrepancies will be innocent accounting errors, and the consequences will be minor. Still, small discrepancies should be further studied in order to ascertain whether they are indicators of illicit activities. From time to time, there will be cases where discrepancies uncover a major infringement of the state's obligations.

- **Technically reliable information that indicates possible non-compliance with a state's obligations.** Technically reliable information would come mainly from three sources: IAEA verification activities, open-source technical information, and from member-states. IAEA verification information could come, for example, from environmental samples taken from either discrete sites or from wide areas, according to INFCIRC/540 prerogatives, where applicable. Commercial satellite photography is an outstanding example of open-source technical information, and comparing data contained in scientific reports with reported activities could also be useful.³ Member-states could supply information gathered by national technical means. For example, states could supply verification organizations with information concerning the sale (whether approved or illegal) and shipment of primary or dual-use technologies that could be used in the production of fissile materials and other illicit activities.
- **Open-source information that, if verified, could lead to uncovering noncompliance.** Other open-source information could come mainly from print and broadcast media reports. Here, the art of distinguishing between important and misleading data comes into play, as many reports could result from disinformation campaigns that intend to mislead such analyses.
- **State behavior patterns during past and present inspections that are aimed at interfering with the verification process.** The most difficult, yet perhaps necessary factor to be taken into account is the intangible behavior pattern of a state towards the verification efforts on its territory. The state's actions in these cases are not the legitimate precautions that are needed to protect commercial and security interests. Rather, they are attempts to cheat, with some additional ornamentation such as delays, apparent translation problems, and many other "tricks" that could turn the process of verification from a smooth operation into a misery. Evidence of such a behavior pattern should result in a reinforced verification effort. While one or two mishaps would not necessarily present a pattern, regular and widespread application of these methods would certainly warrant issuing a warning and consequently strengthening the effort that goes into the verification activities.
- **Nongovernmental organizations.** Nongovernmental organizations (NGOs) can provide meaningful information relevant to a state's risk of proliferation. Through the years, key NGOs have acted as watchdogs over important environmental, social, and arms control issues, and have made many important contributions towards improving the public's knowledge of these issues. In this role, NGOs may notice and bring to light facts that could have a

decisive influence on national and international decision-making. In the nuclear nonproliferation field, they could play a large role in promoting effective and efficient verification systems, and in warning of misdeeds. The NGOs' big advantage is that they do not have to obey the niceties of diplomacy, as states often do. NGOs can be as blunt as needed, and put out warnings under circumstances where international bodies would hesitate to do so.

The Need for Categorization

In the proper application of a differential approach to verification, the effort must be applied such that its success is not measured in numbers, i.e. the number of sites visited and facilities verified. Rather, it should be applied in terms of looking more closely at states with the highest proliferation potential.

This cannot be done without some prioritization. One way to differentiate among states is summarized in table 11.1 and discussed below:

Table 11.1: Criteria for a Differential Approach for Nonproliferation Verification

Category	Description
First (lowest) Category:	States of very low proliferation potential, as long as they do not fall into any other category.
Second Category:	States with low-level nuclear activities and potential that have concluded and ratified all safeguards agreements (INFCIRC/153 and INFCIRC/540).
Third Category:	States with potential for nuclear development and those that have an advanced nuclear program, and who have concluded and ratified all safeguards agreements (INFCIRC/153 and INFCIRC/540).
Fourth Category:	States with advanced nuclear programs or the potential for nuclear development, and who have concluded only INFCIRC/153-type agreements.
Fifth Category:	NPT non-nuclear weapon states that have not concluded any safeguards agreements; states that have not sufficiently explained discrepancies between their declarations and inspection results; or states that have blatantly not cooperated with their verification requirements.

Category-five states warrant close attention. Without a reasonable, operational verification mechanism in place, they could easily carry out illicit activities.

Category-five states can be further differentiated among those states that have not concluded any safeguards agreements at all, and those where problems have arisen as a result of verification activities, or where information about proliferation-related activities has been received from other sources. For

those states that lack any safeguards agreements, the verification organization should devote attention to acquiring information that would allow it to draw preliminary (and then on-going) conclusions about whether the state in question could be undertaking illicit activities. For those other states, every effort should be devoted to resolving the problem issues; unresolved cases should be reported to the IAEA Board and General Conference, and thence to the UN Security Council.

The fourth category includes the majority of the NPT non-nuclear weapon states. Any INFCIRC/153-state could conduct clandestine nuclear activities with impunity if it chose to do so, so long as these activities were not carried out at declared facilities and did not involve declared nuclear material inventories. A category-four state's adherence to the NPT really depends not on verification, but rather on its willingness to abide by its international obligations. There are already well known examples of states that have not shown this willingness.

Thus, the only way to obtain meaningful assurances that category-four states are well behaved is to devote additional verification efforts to their programs. Should a category-four state refuse to cooperate, and not provide additional information or clarifications, even on an ad-hoc basis, then it should be transferred to the more severe fifth category.

The effort devoted to the category-three states should be exactly the effort needed in any state for routine assurances. The verification effort would not require any extra effort, unless some issue remained unresolved at the conclusion of a verification campaign. Category-two and category-one states would require even less verification effort.

Application

Applying the suggested classification system is necessary. However, such a scheme need not be formally accepted; it might only be presented as an internal IAEA classification system to help it more rationally cope with its persistent budgetary problems. However, how states are classified, and the ways in which the verification system is applied, must be transparent to the public.

There is much to be gained by applying a differential verification system. The system would reward those who are transparent and cooperative by lowering the effort expended in those states. Thus, verification operations are made more streamlined, with manpower and resources allocated to those states and programs that pose the greatest concern. Moreover, the world would become aware of problem states and of other areas that need attention. In some states, public pressures may grow for these states to join and ratify verification regimes.

What are the downsides of applying a differential approach? First, the theoretical equality among states would be lost. Classifying states into categories would create friction and dissent. For those states placed in categories of

low concern, some assurances are lost that they are acting according to their obligations.

¹ David Albright and Corey Hinderstein, “Algeria: Big Deal in the Desert?” *Bulletin of the Atomic Scientists*, vol. 57, no. 3 (May/June 2001), pp. 45 – 52.

² See Chapter 2, note 10, for the list of states that fit this definition as of December 2000.

³ Regarding the potential for open-source commercial satellite imagery to broaden public knowledge about possible proliferation-related activities, see David Albright and Corey Hinderstein, “Nongovernmental Uses of Commercial Satellite Imagery for Achieving Nuclear Nonproliferation Goals,” in John C. Baker, Kevin M. O’Connell, and Ray A. Williamson (ed.), *Commercial Observation Satellites: At the Leading Edge of Global Transparency*, (Washington, DC: RAND and ASPRS, 2001).

NECESSARY CHANGES TO EXISTING APPROACHES

Not everything that is faced can be changed, but nothing can be changed until it is faced.
-James A. Baldwin, American Author and Playwright

THE PREREQUISITE TO IMPROVING THE CURRENT VERIFICATION REGIMES and mechanisms is the acceptance—by treaty parties, international organizations in general, and the UN and its subsidiary bodies in particular—that the present state of affairs is unsatisfactory. Contrary to expectations and hopes, there exists no verification mechanism that can provide absolute assurance that a state is not violating its obligations. Until this fact is realized and accepted, the present, unhappy state of affairs, where verification is trusted to do an excellent job against all odds, will continue to mislead many.

There is no absolute solution to this problem. It cannot be cured. We have to learn to come to terms with it. If we do, at least we can be more honest about it, and other compensating solutions can be sought. In the meanwhile, we should strive to achieve the most by applying verification in the best way possible.

The world community's change of attitude towards the basic issues involved in establishing an efficient and impartial verification system is the first and foremost requirement for improving verification. Firm commitments to the treaty or agreement and the full acceptance of the purpose of verification are essential. Each and every member state must commit to the goal of providing assurances in the fullest meaning of the term, and no such state should be able to renege on its international commitments without real consequences. Suspicions must be either satisfactorily proven or allayed. The tendency for states and international organizations to ignore, belittle, or condone obvious facts or indicators of noncompliance must be done away with.

Participating states must come to realize that a universally satisfactory outcome is only possible when the final burden of proof is placed on the inspected state, and not on the verification mechanism. States that do not wish to take this commitment upon themselves make the task of verifying their activities much more difficult. Therefore, they open themselves up to suspicions. The international community should boldly recognize such cases, and the verification effort should be intensified accordingly.

Reviewing the Requirements

Having established that a change of attitude is in order, the next stage in developing an improved verification system is to review the requirements of the accords and obligations discussed in this report: the Nuclear Non-

Proliferation Treaty (NPT), the Comprehensive Test-Ban Treaty (CTBT), and the verification of the disarmament obligations incumbent upon Iraq.

Nuclear Non-Proliferation Treaty

The purpose of NPT verification has to be redefined with the Additional Model Protocol in mind. The findings of a negative verification effort, as attempted in the Protocol, are not always black or white; they are often gray. The shades of gray should be reported, and the states concerned named. These shades could indicate limitations by the inspected states, objective limitations (e.g., the size of a given country), unsatisfactory transparency evident in information and replies to legitimate questions posed to the inspected state, problems encountered during managed access, possible ambiguous interpretations due to technical measurements and data, and other difficulties of a technical or political nature.

The International Atomic Energy Agency (IAEA) should publicly grade the “gray” states. Naming names has two purposes: first, to exert pressure on the state concerned to improve its ways; and second, to give warning that illicit activities may be taking place in the named state (especially when the shade of gray is dark). An added benefit is that the IAEA would be able to justify devoting more resources to a strengthened verification effort in the named state, as opposed to a state held in good standing, where a lesser effort is needed.¹

States that have not adopted the Additional Model Protocol would be severely graded, since the verification mechanism cannot give even a degree of assurance as to the absence of illicit activities, sites and materials. This (almost) black grade would become lighter only after the Protocol was signed, and the first subsequent inspection concluded with no obvious faults.

INFCIRC/153 Verification

Absent the broad application of the Additional Model Protocol, the IAEA’s main verification activities continue to be undertaken according to INF-CIRC/153. These activities should be reoriented towards states that have deep shades of gray, such that workloads are reduced without compromising the aims of positive verification in the other states.

For many states, positive verification activities could be minimized. Since timeliness, on the scale of days or even weeks, is not an absolute requirement, the best option would be if the material balance could be achieved by monitoring the material input and then monitoring the material balance at the final storage site where spent fuel and fissile-material-bearing waste is kept. This could reduce the interim inventory taking, while keeping tabs on the large-scale, ever-growing nuclear material inventories. The facility would be required to keep a balance of materials at the intermediate junction points, as part of its good management practices. At any time, the overall material balance would have to tally at the end points and the books would have to balance at the midpoints. However,

the IAEA would need to deploy technical means to verify that the material balance, including production materials such as plutonium, is correct.

INFCIRC/540 Verification

Since negative verification is empirically imprecise, much greater transparency on the part of the IAEA is needed to ensure that all verification activities are undertaken in a complete and professional manner. Such transparency goes against the grain of how the IAEA and inspected states operate. However, if the IAEA made its verification activities and findings transparent, it would gain greater trust from the international community. Individual states would also gain a better understanding of the IAEA's confidence in the assessment of the status of nuclear projects in the inspected state.

CTBT

Like the Additional Model Protocol, the objective of the CTBT verification mechanism is negative verification. Its conclusions can result either in a positive identification of illicit activities—the occurrence of a nuclear explosion and its direct connection to the inspected state—or in a statement to the effect that no illicit activities were detected, or, if detected, that they cannot be attributed to any guilty party. The false-negative result—in this case, an undetected nuclear test—is the gravest danger of the verification system.

However, the CTBT verification mechanism has one main advantage over either INFCIRC/153 or INFCIRC/540: the permission to use information gathered by national technical means (NTM) for the detection of nuclear explosions. This gives the CTBT system the ability to detect, with a greater-than-zero probability, very-low-yield nuclear explosions. The use of NTM also adds a deterrent effect to the CTBT that is lacking in the NPT. The ability to use NTM to trigger an inspection makes the treaty essentially verifiable, despite its shortcomings.

The crux of this verification effort is the on-site inspection (OSI), since the International Monitoring System (IMS) and International Data Center (IDC) have little chance of detecting low-yield nuclear tests.² Detecting low-yield nuclear explosions will depend on the yield, on the location of the explosion in relation to stations in the IMS network, and on environmental factors. For very-low-yield tests, the IMS will rarely be able to detect nuclear explosions. NTM can provide supporting evidence that a low-yield test has taken place, but such tests will be detectable only through OSI, and only at the exact site of the explosion, if at all.

Emphasis must therefore be placed on the professionalism of the inspectorate. On-site inspections must be conducted by only the best scientists and engineers, who can achieve the most in the shortest possible time, and with as little fuss as possible.

Choosing the wrong people, on whatever basis, can be disastrous. The issue of equality or national balance among inspectors will probably arise, but

creative solutions to this problem can be found. For example, the leadership of an OSI team could be selected on the basis of qualification, while the remaining team members (~ 50 percent) could be chosen on the basis of geographical distribution. That the number of personnel permitted to participate in an OSI is limited is a necessary hindrance. This emphasizes the need for the best people to be allocated to this task.

Transparency into the decision making process is also important. Whether NTM-gathered evidence will be used to initiate an on-site inspection is a political decision that must not be made behind closed doors. Such decisions should be based primarily on technical factors, and political judgments should not be allowed to stand in the way.

Verification conclusions should also be transparent. Conclusions should only be published following the end of an inspection campaign, since interim information can be misleading, and at times erroneous. However, if the technical findings lead to a conclusion of guilt, the technical information on which this conclusion has been based must be made public. As in the case of NPT verification, the requirements for confidentiality and privacy hold, unless a breach of CTBT has been found.

Judgment as to whether a state acted in contravention of its CTBT obligations should be made only on technical grounds, and only on deterministic, single-valued information. Ambiguous information or possible ambiguous interpretation of information cannot be part of the basis of determination of the "guilt" of a state party.

The IAEA Action Team in Iraq³

Assuming that inspections are resumed in Iraq, the IAEA must completely reorient its inspection and monitoring effort. More importantly, the UN Security Council must make political decisions about Iraq's compliance based only on the technical verification conclusions drawn by the IAEA. The Security Council cannot allow Iraq to turn the burden of proof on the inspection effort, as it did before. Without political backing, the inspection effort will be doomed to failure, just as the effort was doomed in 1998.

The renewed inspection and monitoring effort should take nothing for granted. Inspection and monitoring plans should be drawn and implemented as if the search for installations, materials, and activities is starting from scratch. The only exception should be the continued checking of materials and equipment that were under safeguards arrangements prior to December 1998.

The basic assumption that must be made is that Iraq has advanced its nuclear weapons program since the inspections ended. Therefore, Iraq will do its utmost to prevent the inspectors from uncovering its program. Iraq will be very well prepared for the launch of the renewed inspections, and will have hidden materials, equipment, and activities such that it will take a large-scale effort to uncover them.

The IAEA will require a much larger effort, assisted by all available technologies, to uncover Iraq's activities. No site should be exempt from the IAEA's reach, since it must be assumed that otherwise sensitive sites will be used to conceal illicit activities. If the Security Council sets the burden of proof on Iraq, then the chances of uncovering Iraq's activities are improved.

Learning from past failures, the principles employed by the verification teams should be:

- All sites—known, suspected, and potential—should be inspected in parallel, and in the shortest time possible. This activity should include the administrative and procurement headquarters and their documentation. The best available equipment, operated by the best available personnel—regardless of nationality—should be employed in the effort to locate and reveal the concealed facilities, materials, and activities.
- All involved Iraqi personnel should be questioned in parallel with the site inspections.
- Wide-area sampling and aerial monitoring activities should be instituted immediately, and should not be limited to the known sites but extended to other possible sites. Extensive analysis of the samples and the evaluation of the data should begin almost immediately in labs outside Iraq.
- No Iraqi-imposed limitations should be accepted.
- All necessary resources should be available for the implementation of the above plan.
- All past issues (and not only selected ones) should be satisfactorily resolved.

A Regional Approach as an Improved NPT Verification System

The present verification system is probably better than no verification system at all. However, even the improvements suggested here may be insufficient, especially if the affected states and the main political bodies do not change their attitudes.

If we were to propose a universal verification system, what would it look like? Such a system could be defined along these lines:

- The system would be based on the *purpose of verification*, the *eleven verification principles*, and the *preconditions for verification*, as discussed in chapter 10. The differential approach to verification, as discussed in chapter 11, would be emphasized;
- The basic verification mechanism would be based on regional safeguards systems formed for this purpose. The basic arrangement for these systems will include mutual verification and regional judgment procedures;

- The IAEA would retain its role of developing new and improved inspection procedures and technologies. The IAEA should also train inspectors in generic safeguards procedures, including negative-verification methods. However, the IAEA should not be a “super inspector” organization;
- The IAEA would be the depository of regional periodic reports, and would regularly publish the categorization of states; and
- Without infringing on the rights of states to the confidentiality of commercial and security-related information, all conclusions and problems encountered while performing verification activities would become public knowledge.

Implementing a system based on this outline would certainly be a distinct improvement over the present system. However, it would not be easily achieved. States would have to be convinced that the proposed changes benefit their own security, despite any deficiency that they may envisage in the new system.

Reliance on Regional Verification

By their very nature, global verification mechanisms are problematic. In order to avoid many of these problems, the new NPT blueprint would be based on regional verification systems. These regional arrangements would take over the field inspection duties of the IAEA.⁴

Under the proposed system, the region shall be the ultimate authority and shall bear all responsibility for any verification activities. However, the regional inspectorate may contract outside parties for the execution of some verification activities.

The basis for verification would be a differential approach, whereby states are judged according to criteria about their risk of proliferation. The differential approach would allow regional systems to focus their attention and resources on problem states.

In contrast to the enhanced role of the regional systems, the IAEA's role would be much diminished. The IAEA would abdicate its authority for conducting verification activities. However, it would maintain its role as the developer of inspection methodologies, technology, and instrumentation. It would also serve as a backup supplier for logistical equipment, technology, and laboratory services. The IAEA could be called upon to resolve any technical controversies, but all political issues would be resolved either within the regions or according to whatever method the regional members agree on.

The IAEA would also be responsible for training the regional inspection staff, but the regions may institute their own procedures, and employ various technologies to improve their existing systems. The IAEA and the other regions shall be privy to these developments, and each other regional regime shall be able to employ them as it sees fit.

The verification expenses of all regions would be shared internationally, including by the members of the regions. The IAEA would be entrusted with the oversight of the expenses.

¹ A “state in good standing” could be defined as a state that has concluded an INFCIRC/540 – type agreement with the IAEA, has demonstrated transparency, and has not had any problems in interfering with inspections.

² It is assumed that, given the relative ease in detecting larger tests, states that conduct larger tests will be expecting, and perhaps hoping, that the tests will be detected.

³ For a further elaboration of the author’s views on this matter, see the remarks offered on the panel on “Lessons Learned and Looking Forward,” delivered before *Understanding the Lessons of Nuclear Inspections and Monitoring in Iraq: A Ten-Year Review*, sponsored by the Institute for Science and International Security, Carnegie Endowment for International Peace, Washington, DC, June 14-15, 2001 < <http://www.isis-online.org/publications/iraq/panelday2.html> >.

⁴ The CTBT, because of its global coverage, and limited available technical expertise of nuclear explosions, will maintain its verification mechanism, including the IMS/IDC facilities.

CONCLUSION: A VIEW FROM A POINT IN TIME

*The optimist always sees the half-full glass. The pessimist sees the half-empty one.
The problem is that the empty half is always on top.*

-Anonymous

WILL THE INTERNATIONAL COMMUNITY UNDERTAKE THE CHANGES needed to improve verification? There will be opposition, strong at times, to the changes proposed in this report. Some countries, especially those expecting to be colored deep shades of gray, may even go as far as threaten to withdraw from the Nuclear Non-Proliferation Treaty (NPT). However, such opposition could be used positively by bringing the issue to a head. The international community should be strong enough to deal with these threats. It is vital that it do so.

Changing the verification regime will not be cheap. An improved system will be more costly to install and operate. But this is the price that the world will have to pay for its security assurances.

Verification will be essential for as long as the threat of nuclear proliferation remains. Situations could develop where verification requirements could be eased, particularly if regional rivalries are lessened, but these circumstances are rare. Like security and police forces, which a state can reduce in size to address reduced threats, verification organizations could be restructured to meet the new needs, should the threat from the proliferation of nuclear weapons be reduced. But just as security forces are retained, even in a diminished capacity, during times of peace, verification organizations should not be eliminated altogether.

This is looking far into the future, however. At present, the priorities should be strengthening the verification system by improving its capabilities and performance. Without such changes, the situation can only get worse. The deterrent value of verification is directly proportional to its effectiveness. Should the effectiveness of the verification system be eroded (even by remaining stagnant), the deterrent value also will be reduced.

An Unsettled Situation

This report has attempted to present the current situation regarding several international nuclear agreements. Many crises are not yet resolved. North Korea, Iraq, and Iran are all considered by many to be on the verge of nuclear proliferation, despite efforts by international verification efforts to detect their (presumed) secret nuclear activities. There are also intermediate problems: India and Pakistan are de-facto nuclear weapon states, having tested nuclear weapons in 1998. They are under no international obligation to cease

their nuclear weapons programs. Cuba and Israel are not members of the NPT. The large number of NPT members who have failed to negotiate even basic safeguards agreements—much less the Additional Model Protocol—is also a concern.

The present system of verification is not adequate to the task at hand. Recalling the purpose of verification—“to detect, prevent, and warn against states’ activities that are contrary to their international obligations”—it is evident that improvements to verification must be made. In order to be able “to detect,” verification must involve the best professional effort. “To deter” has exactly the same requirement; if the verification effort is partial, it can be easily bypassed. The weaker the system, the weaker the deterrent; the weaker the deterrent, the higher the potential for abuse. The last requirement—that of warning—can only be as strong as the verification system. A weak system will see no evil, and will be unable to sound any warning signal.

There are two major paths that the international community can take. The first one is to improve the verification systems, perhaps as recommended in this report. The second path is to accept the fact that for some states, the formal accession to a treaty is the limit of their willingness to obey the treaty requirements, and that minimal verification systems will be tolerated.

This second path is the easier one to take. It is the choice of compromises. It depends on acknowledging the possibility of “rogue” states developing their own nuclear weapons, and dealing with them when their efforts are eventually discovered. It means accommodating nuclear proliferation.

Unfortunately, the second path is the one that the International Atomic Energy Agency (IAEA) is on today. Unless something drastic happens, the IAEA likely will continue to follow the same path in the future. It is doing so not in ignorance of its deficiencies, but rather in full consciousness of these deficiencies, and by choice. That the choice is deliberate cannot be proven, but there are so many pieces of circumstantial evidence denoting this fact, that the ultimate verdict is certain.

The Right Path

What, then, is the solution? If we want to prevent states from acquiring nuclear weapons by means of international treaties and agreements, we must first behave in a credible manner, without deluding anyone as to the state of affairs, both present and predicted. For any state to be considered responsible, it must adhere to and implement all verification requirements; anything less is not worthwhile.

The international NPT verification system suffered many blows, most of them in Iraq. Yet, not all lessons were learned. One more failure could mean the end of IAEA verification altogether.

The way to prevent this from occurring is to adopt regional verification arrangements, as outlined in chapter 12. Under such systems, states

would insist on the most pervasive verification rights and activities that would be acceptable. The IAEA would retain, for the NPT verification system, its role as a trainer and developer of methods, but it would not act as the actual verification organization.¹

The Comprehensive Nuclear-Test Ban Treaty (CTBT) has a universal verification role that cannot be divided into regions. Although it will probably not enter into force soon, the CTBT is already fulfilling an important function in deterring nuclear explosions (at least those explosions that states do not want to be detected), even if on-site inspections will not be utilized at the present stage of implementation.

Finally, verification in Iraq is the major failure of the world community. Iraq's illicit activities continue. Once Iraq announces—either by proclamation or by a test explosion—that it has achieved a nuclear capability, Iran will follow; it probably cannot afford to do otherwise. The avalanche will have begun.

The choice is obvious: “fuzzy,” imperfect verification cannot succeed, even in a limited scope of activities. Politically supported, regional, all-encompassing verification is the only way that can move us towards the ultimate aim of putting the nuclear genie back in its bottle.

All's over, then; does truth sound bitter
As one at first believes?

Robert Browning, *The Lost Mistress*

¹ By extension, if a fissile material cutoff treaty were to be approved, it should have its own regional verification organization, with the IAEA maintaining advisory, training and R&D roles.