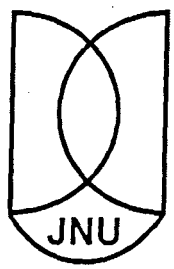
INTERNATIONAL ATOMIC ENERGY AGENCY AND COOPERATION IN NUCLEAR TECHNOLOGY

Dissertation submitted to Jawaharlal Nehru University
in partial fulfilment of the requirements for the award of the degree of

MASTER OF PHILOSOPHY

AMIT KUMAR SINGH



Centre for International Politics, Organization and Disarmament
School of International Studies
JAWAHARLAL NEHRU UNIVERSITY
New Delhi 110067,
India
2006

Date: 21st July 2006

DECLARATION

I declare that the thesis entitled "International Atomic Energy Agency and Cooperation in Nuclear Technology" submitted by me for the award of the degree of Master of Philosophy of Jawaharlal Nehru University is my own work. The thesis has not been submitted for any other degree of this University or any other university.

Amit Kumar Singh

Certificate

We recommend that this dissertation be placed before the examiners for evaluation.

Prof. Varun Sahni

Chairperson, CIPOD

Prof. C.S.R.Murthy

Supervisor

Chairperson
Centre for International Politics,
Organization & Disarmament
School of International Studies
J.N.U., New Delhi

Acknowledgements

First and the foremost I would like to thank Prof. C.S.R.Murthy whose constant motivation and guidance helped me complete this work. His seriousness towards my work kept me on toes and accountable to my work His father-like patience even while pointing out the repeated silly mistakes that I made, has been incomparable. His punctuality and commitment has left an everlasting impact upon me for the whole of my life and not for just this dissertation. I look forward to do my doctorate under him.

I would also like to thank Prof. Varun Sahni who guided me on the research methodology. I would also thank Dr. Rajesh Rajagopalan and Dr. Siddharth who helped build up my theoretical approach for the work. Dr. Yeshi and Dr. Archana Negi had been a constant source of motivation through the course of the completion of this work.

The CIPOD seminars helped me develop a bird's eye-view about the various aspects of world politics to which I have related my work. Besides other seminars, the seminar organized by Dr. C. Raja Mohan under the auspices of Indian Pugwash Society, in particular helped me understand India's stand on the nuclear issues and got clarifications on the implementation of safeguards through personal discourses with Dr. Anil Kakodkar, Cmde Jasjit Singh, Prof. Bharat Karnad and Dr. R. Ramachandran.

In the completion of the work I benefitted immensely from my discussions with my colleagues Madan, Arun, Sameer, Neha, Supriya, Ramesh, Manisha, Santosh, Rose, Rajiv and Jomo and my hostel-mates who kept questioning me about my work and any development related to my field of study.

The staff members of the JNU, IDSA, and ISIL Libraries had been of immense help in fetching the material for this work. The ambience of JNU had constantly rejuvenated my thoughts with better and fresh ideas about my field of study.

I thank my family members for their constant support without which I would not have been a part of JNU.

I intend to bring forth much better works in the future.

CONTENTS

Abbreviations

CSA	Comprehensive Safeguards Agreements
CSI	Commercial Satellite Imagery
DPRK	Democratic People's Republic of Korea
EXPO	External Relations and Policy Co-ordination
FAO	Food and Agriculture Organization
FMCT	Fissile Material Cut-off Treaty
GIS	Geospatial Information System
IAEA	International Atomic Energy Agency
ICJ	International Court of Justice
IFAD	International Fund for Agricultural Development
INFCIRC	Information Circulars
INIS	International Nuclear Information System
NNPZ	Nuclear Non-proliferation Zones
NNWS	Non Nuclear Weapon State
NPT	Non-Proliferation Treaty
NSG	Nuclear Suppliers Group
OIOS	Office for Internal Oversight Services
OLA	Office of Legal Affairs
OSART	Operational Advisory Review Teams
PREPCOM	Preparatory Commission
SAL	Safeguard Analytical Laboratory
SEANWFZ	Southeast Asia Nuclear-Weapon Free Zone Treaty
TCF	Technology Co-operation Fund
TMI	Three Mile Island
UN	United Nations
UNAEC	United Nations Atomic Energy Commission
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
VOA	Voluntary Offer Agreements
WFSW	World Federation of Scientific Workers
WHO	World Health Organization
WMO	World Meteorological Organization

List of Tables/Graphs

INTRODUCTORY NOTE

As an institutional embodiment of the international safeguards regime, the IAEA has been central to the international diplomacy of nuclear control and efforts to limit nuclear weapons proliferation since its inception in 1957. It has played an important role as a negotiator, facilitator, implementer and a vehicle for programmes. That way it has been the core of the regime in its capacity as the role of nuclear watch-dog.

The purpose of this work is to trace the evolution of the International Atomic Energy Agency (IAEA) as an autonomous and an effective mechanism in facilitating international cooperation in the peaceful uses of nuclear technology, application of safeguards and the maintenance of safety standards of the nuclear installations. The study aims at answering questions such as how important the IAEA's role is in the nuclear technology cooperation for peaceful uses and verifications. It also seeks to identify the special features in structure, decision-making processes and work-culture that characterize the organization. To some extent the study also makes an attempt to identify the undercurrents of international politics that affect the functioning of the Agency. While evaluating the technical assistance and safeguard functions of the Agency an attempt had been made to study the relative weightage each had been given at various points of time and to what extent these two functions are in a zero-sum position.

The study has been divided into five chapters. Expounding on the identification of the various aspects and status of the safeguards regime, the chapters of this dissertation focus on the institutional factors of the IAEA. The first chapter dwells on basically the non-proliferation regime, its nature, its origin and various turning points in its evolution. While doing the same, the chapter traces the nuances of regime as a theoretical construct. The next chapter discusses the IAEA as an inter-governmental organization and some of its attributes in that capacity such as membership, three-tired structure, finances, its relationship with the UN and other organisations and functional aspects. The third chapter identifies and analyse the legal framework for the functions of the IAEA. It examines the legal framework for the application of safeguards and the

maintenance of nuclear safety. The fourth chapter evaluates the cooperation in nuclear technology promoted by the Agency through a mix of promotional and verification roles. A comparative analysis of the verification of the safeguards and the technology cooperation functions of the IAEA have also been attempted. The fifth and the final chapter briefly capture concluding observations of the study. A select bibliography at the end intends to suggest range of sources used for the present study.

The study is based on the scrutiny of primary sources such as the official reports/documents, the statute, the text of the relevant treaties, conventions and protocols of the IAEA. Scholarly books and articles as well as internet sources have also been consulted so as to benefit from analysis, perspectives contained in them assessed and analyzed so as to impart comprehensiveness to the study. The work is based on inductive approach and a combination of descriptive and analytical methods has been used.

Chapter I

THE NON-PROLIFERATION REGIME AND THE INTERNATIONAL ATOMIC ENERGY AGENCY

"Regime" may be a useful concept to understand the international cooperation in the nuclear field with particular reference to the International Atomic Energy Agency. Regime analysis sprang from the dissatisfaction with dominant conceptions of international order, authority, and organization. It was an attempt to fill the lacuna that was neither as broad as international structure, nor as narrow as the study of formal organizations and was perceived as reconciliation between the idealist and realist tradition (Haggard and Simmons 1987:492). Thereby, it broke out of the dichotomy between the realists world where states were assumed to be free to pursue their destinies and the idealist assumption of a universal pull towards a world government (Brzoska 1992:215).

Regime as a concept

The concept of regimes was identified as a behavioural pattern of states in response to the compulsions of "interdependence" (Keohane and Nye 1977). John Ruggie first introduced the concept of international regime to international relations theory in 1975 when he defined it as "a set of mutual expectations, rules and regulations, plans, organizational energies and financial commitments which have been accepted by a group of states (Smith 1987:256). By 1983, the concept had become centred on four principal components when Stephen Krasner defined international regimes as "a set of implicit or explicit principles, norms, and rules and decision-making procedures around which actors' expectations converge in a given area of international relations" (Krasner 1983:1). The Principles were to be a belief of fact, causation and rectitude; Norms were identified as standards of behavior defined in terms of rights and obligations; Rules as specific prescriptions or proscriptions for action; and Decision-making procedures were identified as prevailing practices for making and implementing collective choices (Krasner 1983:2).

Long term calculations of pay-offs by the actors in the regime distinguish it from agreements which promote immediate self-interest. The regime allows the states to sacrifice the immediate burden in exchange for future gain in expectation of reciprocity (Smith 1987:256).

The attempt to regulate patterns of behaviour via regimes was seen as a consequence of the mounting costs of interdependence and also the cost-benefit analysis by the actors. An international regime is supposed to establish stable mutual expectations among states about each other's pattern of behaviour and to develop working relationships that would allow parties to adapt their practices to the new situations (Keohane 1982:331).

Whenever there is no authoritative legal framework and regularized institutions for conducting transactions are poorly developed, a strong regime can alter actor's interests and preferences (Haggard and Simmons 1987:514). It helps to make governments expectations consistent with one another through facilitating agreements on matters of substantive significance within the issue area covered by the regime. Regime makes the conclusion of agreements easier as it provides a framework for establishing legal liability, improve the quality and quantity of information available to the actors and reduce the transaction cost (Keohane 1982:338). Even within a multi-layered system of agreements, regimes are able to make mutually beneficial agreements that would otherwise be difficult or impossible to attain (Keohane 1982:332). In so far as the regimes are able to correct institutional defects in world politics along these three dimensions (liability, information and transaction cost) they become efficient devices for the achievement of state purposes.

International regimes and institutions and procedures that develop in conjunction with them perform the function of reducing uncertainties and risks by linking discreet issues to one another and by improving the quantity and quality of information available to the participants as it facilitates information exchange (Keohane 1982:346). Also, when issues are closely related, an ad-hoc approach towards those issues would be less effective than approaching them with a shared set of principles, norms, rules, and decision making procedures (Haggard and Simmons 1987:273).

Regimes are not created spontaneously and some kind of political entrepreneurship is needed to construct them (an example could be 'Atoms for Peace' programme of the United States in the 1950's). Trans-governmental relationships increase opportunities of cooperation in world politics by providing policymakers with high quality information about what their counterparts are likely to do. In so far as they are valued by the policymakers, they help in the demand for international regimes. When incentives for collective benefits exist, and when sufficient interdependence exists that ad-hoc agreements are insufficient, opportunities arise for the development of international regimes. Increased issue density also leads to greater demand for international regimes as well as more extensive regimes.

Regimes develop and evolve over time. They undergo continuous transformation in response to their internal dynamics as well as change in the external political, economic and social environments (Young 1982:297). There are significant alterations in a regime's structure of rights and rules, the character of its social choice mechanism, and the nature of its compliance mechanisms with time.

Most of the regimes that exist today are control oriented in which through a set of more or less institutionalized arrangements, members maintain some degree of control over each other's behaviour thereby decreasing harmful externalities arising from independent action as also to reduce uncertainty stemming from uncoordinated activity. Very few regimes are mutually controlled regimes like the nuclear non-proliferation regimes. These regimes aim towards regulating the behavioural patterns not only among the members but also them and outsiders. (The Nuclear Suppliers Group)

The regime approach is not without shortcomings. Even as the regime functions, the conflicts within the members and units continue. States attempt the burden of adapting to change onto one another. While there can be some issue areas where the regimes are easy to form such as economic areas (aid, energy), regimes in issue areas such as security are difficult to form due to the relatively competitive atmosphere that is prevalent in that area (Smith 1987:253).

The Non-proliferation Regime

The non-proliferation regime could be considered as an authoritative arrangement among the states that is meant to facilitate the accomplishment of non-proliferation of nuclear weapons through a process involving coordination of expectations and modification of behaviour patterns of states. The key trade-off in this regime is considered the technical assistance and a freeing up of nuclear trade, in exchange for the implementation of control and verification measures. As postulated of regimes, the non-proliferation regime is not an end in itself but an instrument of statecraft created and used for the control of the spread of nuclear weapons.

The guiding norm of the non-proliferation regime is that the spread of nuclear weapons to more states could pose a serious danger to international security and should therefore be prevented (Smith 1987:257). This overarching norm finds expression in a number of institutions such as NPT and the regional counterparts such as Tlatelolco and Rarotonga (nuclear weapon free zone treaties of Latin America and South Pacific respectively) which are buttressed by the controls and safeguards of the IAEA. Besides, there are the international forums such as the Nuclear Supplier's Group (NSG) that establish guidelines to govern nuclear exports. The locus of rules and decision-making procedures of the nuclear non-proliferation regime can be found in the system of international safeguards which are administrated by the IAEA (Smith 1987:259).

The non-proliferation regime as it now exists represents a modified but fundamental acceptance of the status quo i.e. nuclear weapons were to be held only by a tiny number of states. The modification is that basic nuclear sciences and technology could be shared with a vast majority. Rudimentary origins of the nuclear non-proliferation regime date back to 1943 when in an effort to keep Nazi Germany from developing an atomic bomb, Britain and United States agreed (at Quebec conference) not to transfer information regarding the atomic bomb to third parties (Smith 1987:264).

Origin

The development of nuclear technology entailed international cooperation and conflict from the very beginning. It was in 19th century that an English scientist John Dalton suggested that the tiniest particles of an element are those that exchange charges to form chemical compounds. Towards the end of the 19th century, Joseph John Thomson discovered the electron. This let loose a rapid increase in the knowledge and experimentation in the 1920s and 1930s. In 1919 Ernest Rutherford showed that much of the mass in an atom is packed in the tiny nucleus. In a dramatic experiment in 1932, John Cockcroft and Ernest Walton bombarded lots of nuclei of the element lithium with protons and split it, thereby, laying the foundation of radioactivity (Thorium energy, undated). All these efforts resulted in the progress in several countries towards similar and complementary theories which explained the newly observed phenomena of atomic disintegration, induced radioactivity, and atomic scattering.

The fission of Uranium was announced first by an Austrian physicist Frisch (1904-79) to the scientific community in 1939 and its possible peaceful and military uses were soon recognized (Paul 1998:2). In December 1942, Enrico Fermi achieved criticality in the world's first nuclear reactor and three years later Robert Oppnheimer and his team achieved the first man-made nuclear explosion at Alamogordo in New Mexico in July 1945 (Paul 1998:2). The Manhattan Project led to the fabrication of the atomic bomb that was dropped eventually on Japan leaving thousands of people dead and many more injured and crippled. While the bomb was being made, efforts towards the peaceful uses of the nuclear technology were also going on simultaneously. By mid 40s the scientists had learned how to use nuclear reactions peacefully to make electricity.

Various factors induce a state to acquire nuclear weapons such as unstable regional security environment, the derive for international prestige, the nuclear weapons options as a bargaining chip and aggressive political intentions (Gjelstad 1996:103-119). But the nuclear weapons also have the potential for destabilization of the international system by virtue of their capacity to disrupt statehood, vitiate territoriality, and render the notion of sovereignty trivial. It is this realization that motivated some

states which had made efforts to prevent the spread of nuclear materials, equipment and technology. The fear of military use of this technology was being felt even then and the idea of some kind of control mechanism to ensure its peaceful use was in the air. These accumulated fears later on helped to form a consensus for the formation of a regime.

Numerous treaties, agreements and institutions that characterize the non-proliferation regime today have been the result of its active and responsive nature. The IAEA, an institutional manifestation of this regime had increasingly become central to this regime. In fact, the IAEA sprouted out from the soil that was fertilized and watered by efforts to concretize the insipient regime.

Preliminary efforts towards controlling and limiting the use of the atomic energy as an instrument of war and to direct and encourage its development for peaceful and humanitarian purposes were those of Stimson, the then Secretary of war of the USA in 1945 and the "three nation agreed declaration on atomic energy", in November 1945 between USA, UK and Canada.

Immediately after the Second World War the world opinion was in favour of complete elimination of nuclear weapons which led to the launching of the United Nation Atomic Energy Commission (UNAEC) (International Organization, 1947) in January 1946, by the first resolution of the first session of the General Assembly in the United Nations (Chittranjan 1997:1088). But this was a step as a result of rhetoric and not based on the realities of the international order that existed.

A similar development was the formation of a committee in the US under the chairmanship of Dean Acheson and David Lilienthal for drawing up proposals for an architecture for the abolition of nuclear weapons and for overseeing peaceful uses of nuclear energy (Goldschmidt 1997:4). Its report envisaged an international authority that would own, control and operates all nuclear activities that lead to the production of fissile material, including all reactors except those that were non-dangerous. This international authority was envisioned to license and inspect all nuclear activities and foster beneficial nuclear uses and research. The report, however, did not provide for the measures to be taken against the violators.

At the inaugural meeting of the UNAEC in June 1946, Bernard Baruch proposed the creation of an International Atomic Development Authority (IADA) that would be entrusted with managerial control or ownership of all atomic energy activities that were considered potentially dangerous to world security (Bechhoefer 1973:22). This authority was to have full information and control of all the sources and stocks of Uranium and Thorium as well.

Baruch emphasized upon the penalization of non-complying state and proposed that this should be devoid of any veto (Chittranjan 1997:1089). Its implementation would have entailed a massive transfer of power to an international body, which at that point of time was an impossibility, therefore, the optimism which marked the Baruch plan proved unrealistic. In USA itself, the plan faced severe criticism and was considered as unrealistic.

Contrary to the Baruch approach of control before disarmament, the erstwhile USSR proposed a plan of its own. It emphasized as a first step, the conclusion of an international convention that would outlaw the use and manufacture of nuclear weapons and that all those in existence be destroyed within three months of the convention's entry into force. Only then should the UNAEC turn to the organization of controls to prevent the production of nuclear weapons (Harald 1994: 15).

The chances of the nuclear free world order were gradually fading on account of the ending of the US nuclear monopoly, the continuing deadlock at the UN and the growing tensions of the Cold War (Schiff 1983: 53). Towards the end of 1953 there came a change in US policy (of extreme denial to constructive cooperation) which was brought about by the growing fear of the Soviet nuclear arsenal, re-evaluation of the policy of secrecy that was being followed until then, the chances of a nuclear war and the drive towards privatization of nuclear energy (Bechhoefer 1973: 25).

The September 1953 Eisenhower proposal for drawing the fissile materials of the nuclear weapon States into a common pool to be used by all nations for peaceful purposes was an outcome of this change in policy. This was seen as a means of

building East-West confidence, and as the road to an international agency that would promote the civilian applications of nuclear energy.

Transformation of an idea into an institution

Addressing the UN General Assembly in December 1953, US President Dwight D. Eisenhower called for the establishment of an International Atomic Energy Organization to "serve the peaceful pursuits of mankind". His 'atoms for peace'(Nye Jr. 1992:1294) plan was less radical than the Baruch plan, but still overoptimistic for its time in projecting an international agency to remove fissionable material from the stockpiles of the three weapons state then existing and distribute them to the others for peaceful use. It is nevertheless due to this plan that the sharing of peaceful nuclear technology in return for pledges of peaceful use had been made possible (Fischer 1997:29).

The negotiations for the formation of the IAEA were held in phases as far as the composition of the negotiating team is concerned. The preliminary talks were concluded bilaterally between the USA and the Soviet Union. Later, the USA consulted its allies but when this action was criticized, it widened the group to include the Soviet Union, Czechoslovakia, India and Brazil and ultimately 81 states at the final stage of approval.

Realizing that participation of the USSR as a founding member of the proposed organization was necessary, the US submitted a series of memoranda to the USSR suggesting the principles that were to be incorporated in the statute of such an agency. It was, however, impossible for the two powers to reach agreement at that time.

The USSR stood firm on its conviction that the issues of disarmament and peaceful uses of atomic energy were inseparable and that agreement on a general prohibition of nuclear weapons would have to precede the creation of the agency. Moscow had doubts about the wisdom of the underlying concept and insisted that priority should be the total and immediate renunciation of nuclear weapons. The US countered that stand with an argument that effective international control of nuclear weapons would have to precede

their prohibition, and it announced that it was prepared to go ahead with international negotiations even without the participation of the USSR.

In September 1954, the USA informed the UN General Assembly of its plans to create the agency. For that purpose a group of eight countries (the eight-nation group) was formed which included major atomic powers and important Uranium-producing states namely Australia, Belgium, Canada, France, Portugal, South Africa, and the UK to prepare a draft statute for the proposed Agency (Bechhoefer 1973:27). This group included all non-communist states which were then producing uranium.

In the meanwhile due to the change in the political regime in the USSR after Stalin and the fear to be left out and its calculations of the relative gains, the USSR reviewed its previous position. It announced its willingness to separate the issues of disarmament and peaceful uses of atomic energy and to accept the eight-power draft statute as a basis for further negotiations and guidance.

The legal basis (a statute) of the Agency was drafted after intense negotiations and compromises. In preparing the draft, the United States did its best to allay the Soviet fears and to lay the ground work for Soviet Union's participation in the negotiations. Together with progress in other negotiations, the agreement on the IAEA marked the first major thaw in the post-war relations between Moscow and Washington. This factor together with certain political developments and the hype about the benefits of the nuclear technology actually led to the formation of the Agency.

The agreement was particularly significant at a time when so many benefits were expected from the 'peaceful atom'. The prevailing euphoria was greatly boosted by the International Conference (The First Geneva Conference held in August 1955) on the peaceful uses of atomic energy. The conference sensitized the up to now complacent countries about the nuclear technology and the need for an international agency.

On the Soviet suggestion, the eight-nation group was expanded to twelve in February 1956 (including USSR, Czechoslovakia, India and Brazil) and the revised version of the draft Statute was circulated to all members of the UN and its specialized agencies to

ensure the participation of maximum number of states. The twelve-nation group elaborated the Statute in much the same form and content that it has today. They could therefore be regarded as the main collective architects of the IAEA, but in most cases it built upon the foundations laid by the eight-nation draft. It made no structural changes to that draft and maintained the IAEA's central function as a "receiver, distributor, broker and safe guarder" of nuclear materials (Schiff 1984:6).

The developing countries had a relatively limited role and presence in the initial phases of the formation of the Agency's statute. It was for the first time that developing countries got an opportunity to put forward their concerns about the draft statute.[1] They sought to link the Agency more closely to the United Nations, to make the IAEA more like a UN specialized agency. As the developing countries were against imposition of stringent safeguards on the grounds that it would impede their progress in nuclear technology, India, with some support from the Soviet Union, sought to blunt the edge of safeguards.

An International Conference on the Statute was convened at UN headquarters in New York on 20 September 1956, with the participation of 81 nations, including some of those who were not yet members of the UN itself. The key aspect of the negotiations for the IAEA dealt with the appropriate balance between its two central functions and also whether the issue was nuclear disarmament, control of uses, or simply verification of member state undertakings. During the negotiations the stands of the various countries changed with calculation of the pay-offs as in case of USSR and India. At first both the Soviet Union and India maintained their stance that the objective was nuclear disarmament but argued against intrusive safeguards. The objective for the USA was the control of peaceful uses and arms control, and it also supported strong safeguards. However, to a number of West European and developing countries which were actively pursuing nuclear research, extensive and intrusive controls were not acceptable (Goldschmidt 1997:11). A key to the success of the statute conference and the organization lay in the resolution of this issue. The relative emphasis on promoting

[1] India and Brazil represented the developing countries in the twelve-nation group in 1956 (Fischer 1997:411).

peaceful uses and controlling the proscribed uses was also central to the status of verification procedures in the system because a system that emphasized the promotion would not press on the strong and intrusive safeguards to the same degree as a regime in which controlling proliferation has the highest priority.

After adopting a number of amendments, proposed for the most part by the atomic "have-not" powers, the conference unanimously adopted the statute as a whole on 23rd of October 1956. On 29 July 1957 the statute came into force after 26 states had deposited instruments of ratification and the International Atomic Energy Agency officially came into existence (Szaz 1970:61).

Evolution of the regime

From 1946 through 1953, consensus over norms basic to the regime and rules to implement them could not be formed despite the extended international negotiations between the protagonists, the USA and the Soviet Union. This consensus began to emerge after 1953, but it was not until the year 1964 that the rules were established to implement agreed norms. Fragmented issue linkage became possible within the nuclear issue area as East-West differences were ameliorated by mutual interest in framing rules. This allowed for institutionalization of substantive consensus in the form of the IAEA and its safeguard program.

The statute provides the legal basis for the establishment of a safeguard system, but the measures that were necessary to meet its objective took a long time to develop and are still developing (Smyth 1973:9). The Safeguards began modestly in the early 1950s when the USA, reversing its earlier policy of secrecy, started to export research reactors and their fuel to friendly countries and required them to accept US controls and inspections to verify peaceful uses (Szaz & Fischer 1985:15). Through the force of majority, the US and allied countries were able to establish the principle of safeguards as fundamental to the creation of the IAEA, although no administrative or technical guidelines were given for an operating system (Pendley and Butler 1975:598).

Despite the importance that the negotiators of the statute had given to the safeguards, the initial programme of the Preparatory Commission (Prepcom) contained only a perfunctory reference to the safeguards because of the wide gap between the views of the west, the Soviet Union and the several leading developing countries about the role, scope and coverage of the safeguards. The situation was such that there was very less discussion of safeguards at the first General Conference in October 1957 and during the first few meetings of the Board. To add to this, the Agreement for cooperation between the US and the Euratom, signed in February 1959, further limited the role of the IAEA as the West European countries were excluded from their application. The safeguards became international in full sense only when the IAEA took over this task from the USA and other suppliers in 1961.

Against much opposition from India (supported by the USSR and other countries), the Board was able to approve in January 1961 a system of safeguards to cover reactors up to the capacity of 100MW (th) (INFCIRC/26). In February 1963 it was extended to cover reactors of any size. As this enabled India to buy power reactors from USA and Canada, it did not object to this extension of the safeguards to larger reactors (Fischer 1997:249). Even the USSR had changed its stand by now (Simpson 1994:22). Furthermore, the international political atmosphere eased as the Cuban crisis was put behind (Harald 1994:17). The existing safeguards were embodied in a system unanimously approved in 1965 which was a new set of rules known as the Agency's safeguard system (INFCIRC/66) which was later extended in 1968 (INFCIRC/66/Rev.2). The change in the Soviet attitude cleared the way to a prompt extension of the range and coverage of INFCIRC/66/Rev.2 safeguards. With both the superpowers squarely behind IAEA safeguards, the system gained authority and legitimacy. This document still serves as the framework for all the IAEA safeguards agreements with states not party to the NPT (NNWS).

The IAEA safeguards system had been continuously revised to cover all major aspects of the fuel cycle. The IAEA exercised its control either over assistance provided directly by it or under its auspices, or over items placed voluntarily under IAEA safeguards by any state or group of states which included reactors, fuel, and fuel-

reprocessing plants. The developing countries still had little interest in safeguards, and a few of the most influential amongst them continued to denounce them as a form of neo-colonialism. The North had no option but to accept the concept of balance between regulatory and the promotional activities of the IAEA.

Despite developing states' growing concern over the balance among norms as implemented, consensus over norms, rules and procedures within the regime continued to grow during the period 1964-1973. It was quite evident from the wide adherence to the Non-Proliferation Treaty (NPT) opened for signature in 1968.

In the late 60's, the need for a more comprehensive arrangement towards non-proliferation was echoed and the Agency in 1969 established a second division in the safeguard department, devoted exclusively to safeguards research and development. The Director General also appointed a working group to prepare the draft text of the articles of the comprehensive safeguards. The experience gained in applying IAEA safeguards helped in the negotiation of the NPT and thereafter in the decision to give the IAEA the responsibility for verifying compliance (Fischer 1997:250).

The NPT document was an evolution over INFCIRC/66/Rev.2 as it was a complete and detailed safeguard agreement. It was a major development which greatly affected the significance of the IAEA's work as the Non-nuclear weapon states (NNWS) agreed to accept IAEA safeguards on all their peaceful nuclear activities. The NPT assigned to the safeguards of the IAEA the cardinal role of verifying the fulfilling of obligation of non-diversion of the peaceful nuclear activities for production of weapons or other nuclear explosive devices by the Non-Nuclear Weapons States (NNWS) party to the NPT (Article III.A.5). It envisioned facilitating the effort to institutionalize a standardized and universally accepted system of collective behaviour with respect to a steadily spreading technology.

As in the previous documents, the safeguards ultimately incorporated in the NPT reflected a compromise with the principle of universal safeguards under the auspices of the IAEA. Therefore, the distribution of burden remained sharply asymmetric and the treaty itself fundamentally discriminatory (Pendley and Butler 1975:608). The NPT

required each NNWS country to conclude an agreement with the IAEA, within a prescribed a time-limit, so that the IAEA may apply its safeguards to all the states peaceful nuclear activities. After the NPT entered into force in March 1970 the IAEA drew up a detailed model agreement (INFCIRC/153) to be used as the basis for the negotiations with the NNWS (Smyth 1973:19). The secretariat of the IAEA had since then used INFCIRC/153 as the basis of all agreements with the NPT NNWS and parties to the treaty of Tlatelolco (International Organization, 1969), and to a considerable extent too for the NWS, whether parties to the NPT or not. The EURATOM states and Japan had reservations regarding the safeguards in the NPT and it was only after lengthy and difficult negotiations that the matter was resolved in 1973 through an agreement (Fischer 1997:258).

In the 1970's despite the technical improvements in the implementation of the rules that require safeguards on civil nuclear and the transfer of peaceful nuclear technology, political consensus over the norms fundamental to the regime began to decline. The Pokhran explosion by India[2] pushed the industrialized nations such as USA and west Europe to focus on the safeguards arrangements such the nuclear exporters committee (NEC) (Harald 1994:22). The nuclear suppliers group (NSG) released their trigger list of sensitive nuclear items (Lodgaard 1980:111). The nuclear fuel cycle evaluation (INFCE) was convened to prevent any further horizontal growth of nuclear technology for military use (Fischer 1997:400). The NSG also required the application of IAEA safeguards to the plants built in the non-nuclear weapon states on the basis of the transfer of technology.

The discovery of a clandestine nuclear weapons development program in Iraq after the Gulf War demonstrated the limitations of the IAEA safeguards system to detect possible undeclared nuclear activities. This discovery along with the emergence of new countries (CIS countries) with new security perceptions at the end of the Cold War, and the 1996 report that the Democratic People's Republic of Korea (DPRK) was not in compliance with its obligations under the NPT safeguards agreement was viewed as a

[2] On 18th may 1974.

call to action by IAEA member states. These experiences necessitated that the Agency should go beyond just auditing the states nuclear accounts.

Taking the events seriously, ever since 1991, the IAEA have begun to revamp the safeguards system through various initiatives and programme. In 1993, a programme "93+2" was initiated in order to strengthen and improve the efficiency of the Agency. The progress towards this was made gradually when in 1995 the Board authorized the Secretariat to put into effect those elements of the programme "93+2" that did not require additional legal authority. The NPT was made permanent in 1995. In May 1997 the Board approved an Additional Protocol to be added to the existing comprehensive safeguards agreement. This was supposed to provide legal authority for several safeguards measures that go beyond the existing system and would enable the Agency's access to more information about the states nuclear activities, more intensive inspections, including access beyond previously agreed strategic points in a safeguard plant and access to any installation within the perimeter of the nuclear related activities. The additional protocol also sought to make the safeguards cost efficient and also took into account the limitations placed on the IAEAs budget by the zero growth rule.

A politically driven regime

As is quite evident from the evolution of the non-proliferation regime, the dynamics of the nuclear world order had conditioned the regime since the very beginning. The initial formative years of the regime (1953 to 1974) was conditioned by a shift from the emphasis on secrecy and denial to a more liberal policy i.e., greater willingness by the nuclear states to share information with other countries (Tate 1990:399).

The second phase (1975 to 1990) saw a return to stringent controls over nuclear technology as a response to the disturbing developments such as the peaceful nuclear explosions by India (Tate 1990:400). From 1990 onwards i.e. after the cold war ended, the regime witnessed an unprecedented strengthening process with the IAEA being awarded an additional mandate from the Security Council, the signing of additional protocols by most of the states parties to the NPT and even NNWS like India agreeing to sign the Additional Protocol (Ramachandran 2005:581). All this became possible

through support from the major powers and a flux in the immediate post cold war political situation.

The current phase is characterized by a more realistic phase in the maturation of the safeguard regime. Today, the emphasis is not just on the prevention of nuclear proliferation, but on roll back of new, covert nuclear weapons programmes and on substantial cuts in the strategic arsenal of existing nuclear weapon states. The Additional Protocol which the Board approved in 1997, impose legally binding obligation to submit reports under the Universal Reporting System. This was aimed to provide the IAEA with complete information regarding the Non-Nuclear Weapon States' holdings of nuclear material.

Several developments in the recent years seem to support this new approach. It could be the willingness of the former holdout nations such as France and the People's Republic of China to join NPT or the acceptance of Argentina and Brazil of full scope safeguards. It could also include the imposition on Iraq of the long term verification and monitoring procedures mandated by the UN Security Council resolutions 687, 707 and 715 (Cortright undated). As the international web of treaties become more extensive as in case of the non proliferation, it has become safer and thus easier to renounce the nuclear weapons and to maintain that renunciation. As the technical barrier continues to be eroded, the political commitments to non-proliferation and its international verification become more important.

Though the safeguard regime had made strides, it still remains an incipient one. The goal of universality had not been achieved yet (El Baradei 2003:17). India and Pakistan, both nuclear-weapons states as of today, are not parties to the Nuclear Non-proliferation Treaty and have not accepted "comprehensive" IAEA safeguards (Brzoska 1992:218). Israel, yet another state with a well-developed nuclear programme and the technological capability to build nuclear explosive devices, is a non-signatory. The discriminatory rules also limit the prospects of it becoming truly universal in character and power remains the major actor within the regime. The numbers of violations of the

treaty also cannot be ignored and are said to be increasing. First it was Iraq, then North Korea and now it is Iran.

The development of nuclear capabilities by some of the non-signatories to the NPT has posed a great challenge before the regime. The problem is of the status that is to be accorded to them. Some countries have entered into bilateral agreements e.g. India and the US (Ramachandran 2005:574) and have agreed to affect country specific changes in the regime, but this very proposition would erode the very basis of the regime. Even if the country-specific concessions are made, it is hard to conjecture as to how long it would last and for how long would some of the other NNWS resist the temptation of achieving a similar status.

The arrangements within the nuclear non-proliferation regime have no common guiding principles or norms. (Brzoska 1992:217). The resort to counter-proliferation from the non-proliferation in the aftermath of the 9/11 terrorist attack raises questions about the effectiveness of the norms of the regime though these could be sheer political moves (Klerk 2003:33).

Chapter II

ORGANIZATIONAL ASPECTS OF INTERNATIONAL ATOMIC ENERGY AGENCY

Though the non-proliferation regime may be an insipient one and there still remains much to be done to strengthen it, the IAEA, which is also a significant part of that regime, have matured and evolved in capacity as an international governmental organization ever since it has been formed.

The very rationale of forming inter-governmental organizations lies in the fact that these help manage many significant areas of international relations in periods of increasing issue complexity and growing number of states (Abbott and Snidal 1998:4). Interdependence and convergent national interests lead to participation in these organizations, thereby, reducing conflict and promoting confidence building among them (Bennet 1995:5).

The International Atomic Energy Agency (IAEA) was created in response to the deep fears and great expectations resulting from the discovery of nuclear energy (Khan 1997:291). Also, it was an outcome of the security dilemma that the United States faced in the 1950's as to whether the transfers of nuclear technology would cause nuclear weapons proliferation. It emerged out of a dire necessity that was felt in the late 1940's and 50's for an international mechanism devoted specifically towards controlling nuclear technology. Ever since its formation in 1957, the IAEA has been continuously evolving, functionally as well as structurally.

Organizational Features of the IAEA

IAEA is a specialized (sectoral) inter-governmental organization that has a legal basis (a statute). The statute lays down the mandate, rules, procedures and functions of the Agency. As is the case with other inter-governmental organizations, its membership is voluntary (Virally 1981:52). It falls under the category of both the standard-setting and operational organizations.

The headquarters of the Agency is in Vienna which was chosen out of the two short-listed sites i.e. Vienna and Copenhagen (Joles 1997:31). Since July 1957, Vienna became as the headquarters though the permanent establishment of the Agency came into existence only in the year 1979 (Fischer 1997: 88). Additionally, the IAEA maintains field and liaison offices in Canada, Geneva, New York, and Tokyo and operate three laboratories: a small one at its headquarters in Vienna, the main laboratory at Seibersdorf, and one at Monaco for research on the effects of radioactivity in the sea. It also supports a research centre in Trieste, Italy (Katz 1968:410).

Membership

The statute of the IAEA is a treaty to which 138 nations are parties as of today on the principle of the sovereign equality. Even while the statute was being negotiated, there emerged divergence among the countries on the membership issue. The Soviet Union sought universal membership while the western countries successfully supported a criteria that restricted membership to all members of the United Nations or of the specialized agencies thus eliminating Vietnam, the People's Republic of China and the Democratic Republic of Korea. The statute provided that any member of the United Nations or of any of the specialized agencies that signed the statute within 90 days after 26 October 1956 became a Charter Member of the IAEA upon ratification of the statute. It was for the first time that the expression of equitable geographical distribution was replaced by a list of geographical areas in the statute of a United Nations agency for membership (Goldschmit 1997:10).

The membership of the Agency has been stratified chiefly into two categories. Though there is a classification of members as initial and other members (Art.IV. A and B) within the General Conference and as technologically advanced and other members within the Board (Art. VI.A), yet notably the statute lays emphasis on the sovereign equality of the member states (Art. III.D and VI.C).

In the initial years the developing countries did not have adequate representation in the IAEA despite the formula to assure a balanced representation of the different regions of the world. The IAEA unlike other specialised bodies has autonomy in admission of new

members (Article IV.B and Lamm 1984:57). Admission applications are approved by the General Conference upon the recommendation of the Board of Governors.

The effectiveness of the Agency lies in the signatory states adhering to the rules laid down by it. In the event of non-compliance and failure by the recipient State or States to take requested corrective steps within a reasonable time the Agency can suspend or terminate assistance and withdraw any materials and equipment made available by the Agency or a member in furtherance of the project, encourage others to do so, and may even suspend a state's membership. IAEA has no mechanism for effective enforcement as the Statute leaves the question of forcible sanctions primarily to the United Nations or to state or to a group of states (Smith 1987.259).

Representation and voting pattern in the IAEA constitutionalize balances among the states having different levels of power, interests and knowledge. States with advanced nuclear technology and larger supplies of nuclear raw materials have guaranteed seats on the Board of Governors (Abbott and Snidal1998:10). This decision structure frequently has led to a disproportionate influence of the powerful states. Even though there are rules and procedures as to protect the interests of weaker states, in actual practice these remain on paper.

Mandate

Though the IAEA has a mandate limited to a particular field of activity i.e. the nuclear technology, it is the versatility of the technology that has widened the domains of the Agency's activities. This is quite evident in the dual approach that characterizes the IAEA's statute, with its objective of enlarging the contribution of the atomic energy to peace, health and prosperity on the one hand and of ensuring so far as it is possible that the transfer of technology will not serve the military purpose (Article III.A.7). This duality was subsequently reinforced by the Non-proliferation Treaty. For that purpose the Agency can acquire and establish facilities, plants and equipment and establish controls over the use of special fissionable materials received from the Agency.

The statute lays down in general terms the rights and obligations of the Agency in

applying and administering safeguards and provides a framework for the same; but it leaves the specific methods by which safeguards should be applied to be worked out in specific agreements with the states concerned(Sanders 2004:44).

The United Nations under special circumstances grants an additional mandate (Security Council resolutions 687, 707) to the Agency as in the case of Iraq in order to enhance the effectiveness of the verifications by the IAEA. The intrusive authority of the Agency vis-a-vis sovereignty of the member states is not to be ignored. But as the interpretations of concept of the sovereignty itself are changing this could not be exaggerated (Taylor 2003: 26).

The Statute of the Agency reflects partially the concept of nuclear pools in Articles IX and XII.B (which was also envisioned in Eisenhower's 'atoms for peace' proposal), but due to the political limitations it was never realized (Fischer 2003: 12). For this ultimate solution to fructify it requires a great deal of consensus within the Agency. But again, in the wake of September 2001 terrorist attacks, this concept is being increasingly identified as a solution to check nuclear proliferation and the increased vulnerability of the nuclear facilities world over.

As the nuclear technology is sensitive and contains inherent threat of misuse, it was put under a broad framework of the United Nations. A significant clause that required the IAEA to "conduct its activities in accordance with the purposes and principles of the United Nations to promote peace and international co-operation and in conformity with the policies of the United Nations furthering the establishment of safeguarded world-wide disarmament and ... any international agreements entered into pursuant to such policies" (Article III.B.1).

Structures

The IAEA has an elaborate, concrete and stable organizational structure and a supportive administrative apparatus for carrying out its mandate. This organizational structure of the IAEA has influenced the inter-state cooperation in the field of nuclear technology as the political and the technological ambience changed with time. The

statute establishes the Agency's three organs i.e., the General Conference, the Board of Governors, and the Secretariat headed by a Director-General and also lays down their rules of the procedures in articles V, VI and VII. (Sasz 1970:227). The IAEA's organizational structure is a bicameral one i.e. it consists of an executive board of limited membership and a General Conference or assembly of all states (Fischer & Szaz 1985:12). The IAEA statute concentrates authority, particularly within the domain of safeguards, in its executive, the Board of Governors, rather than in the General Conference (or in the hands of the Director General). When the statute of the IAEA was being negotiated (1954-56) it was so framed as to ensure that the Board would be the more 'safeguard minded' (Fischer & Szaz 1985:12) than the other two bodies. The IAEA's organizational set up appears to be more centralized though structurally it is more balanced as compared to other specialized bodies (Desai 1998: 146).

General Conference

The General Conference is the deliberative body which has a broad review and policy guidance function with regard to all IAEA programmes, but no day-to-day role in safeguards arrangement. It consists of all members of IAEA each having one vote. It meets once a year at IAEA headquarters in Vienna though special sessions could also be convened as per the need.

The Conference's Agenda is set by the Board of Governors and the activities are limited to the approval of the budget and the programmes proposed by the secretariat and adopted by the Board, discussing political issues of relevance to the Agency and its activities without taking any action on them. The major useful purpose that the conference serves is to bring together relatively high ranking officials from all the member states nuclear technology or foreign offices, where they could pursue informal talks on nuclear-related issues such as negotiation of agreements for cooperation, planning for future collaboration on security procedures, initiatives to be taken in the coming Board meetings etc.

The General Conference considers the Board's annual report and approves reports for

submission to the UN and agreements with the UN and other organizations. It discusses any question or matter concerning the IAEA and makes recommendations to the Board of Governors or to any of its member states. It also elects 22 of the 35 members of the Board of Governors for a period of two years.

In Article V of the statute the sessions, rules of procedure, voting, quorum etc. in the General Conference are laid down on the lines of the United Nations Charter. Even in the various committees of the General Conference, the rules for the conduct of business are similar to those of the General Assembly. The rules of procedure of the General Conference were prepared by the Prepcom pursuant to the specific mandate in paragraph C.3 of annex I to the statute (Sasz 1970:111).

The decisions in the General Conference are taken by a majority of the members present and voting except in certain exceptional cases (Article XIV, XIX and XVIII) when two- thirds majority is required (Article V). The General Conference approves States for membership, suspend a member from the privileges and rights of membership and approve amendments to the Statute (Article VI).

The statute circumscribes functions to the General Conference. Though it assigns a few specific independent powers such as consideration of the Board's annual report (Art. V.E.4 and VI.J), approval of amendments to the statute (V.E.9and XVIII.C (i))) etc. but these are to be exercised on the recommendation of the Board. In fact the only non-specific powers that the General Conference can exercise independently of the Board are to discuss, to recommend or to request reports (Sasz 1970:109).

Despite the dominance of the Board the General Conference has its say in approval of admission of new Member States, suspension of a Member (Article V.E.2 & XIX), the approval of reports required by the IAEA's relationship agreement with the United Nations and other organizations and the approval of the appointment of the Director General (Article VIL.A).

This unique division of powers differentiates the IAEA from most of the specialized agencies of the United Nations where the ultimate authority is usually vested in the

periodical conference of all Member States.

Board of Governors

The 35-member Board of Governors is the body actually vested with "the authority to carry out the functions of the Agency in accordance with the Statute." The Board has retained its paramount position within the Agency decision-making bodies despite the increase in membership and altered member selection rules. It accords importance to member countries in ways similar to the distribution of powers within the UN Security Council.

The Board's membership had been one of the most contentious issues during the negotiations of the statute and is currently governed by a formula that was proposed by the Indian delegate which combines technological stratification with regional representation. However, the decision as to who should be chosen as the technologically advanced state from a particular group has not been easy.

With the original strength at 23[3], the membership of the Board had expanded in phases (Szaz 1970:140). First, in the mid 1963-64 when the Board and the General Conference realizing that the African and Middle Eastern regions were under-represented, approved the addition of two more elective seats to the region and arrived at an informal understanding that Latin America would have three elective seats (Szaz 1970: 141). The second expansion was in 1973 when the permanent seats were increased from 5 to 9 and the regional leaders were reduced from five to three and increased the elective seats from 12 to 22 i.e. a total of 34 (from 25) giving the developing members a slim majority (Schiff 1984:91). The third expansion was in 1989 when the People's Republic of China became its member with an amendment for its inclusion in the most advanced category to consist of 10 members (Fischer 1997:429). This was only after the United Nations had recognized the government of People's Republic of China as the representative of China in October 1971(Fischer 1997:111).

[3] 13 as suppliers and 10 geographically elected states. Out of 13 suppliers: 10 were characterized as "advanced in nuclear technology" (i.e. ability to produce special fissionable material including the production of source material; 2 were to be "other producers of source materials and I as the "supplier of technical assistance".

As of today the Board consists of 13 members designated by the outgoing Board and 22 members elected by the General Conference. The outgoing Board designates the ten members who are the most advanced in atomic energy technology and the remaining three most advanced members from any of the following areas that are not represented by the first ten: North America, Latin America, Western Europe, Eastern Europe, Africa, Middle East and South Asia, South East Asia, the Pacific, and the Far East. These members are designated for one year terms (ArticleVI.A.1). The General Conference elects 22 members from the remaining nations for two year terms with due regard to geographical representation. 22 seats are allocated thus 5 to Latin America, 4 to Western Europe, 3 to Eastern Europe, 4 to Africa, 2 to the Middle East and South Asia, 1 to Southeast Asia and the Pacific, and 1 to the Far East. The General Council also elects 1 further member from the Middle East and South Asia, Southeast Asia and the Pacific, and the Far East and 1 from member from Africa, the Middle East and South Asia, and Southeast Asia and the Pacific (ArticleVI.A.II) (Wikipedia, undated).

The formula still remains the organizing principle of the Board even though the membership of the Board has grown to 35 States, the top five[4] have become the top ten and include China, and the Middle East has been joined with the South Asian region (Article VL.A to VL.C). Moreover, with one exception, all those States that in 1956 were assured permanent or, at least, continuous seats on the Board have retained them. The exception was South Africa, which lost its seat in 1977 and regained it in 1995.

The twelve-nation group deliberately maintained concentration of executive power of the Agency in the Board of Governors which is responsible to the General Conference (Article VI). The Board appoints the Director General and approves the appointment of the Inspector General. It exercises exclusive power in safeguard matters and draws up and approve safeguards systems, appoint inspectors, approve safeguards agreements and, also establishes non- compliance before taking necessary corrective steps(as in the case of Iran in 2006). The Board proposes modifications to and approves the draft budget, including the appropriation for the

[4] Canada, France, USSR, United Kingdom and United States of America(Szaz 1970:145)

safeguards, to the general conference.

The Board of Governors prepares and presents an annual report to the General Conference concerning the affairs of the Agency and also the reports which are required to be submitted to the United Nations or to any other organization by the Agency.

As per the statute, the Board's formal procedures require majority voting on substantive issues and a two-third majority on some specific actions. No state or small group can veto or constitute a blocking minority.

Director-General and Secretariat

The Agency Secretariat has considerable power over the implementation of rules and this power confers on the secretariat considerable procedural authority (Schiff 1984: 27). The staff of the IAEA is headed by a Director-General who is appointed by the Board of Governors for a term of four years. The appointment of the Director-General is marred by politics since the beginning and generally a compromise candidate had been elected. For the election of the first Director General (Sterling Kole, an American) was severely criticized by USSR but strangely enough it didn't vote against his apponitment (Stoessinger 1959:396). In yet another case, the appointment of Hans Blix in 1981, a compromise candidate from Sweden, was preceded by intense manoeuvrings (Fischer 1997:105). But it remained a fact that the first three Director Generals were from industrialised countries despite criticisms from the developing nations (Fischer 1997:105). The efforts of the developing nations bore fruit with the appointment of El Baradei in1997 (Khan 1997:305), who has been elected for the third consecutive term early in 2006.

While according the statute, the Director General is under the authority of and subject to the control of the Board, he has become not only the IAEAs chief administrative officer as the statute puts it, but in effect the IAEA's chief executive. The Director-General could be most effective while responding to any emergency and the least influential where a group of leading countries decides on hard and inflexible line.

Though there is no procedure for the dismissal during the term of office, considering the predominant influence of the Board within the Agency, the Director-General who loses the confidence of the majority of the governors might, in effect, be forced out.

The Director-General is responsible for "the appointment, organization, and functioning of the staff" (Article VIL.B). The IAEA staff follows the norms of the international civil servants in the performance of their duties and it is presumed that the Director General and the staff do not seek or receive instructions from any source external to the Agency and also not disclose any industrial secret or other confidential information coming to their knowledge by reason of their official duties for the Agency (Kessler 1995: 30).

The secretariat's total strength is around 2200 people and comprise of multidisciplinary professional and support staff from more than 90 countries (IAEA staff, undated). The Agency adheres to the principle of recruiting its staff on geographical basis and keeping its permanent staff to the minimum. The staff consists of qualified managerial, scientific and technical personnel, appointed to fulfil the objectives and functions of the Agency. The Board of Governors, subject to the provisions of the Statute, decides the rules for the appointment, remuneration, and dismissals of the staff.

IAEA maintains effective surveillance through a set of inspectors who are assigned the responsibility of examining all the operations conducted by the Agency. They determine a state's compliance with the health and safety measures prescribed by the Agency for application to projects subject to its approval, supervision or control, and whether the beneficiary state is taking adequate measures to prevent use of the source and special fissionable materials in its custody or used or produced in its own operations for any military purpose (ArticleXII.B). In case of non-compliance the inspectors report that to the Director General who transmits the same to the Board of Governors.

The IAEA implements a large number of programmes under functionally defined departments. The six major departments: the management, Nuclear Sciences and Applications, Nuclear energy, Nuclear Safety and Security, Technical Cooperation and

safeguards and verification departments set up the organizational framework for the IAEA (IAEA staff, undated). The Inspector General is the head of the department of the safeguard and inspections within the secretariat. He along with the Director General takes the most practical decisions of implementing the safeguards.

Most of the Safety obligations that are set by the convention on safety 1994 are under the auspices of the IAEA The secretariat convenes, prepares for and services review meetings of the convention (IAEA 1994, Art. 21). The substantive work takes place in specialized committees staffed by its secretariat. Such committees are open to all members, but specialization occurs naturally because of differences in interest, expertise and resources.

Resources

The IAEA is the only organisation in the entire UN system that has its own resources and programme for direct support to its members (Barreto and Cetto 2005:29). The Agency receives funds from different sources to carry out its activities. Its regular budget which is funded through the assessed contributions which member states are required by the statute to pay to the IAEA bears the cost of administering all the Agency activities, including that of safeguards and technical cooperation programmes that are also funded by the TCF (Technology Co-operation Fund) and the voluntary contributions from the member states.

The budget also meets the costs incurred by the Agency when the members of the secretariat serve as technical officers for individual projects and provide scientific and technical services. The costs of the contracts awarded under coordinated research programme are also financed through regular budget. The contributions made by individual countries to the IAEA are unequal and are based on a formula arrived at keeping in view the financial status of the member countries as in the United Nations. The United States has been the largest contributor which alone contributes about one-fourth of the total IAEA's regular budget and about half of the voluntary contributions that the agency receives (Sanders 2004).

Funding for the IAEA's programs provided through both its regular budget and voluntary contributions, has increased. The IAEA's regular budget, which pays for safeguard costs along with the costs of science, safety, health, and environment programs, had shown meagre growth on account of the agreements between the Agency and its member countries to maintain an almost "zero-real-growth" budget. Under this policy, the IAEA could only increase its budgets from year to year to adjust for the impact of inflation on such items as salaries and purchases. As a result, the agency has grown more dependent on voluntary contributions to support rising costs in the safeguard programmes.

In light of the expansion of the IAEA's safeguards over the past 14 years, the Agency's Board of Governors approved an increase in real terms in the regular budget beginning in 2004. The recent budget increase is a landmark step to bring IAEA capabilities in line with responsibilities as implementing the Additional Protocol would increase costs(Redden 2003:30).

Voluntary contributions make up the technology cooperation fund (TCF) which is the largest source of fund that the IAEA has at its disposal. The extra-budgetary funds are used also to assist technical cooperation. It also consists of numerous earmarked research contributions by member states. Some of the countries contribute in kind which comprise of the services of experts, equipment, fellowship and training free of cost or at nominal cost to the IAEA. As the technical assistance programmes are funded through voluntary contributions they are unevenly spread in time and space and affected by politics.

Over time the relative importance of each source has varied widely. In the early years the contributions of United Nation funds and contributions in kind were comparable in magnitude to the funds provided to the IAEA itself via the TCF. But now the TCF dwarfs all the other sources.

Relationship with other organisations

Although the IAEA has been established as independent international organization and

not as an organ of the United Nations operating under the Charter, the statute explicitly subordinates the Agency to the United Nations and specially the Security Council (Kessler 1995:29). The status of the IAEA within the UN family was debated upon even during the negotiations on the statute. A committee that was formed for that purpose negotiated on UN's behalf the relationship agreement with the IAEA Preparatory Commission. Since that time, the UN and the IAEA have built an extensive network of global nuclear co-operation in fields related to international security, economic and social development, and environment.

Under the relationship agreement between the United Nations and the IAEA, the Agency is recognized as being responsible for international activities concerned with the peaceful uses of atomic energy. By reason of its statute and its relationship agreement with the United Nations, the Agency is bound to consider resolutions relating to it adopted by the General Assembly or by any of the United Nations councils (Article XVI.B.2). In practice, the General assembly's recommendation on the subject of safeguards has a stronger influence on the IAEA Board than a resolution emanating from the Agency's General Conference. Any agreement of the Agency with any of its members or sister organizations is registered with the United Nations (Article 102, U N Charter).

As already mentioned, in cases of non-compliance of the safeguards by any state, the Agency's Board of Governors report to the Security Council and the General Assembly of the United Nations (Kessler 1995: 29). The General Assembly considers the matter and sends recommendation to the IAEA or to the Security Council. The Council can even consider the matter under chapter VII of the Charter and can take decisions binding on United Nations members which could even require the imposition of a nuclear or a general embargo, or even use armed force (Article 43, of the Charter). This decision is subject to a veto of any permanent member of the Council.

Apart from the United Nations, the Agency has an interface with other organizations and agencies as well. It overcame the problems caused by the conflict of jurisdiction with other bodies or by over-lapping of functions during the initial phase of the

Agency's formation. Its functioning and social behaviour matured towards having various arrangements with other international organizations and agencies (Statute, Article XVI).

IAEA has in place cooperation arrangements with many of the United Nations developmental agencies such as Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), the World Health Organization (WHO), the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), the International Fund for Agricultural Development (IFAD), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Euratom[5] and the United Nations Industrial Development Organization (UNIDO) for the advancement of the contribution of nuclear science and technology in the fields of agriculture, human health, industry, environmental protection, and other sectors (International Organization 1969:993). The Agency also developed such arrangements with multilateral development banks, bilateral donors, and non-governmental organizations and institutes such as the Inter-American Nuclear Energy Commission, the Agency for the Prohibition of Nuclear Weapons in Latin America, the League of Arab States etc. The IAEA and the ENEA compiles periodic surveys of the known reserves of uranium and estimated current and future consumption.

The IAEA's relations with the non-governmental organizations (NGOs) is relatively limited. As early as in the first General Conference, the Agency realized the importance of the non-governmental players and thereby, a scheme was drawn up to tap the expertise of such bodies. The Board too gave approval to the rules and granted a consultative status to 19 such organizations in the relevant field of activity. But this granting of consultative status became controversial in the year 1959, when the application for such a status from WFSW (world federation of scientific workers) was rejected. The USSR and the other Warsaw countries successfully blocked all further grants of such status. The granting of such status was later on abandoned as a whole in 1961. Representatives of the non-governmental organisations which have consultative status are authorized to attend the conference meetings (Szaz 1970:130)

[5] Have been dealt with in the next (third) chapter.

Functioning

In carrying out its functions, the Agency conducts its activities in accordance with the purposes and principles of the UN Charter to promote peace and international cooperation, and in conformity with policies of the United Nations for furthering the establishment of worldwide disarmament through safeguards.

During the initial stages, assistance in training, especially for the developing countries, was given importance, though later on (especially from 1974 onwards), the major emphasis tilted towards the safeguards and their verification (Ramanna 1997:29). The IAEA acts as a clearinghouse for the pooling and coordination of experience and research in the peaceful uses of nuclear power. It helps its member countries acquire the necessary skills and materials to share in the benefits of the atomic age. In practice, the IAEA has been particularly concerned with bringing the advantages of atomic energy to underdeveloped regions.

The IAEA ensures through a system of supervision and control that none of the assistance programs fostered by it and none of the materials whose distribution it supervises, are used for military purposes. Verification includes national declaration of items and facilities, onsite inspections by inspectors and monitoring of items (Kessler 1995: 10). IAEAs verification measures ensure the compliance of the safeguards and helps promote confidence in the political atmosphere. But it is a fact that uncertainty is inherent in verifications and no practical set of verification can provide absolute assurance (Kessler 1995:13).

The IAEA also facilitates the transfer of technology between the nuclear suppliers and non-nuclear states and assists the latter to utilize nuclear technology for development. Although most transfers of nuclear items take place on a bilateral basis, it is the IAEA that usually applies the necessary safeguards.

The IAEA has taken due cognizance, though lately, of the safety of the nuclear

establishment.[6] Now that the safety of such facilities are perceived as a cooperative effort (rather than just a national responsibility) where the Agency facilitates the member states' efforts in this regard (El Baradei 2003:19). The IAEA's activities in the field of nuclear safety include plant siting and design, the transport of radioactive waste, emergency planning and preparedness, and decommissioning.

The IAEA facilitates the centralization of collective nuclear activities through a concrete and stable organizational structure and a supportive administrative apparatus. As an established organization, the IAEA provides a stable negotiating forum, enhancing iteration and reputation effects. This also allows for a fast response to sudden developments as could be noticed in case of DPRK and Iran.

IAEA performs extensive supportive functions. It contributes and participates in various conferences such as that on climatic change (Stockholm), earth summits where its personnel coordinate and help in structuring there agendas. They also provide background research in order to promote successful negotiations.

IAEA also acts as a data base for nuclear technology such as numerical and associated information on neutron cross-sections, related fission, capture, and scattering parameters of neutron-induced reactions, as well as other nuclear physical constants. The IAEA maintains an efficient system for collection of these data and, together with regional centres, in France, the Russian Federation, and the US, issues an index to the literature on microscopic neutron data (CINDA). It also compiles, the world request list for nuclear-data measurements needed both for the development of fission and fusion reactors and for nuclear-material safeguards (WRENDA). The IAEA plays a leading role in promoting the dissemination of scientific and technical information by organizing conferences, symposia, and seminars and a large number of smaller technical meetings to establish the authenticity of the data, and producing safety manuals (Ramanna 1997:291). The International Nuclear Information System (INIS), set up by the IAEA in 1970, provides worldwide coverage of the literature dealing with

[6] Though it was a statutory responsibility of the Agency the serious efforts began only after the Chernobyl accident.

all aspects of peaceful uses of atomic energy and is the first fully decentralized computer-based information system

Procedures:

The rules and procedures that are followed in different organs of the IAEA were laid down by the Prepcom. These were often modified through gentlemen's agreement between the member countries (without putting them to vote or amendment).[7]

Almost since it began its work, the IAEA had made use of standing international working groups (IWGs) which consist of leading nuclear specialists from Member States. In recent years these have played an increasingly important role, especially in efforts to improve the safety and reliability and reduce the costs of nuclear power and in spreading information through publications, technical meetings and status reports.

For the purpose of interpretation and application of safeguards agreements, the principles of international law, rather than the rules of domestic national law, are used. The International Court of Justice (ICJ) resolves disputes concerning treaties if the requirements of the Statute of the Court are met (Szaz 1970:32 and article XVIIA).

The amendments to the statute entails a rigorous procedure and can come into force only when it is approved by the General Conference by a two-thirds majority of those present and voting and after consideration of observations submitted by the Board of Governors on each proposed amendment (Article XVIII.C.i) and accepted by two thirds of all members in accordance with their constitutional processes (Article XVIII.C.ii).

Work culture

What the IAEA is asked to do about nuclear energy, and indeed, what it can do and does, are much affected by the vicissitudes of national moods, broad currents of international politics and technological change. The major decisions are preceded by

[7] An example could be the membership issue (especially the representation of Latin America in the Board of governors) which is also resolved through a mutual understanding between the states.

bargaining and compromises among the member state given the sensitivity the nuclear problem, lack of veto and diverse priorities and political interest of members.

IAEA believes in gradualism in its functioning and achieving of its goals. It tries to get the maximum whenever possible on paper, thereby legalizing it and achieving greater legitimization each time. Whenever the negotiations get stuck, a compromise is reached and the document framed. Whenever the dynamics of the international nuclear order change or any event of significance takes place, the IAEA puts forth its tools for further evolution of structure and function and its legitimization.

This has been observed ever since the negotiations for the formation of the IAEA began. An example of this could be the implementation of the safeguards system. It was first adopted through force of majority of voting members of the Board of Governors. The Agency had to wait until1964 (when China exploded its nuclear device followed by the Soviet-Sino split which changed the international political environment and also the pay-offs) for achieving consensus on the issue. Another factor that changed the environment was the breakthrough in peaceful nuclear power generation, which the nuclear countries saw as a great economic benefit. In these circumstances Soviet Union chose to go for safeguards which it had been until then opposing.

The IAEA had adapted functionally and structurally whenever the need arose. The IAEAs increasing efforts to combat terrorism and its decision to depart from the zero-budgetary policy which had put severe limitations on its functioning are examples of the Agency's adaptability and credibility(Redden 2003:28).

That the safeguards functions of the Agency have evolved is evident from the content of the relevant debates. In the 1950's and 1960's they revolved around the issue whether the political, strategic and economic considerations subordinated technology factors. But now the debates revolved around how and the technology factors facilitated the construction of the safeguards regime that would be politically acceptable.

Even the voting patterns within the Agency seem to have evolved. In the Board of Governors the consensus has emerged as the authoritative procedure for conflict

resolution. The instances that lead to voting have been continuously decreasing. This could be on account of the ending of the East-West confrontation. Also an increasing number of activities has become routine, requiring administrative attention by the Secretariat and the Director General, but no longer necessitating the decision by the Board. But, nevertheless, it does not mean that the differences have been completely sorted out on all issues without resort to vote. This was demonstrated in March 2006 meeting on the referral of the Iran's nuclear violations to the Security Council (The Hindu (ii)).

In the earlier years the Scientific Advisory Committee (SAC) which had some of the most distinguished scientists played an important role in the work of the Agency and decisions could be taken on the basis of scientific rationality. But in recent years, politics and economics are beginning to play a major role within the Agency as there is a transformation in the composition of the Board of Governors where more economists and administrators represent their countries (Redden 2003:28). This is seen also in the General Conference as well where the diplomats have replaced the scientists as delegates to its annual sessions.

The change in the composition of the Board in 1971 and the addition of the more industrialized countries into it diluted the representation of the developing countries from Asia, Africa and Latin America. Even though they do not have a majority in the Board but they have it in the Conference where some of the decision get approved in order to get implemented. They have played an important role in the election of the Director General, the structure of the secretariat, the composition of the staff, and the allocation of the resources for various programs and activities (Khan 1997:203).

The bargaining power of the developing countries has certainly increased. This was quite revealed when there was a stalemate over the election of the Director General in 1981. Later in 2005, they got re-elected their Director General. They often succeeded in getting several of their nominees appointed to senior posts, streamlining the technical assistance, achieved abolition of the convention of appointment of senior posts to specific major powers (Khan 1997:305). Their latest achievement being the election of

El Baradei as the Director General for the third consecutive term.

But still the major powers exert a decisive influence over the IAEA's policies and actions, especially where politics is concerned. They do this collectively at the meetings of the General Conference or the Board of Governors or due to their relations with the Director General and his staff. This was most evident in the selection of the staff.

Legitimacy

The huge legitimacy that the Agency has acquired is reflected in the 114 countriesthat had signed the additional protocol till date.[8] This level of legitimacy had been achieved through consistency and responsive nature of the IAEA ever since its inception.

Since 1956, the IAEA has constructed the paramount framework for the conduct of global nuclear cooperation. Negotiations concerning the international control of civil nuclear technology either takes place within the IAEA or sponsored by it as a means for international legitimization. Even as significant activities still occur outside, for instance, in the individual countries unilateral and bilateral nuclear policies, the IAEA continues to be central to international negotiations and decision-making on nuclear control and in implementing cooperative programmes. Most of the bilateral agreements concerning nuclear transfers involve the Agency in some way, and it influences directly the outcome of the bargaining between the suppliers and the recipients. That way the Agency has played an important role in the non-proliferation regime as a facilitator, implementer, and vehicle for programmes and could be identified as the core of the regime.

That the IAEA has acquired credence the world over emerges form the fact the it has been assisting and providing information to the various organizations, world summits and conferences and various treaties and groups such as the Zangger group and the Nuclear-suppliers group (NSG).

[8]As on 17th May,2006

Chapter III

LEGAL FRAMEWORK FOR THE FUNCTIONING OF IAEA

The Statute could be considered as a fountainhead for the legal framework of the functioning of the IAEA. This framework that had been continuously evolving and expanding due to the regular addition of various information circulars (INFCIRCs), conventions and protocols by the Agency to it. Besides these there are some regional treaties and arrangements that assign the Agency a significant role. This legal framework is expected to expand further on account various additional responsibilities that are supposedly to be assigned to the Agency such as the additional protocols and fissile material cut-off treaty under negotiations.

The Statute

The statute[9] is a general agreement or a treaty that provided the legal basis for the establishment of the IAEA and its functioning. Unlike the charter of the UN, it does not group its articles into chapters or other units. The draft was badly and incompletely drafted (as pointed out by experts such as Szaz) due to which the application of safeguards, which is one of the major functions of the Agency, took about a decade to become fully operational (Smyth 1973:9). [10]

The statute contains extensive provisions for brokerage role for the IAEA (Article IX) and it was supposed to serve as a guarantor of two fuel cycle related services namely the supply of fissile material for fuel and the reprocessing of spent fuel.[11] But this role has been realised in a very limited sense.

The statute makes explicit mention about the ultimate goal of disarmament and pledges

---

[9] Its text, which was adopted unanimously on 23rd of October 1956 and entered into force on 29th July 1957, (Szaz 1970). Eighty countries including India signed the agreement within the specified period of time i.e. 90 days.

[10] It could have been a consequence of the small time-frame and the non-conducive political atmosphere that prevailed at the time within which the statute was being drafted.

[11] The Agency's role that was envisioned initially was that of a primary supplier of installations and material but even during the formation of the statute the role was reduced to that of a broker (Goldschmidt 1997: 9).

to contribute to the global arrangements towards this goal in conformity with the purposes and principles of the United Nations (Art. III.B.1). The statute also recognises the Security Council as an organ bearing the responsibility for the maintenance of international peace and security. (Art.III.B.4)

In addition to this basic framework provided by the statute the legal framework for the functioning of the Agency that flows out from the statute itself provides for a comprehensive frame of reference for the application of the safeguards and maintenance of the safety of the nuclear material and facilities.

Legal Framework for the Safeguards Functions

The IAEA's safeguards system is strongly built into the provisions of the Agency's Statute and the various Information Circulars (INFCIRCs) that have been approved by the Agency at various points of time along with the regional arrangements for various Nuclear Weapon Free Zones (NWFZs).

The statute refers to the IAEA's obligation to 'ensure so far as it is able' that materials subject to its responsibility are not diverted to military uses (Imber1983:57). It also provided for a situation where the Agency is authorized 'to establish and administer safeguards designed to ensure that nuclear items supplied by or through the Agency are not used in such a way as to further any military purpose (Article III.A.5). In addition, Article III.A.5 authorizes the IAEA to apply safeguards to any bilateral or multilateral arrangement, at the request of the parties, and to any of the nuclear activities of a State, at that State's request. Thus under the IAEA Statute, the Agency was assigned the role of a 'factory inspectorate' and the 'night-watchman' (Sasz 1970:227).

The Statute dwells on the rights and obligations of the Agency while applying safeguards though it does not specify as to how the safeguards were to be applied which had been left to be worked out in specific agreements with the states concerned. (Article XII). It requires the maintenance and production of operating records (to assist in ensuring accountability for and control of source and special fissionable materials), the submission of reports, to send into the State its inspectors and impose certain

sanctions in case diversion is detected and confirmed.

As already mentioned in the last chapter the statute requires the IAEA to establish a staff of inspectors, whose general functions and right to access has been laid down clearly. The inspectors are to be designated by the Agency after consultation with the State or States concerned. These inspectors are entitled to certain privileges and immunities while carrying out their responsibilities that are necessary in the independent exercise of their functions (INFCIRC/9/Rev.2). These include immunity from personal arrest or detention for non-official as well as official acts occurring during a mission, inviolability of papers and documents and freedom from seizure of personal baggage. The inspectors are to have access at all times to all places and data and to any person who by reason of his occupation deals with materials, equipment, or facilities which are required for safeguards purposes. These privileges and immunities are to be extended to inspectors not only by the country in which an inspection takes place, but also by those Member States through which inspectors are transiting on their way to and from that country.

The various information circulars (INFCIRCs) that have been approved by the Agency inorder to make the verification regime more stringent and effective further add to this basic framework for the safeguard implementation as provided by the statute. INFCIRC/26 was the first Safeguards Document approved by the Agency's Board of Governors.[12] It comprised of the principles and procedures for the application of safeguards to small reactors i.e. upto 100 MW (th) (para 4.b) which was subsequently extended to larger reactors in February 1964 (Szaz and Fischer 1985).

These were completely revised to form a new set of rules INFCIRC/66, which was unanimously approved in 1965 and was later extended in 1968 (INFCIRC/66/Rev.2). This comprised of Annex I to the latter which contained the provisions for reprocessing plants and Annex II which contained provisions for safeguarded nuclear material in conversion and fuel fabrication plants.

The 1968 document also incorporated the Inspectors Document (GC (V)/INF/39) which

[12] January 1961

was adopted by the Board in June 1961 and which was incorporated by reference in INFCIRC/66-type agreements. It covered four different areas of the inspection activities, including designation of Agency inspectors, notification of inspections, the conduct of inspection; the right of access and the privileges and immunities of inspectors. Distinguished mainly by the restrictions it set on the selection and access of Inspectors, this document was a presage to the problems that even now obstruct the applications of the Agency's safeguards under the NPT.

The safeguards agreements concluded in accordance with INFCIRC/66/ Rev.2 contain an undertaking by the State not to use safeguarded items for "any military purposes". Although originally limited in applicability to nuclear material and certain types of nuclear facilities, the scope of INFCIRC/66-type agreements over the years has expanded. These agreements now include provisions for the safeguarding items such as non-nuclear materials and facilities and transferred technology as well. Also, specific provisions for the application of containment and surveillance measures have routinely been included in such agreements. Despite some reservations by some countries, all INFCIRC/66/Rev.2 safeguards agreements since 1975 have incorporated a basic undertaking which precludes the use of safeguarded items for the manufacture of any nuclear weapon or to further any other military purpose or for the manufacture of any other nuclear explosive device.

In the 1968 document[13] there is a reference to the "desirability" of providing for the continuation of safeguards with respect to produced 'special fissionable material' and to any materials substituted therefore (IAEA 1968 Para.16). Taking this into account, from 1974 onwards, the duration of INFCIRC/66-type agreements has been tied to the actual use in the recipient State of supplied material or items, rather than to fix periods of time where safeguards are required to continue on all safeguarded items, including subsequent generations of produced nuclear material derived from safeguarded material or facilities, until safeguards are terminated on in accordance with the revisions of the 1968 document. .

[13] INFCIRC/66/Rev.2

When INFCIRC/66/rev.2 was drawn up there was no coherent, technically and quantitatively oriented concept on which to base it, therefore, it made no attempt to spell out the technical aims of the procedures that it prescribes or the methods to be used to achieve such aims and therefore did not speak in terms of a formal document such as "Subsidiary Arrangements". But most recent agreements based on INFCIRC/66/Rev.2 do include a specific reference to them. However, this only formalizes the Agency's practice of making detailed arrangements for the implementation of safeguards in all States with such agreements. What was significant about these earlier extensions of safeguards was that they entailed an expansion of the scope of initial system to cover a large range of principal facilities but not a qualitative up gradation of safeguards per-se (Pendley and Butler 1975:604).

Safeguards agreements concluded pursuant to INFCIRC/66/Rev.2. relies heavily on the presence of inspectors at the plant to detect any breach of a safeguards agreement and sets very high limits on the annual number of inspections (para.57). The document also contains provisions requiring in general the application of safeguards as a condition of re-transfer of safeguarded items. This document still serves as the framework for all the IAEA safeguards agreements with states (NNWS) not party to the NPT or the Tlatelolco treaty.

A major expansion of the IAEA's safeguards activities took place after the coming into force of the nuclear non proliferation treaty (NPT) on 5th March 1970. The NPT assigns to the safeguards of the IAEA the cardinal role of verifying that the non-nuclear weapons states (NNWS) party to the NPT are fulfilling their obligation not to divert their peaceful nuclear activities to nuclear weapons or other nuclear explosive devices where the Non-nuclear weapon states are those states which have conducted nuclear tests before 1st January 1967(Srinivasan 2003:36).

A new approach had been presaged in the treaty itself, where the fifth paragraph of the Preamble and Article III, on safeguards, postulated the 'principle of safeguarding effectively the flow (Szaz and Fischer 1985) of source and special fissionable materials by use of instruments and other techniques at certain strategic points. Thus in contrast

to the safeguards as envisaged in the statute which requires safeguards on projects, the NPT calls for 'compulsory' and comprehensive safeguards on the territory of the state parties and are 'fuel-cycle oriented safeguards'(Edwards 1984:10).

The NPT requires each non-nuclear weapon State (NNWS) to accept safeguards, as set forth in an agreement to be concluded with the IAEA in accordance with its Statute, on all source or special fissionable material in all peaceful nuclear activities within its territory, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices (Article III.1). Pursuant to this a document entitled "The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons" (INFCIRC/153), was developed by a Safeguards Committee of the Agency to be used as the basis for negotiating safeguards agreements under the NPT. It drew up a detailed model agreement that was to be used as the basis for the negotiations with the state concerned.

The IAEA had made the INFCIRC/153 the basis of all agreements with the NPT NNWS[14] and parties to the Treaty of Tlatelolco, and to a considerable extent for the NWS too, whether parties to the NPT or not. The Euratom states and Japan had reservations regarding the safeguards in the NPT and it was only after lengthy and difficult negotiations that the matter was solved in 1973 through an agreement (Fischer 1997:258).

Unlike the INFCIRC/66/Rev.2 which contains provisions requiring the application of safeguards as a condition of re-transfer of safeguarded items, the INFCIRC/153 contains no such condition as it was considered unnecessary in light of the requirement in Article III.2 of the NPT prohibiting the transfer of nuclear material to NNWSs unless the material will be subject to safeguards in that State.

[14] NPT lays down the criteria for the identification of nuclear weapon state and the non nuclear weapon state even though it asserts the principle of sovereign equality (Article X.para.1) among members on the basis of technological advancement in this field and production and use of nuclear energy (Article IV.para.1).

The duration of INFCIRC/153 agreements is generally linked to the State's adherence to the NPT, to the Tlatelolco Treaty or to other underlying treaties or agreements. There is no provision for the survival of safeguards on produced special fissionable material upon expiry of such an agreement. Agreements with NNWSs party to the NPT prohibit the diversion of nuclear material from peaceful nuclear activities to nuclear weapons or other nuclear explosive devices. There is, however, no prohibition of non-explosive military applications of nuclear material. Accordingly, agreements with NNWS parties to the NPT contain provision for the withdrawal from safeguards of nuclear material for use in non-proscribed military nuclear activities (IAEA 1972, para. 14). As regards NWSS, the undertaking is limited to a commitment not to withdraw material or facilities from safeguards except in accordance with the terms of the relevant agreement, which provide in each case for withdrawal for national security reasons.

For practical as well as for political and legal reasons to specify the specific control measures to be applied to actual materials and installations, the agreements require the state and the Agency to conclude 'subsidiary agreements' in which these important details can be set forth (Szaz 1973:81). These consist of a General Part and Facility Attachments as well as an attachment for locations outside facilities wherever applicable. Subsidiary arrangements are also concluded with nuclear weapon states for the implementation of safeguards under 'voluntary offer agreements'.

Protocols to safeguards agreements

A number of protocols to INFCIRC/153 agreements have been concluded by the Agency. It had been provided in the INFCIRC/153 document (para. 24) itself that when a comprehensive safeguards agreement is in force, the application of safeguards under other agreements with the State or States concerned stands suspended. Accordingly, the IAEA has concluded protocols giving effect to this article in cases where States have had pre-existing safeguards agreements with the Agency. In cases where a State concerned had concluded a trilateral agreement for the application of safeguards, the third party to the trilateral agreement is also a party to the suspension protocol.

Protocols for cooperation and coordination with multinational or national inspectorate

have been concluded with Euratom, with the newly-established Argentine-Brazilian Agency for Accounting and Control of Nuclear Material (ABACC) and with Japan. In each case, the IAEA's ability to reach independent conclusions concerning compliance with the agreement is an indispensable element. The standardized text for INFCIRC/153 agreements also provides for the conclusion of protocols with States having no nuclear activities.

The Model Additional Protocol (INFCIRC/540) approved by the Board in May 1997 was a result of the effort by the Agency and its Member States to strengthen the Agency's safeguards system through a set of measures that were to go beyond the existing system. The protocol is individually negotiated with the states (Ramachandran 2005: 586). It enables the Agency's access to more information about the states nuclear activities, more intensive inspections, including access beyond previously agreed 'strategic points' in a safeguard plant to any installation within the perimeter of the nuclear related activities (Bunn undated). The protocol imposes legally binding obligation for the states to provide to the Agency information about all the transfers of specified nuclear and non-nuclear material (Article 2.a.ix). This was aimed to provide the IAEA with complete information regarding the non-nuclear states' holdings of nuclear material. The second aim was to identify nuclear activities planned or carried out by a state for which it would need certain specialized equipment or non-nuclear material. Additional Protocol envisions improvement within the administrative procedure including streamlining procedures for the designating inspectors and providing visas (IAEA 2005:6).

Protocol gives IAEA inspectors broader access to information about member countries' nuclear programs and broader physical access to both declared and undeclared locations. Under the protocol, countries not possessing nuclear weapons are required to provide declarations about all phases of their civil nuclear fuel cycle and related research and development. They are also required to provide declarations about other locations where nuclear material intended for peaceful purposes is present and about the manufacture and export of materials, equipment, and facilities especially designed for nuclear use.

The protocol allows for the deployment of the latest verification mechanisms and use of modern means of communication (e.g. satellite phones) during inspections (Vincent and Truong 2004:69). The IAEA is moving steadily in the direction of using Commercial Satellite Imagery (CSI) to supplement its traditional safeguards (Keely 2004:89). The GIS (Geospatial Information System) could prove effective in catering to the requirements of the additional protocol for which 70 percent of the data required is geographically related which include site maps, photos , plans, drawings and even videos for more accounting information(Vincent and Truong 2004:70).

Regional Treaties

Besides the IAEA, there are nuclear non-proliferation efforts in different regional pockets which aims at the promotion of the nuclear technology for development purposes and also to serve as confidence building devices in those particular regions. Article VII of the NPT both recognised and encouraged the establishment of Nuclear Weapon Free Zones (NWFZs) as a means of promoting nuclear non-proliferation through regional measures.

INFCIRC/153 serves as a basis for the structure and content of Comprehensive Safeguards Agreements concluded pursuant to the Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty1967), the South Pacific Nuclear Free Zone Treaty (the Rarotonga Treaty 1886.), the African Nuclear Weapons Free Zone Treaty (Pelindaba Treaty, 1996) and The Southeast Asia Nuclear-Weapon Free Zone Treaty (the SEANWFZ or Bangkok Treaty, 1995).

These regional initiatives falls under the legal framework of the IAEA as each of these assigns the Agency a role of a guardian and preserver of these arrangements. All these regional treaties require the members to conclude agreements with the IAEA for the application of its safeguards to their nuclear activities.[15]

Euratom is an exception to the unified approach of the NPT. INFCIRC/193 (1973)

[15]Tlatelolco treaty (Article 12-18), SEANWFZ Treaty (Article 5), Rarotonga Treaty(Article 4) and Pelindaba Treaty (Article 9.b)

establishes joint IAEA-Euratom safeguards over the seven non-nuclear weapon states (Imber 1983:61). The Agency had the right to make inspections (Article 70) for which the access that was allowed in various circumstances had been dealt in article 76 of the treaty. While carrying out its verification activities it could make full use of the Community's system of safeguards (Article 31).

The agreement required on the part of the Euratom countries to make arrangements to facilitate the examination of records by Agency inspectors, particularly if the records were not kept in English, French, Russian or Spanish (Article 52). The community was also expected to provide the Agency with reports in respect of nuclear material subject to safeguards (Article 59). These reports could be Inventory change reports or Material balance reports (Article 63). The NPT along with these complementary regional treaties provides the foundations of legally binding non-proliferation commitments by countries around the world.

Overall, the safeguards, as are applicable today, could be classified on the basis of their scope as item-specific agreements concluded in accordance with INFCIRC/66/Rev.2, Comprehensive Safeguards Agreements (CSA) concluded in accordance with or along the lines of INFCIRC/153 and Voluntary Offer Agreements i.e. safeguards agreements that are applicable to all or part of the civil nuclear fuel cycles of nuclear weapon States.

The procedures[16] for safeguards are more or less the same in each type and provide for Agency review of design information, reporting and record-keeping by the State, inspection activities to be carried out by the IAEA, including rights of access and notification of inspections, and provisions related to the exemption and termination of safeguards.

However, the specific terms of these safeguard agreements vary. While INFCIRC/66/Rev.2 serves as a guideline, INFCIRC/153 is a standardized model. Hence, agreements concluded pursuant to INFCIRC/66/Rev. 2 reflect a greater degree of variation than do agreements concluded pursuant to INFCIRC/153. The agreements

[16] Dealt with in the next chapter in detail

concluded with the nuclear weapon states (all of which are party to the NPT) more closely resemble in format. The agreements with non-nuclear weapon states along the lines of INFCIRC/153 cover all source and special fissionable material in all peaceful nuclear activities of the State party. Hence there is no elaborate provision on the scope of the agreement and or on the inventory.

The scope of the "voluntary offer agreements" (VOA) on the NWS , which are not obliged under the NPT to put in place any safeguards arrangements at all, is thus more symbolic and varies from agreement to agreement. However, while some provide for the application of safeguards to all of the State's civil nuclear activities and others to only some of the State's civil programme, all provide for the selection by the Agency of a sub-set of facilities or material from that which is offered by the State concerned. IAEA selects only some of the material and facilities for the application of the safeguards unlike an NNWS where the Agency is obliged to inspect all facilities where nuclear material is used. For example under the VOA, US has provided a list of 245 civilian facilities for IAEA safeguards. But since 1982 only 19 facilities had been put under safeguards (Ramachandran 579:2005).

Safeguards agreements concluded in accordance with INFCIRC/66/Rev.2 incorporate the Agency's statutory right of access to all persons, places and information relevant to the implementation of safeguards. INFCIRC/153 agreements, on the other hand, limit the Agency's access to carry out routine inspections to strategic points identified in the Subsidiary Arrangements (as do the voluntary offer agreements). INFCIRC/66 limits the maximum number of routine inspections annually at nuclear facilities based on the inventory or output of nuclear material at the facility in question, while providing for a right of access at all times to facilities with an inventory or annual output in excess of 60 effective kilograms of nuclear material. INFCIRC/153, on the other hand, limits the Agency's "inspection effort", permitting the Agency to distribute its inspection activities within categories of facilities in the State (Rockwood 2006).

Legal Framework for the Safety Functions

The statute empowers the Agency to establish or adopt standards of safety for the

protection of health and minimization of danger to life and property (Article III.6). It makes the safety standards binding on the IAEA in relation its own operations and in relation to the operations assisted (use of materials, services, equipment, facilities, and information made available by IAEA) by the Agency (Edwards 2003:58). Adherence to these standards was to act as a precondition to technical assistance (ElBaradei et al. 1995:16-26). When there was no such assistance, the standards that were set by the Agency were recommendatory (ElBaradei et al.1995:16-26).

Although a significant number of health and safety standards were developed by the IAEA, none of these is translated into binding international obligations. Also, the IAEA's inspection role was never extended to the area of nuclear safety though the IAEA virtually had a monopoly in establishing standards. The Chernobyl accident[17] revealed the inadequacy of placing nuclear power development solely within a state context (Bakenbus 1986: 478). Even the efforts such as the convention on early notification of a nuclear accident (1986) and the convention on assistance in case of a nuclear accident or radiological emergency (1987) which were elaborated and adopted within the framework of the IAEA, could not make any impact as both were concerned with after-math and not the prevention of accidents (Bakenbus 1986: 485).

Besides these conventions, there were initiatives like OSART (IAEA's Operational Advisory Review Teams) which was set up after the TMI (Bakenbus 1986: 484)[18] and ASSET (Assistance of Safety Significant Event Team) that was set up after Chernobyl (Kamminga 1995:874). These consisted of visits on request and the reports were merely advisory but strictly confidential. Even the assistance program increasingly emphasised on the safety aspect as a precondition. IAEA in cooperation with the member states developed and issued 'Safety Series' which consists of the Safety Fundamentals, Safety Guidelines, Safety procedures and Safety standards (Gonzalez 1998:2-4).

A proposal for legally binding conventions on the safety of nuclear material and facilities aspects had been pending ever since the 1960's (Rautenbach et al., 2006). But

[17] Chernobyl accident 1986
[18] Three Mile Island accident ,1979

the momentum was gained only after getting endorsement at the international conference on the safety of nuclear power held at Vienna in September, 1991.

The Safety Convention[19] is the world's first legally binding international standards on the siting design, construction and operation of land based power plant (IAEA 1994, Article 17-19). It provides for an international review system to supervise the implementation of these provisions. The substantive provisions of the convention were based on technical standards that were contained in the Safety Fundamentals published by the IAEA in 1993.

Even though the convention was a major step forward as far as the safety of nuclear material and facilities is concerned, it left much to be done. Substantive obligations under the convention are legislation and regulation, general safety consideration and safety of installations. The character of most of these has been kept very general and there are no detailed technical annexes.

The convention is not comprehensive as it excludes military installations, reprocessing plants, research reactors, and facilities for the treatment and storage of the radioactive waste and is restricted to land based power plants only (Art.2.i). Convention's supervisory functions are not backed by provision in case of non-compliance and it also does not provide for the compulsory settlement of disputes, rather, leaves it for the parties to consult within the framework of the meeting of contracting parties (Art. 29). As the obligations are imprecise, implementation of the same had been left to the reviews.

It does not provide for independent inspections, instead, the states are required to submit periodic reports (Art. 5). Also, as the previous conventions, it maintains that nuclear safety is a domestic concern and leaves it to the country concerned to decide upon the duration of shutting (de-commissioning) or upgradation of the substandard facilities (Kamminga 1995:877). .

[19] Opened for signature on 20th September '94 by the General Conference of the IAEA and entered into force on 24th October 1996 (Fischer 1997:217)

The convention has not left much scope for adaptability for more specific standards as a two-third majority or consensus is required for interpretations (Art.32). It retained the dominance of the nuclear power states by providing that of the 22 states that had to ratify, 17 must be from states which have achieved criticality in the reactor core (Art. 31.1).

Other Aspects

The amendments to this legal framework are made as per the provisions within the agreements themselves. If the Board modifies the Safeguards Documents, the Inspectors Document, or the scope of the safeguards system, the agreement could be amended if the countries party to the agreement so request. Amendments to INFCIRC/66/Rev.2 safeguards agreements usually made for the purpose of extending the duration of the agreement, and occasionally, the scope. INFCIRC/153 agreements provide that either party (the State or the IAEA) may request consultations on the amendment of the agreement. Any amendment would require the agreement of all parties to the agreement (Rockwood 2006).

There is no court or established judicial tribunal which has competence to resolve a dispute between the IAEA and a State relating to the interpretation and application of a safeguards agreement as the IAEA is neither subject to the jurisdiction of national courts, nor under the Statute of the International Court of Justice is it eligible to be a party to an action before that tribunal. For this reason, all safeguards agreements contain a provision for submitting disputes concerning the interpretation and application of the agreements to binding arbitration. Although several versions of these provisions have been developed, they all basically provide for the establishment of an arbitration panel (or arbitral tribunal) composed of one member selected by each of the parties to the dispute, plus one or two members designated by the panel members chosen by the parties to the dispute, plus one or two members designated by the panel members chosen by the parties. The arbitration provisions are designed to ensure that the panel is always composed of either three or five members to avoid the possibility of a tie vote.

Complete disarmament still remains a distant goal despite continuous efforts. Non-proliferation of nuclear weapons is seen as a primary requisite for achieving the ultimate goal. A total ban on further production of fissile material for nuclear explosive could be an effective international effort to minimize the accessibility of weapons usable fissile material to states, terrorist groups and black marketers, especially when backed by effective verification measures.

Fissile Material Cut-off Treaty (FMCT) is one of the efforts in this direction. The proposed FMCT convention could put an end to the production of the fissile material for the nuclear weapons. If the convention is concluded, the nuclear weapon states and the three remaining non-nuclear weapon states that are operating unsafeguarded nuclear plants (India, Pakistan and Israel) may be required to, if they join the convention, to place under the IAEA safeguards all their reprocessing and enrichment plants, and all the plutonium and highly enriched uranium produced by those plants that continue to operate, as well as any plant using such material (FMCT 98 undated). As yet no substantive progress had been registered since except the acceptance by the conference on disarmament in March 1995 of the special coordinator and the mandate therein (Rauf 2001:44).

This elaborate legal framework lacks teeth. The IAEA can neither use force nor can it compel a state to do anything or physically prevent it from doing anything. If the IAEA found that a state is diverting, the sanctions it could invoke would largely be formal. It would ask the state to desist, report the diversion to the Security Council and the General Assembly of the UN, it could curtail or seek to curtail nuclear supplies or at the most suspend the state from the membership of the IAEA.

The Security Council's declaration 1992 regarding the threat to international peace and security posed by the proliferation of weapons of mass destruction and model additional protocol of 1997 would definitely make the IAEA safeguards more effective and reliable.

CHAPTER IV

PROMOTIONAL AND REGULATORY ROLES OF THE IAEA

The IAEA functional mandate derives its sustenance from the legal framework that has been examined in the previous chapter. This mandate could be considered as unique in the sense that it has both the promotional as well as regulatory roles in the domain of nuclear technology. On one hand it is expected to disseminate the benefits of the applications of nuclear science and technology, on the other the prevention of that technology from being used for military purposes forms the underlying basis of its existence. The two functions have been apportioned different levels of priority at different points of time by the IAEA.

This duality had been clearly outlined in the Agency's Statute and was subsequently reinforced by the NPT later on. It is the very dynamics of the delicate balance between the two mandates that have held the Agency together and have resulted in the support that the Agency enjoys among its 138 Member States. The last NPT Review Conference held in 2005 renewed its vote of confidence in the continuing relevance and value of the Agency's dual mission.

Promotional Role

The international co-operation for peaceful uses in nuclear technology formed the underlying basis for the formation of the IAEA besides the objective of containing the proliferation of the nuclear weapons. The promotional activities of the Agency which include technical assistance, research and development in nuclear science and technology constitute the focal point of the world's scientific and technical cooperation in the nuclear field.

The origins of the technological cooperation programmes of the IAEA lie in the euphoria that prevailed in the late 1940s and 1950s for promoting equitable development throughout the world and the peaceful uses that the nuclear technology

could be put to. All the major organizations and especially the United Nations were working with this philosophy and aimed at realizing this through facilitating the technology flows from the developed to the under-developed world. As the nuclear technology at that point of time was being seen as a solution to most of the problems of development, there was an increasing demand for technology transfers in this field to the developing countries. The Agency's technical assistance programme was at that point of time an institutional response to these increasing demands and it was not surprising that the very first resolution that was adopted by the General Conference was to make specific appropriations for the provision of the technical assistance to the developing countries (Khan 1997:299).

The IAEA's authorized functions as conceived in the statute were extremely broad on the basis of which it was empowered to take any action needed to promote research and development of practical applications of nuclear energy for peaceful purposes (Article III.A.1).

Though the Statute did not explicitly mention of the Technical Co-operation Programme, it underlined the special importance of helping the developing countries (Article III.A.2) and to promote use of nuclear energy through providing materials, services, equipment and facilities for such purposes and to foster the exchange of scientific and technical information among these countries (Article III.A.3). This was made explicit in the clause that the Conference on the Statute added to Article III on the proposal of Poland, which authorized the IAEA "to encourage the exchange and training of scientists and experts in the field of the peaceful uses of atomic energy" (Article III.A.IV). Also the Article IV of the NPT re-enforced this mandate while calling upon the Parties to the Treaty to co-operate with each other and with international organizations in promoting the peaceful uses of nuclear energy while mentioning in particular the needs of the developing countries. This clearly marked out a role for the IAEA as a catalyst in the transfer of nuclear technology.

Today, international co-operation in nuclear science and technology takes place in a complex framework of bilateral, regional and multilateral arrangements. IAEA's

assistance programmes are aligned with the assistance given by the other United Nations Specialized Agencies and Programmes such as the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP) (iaea.org undated(1)).

Within the IAEA four departments are concerned with promotion of technical cooperation. The Department of Technical Co-operation, the Department of Research and Isotopes, the Department of Nuclear Energy and Safety and the Department of Nuclear Sciences and Applications are the main channels through which technology transfer activities take place. Despite the fact that these departments pursue similar goals, their funding sources are different. While the financing of activities undertaken by the two technical departments i.e. the Department of Research and Isotopes and the Department of Nuclear Energy and Safety is through the IAEA's Regular Budget, that of the Department of Technical Co-operation is largely from the Extra-budgetary resources, namely 'Voluntary Contributions' made by the Member States. The departments provides scientific and technical support for the IAEA's technical cooperation programme, launch IAEA's coordinated research programmes, promote information exchange and provide laboratory services and training at the Agency's laboratories.[20]

Evolution of the Technical Cooperation Programme

The initial report of the Prepcom formed the basis for the IAEA's first Technical Assistance Programme but soon afterwards a regular pattern for assistance was developed. In the year 1957, the basis for technical assistance activities was fairly weak and opportunities for co-operation were limited to mainly nuclear power and aspects of its fuel cycle and, to a certain extent, some aspects of radiation applications. Very few peaceful nuclear technologies had reached the level of maturity so as to be effectively used for practical applications. Also, most of the developing countries did not have the

[20] The Agency is the only international organization that operates and promotes its own research and service laboratories such as the Seibersdorf Laboratories in Vienna which offers a diverse range of technical services to assist the technical cooperation programme (Fischer 1997: 80)

basic minimum level of framework developed to effectively apply nuclear science and technology. None among the three partners involved in the technical assistance process i.e. donor countries, recipient countries, and the IAEA had neither the required experience nor did they have the administrative arrangements for multilateral intergovernmental co-operation.

Therefore, in 1959, the IAEA launched a full fledged Technical Assistance Programme under which it organized training courses and arranged the services of experts and specialized equipment as well as fellowships. On account of the delays in launching of safeguards and the slow growth in the demands of nuclear power, the Technical Assistance emerged as the Agency's main programme in the 1960's. To regulate and harmonize the conditions for providing the technical assistance "the guiding principles and general operating rules" were framed in 1960 adherence to which was then onwards a precondition for any agreement of technical assistance that was to be concluded between a country and the Agency (Szaz 1970:457). The guiding principles were revised in 1979 to adapt the contents and modalities of Technical Assistance Program to the needs and procedures of the NPT in as much as to have similar safeguards as provided in the treaty. These principles were then incorporated into Revised Supplementary Agreements (RSA) that became compulsory for the recipients nation to sign before getting any assistance (iaea.org undated (3)).

The capacity of the IAEA to assist also increased with time. Until 1977, the Agency's projects were smaller and that which involved a maximum of twelve man-months of expert service while all the major projects were implemented through the UNDP. As the Agency enhanced its organizational capacity and gained experience in imparting technical assistance, its confidence towards that allowed it from 1977 onwards, to include the multi-layered projects into its own programme.

In the first three decades of the functioning of the Agency, the Technical Cooperation Program concentrated upon the creation of institutions and facilities in the developing countries so as to enable them to introduce and enlarge the role of nuclear technology or apply the nuclear techniques to do so safely and effectively. But in the last two

decades, when the institution building was more or less completed, the approach matured to have a cost efficient, direct and measurable impact on the high priority economic or social needs of the country being assisted. In this new approach the Agency and the recipient country act as partners (through Country Programme Frameworks (CPF)) in the development and strengthening of the applications of national institutions to manage and organize the applications of nuclear technology (Cetto 2003:43).

Types of assistance

In order to facilitate engineering and technology transfer in various fields related to nuclear energy, the Agency has been providing technical assistance to developing member countries since 1959 in the form of expert services, equipment and training, the relative merits of which had always been a subject of debate.

Though the developing countries have always insisted on the demand of more equipment, the Agency considered the lack of trained personnel as the main factor limiting the use of nuclear techniques in the developing countries. Therefore, the award of fellowships and organization of training courses (iaea.org undated (4)) has remained a priority of the Technical Assistance Programmes to train the personnel in such countries (Szaz 1970:478). But this had, at times, tended to become controversial when there is paucity of trained nationals to take advantage of them. The Agency also assigns experts and consultants to impart advice and training to developing countries on various subjects (Szaz 1970:475).

The Agency provides special fissionable and other materials for setting up an atomic energy project and for research purposes to the countries on request as per the statute thereby acting as an intermediary in arranging the supply of reactor fuel and specialized equipment from one member state to another (Article IX).

Fields of assistance

In terms of total annual disbursements through the IAEA's Technical Assistance Programme, the largest share goes to the projects related to nuclear applications in food

and agriculture(iaea.org undated (5)), which accounts for more than one-fifth of the total. Nuclear related methods are widely used in developing countries in areas such as plant breeding, soil fertility studies, insect and pest control, animal production and health, and studies of the fertilizer efficiency (Schiff 1984:61). The technology of food irradiation additionally is finding increasing acceptance.

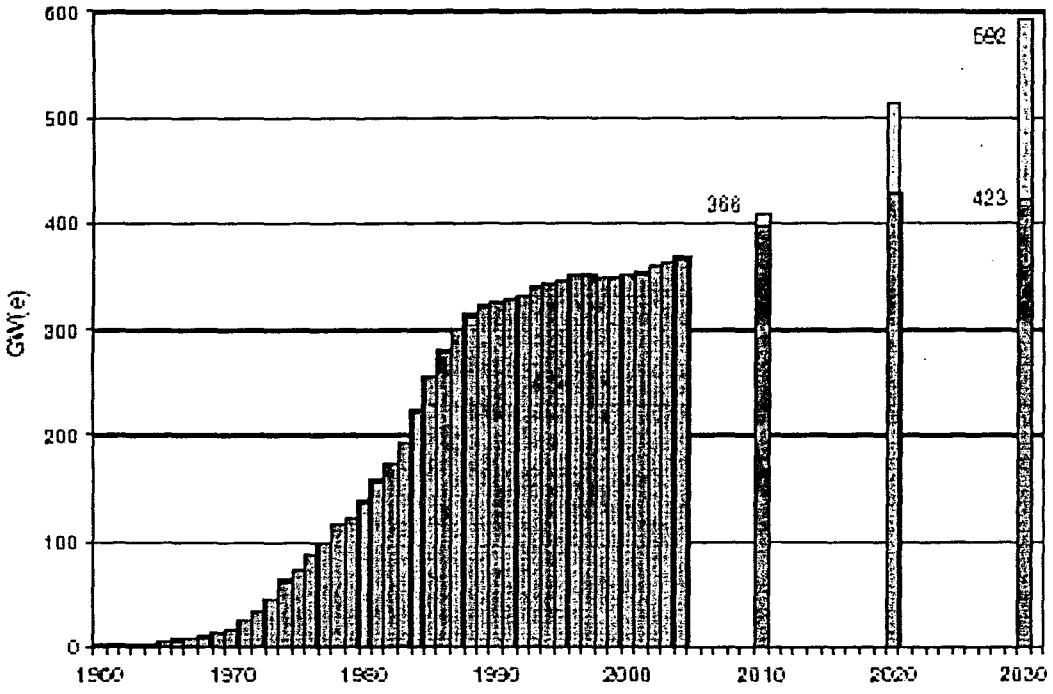
The Agency also provides assistance in Physical and Chemical sciences such as assisting the utilization of research reactors and particle accelerators for scientific studies, production of isotopes; the application, maintenance and repair of nuclear instrumentation; and the preparation and utilization of radio-pharmaceuticals(Schiff 1984:63)(iaea.org undated (6)). The share of total disbursements in this sector has ranged between 18 percent and 25 percent.

Other area that shows high levels of interest is the nuclear applications in Industry and Earth Sciences such as nondestructive testing of materials and products, development of water resources, radiation processing, isotopic tracers and nuclear gauging, radioisotope and radiopharmaceutical production to research reactor design and use (Katz 1968: 408).

The Agency shares the view that power is one of the most effective tools for development of any country. Therefore it provides help in the generation of electric power through assisting countries in power reactor design, reactor electronics instrumentation and control, reactor engineering and quality assurance and electricity system planning. The IAEA started its statutory role of a broker of nuclear power in 1958 when a deal between Japan and Canada set the pattern for the future that the IAEA was to act as a nominal supplier.

Nuclear power had been an area of fluctuating demands as nuclear power programmes in many countries have been cut back or halted and the share of disbursements on nuclear power has dropped from about 12% in the late 1980s to 6% in the 1990s. The developing countries, most of which are starved of the power resources, have been desperate to acquire this technology have shown considerable interest in this regard. In

response to this interest, the IAEA undertook objective nuclear-power planning studies for individual member states.



(Low projections: dark grey bars; high projections: light grey bars)

Graph showing historical growth in world wide installed capacity,1960-2004 and the Agency's projections through 2030

(Source: Annual Report 2004, p.2)

The Agency has been responsive to the changing demands and preferences of the sizes of the nuclear plants. In the first General Conference in 1957, encouragement was given to the development of small and medium sized power reactors but in the sixties the trend changed towards the larger nuclear plants.

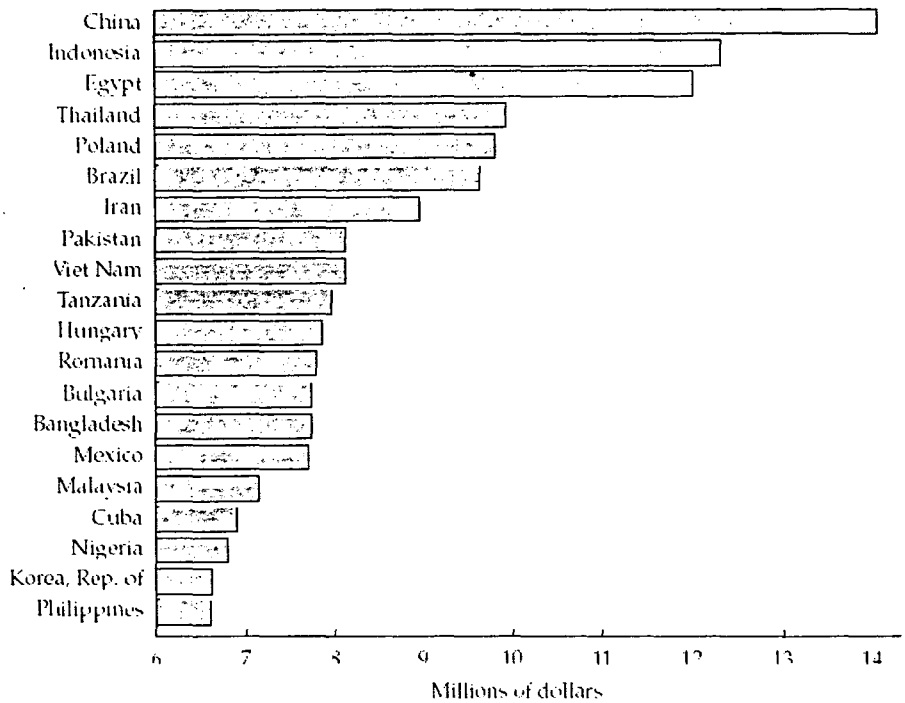
The technical cooperation had been evolving with the advancement of nuclear technology and the changing needs of the countries. In the period prior to 1966, engineering and technology, isotope applications (radioisotopes and radiation techniques) and nuclear science were the fields of technical assistance activity. From 1966 onwards until the 80's the isotope applications in agriculture too received allocations comparable or more than that for engineering and technology.

On the whole from the beginning till the mid-eighties all the modes of assistance such as medicine, food and agriculture, physical and chemical sciences and radiation safety had more or less equal shares in the allocations made for them. The funds spent on power had fluctuated during the late 1960's and 1970's; the proportion of funds sharply and thereafter fell to lowest level after the Chernobyl but again, after the Kyoto Protocol coming into effect, the allocations and the demands for power seems to be on rise.

Growth of technical assistance

Although the statute provides that the allocations of resources are to be made while taking into consideration the needs of the developing countries, the technical assistance programme had followed the principle of sovereign equality for all its members. The very fact that the Agency serves a wide spectrum of countries which vary from the states largely underdeveloped in basic sciences to those which have developed extensive nuclear power and research program, the technical assistance had varied in content, time and space. The bulk of the Agency's country programmes and support of research has flowed towards developing countries that have already made significant technical and scientific progress.

Technical assistance over regions has also varied over time. In the early years of the Agency, the assistance went chiefly to the Atoms for Peace Assistance recipients. From the early Sixties onwards Asia, the Pacific and the Far-East have steadily, though slowly declined as the largest assistance recipients while Latin America and Africa has gained slowly. The Middle-East (West Asia) has received the least allocations as low as 0.5 percent as compared to Asia and the Pacific and Latin America which received around 25 and 24 percent of the total allocations respectively (Desai 1997:149). Lately, the African region has shown the greatest increase in assistance fund allocations.



The total IAEA Technical Assistance programme, 1986-1996 (20countries receiving the most assistance)

(Source: Fischer 1997:326)

Even the form of assistance had varied for different regions. Assistance has tended to shift from more basic forms i.e. General atomic sciences and isotopes applications to more industrially and power oriented forms. Asia, the Pacific and the Far East region have received most of its assistance in isotope applications and uranium prospecting. In Latin America, the use of isotopes dominated the earlier phase of assistance but later on the industrial applications gained precedence. Contrastingly, the assistance to European countries had been dominated by engineering and technology from the very beginning. In Africa (except South Africa), the assistance had been mainly for food and agriculture and not for power (Desai 1997:149).

Distribution of assistance for the peaceful uses of atomic energy as per the Statute of the Agency has to be based on the criteria of need, equity and scientific merit. These criteria left a lot of room for the variation in the pattern of distribution among the states. In fact, no particular pattern of assistance is followed. The assistance is affected by the priorities of the major powers and is affected by strategic, economic or political

dimensions as well. The level and amount of technical assistance varies with the technological know and the level of development of the countries.

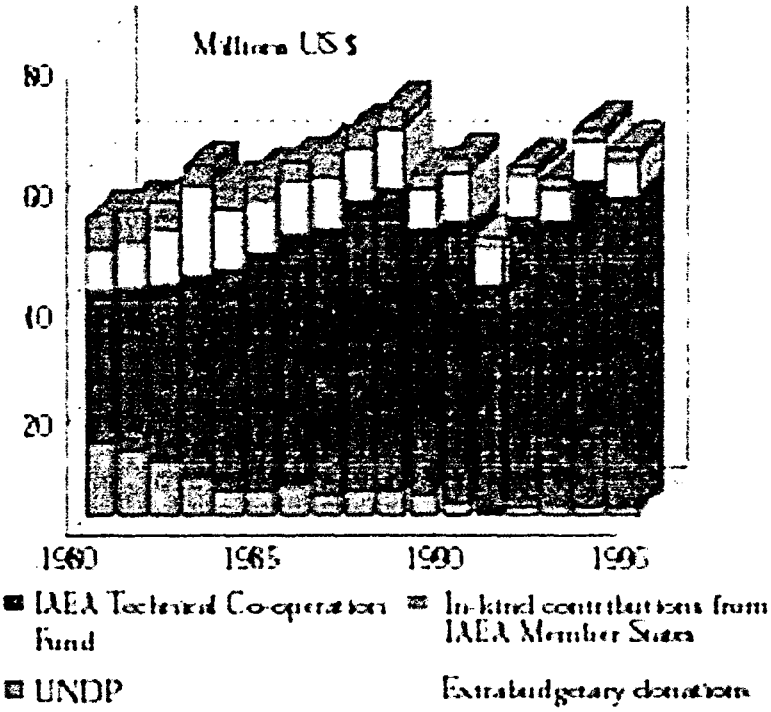
The states that are the largest recipients of assistance are those which already have nuclear capabilities. Agency transfers have gone from the more developed to the less developed ones where that capital could be best absorbed. In terms of supplying technical assistance to such a diverse range of countries, one noticeable trend is that end users are being more clearly defined and targeted.

Resources for Assistance

While the statute had been explicit about the activities that the Agency can pursue, it does not clearly lay down as regarding the funding mechanism for the Agency projects under its technical assistance programme. While the costs of administration and related support for technical co-operation projects are fully borne by the IAEA regular budget, the technical assistance actually provided to countries comes from voluntary contributions that states directly make through the IAEA or the United Nations Development Programme (UNDP) (Szaz 1970:472).

Throughout 1960s the United Nations Special Fund remained a source of finance comparable to IAEA's own programme. But from the mid-1970's the latter's share grew while that of former's reduced to fractional levels (1/40 that of the former in 1995). About 75% of total resources in the last decade years have come from the IAEA's Technical Co-operation Fund (TCF) which is financed through the contributions of the member countries. This fund worked well until the mid-1980s from when onwards the pledges and payments started to show a downward trend and touched the lowest ebb of 65% of the target in 1992 (Barretto and Cetto 2005:29). In the last five years on account of the efforts made in this direction by sensitizing on the issue and generating consensus, the situation had shown an improvement and there had been a gradual growth in the contributions and lesser deviations from the pledges.

Another source of financial support is the extra-budgetary funds that are available to all the organizations of the UN family and administered by United Nations Specialized Agencies.



(Source: IAEA Bulletin 39(3), 1997. p. 18)

These comprise also of the contributions made for specific projects by the donor States. The donor nations exercise the discretion to select the project and countries of interest to them. The recent trend has been that of increase in the extra-budgetary resources. Also, the governments receiving these funds are steadily increasing their own shares in the form of government cost-sharing.

The relative importance of each source had been varying at various points of time. Despite the membership of 138, the voluntary contributions had been short of the set target most of the times. Also, the fact that the voluntary contributions can be in any currency, the Agency have to at times face problems of disposing off the non-convertible ones. In the early years the funds from the United Nations formed one of

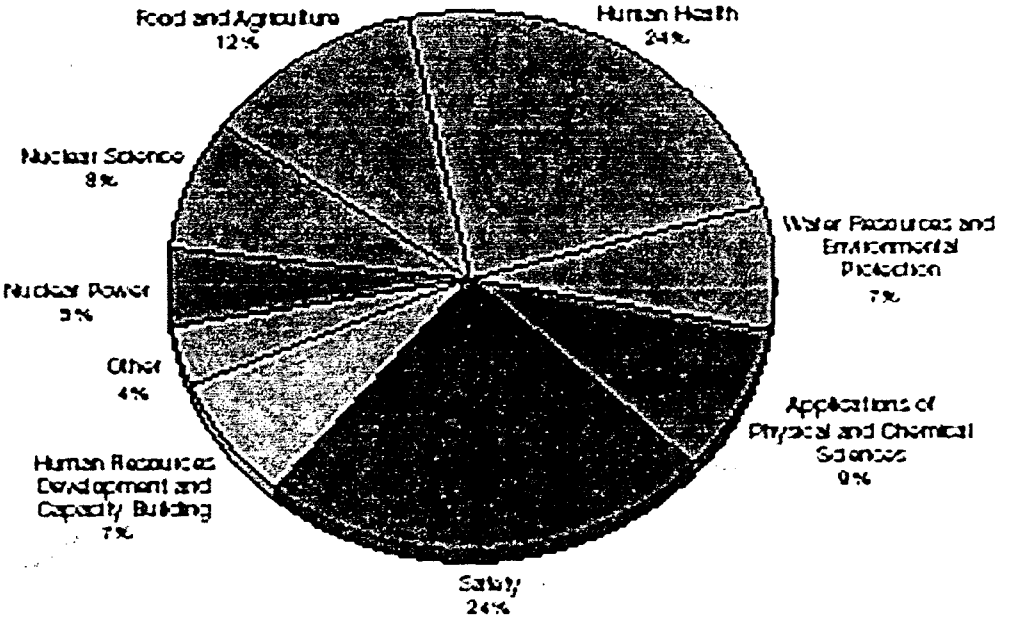
the major sources of funding but later the Agency's own funds increased and far exceeded the former.

The types of assistance had also been varying with time and space. Of the main components of assistance, the equipments take away the major share of assistance to as high as 43.5 percent (in 1980). Generally about two-fifth of the disbursements went to equipment, and the rest in provided training, expert services, subcontracts, miscellaneous services, and fellowships. It had been observed that the funds for the fellowships are the most difficult to arrange and its share of allocation had also decreasing consistently for e.g. from 47.5 % in 1970 to 30.9 % in 1995. The share of experts had remained more or less the same i.e. around one-fourth of the assistance (Fischer 1997:345). Since 1970, sum-total of resources available to the IAEA's Technical Co-operation Programme have grown but slowly as compared to the safeguards. The developing countries had been constantly making efforts to amend the statute so as to incorporate funds for the technical assistance in the regular budget, but till date, without success. Lately there had been an increasing contribution of developing countries to regional IAEA technical co-operation activities, both as hosts for training courses and as providers of experts.

Year	Total programme (million $)	Experts (%)	Equipment (%)	Fellowships and other training (%)	Others (%)
1970	4.6	27.5	25.0	47.5[a]	
1971–1980	NA	30.3	39.4	30.3	
1980	21.7	24.6	43.5	31.9	
1990	62.6	28.0	37.7	30.9[b]	3.4
1995	83.3	27.0	39.4	30.9[b]	2.7

Changes in the shares of the main components of the IAEA's Technical assistance Programme

(Source: Fischer 1997:345)



Technical Cooperation Programme disbursements in 2004 by area of activity

(Source: Annual Report for 2004.p.5)

Safeguarding of Technical Assistance

Prior to 1977, technical assistance, whether in the form of information or equipment, was not under safeguards even though the Nuclear Weapon States had been consistently making efforts towards the superimposition of nuclear safeguards over the Technical Assistance Programs.

In 1977 this was concretized in the form of a decision by the board that the safeguard would be normally be applied to a Technical Assistance Project if it made a substantial contribution to a sensitive technology area i.e. in an activity involving enrichment, reprocessing, production of heavy water, handling of Plutonium or the manufacture of MOX fuel. It was for the first time that a direct relationship between the technical

assistance program and safeguards was established. Since then onwards the technical assistance is dominated by the non-sensitive technologies. This decision was severely criticized by the nations not party to the NPT.

The IAEA's technical co-operation programme is the major channel of technology transfer. The technical co-operation projects, either at the national, regional, or interregional level, cover a wide range of scientific and technical work related to nuclear power; the nuclear fuel cycle; radioactive waste management; food and agriculture; human health; industry and earth sciences; physical and chemical sciences; radiation protection; safety of nuclear installations; and programme direction and support.

Problems

The technical cooperation programme has not been without problems which had arisen at various points of time during the long course of its implementation. To generate consensus had been the toughest job of the Agency and even when the slightest reform was to be made, there had to be diversionary stances. The Revised Supplementary Agreement (RSA) which revised the former guidelines in 1979 and which incorporated the basic features of the NPT was vehemently opposed by some states (Barretto and Cetto 2005:30). The countries like India even announced that they were no longer interested in receiving technical assistance from the Agency and it has maintained its refusal and have not participated in the technical co-operation programme (except for some training courses) since then.

Other common problems faced by the technical cooperation programmes are those of arranging for adequate training of personnel selected to carry out projects and shortages of national counterpart staff. Therefore, many uses of radiation and radioisotopes still remain beyond the means or technical expertise of the developing countries (Fisher 1997:420).

The donor countries have shown clear preferences for states based on political or economic calculations (Barretto and Cetto 2005:29). This had led to dispersed and

uneven transfers of technology. In the last decade, more controls and barriers have been introduced to the transfers of materials, equipment, information and nuclear technology in general and in particular for the areas related to nuclear power and its fuel cycle. These have emerged from the concerns of proliferation and requirement of high standards of safety and environmental protection. It has been observed the promotional role of the Agency had been biased towards the transfer of radioisotope and radiation techniques to the developing countries rather than to promote the use of nuclear power (Fisher 1997:420).

Most of the IAEA's country programmes have been availed by the developing countries that have already made significant technical and scientific progress. A significant part of the funds is utilized in these nations with a miniscule amount left for the rest even though special steps were taken by the Agency to serve the less advanced member states by undertaking projects designed to improve their scientific infrastructure and by helping them to train and educate their scientists and technicians.

Performance of technical cooperation programme

Agency's assistance was in fact aimed at fulfilling its statutory mandate to promote the uses of atomic energy in the developing countries, in the sense of popularizing the technology and familiarizing the potential users with it, as opposed to administering transfers of technology. The success of the technical cooperation programme could be therefore be measured in terms of its effectiveness in implementing its basic principle to provide the technical foundations for development and the extent to which it helped create a framework for the effective use of nuclear energy and radioactive materials.

The Agency has only partially realized its goals in the nuclear power sector on account of the incidents such as TMI and Chernobyl and the fears of proliferation nuclear power accounts for only about 17 percent of all the modes of power generation (Srinivasan 2003:37). Western countries have completely backtracked from this mode of generation of power and have stopped constructing new ones and scrapping the existing reactors (The Hindu (a) 2006:14). But most of the developing and some of the developed ones

still consider this as a viable option. Over 60 percent of the power reactors under construction are in developing countries (Annual Report 2004:1)

As has been earlier pointed out that whatever assistance was there, it was not uniform. Even as some countries received larger assistance, others were neglected. This varied over time and space. Also, there is no logical connection between the size of Agency's budgets for the technical co-operation and for nuclear safety and safeguards and the balance between them is solely driven by political considerations (Fischer 1997:423).

Regulatory Role

The regulatory roles of the IAEA comprise of the application of safeguards and the maintenance of the safety standards within the nuclear facilities.

The Safeguards

Article III.A.5 of the statute of the Agency authorizes application of safeguards to the nuclear facilities and material. Safeguards are tools, devices and codes of conduct which help the IAEA to verify whether a state is living up to its international commitments of non-military use of nuclear technology. The safeguards system functions as a confidence-building measure, an early warning and trigger mechanism that sets into motion other responses by the international community if and when the need arises and are based on assessment of the correctness and completeness of a State's declared nuclear material and nuclear-related activities.

Despite being a statutory function of the IAEA the safeguards took a long time to develop due to the technical and political exigencies. The Statute provides the legal basis for the establishment of a safeguard system and established a framework for controls over which the subsequent agreements and treaties like NPT built upon to make that framework more effective. The non-proliferation treaty complements the statute by adding two provisions that were missing in the statute i.e. an obligation to submit to the safeguards and a requirement that most international transfers of nuclear

material or equipment be subject to controls. But the NPT remained less specific about the control measures that were to be applied.

In the statute it had been repeatedly declared that nuclear items and certain other items are not used in a way so as to serve any military purpose. In some related contexts this clause had been replaced by "are used only for peaceful purposes". The statute also outlines tools to achieve these objectives. The NPT safeguards signal a departure from the previous modes of safeguards as it laid explicit emphasis on the domestic safeguards.

The safeguarding responsibilities have expanded due to various treaties entrusting the IAEA with a role of a nuclear inspectorate and as their verifying agent. Today, the IAEA safeguards nuclear material and activities under agreements with more than 140 States. Over the past decade, IAEA safeguards have been strengthened in key areas so as to enable it to detect a clandestine nuclear weapons programme and to build confidence that States are abiding by their international commitments. The objective is to provide credible assurance to the international community that the nuclear material and other items placed under safeguards are not directed towards military use inorder to provide credible assurance on the absence of the undeclared material and activities for the states as a whole. It also aims at supporting the international community's efforts towards nuclear disarmament.

The Director General or the Inspectors General (head of the department of safeguards and inspections) take most of the decisions in the implementation while the inspectors audit a facility's accounting and operating records and compare these records with the State's Accounting Reports to the Agency. They verify the nuclear material inventory and inventory changes and apply containment and surveillance measures (e.g., seal application, installation of surveillance equipment) during their on-site inspections.

Methods of Implementation

The implementation of safeguards entails a comprehensive procedure. Every state is divided into material balance areas (MBA) and strict inventory controls are instituted

for each area for which a state is required to maintain records as the safeguards are based on accounting of the records and the reports that are submitted regularly for each such MBA (Hough 1970:425). This material accountancy is considered as the fundamental control measure of safeguards along with containment and inspections as secondary ones (Szaz 1973:97). Containment is done in order to keep a track of the material by sealing the containers and an inventory being made for the same (Szaz and Fischer 1985:26).

The implementation of the safeguards comprises of the provision of information by the states and their verification and evaluation by the IAEA. For a state with the Comprehensive Safeguard Agreement (CSA) without an Additional Protocol, the state declarations are primarily nuclear material accounting reports and facility design information and the Agency's verification is focused on verifying these declarations. While those states which are signatories to the Additional Protocol, the verification involves the provision by that state of a much broader range of information about its nuclear and nuclear related activities and performance by the IAEA of the activities under the complementary access as necessary to assure the absence of the undeclared nuclear material and activities at specific locations or to resolve any question or inconsistency related to the information provided by the state.

The IAEA had devised new and improved capabilities and methodologies to detect undeclared nuclear material and activities. The latest technologies assist in the state-system of accounting for and control of nuclear material through the information analysis and remote monitoring (Schriefer 1996:7-10). The analysis of open source information through the satellite imageries plays a guiding role for the inspectors. Through its remote monitoring device such as cameras it helps in detecting the unaccounted flow of nuclear fuel. Environment sampling is one of the measures for the detection of undeclared nuclear activities. Inspections can be carries out at any location to which the Agency has access under the safeguards agreement or additional protocol. Through this method of collection and analysis of environment samples, the Agency determines whether nuclear activities and types of nuclear material are consistent with

those declared and whether the presence of any undeclared nuclear material and activities is indicated.

Scope of investigation has now broadened to include the detection of the undeclared reprocessing plants and reactors and monitoring of declared enrichment facilities and the detection of indications of undeclared enrichment activities. A safeguards state evaluation is carried out which includes the broad information provided under Additional Protocols and results of 'complementary access activities' (IAEA 2005:10). This enables the Agency to draw a conclusion of even the non-diversion of the non- declared material and absence of undeclared nuclear material and activities in the states.

Inspections

While the efficacy of the IAEA safeguards rests primarily on the records that must be maintained about all peaceful nuclear material, facilities and operations in non-nuclear weapon states, the credibility of these controls depends entirely on the inspections that the Agency carries out in order to determine the extent to which their records correspond to the reality(Mc Knight 1971:106). These inspections being the most manifest intrusion upon the sovereignty of the controlled state had been politically delicate and controversial and therefore the inspectors are always designated with prior agreement of the government concerned.

There are different set of rules as per the frequency, rationale, notice and access allowed that apply for different types of inspections which could be ad-hoc, routine or special depending upon the procedural and circumstantial conditions.

Ad-hoc inspections are undertaken in order to verify a State's Initial Report of nuclear material and the reports on changes or the nuclear material involved in international transfers. Only a twenty-four hour notice is required and the access allowed is limited to the earlier notifications of transfer (Szaz 1973:104).

The most frequent inspections are the Routine inspections. The Agency's right to carry out such inspections under Comprehensive Safeguards Agreements is limited to

locations, also called Strategic Points within a nuclear facility and the locations through which the nuclear material is expected to flow as identified in the Subsidiary Agreement by the nation concerned. These are to verify consistency of the State's reports with the records, to verify the location, identity, quantity and composition of all nuclear material subject to safeguards and to obtain information on possible causes of material unaccounted for or of various uncertainties in the records (IAEA 1972 para.72). This is done through by physical inspections, measurement and sampling (Mc Knight 1971:108). These inspections are carried out according to a defined schedule and ordinarily twenty-four hour notice is given. But these could be unannounced as well on a very short notice.

Special Inspections are carried out in unusual circumstances such as when the IAEA considers the information made available by the State concerned including explanations from the State and information obtained from routine inspections are not adequate for the Agency to fulfill its responsibilities under the Safeguards Agreement. Such inspections require prior consultation with the State (para.73).

Safeguards visits could also be made to the declared facilities at appropriate times during the lifecycle for verifying the safeguards relevant design information. Such visits are carried out during the construction of a facility in order to determine the completeness of the declared design information or during routine facility operations and following maintenance, to confirm that no modification has been made that might allow unreported activities to take place. The inspections are also carried out during the decommissioning of a facility in order to confirm that the sensitive equipment is rendered unusable.

Apart from the different types of inspections which amount to a certain extent a transgression upon the state's sovereignty, there are arrangements to keep this intrusion to the minimum required level. The States are protected against any unreasonable use of the right to carry Special Inspections as the provision of access to all places and data and to all persons in the Statute is by no means an unlimited license to search. The places or the data subjected to be investigation are defined precisely either in the

agreement with the state or concerned or on direction of the Board of Governors. Thus despite the Board powers envisioned in the statute, the reach of the inspectors is limited to narrowly circumscribed locations.

Types of safeguard arrangements

There are different kinds of safeguards agreements entered into at different periods of time so as to implement the Agency's statutory mandate which envisions "to establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency, or at its request or under its supervision or control, are not used in such a away as to further any military purpose ; and to apply safeguards, at the request of a state, to any of the state's activities in the field of nuclear energy" (Article III.A.5). The safeguards arrangements that exist are of different types and vary with the type of arrangements that have been entered into with the State and the Agency.[21]

INFCIRC/66 provides for the first time any internationally endorsed safeguard measures (Sinden 1997:29). These are not comprehensive but facility specific and are based on the guidelines contained in INFCIRC/66/Rev.2 (Ramachandran 2005:578). These aim at ensuring that the nuclear material, non-nuclear material, services, equipment, facilities and information specified and placed under safeguards are not used for the manufacture of nuclear weapons or any other nuclear explosive devices or to further any military purpose.

The second type of safeguards arrangement is the Comprehensive Safeguard Arrangement (CSA) which is based on the IAEA document INFCIRC/153 and applies safeguards to all nuclear material in all nuclear activities of a state that follow a Non Nuclear Weapon State's (NNWSs') obligations under the NPT. These types of safeguards could be applied on the basis of an agreement pursuant to a project between the Agency and the states that does not have the CSA in place. These could be also applied on account of a unilateral submission agreement between the Agency and the state concluded at the request of the latter. These safeguards aim at the verification of

[21] The Legal aspects of different types of safeguards has been dealt with in Chapter III

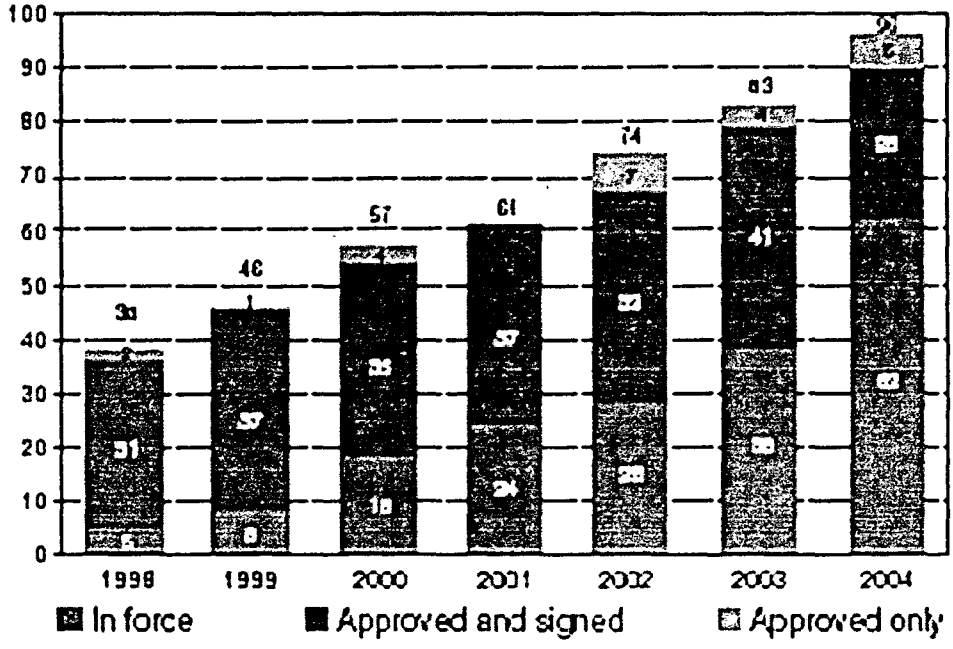
the State's compliance with its undertaking to accept safeguards on all the nuclear material in all its peaceful nuclear activities and the timely detection of the diversion of significant quantities of nuclear material from the peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosives or for other purposes that are unknown (Hough and Solem 1970:421).

The processes for the verification of these types of safeguards include the Nuclear Material Accountancy which is complemented by containment and surveillance techniques such as tamper-proof seals and cameras that the IAEA installs at nuclear facilities. While verifying these safeguards, the Agency is authorized to use remote monitoring to detect the movements of unattended declared nuclear material in facilities. The terms 'significant quantities' and the 'timely detection' were left unspecified, interpretations of which had varied over time (Schiff 1984:118).

The Voluntary Offer Agreements (VOA) are those agreements which the Nuclear Weapons States (NWS) enters into and under which they agree to open certain facilities for inspections (Ramachandran 2005: 578). These agreements enable the Agency to verify that nuclear material is not withdrawn, from activities in facilities while such material is being safeguarded under this agreement (Annual Report 2004:62). These nations offer some or all civilian nuclear material or facilities, from which the Agency may select for the application of safeguards. These agreements generally follow the format of INFCIRC/153-Type agreements, but vary in scope.

The latest among all the safeguards arrangements and also the most effective of all are the Additional Protocols (INFCIRC/540). These protocols grants the Agency a complementary inspection authority along with that provided in underlying safeguards agreements so that the inspectors could provide assurance about both declared and possible undeclared activities(iaea.org(7) undated). The Additional Protocol grants an expanded right of access to information and sites, as well as additional authority to use the most advanced technologies during the verification process. This enables the detection of the undeclared nuclear material and activities and to address fully the verification of a state's compliance with its undertaking through measures additional to

the existing safeguards agreements. It is designed in a way as to enable the Agency to get a qualitative picture of the State's activities over and above the quantitative verification of material accounting and prevention of diversion under the State's regime of safeguards.



INFCIRC/540 Type (Additional Protocol) 1998-2004

(Source: Annual Report 2004)

The measures under this protocol enable the IAEA not only to verify the non-diversion of declared nuclear material but also to provide assurances as to the absence of undeclared nuclear material and activities in a State. It provides credible assurance on two points i.e. non-diversion and no undeclared installation or activity.

Under the Additional Protocol, the State is required to provide information about and allow the IAEA inspector an access to all parts of a State's nuclear fuel cycle which includes uranium mines, fuel fabrication and enrichment plants, and nuclear waste sites or to any other location where nuclear material is present. The state is required to allow

short notice access to all the buildings on the nuclear site to the inspectors. The advance notice for such verifications is generally 24 hours but it could be as short as two hours in case access to any place on a site that is sought in conjunction with design information verification visits or ad hoc or routine inspections on that site is desired.

The activities carried out during such a complementary access could include examination of records, visual observation, environmental sampling, utilization of radiation detection and measurement devices, and the application of seals and other identifying and tamper-indicating devices.

Thus, under the Additional Protocol, the IAEA is authorized to collect environmental samples at locations beyond declared locations in case it is felt as necessary by the Agency and right to make use of internationally established communications systems, including satellite systems and other forms of telecommunication(Annual Report 2004:66).

While keeping in mind the treatment and visa problems which the inspectors have often faced in the past, the protocol also provides for the State's acceptance of IAEA inspectors' designations and issuance of multiple entry visas valid for at least one year (Schriefer 1996:7-10). It also provides for the State to provide information about, and IAEA verification mechanisms for, its research and development activities related to its nuclear fuel cycle. Hence the Additional Protocols assist the Agency in verifying activities of a state's compliance with its safeguards obligations and helps the Agency to reach a broader conclusion regarding the status of the nuclear material and activities in the states as under this arrangement the Agency enjoys enhanced right of access to locations and information regarding a state's nuclear fuel cycle.

The latest trend that is being resorted to in this context is of the Integrated Safeguards (since 1998) which is an optimum combination of all safeguards measures available to the Agency under the CSA and Additional Protocols to achieve maximum effectiveness and efficiency(Annual Report 2004:66). A pre-requisite for the implementation of Integrated Safeguards is the broader safeguards conclusion to be drawn by the Agency for the state concerned. In 2004 the Agency for the first time in its history could draw a

broad safeguard conclusion for Japan which has a large and complete nuclear fuel cycle(Annual Report 2004:67)..

Thus one can see that there have been efforts towards the strengthening of safeguards from the very beginning and also, the safeguards approach has evolved from correctness of the State's declaration to completeness i.e. a credible assurance of the absence of undeclared nuclear material and activities (iaea.org (7) undated).

The safeguards have been ineffective for the states which had not signed the NPT such as India. Also the incidents of North Korea and Iran had left the safeguard measures as dysfunctional.

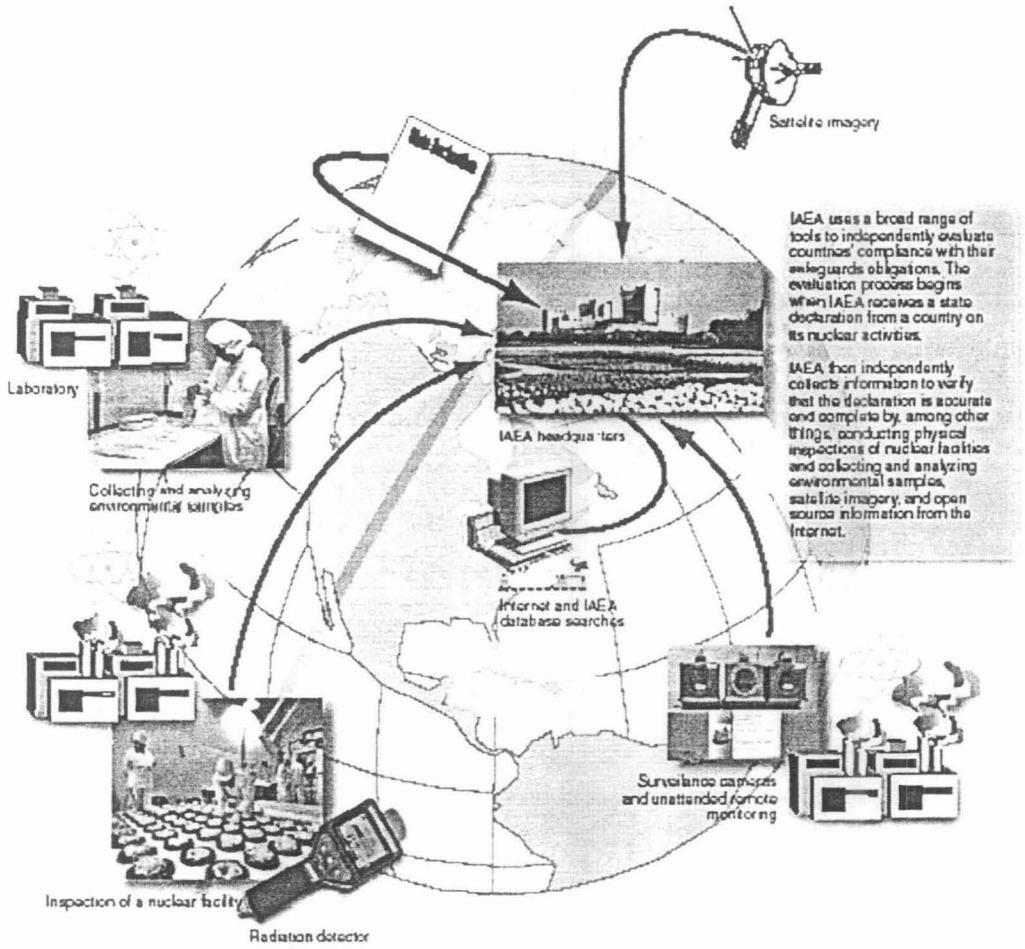
Different problems arise in concluding safeguard agreement as also the additional protocols. These could be technical in nature such as the need to establish a functioning state system of accountancy for and control of nuclear material or it could be legal such as the lack of understanding of the legislative requirement of safeguard agreements and Additional Protocols.

Administrative factors such as a lack of working relations between the ministry dealing with the Agency's affairs and government officials responsible for the conclusion of international agreements and policy factors, such as competing priorities and the expectation of economic and security benefits "in return for" the conclusion of safeguard agreement and additional protocols are also sometimes controversial.

The safeguards arrangements are discriminatory in nature and remains as such even though there had been reduction in the nuclear arsenals of the nuclear weapon states (Fisher 1997:422).

Scope and methods of verification

Along with the treaties that have been successively made more effective, the methods of verification of the safeguards have also evolved. In the 1960s the IAEA's laboratories analyzed the Uranium and Plutonium samples taken routinely at nuclear plants where the safeguards were applied.



A schematic displaying Types of information used by IAEA to verify countries compliance with their safeguards obligation

(Source: GAO 2005, "Nuclear Proliferation: IAEA has strengthened its Safeguards and Nuclear Safety Programs, But Weaknesses Need to be Addressed".pp.15)

Despite differences of approach, both INFCIRC/66 AND INFCIRC /153 made use of three essential methods of verification which are material accountancy, containment, and surveillance including inspections, whose number, intensity, and duration was kept

to the minimum consistent with the effective implementation of safeguards.

After the entry into force of the NPT in 1970, nuclear material in many facilities of all types came under the IAEA safeguards and the number of samples that were to be analyzed grew rapidly. As a response to these added responsibilities the agency built a special Safeguard Analytical Laboratory (SAL) in 1975 that started regular analysis of uranium and spent fuel in 1976 and that of plutonium in 1979.

The 1971 verification system of the IAEA was essentially an audit system, auditing the states nuclear material account and it had worked well in regard to the locations and nuclear material that had been reported to the IAEA. The Nuclear Weapon States which were against the inspection of their installations ultimately accepted them in 1982 to smoothen out the explicitly discriminatory safeguards.

In the aftermath of the Gulf War, the IAEA established a Universal Reporting System under which the participating states are voluntarily required to report to the Agency of all the transfers of specified nuclear and non-nuclear items. In Iraq, the Agency applied highly sensitive analytical techniques such as environmental sampling and satellite imageries (El Baradei 2003: 17). This proved useful in detecting the undeclared nuclear material or any activity that has taken place in a given area.

The most crucial element for discovering secret nuclear activities remains the access to information. The IAEA has neither satellites nor spies of its own. However, it amasses a lot of information from its overall verification activities and from member states about exports and imports of nuclear material and equipment. It also extract clues from the media and other open sources such as information which member states have obtained through national means such as satellites (Gjelstad and Njolstad 1996:129). It was through the means for satellites imagery that the Iran's as well as DPRK sites were discovered.

Funding of safeguards

The statute outlined two ways of financing of the safeguards. The general rule was that the cost of safeguards were considered as administrative expenses and thus were

supposed to be borne by all member states in accordance with a scale that was to be fixed by the General Conference guided by the principles adopted by the United Nations in assessing the contributions of the member states to the regular budget of the United Nations (XIV.D and Sasz 1973:127). However, between the Agency and the parties to the bilateral or multilateral arrangements the costs were to be met from resources outside the IAEA budget. (XIV.C) pursuant to this all the safeguards agreements implicitly provide that the expenses of safeguards are to be shared between the Agency and the State concerned. But there had been a contradiction over the responsibility for particular expenses associated with certain safeguards activities. In 1990, Agency developed a uniform policy with respect to the allocation of expenses under INFCIRC/66/Rev.2-type agreements and INFCIRC/153 agreements (GOV/INF/577). The Secretariat has since then included these provisions in the Subsidiary Arrangements to all Safeguards Agreements. (Rockwood 2006).

In the early years the budget of the IAEA safeguards was an integral part of the Agency's regular budget. But in 1971, after the signing of the NPT and with the expectation that the safeguarding budget would increase and to avoid opposition from the developing countries, the Board and the General Conference approved special arrangements for financing safeguards. This led to the reduction in the shares of the safeguard budget of those countries which had relatively low per capita incomes (less than one-third of that of the average per capita of the ten largest contributors) (iaea.org (7), undated). In 1976 amounts of these contributions were frozen in order to pacify the G-77 which had by then become a pressure group.

This system had inherent defects to the effect that for one year even the USSR figured among the low income countries. Moreover, this did not take into account the inflation or the rise of prices. Therefore, in 1989, the General Conference, on the recommendation of the Board approved a new system that took into consideration the effect of price increases on the safeguards budget. This amounted to de-freezing of the contributions of the developing countries and raising the same on account of price increase. This system is applied ever since for assessment of individual contributions after adoption pf the safeguards budget.

As already mentioned, this system of zero-real-growth budgeting have been done away with in 2004 which had led to an increase in funding of safeguards. This increase which came after fifteen years when viewed against the backdrop of the reduced, or at best flat, budgets of the vast majority of other United Nations organizations is a positive development.

Safety and Security

Besides technical cooperation and safeguards, safety and security of nuclear material and facilities also form a statutory function of the IAEA. The architects of IAEA's statute were tempted to merge safeguards and the safety functions as at that point of time it seemed logical to have the same inspectors for both these functions. But soon the inherent limitations of this arrangement surfaced because while the safeguards served a political purpose and the states used IAEA safeguards to achieve their political motives, safety of national programmes was a technical problem and was to be ultimately the responsibility of the government concerned and not the secretariat of the Agency(Fischer 2003:13). Therefore, these two functions were separated.

The safety functions of the IAEA are aimed at increasing a state's awareness and ability to control and protect nuclear and other nuclear material, installations and transports, from terrorists and other illegal activities, the ability to detect and respond to such events and provide engineering safety measures.

The IAEA's Nuclear Safety Standards Programme provides member states with internationally acceptable safety codes and guides on many aspects of safety associated with nuclear-power plants. The codes outline the basic objectives and minimum requirements that have to be fulfilled to provide an adequate safety level while the safety guides recommend procedures and acceptable technical solutions to implement the requirements and achieve the objectives of the codes. The Agency's safety standards are mandatory with regard to the nuclear activities undertaken under the Agency's assistance while in other cases where the assistance is not provided; it is recommendatory (El Baradei et al. 1995:16-25).

In the early 1960's the safety was considered as a national responsibility. But after Chernobyl accident the perception changed as the fallouts of a nuclear disaster transcended the borders (Kamminga 1995:874). Therefore, a series of international efforts to address the problem began. Since the Chernobyl incident three safety related international conventions under the IAEA auspices which set legally binding rules, cover the early notification and assistance of nuclear accidents and lay down fundamental requirements and mechanisms for ensuring the safety of nuclear power plants states have been adopted (Blix 1995). In the 1960s and 1970s, technical assistance in nuclear safety was a negligible. Even though the IAEA first issued its safety standards in 1962, revised them in 1967 and again in 1981-1982, serious efforts started only after the Three Mile Island (TMI) and the Chernobyl disasters in the late 1979 and 1986 respectively (The Hindu 2006:14). When the TMI accident took place, nuclear safety accounted for only about 8% of the total programme.

In 1991 a joint secretariat of the international and regional agencies concerned such as the WHO, ILO, FAO, NEA and the Pan American Health Organization (PAHO) together with the IAEA, began the revision of the safety standards of 1982 (Sharma :10). The Board approved these revised basic safety standards in 1994.

Concomitant with the relative importance, the funds allocated for the nuclear safety increased from late 80's when Chernobyl brought about a greater emphasis on the nuclear safety and waste disposal in the technical assistance program to an extent that in 1994 it was allocated around one fourth of the total allocations for the technical assistance programme. Thus, the fund allocations have shown a shift towards the projects in areas of radioactive waste management, radiation protection, and safety of nuclear installations which also reflect the changing needs and interests of the developing countries.

The IAEA's activities in the field of nuclear safety include plant siting and design, the transport of radioactive waste, emergency planning and preparedness, and decommissioning. Projects that are supported include those related to strengthening national infrastructures for radiation protection; occupational safety of radiation

workers; safety of nuclear installations; the safe management, storage, and disposal of radioactive wastes.

In recognition of the increasing emphasis on operational safety, the IAEA initiated the Operational Safety Review Team (OSART) program in 1983 to assist regulatory authorities in the review of operating nuclear-power plants. Internationally agreed, regularly examined and revised standards, recommendations and guidelines now cover virtually every type of nuclear operation from mining and preparation of nuclear fuel to the disposal of nuclear waste. Much however remains to be done to promote uniform safety practices in the form of nuclear safety services, safety and design reviews, international design and peer reviews of follow up missions.

The past twenty years have witnessed dramatic changes in the area of nuclear safety in reaction to the accident at Chernobyl and are driven by an upsurge in international co-operation. Today, the job of assuring such safety is a vast cooperative effort. It draws heavily on the support of bodies such as WANO (The World Association of Nuclear Operators), WHO (World Health Organization), the nuclear energy agency of the OECD (Organization for Economic Cooperation and Development, other UN agencies and the European Union.

In the aftermath of the 11 September 2001 terrorist attacks on the U.S., the IAEA Board of Governors approved a plan designed to upgrade world-wide protection against acts of terrorism involving nuclear and other radioactive materials, including those that could be used to make "dirty bombs." The Board acknowledged that strong physical protection of nuclear facilities and materials is needed

Compliance and enforcement

The responsibility to fulfil the obligations of the agreements rests with the Government of the State that is party to the agreement. If the Government does not ensure adequate access for the inspectors it amounts to that Government's violation of the agreement.

If such doubts about the State fulfilling its obligations under the agreement cannot be resolved to the satisfaction of the Director General, the Director General is supposed to report, under an INFCIRC/153 agreement, to the Board of Governors that the action by the State concerned is essential and urgent to ensure the verification of non-diversion or report to the Board the Agency's inability to verify that nuclear material required to be safeguarded has not been diverted, or, under an INFCIRC/66/Rev.2 agreement, that the State is in non-compliance with the agreement (Woodliffe 1987:95).

Any actions considered by the Board to be "essential and urgent" are required to be implemented by the State without delay. If the State does not take the required action, the Board may conclude, on the basis of the information reported to it by the Director General, that the IAEA cannot fulfil its obligation under the agreement to verify non-diversion.

Under the Statute of the Agency, failure by a State to take fully corrective action within a reasonable time with respect to non-compliance could subject the State to curtailment or suspension of assistance provided by the Agency or by a Member State, to the recall of material and equipment, and to the suspension of the privileges and rights of Agency membership. Article XIX.B permits the General Conference, acting by a two-thirds majority and upon the recommendation of the board to suspend the privileges and rights of a member that has persistently violated the statute or agreements. However, there is no provision of expelling a member. Article XVIII.E specifies that even by withdrawing from membership a state cannot denounce its contractual obligations to the Agency with respect to the projects. Non-compliance may also trigger measures by the Security Council within the framework of the United Nations Charter. In the event of failure of the recipient State or States to take fully corrective action within a reasonable time, the Board either curtails or suspends assistance that is being provided by the Agency or by a member, and may call for the return of materials and equipment made available to the recipient member or group of members. It can also suspend a non- complying member from the membership (Article XIX).

There had been difference of view between the developed and the developing nations

about the main focus of the IAEA's operational activities should be. There are also opposite stands of these countries as to how should the Agency's programme should relate to each other. while the nuclear weapon states view the technical assistance as complementary to, and a necessary adjunct of safeguards, the developing country's view safeguards and technical assistance programmes as in competition with each other for scarce agency resources and that the zero-sum situation exists between the two (Schiff 1984:169). The NWS sees the assistance programmes as a device of bargaining for securing a commitment for the implementation of safeguards on state's nuclear material and facilities. All the treaties and safeguard arrangements that have been opened up for signature substantiate this.

CONCLUSION

Non-proliferation has been an important ingredient of international cooperation for a peaceful world order. Its importance is underpinned by the inherent strength and resilience of the regime working for the goal of non-proliferation. The non-proliferation regime could be seen as part and parcel of the global order as a framework without which other steps towards peaceful solutions of conflict would be more difficult if not impossible, while measures of disarmament could be incomparably more complicated if feasible at all. In a principal sense the regime refers is manifested in the International Atomic Energy Agency which remains the only international organization that provides for comprehensive and intrusive inspections, in accordance with an international treaty and regime (Tate 1990:404).

The non-proliferation regime has been evolving and expanding especially since the 1970's. Almost all the issues related to the nuclear field now come under the continuously expanding umbrella of the regime. The density of issue-linkages has enhanced the allurement to be a part of the regime. The NPT, which is one of the major and most comprehensive instruments of the regime have proved to be the most widely adhered to and the relatively more successful multilateral arms control agreement in history.[22]

The nuclear-haves have a dominating influence within the regime. This influence has been exercised ever since the 1960s when the North-South conflict had replaced the East-West conflict. The NPT's stratification of the states (as nuclear weapon states (NWS) and the non-nuclear weapon states (NNWS) and the differentiation in the application of the safeguards to these two categories has always remained an issue that struck at the very base of the NPT. Under the treaty the nuclear weapon states remained unaffected in the maintenance of their nuclear arsenals and unsafeguarded as to any part of their nuclear development programs. That way, it is in fact a treaty to impose additional restrictions on the non nuclear weapon states that were expected not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices.

[22] Only four states are non-parties: Cuba, India, Israel and Pakistan (Rauf 2001: 32).

Though origin of the IAEA sprouted from the security dilemma that the United States faced in the 1950s, the statute envisaged an 'apolitical' IAEA. But from the very beginning its functioning had been affected by politics. In the first decade and a half of the functioning of the Agency the super-powers rivalries had its repercussions on the decision-making of the Agency. There has been a shift from the super power domination of the Agency activities to growing importance, if not the dominance of the developing countries. This was first witnessed when in 1976 South Africa was excluded from the Board (Fischer 1997:411). Although, the strength of the elected members from the developing countries has increased, it remains a fact that the western countries still dominate the decision making processes.

The dominating influence of the nuclear-haves became explicit when in 1981 the United States announced its intention to opt out of the IAEA when the Agency rejected Israel's credentials (Harald 1994:29).[23] The regime suffered a major jolt on this announcement and it was only on Director General Hans Blix's assurance that the precipitous situation was averted.

Since the beginning the geographical representation in the Board had been beset with controversies. There had been contesting claims for the representation within different geographical areas. Such claims have been put to rest after a gentleman's agreement to clinch the issue in favour of alternative representation.[24] This suggests the flexibility and dynamism within the legal framework for the functioning of the IAEA. Whenever the need arose the Agency had modified the rules and in some cases adjusted although clumsily to the statutory mandate.

Despite the NPT being comprehensive there remain some technical snags which provide room for different interpretations. Some countries such as India and South Africa had used the supposed benefits to be derived from peaceful nuclear explosions (PNEs) as a justification for developing nuclear explosive technology, which is

[23] In 1981Israel bombed Osiraq research reactor near Baghdad. Iraq was a party to NPT and the reactor was under IAEA safeguards. Israeli government professed a lack of confidence in the IAEA's ability to detect diversion of nuclear material.

[24] Brazil and Argentina 1960s

basically the same whether the explosive is used in a weapon or for a constructive purpose.

The regime has not yet attained universality (a primary requisite for a full fledged regime to exist) and such prospect may not be achieved in the near future. It is only after attainment of this universality that any regime could ever function efficiently as it could then promote reciprocity between the members and would be able to address their insecurities. The unequal and selective application of safeguards is a major impediment towards realising this. There still remain 39 states that are party to the NPT but have not brought the comprehensive safeguards agreement into effect (IAEA 2005:13). Furthermore, though 114 countries have signed the additional protocol, it could not be considered a significant achievement unless the so called 'threshold states' or 'proliferating states' are signatories to it (Harald 1994: 22).

The IAEA has been an integral part of this regime as the primary verifying agent, a role institutionalized by the nuclear non-proliferation treaty and the various treaties establishing nuclear weapons free zones, among other international instruments of non-proliferation. As an intergovernmental organisation it has been recognized as one of the most effective intergovernmental organisation (Ramanna 1997:291). Since its formation, the IAEA has been continuously evolving, functionally as well as structurally and had been responsive to the needs of the changing political and nuclear world order, the needs of the member states and the advances made in the field of nuclear technology. As the Agency matured, its working capacity and domain also acquired comprehensiveness.

Though there had been views about the incompatibility between the promotional and the regulatory roles of the IAEA, the two still remain its main motivations even as their relative importance has varied with time on account of the dynamics of the world politics and funding structure. This is clear when during the initial phases the technological cooperation secured a major chunk of the allocations and work.[25]

[25] After INFCIRC/66/Rev.2 came into force in 1968 the demands for an increase in technical assistance funding began to be articulated along with the concern for balance between technology transfer and safeguards activities.

Subsequently, the focus moved away from the promotion to regulation with the safeguards securing about one-third of the allocations i.e. roughly the same or even more than that of all other technical programmes put together. The Chernobyl incident elevated the issue of safety and stimulated concerted international efforts to strengthen the safety framework. As a response to this, the safety functions has secured a significant chunk of allocations made. Major emphasis as of today is to establish the standards as a global reference point to promote the application of the best safety practices. The September 2001 terrorist attacks in the USA raised the spectre of nuclear terrorism and accelerated the efforts to upgrade the levels of safety and security for activities involving nuclear and radiological materials.

The IAEA has been diversifying its activities. Whether it is nuclear desalting and agro-industrial complexes or any other activity, the IAEA has been into everything that goes on around the world in the field of nuclear research and application. An aspect of this diversification of the activities of the Agency also includes the coordination of isolated and frequently uncoordinated laboratories and scientific institutes' world over through its coordinated research programmes to enable them to focus their research on topics of common interest. That way it acts as a catalyst. The technical cooperation has assumed new significance in the light of growing stress on human development and the soaring electricity demand. Besides, the threat of climate change and the protection of nuclear facilities and materials from terrorist attacks are the major challenges to the programme.

The safeguards function of the IAEA centric regime has strengthened over time. Up till the mid-nineties, the system was focused on the safeguards activities in large and visible facilities such as nuclear power plants, while other smaller facilities with a potentially larger proliferation risk received less attention. But there is a shift in focus now and a drive to gain a horizontal view rather than piling up controls vertically on existing nuclear facilities is underway (Additional Protocol). This new approach has considerably improved the efficiency of the Agency in the implementation of the safeguards. At times, the verification measures of the IAEA turned out to be more effective than the intelligence apparatus of the world's most powerful nation in

discovering hidden nuclear projects in Iraq (Nye Jr. 1992: 1294). But the way the safeguards have been implemented until now suggests that their effectiveness depend upon stable international relations (north-south as well as east west) and upon the willingness of the government to cooperate with the IAEA in helping it to apply safeguards to the national fuel cycle. The safeguards verification get sometimes defeated when the countries resort to alternative methods of enrichment than what they have proclaimed. Iraq is an apt example which used the electromagnetic isotope separation to produce enriched uranium (Nye Jr. 1992: 1294).

Functioning of the IAEA became relatively more prominent from the early 1990's onwards on account of the end of cold-war rivalries and generation of a much larger consensus on nuclear non-proliferation. It is on account of the Agency's legitimacy, experience, expertise, database and the resources available that it has become a reference point of the nuclear technology related activities around the world.

As any other international organization the amount of intrusion of sovereignty that a state can tolerate determines the IAEA's effectiveness and constraints. Most of the constraints that the IAEA has to face in carrying out effective safeguards are limited by the authority that the states are willing confer on it. In many parts of the Third World the safeguards are only reluctantly or partly accepted. That the additional protocols entail an extensive intrusion into the sovereignty of the state its acceptance has been growing but slowly as till date only 114 states having signed it.

Even where safeguard coverage is complete their application has sometimes become difficult and uncertain to the extent that their credibility is doubted (Israel claim in 1981). The clandestine activities of countries like Iran and DPRK and the nuclear weapons test by India and Pakistan and now the announcement by Iran that it would start enrichment of the fuel and its breaking of the IAEA seals had posed a question as to whether and to what degree the IAEA matters.

Though the IAEA has made strides in assisting the peaceful uses in nuclear technology, it is beset with controversies owing to flaws in verification and safeguards techniques, disarmament norms adopted and the lacunae within the Nuclear Non-proliferation

Treaty (NPT). Due to the uneven spread and the treatment of the technical assistance as a trade-off against imposition of safeguards by the nuclear-haves, the resultant benefits have been far below expectations. The fulfilling of the Agency's mandate is often hampered by the paucity of funds. This had caused asymmetric spread of its activities and allocations in time and space. The funding is solely driven by political consideration though many countries have successfully pressed for the balance between budgetary allocations for the promotional and regulatory programmes of the Agency. The recent (in 2004) effort aimed at doing away with the 'zero growth budgeting' towards could yield more funds required for its effective functioning of the Agency.

In about five decades of experience and the emerging imperatives had led to a major re-evaluation or re-enforcement the Agency's aims and modus operandi. Efforts are on to make the functioning more relevant and effective so that it could address the increasing insecurity levels among the countries.

At present the non-proliferation regime is facing a crisis on account of the dwindling belief in the promises of the NPT which could detract states' trust in the Agency's safeguards and reduce their continuing willingness to submit to the regime. This is quite evident from the break-outs from the regime in the past few years (e.g. DPRK). There are serious impediments to the strengthening of the regime such as more and more countries attaining sensitive nuclear know-how and capabilities, continuing uneven degree of physical protection of nuclear materials from country to country and the limitations on the IAEA's verification authority (particularly in countries without additional protocols).The rise in terrorism, the discovery of clandestine nuclear programmes and the emergence of a nuclear black market further poses a serious challenge to the regime.

There has been no significant development towards the ultimate aim of complete disarmament. The continuing reliance on nuclear deterrence by the countries, the ongoing perception of imbalance between the nuclear haves and have-nots has raised the insecurity levels. Though there have been talks on the reduction of arms, several countries have been working on the development of its nuclear arsenal (Srinivasan

2003:37). This suggests that even though the regime marks its presence, it is in many aspects, an incipient one.

Moreover, it has been observed during the study that IAEA has been relatively less interactive with the NGOs. In the changing global order the IAEA could go for a larger integration of its programmes with the regional arrangements for their better implementation.Moreover, regional measures could also serve as stepping stones towards assimilation into the broader international verification system and as necessary elements in supporting and consolidating the foreclosure of the nuclear option as a way of achieving security.

In the back drop of the Kyoto protocol, the nuclear power is bound to play a key role in economic and social development.[26] There has been increasing demands (especially within the developing countries) for nuclear power as a source of clean and eco-friendly energy. Even the developed countries are revisiting their earlier decisions regarding nuclear power.[27] In such a scenario the IAEA's responsibility is bound to increase. The latest efforts to underscore the Indo-US nuclear deal and the initiative that the IAEA has taken to formulate India specific safeguards marks a paradigm shift in the approach of the Agency's functioning and is an indication of its becoming more and more sensitive and responsive to the realities that exist.[28]

[26] Nuclear energy generates 16 percent of the world's electricity in 30 countries.
[27] The Hindu , 8th July 2006. p.14
[28] The Hindu, 9th July'2006.p.1

References

*Annual Report 2004: IAEA doc GC(49)/5, " Annual Report 2004" [online: web] Accessed 28 March 2006, URL: www.iaea/Publications/Reports/Anrep2004/index.html

*IAEA 1968: INFCIRC/66/Rev.2 Text

*IAEA 1972: "The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons" (INFCIRC/153) Text

*IAEA 1973: INFCIRC/193 Text

*IAEA 1994: Safety Convention Text

*IAEA 1997: INFCIRC/540/Additional Protocol Text

*NPT: The 'Non-Proliferation Treaty' (1970) text

*Pelindaba Treaty 1996, African Nuclear Weapon Free Zone Treaty Text.

*South-East Asia Nuclear Weapon Free Zone (SEAWFZ or Bankok Treaty, 1995)

*Statute: 'IAEA Statute'1957

*Tlatelolco treaty : "Treaty for the Prohibition of Nuclear Weapons in Latin America" 'Tlatelolco treaty' (1967) text

* U N Charter: Charter of the United Nations

Abbott, Kenneth W. and Snidal Duncan 1998, "Why States Act Through Formal International Organization", *The Journal of International Conflict Resolution*, 42(1).pp3-32

Barkenbus, Jack 1987, "Nuclear Power Safety and the Role of International Organization, *International Organization*, 41(3).pp.475-490.

Barreto, Pallo M.C. and Cetto, Ana Maria 2005, *IAEA Bulletin*, 46(2).pp.28-30.

Bechhoefer, Bernhard G.,1973, "Historical Evolution Of International Safeguards" in Mason Willrich (ed.), *International safeguards and Nuclear Industry,* London: The John Hopkins University Press.pp.21-45

Bennet, A. Leroy 1995, *International Organizations: Principles and Issues*, New Jersey: Prentice Hall

Blix, Hans1995, "The IAEA, United Nations, and New Global Nuclear Agenda," *IAEA*

*Bulletin,*37(3).pp.2-9. [online: web] Accessed 1st July 2006, URL: http://f40.iaea.org/worldatom/Periodicals/Bulletin/Bull373/bulletin37n3.html

Bunn M., "International Safeguards: Summarizing by 'Traditional' and 'New Measures'" [online: web] Accessed 3 July 2006, URL: http://ocw.mit.edu/NR/rdonlyres/Nuclear-Engineering/22-812JSpring2004/A88D2643-5744-4760-961C-D2859A1457A1/0/lec16notes.pdf

Brzoska Michael1992, "Is Nuclear Non-proliferation System a Regime? A comment on Trevor Mc Morris Tate", *Journal of Peace Research*, 29(2). pp.215-220.

Cetto, Anna Maria 2003, "Pillars of Peace: The Evolution of Nuclear Technical Cooperation", *IAEA Bulletin,* 45(2).pp.42-45

Chittaranjan, Kalpana1997, "The IAEA as a Safeguard Regime", *Strategic Analysis*, 21(7).pp.1086-1106.

Cortright, David "The Legal Basis for U.N. Weapons Inspections", [online: web] Accessed 2 July 2006, URL: http://www.ceip.org/files/publications/iraq/cortright.htm

Desai, Pranav N. 1997, *Science and Technology and International Cooperation*, New Delhi: Har Anand,

Edwards, D.M. (1984), "International Legal Aspects of Safeguards and the Non-proliferation of Nuclear Weapons", *The International and Comparative Law Quarterly*, 33(1). pp.1-21

El Baradei,Mohammed, 2003, "Atoms for Peace : a Vision for Future", *IAEA Bulletin,*45(2).pp.17-20

Elbaradei Mohamed, Nwogugu, Edwin and Rames, John 1995, "International Law and Nuclear Energy: Overview of the Legal Framework", *IAEA Bulletin,*37(3).pp.16-25

Fischer, David 1997, *History of the International Atomic Energy Agency: The First Forty Years*. Vienna: Division of Publications, IAEA.

Fischer, David 2003, " IAEA Vision and Reality : How Far has the IAEA Been Able to Realize that Inspired its Creation in 1957", *IAEA Bulletin*, Vol. 42, No. 2,.pp.12-16

FMCT 98 undated, "Negotiating a Fissile-Material Cut-off Treaty" [online: web] Accessed 16 May 2006,URL:http://www.defencejournal.com/dec98/fissile.htm

GAO 2005, "Nuclear Proliferation: IAEA has strengthened its Safeguards and Nuclear Safety Programs, but Weaknesses need to be Addressed". [online: web] Accessed 16 May 2006 URL:www.gao.gov/cgi-bin/getrp?GAO-06-93

Gjelstad, J., 1996, "Introduction: The Last Waltz-time to Halt the Nuclear Spread" in Gjelstad J. and Njolstad *"Nuclear rivalry and international order,* New Delhi: Sage

Publications.pp.103-119

Goldschmidt, Bertrand1997, "The Origins of the International Atomic Energy Agency", in *The International Atomic Energy: Personal Reflections,* Vienna: Division of Publications, IAEA, 1-13.

Gonzalez, Abel, J. (1998), "Towards an International Regime on Radiation and Nuclear Safety", *IAEA Bulletin*, 40(2).pp.2-4

Haggard, Stephan and Simmons, B.A., 1987, "Theories of International Regimes", *International Organization*, 41(3).pp.491-517.

Harald, M., Fischer, D. and Kotter, W. 1994, *Nuclear Non-proliferation and Global Order*, SIPRI: Oxford University Press.

Hough, C. G. and Solem, L.C. 1970, "Verification of Nuclear Materials" in *Safeguards Techniques: Proceedings of a Symposium on Progress in Safeguards Techniques*, Vol. I, Vienna: IAEA.

IAEA 2005, *Non-Proliferation of Nuclear Weapons and Nuclear Security: IAEA Safeguards Agreements and Additional Protocols 2005*, Vienna: IAEA.

IAEA staff undated, [online: web] Accessed 22 May 2006 URL: http://www.iaea.org/About/Staff.html

iaea.org (1) undated, "The Use of Nuclear and Isotopic Applications to Address Specific Coastal Zone Management Problems" [online: web] Accessed 26 May 2006, URL: http://tc.iaea.org/tcweb/abouttc/strategy/thematic/pdf/reports/Thematic_plan_CZM.pdf

iaea.org (2) undated, "The Safeguards System of the International Atomic Energy Agency", [online: web] Accessed 1st July 2006, URL: http://www.iaea.org/Publications/Booklets/index.html

iaea.org (3) undated, "The Revised Guiding Principles And General Operating :Rules To Govern The Provision Of Technical Assistance By The Agency (Infcirc/267)", [online: web] Accessed 15 July 2006, URL: http://www.iaea.org/Publications/Documents/Infcircs/Others/infcirc267.pdf

iaea.org (4) undated, [online: web] Accessed 28 March 2006, URL: http://www.iaea.org/programmes/naal/pci/pages/training.htm

iaea.org (5) undated, [online: web] Accessed 26 May 2006, URL: http://www-naweb.iaea.org/na/index.html

iaea.org (6) undated, [online: web] Accessed 28 March 2006, URL: http://www-naweb.iaea.org/napc/index.asp

iaea.org (7), "The Safeguards System of the International Atomic Energy Agency", [online: web] Accessed 26 May 2006, URL: http://www.iaea.org/Publications/Booklets/index.html

Imber, Mark F. (1983), "Arms Control Verification: The Special Case of IAEA-NPT 'Special Inspections" in Ian Bellany and Coit D. Blacker (eds.), *The Verification of Arms Control Agreements*, London: Frank Cass and company Ltd.pp.57-76

International Organization 1947, "Atomic Energy Commission", 1(1). pp.99-102.

International Organization 1969, "Specialized Agencies", 1969, 23(4).pp.990-996

Jolles, Paul 1997, "From the East River to the Danube: Preparatory Commission and the First Years in Vienna, " in *The International Atomic Energy Agency: Personal Reflections*.Vienna: Division of Publications IAEA, pp.27-35.

Kamminga, Menno T. (1995), "The IAEA Convention on Nuclear Safety", *International and Comparative Law Quarterly*, 44(4).pp.872-882.

Katz, Sherman E.1968, "Application of Science and Technology to Development", *International Organization,* 22(1).pp.392-416.

Keely, James F. (2004), "The Use of Commercial Satellite Imagery and Canadian Security Needs" in Keeley, James F. and Huebert, Rob (eds.) *Commercials satellite Imagery and United Nations Peacekeeping*, Hants UK: Ashgate Publishing Company.pp.87-99.

Keohane Robert O., 1982, "The Demand for International Regimes", *International Organization*, 36(2).pp.325-355.

Keohane, Robert O and Joseph Nye, Jr. 1977, *Power and Interdependence: World Politics in Transition*, Boston: Little brown.

Kessler, Christian J. 1995, *Verifying Non-proliferation Treaties: Obligation, Process and Sovereignty*, Washington DC: National Defense University Press,.

Khan, Munir Ahmed 1997, "Major Milestones in the Development of the IAEA" in the *International Atomic Energy: Personal Reflections*, Vienna: The Division of Publications IAEA.pp.297-311.

Klerk, Peit de 2003, "Under Fire: Is the World's Treaty against the Spread of Nuclear Weapons Strong Enough", *IAEA Bulletin,* 45(2).pp.31-34

Lamm, Vanda 1984, *The Utilisation of Nuclear Energy and International Law*, Budapest: Akademiai Kiado,

Lodgaard, S. 1980, "The Role of Institutional Measures in Strengthening the Non-Proliferationa Regime" in SIPRI, *Internationalization to Prevent the Spread of Nuclear*

Weapons, London: Taylor and Francis.pp.109-121.

McKnight, Allan 1971, *Atomic Safeguards: A Study in International Verification,* New York: UNITAR.

Nye Jr., Joseph S.1992, "New Approach to Nuclear Proliferation Policy", *Science*, New Series, 256(5061).pp.1293-1297.

Paul G.1998, "Brighter Than a Thousand Suns" in Pinto, Embrose(ed), *Nuclearisation of India: Myths, Beliefs and Fact*, New Delhi: Indian Social Institute.pp.1-28.

Pendley Robert, Scheinman, L and Butler, Richard W. (1975), "International safeguarding as Institutional Collective Behaviour", *International Organization*, 29(3).pp585-616

Ramachandran, R.2005, "Indo-US Nuclear Agreement and IAEA Safeguards", Strategic *Analysis*, 29(4).pp.574-592.

Ramanna, Raja 1997, "Positive Aspects of the Work of the International Atomic Energy Agency" in The International Atomic Energy: Personal Reflections.Vienna: the Division of Publications IAEA,).pp.287-295.

Rauf Tariq 2001, "The Strengthened NPT Review Process: Legal and Diplomatic Consideration" in Ungerer, C., and Hanson, M., *The Politics of Nuclear Non-proliferation,*Canberra: Allen and Unwin.pp.11-31

Rauf, Tariq, Bethnikitin Mary and Rissanen Jenni 2000, *Inventory of the International Non-proliferation Organizations and Regimes, 2000 Edition*, Monterry: Center for Non-proliferation Studies(MIIS).

Rautenbach, J., Tonhauser,W. and Wetherall, A., "Overview of the international legal framework governing the safe and peaceful uses of nuclear energy: some practical steps" [online: web] Accessed 5 May 2006 URL :http://www.nea.fr/html/law/Chernobyl/IAEA.pdf

Redden, Kaleb J.2003. "Verification Ghosts: the Changing Political Environment of the IAEA", *IAEA Bulletin,* 45(2).pp.28-30.

Rockwood, L., 'Legal Instruments Related to the Application of the Safeguards" [online: web] Accessed 6 May 2006 URL:www.opanal.org/Articles/Jamaica/jam_Rockwood.htm

Sanders, Ben 2004, "IAEA and the NPT safeguards", *Disarmament Forum*, Vol. 4, .pp.43-49

Sanders J. W. 2004, [online: web] Accessed 5 May 2006 URL: http://usmission.ch/press_2004/0325JackieSanders.htm

Sasz, Paul. C. (1970), *The Laws and Practices of the International Atomic Energy Agency,* Vienna: IAEA.

Schiff, Benjamin N. 1984, *International Nuclear Technology Transfer: Dilemmas of Dissemination and Control,* Totowa, N.J: Rowman & Allanheld.

Schriefer1996, Dirk, "New Safeguards Measures: Initial Implementation and Experience", *IAEA Bulletin*, 38(4).pp.7-10

Sharma, Sheel Kant, "The IAEA and the UN family: Networks of Nuclear Cooperation, *IAEA Bulletin*, 37(3). pp.10-16, Accessed 1st July 2006, URL: http://f40.iaea.org/worldatom/Periodicals/Bulletin/Bull373/bulletin37n3.html

Simpson, John 1994, "Nuclear Non-Proliferation in the Post-Cold War Era", *International Affairs* (Royal Institute of International Affairs), 70(1).pp.17-39.

Sinden, D., "93+2 Programme Proposal" in Olllapally, D. and Rajgopal, S., (ed.), *Nuclear Cooperation: Challenges and Prospects* (Bangalore: NIAS, 1997).pp.29-41.

Smith, Roger K.1987, "Explaining the Non-Proliferation Regime: Anamolies for Contemporary International Theory", *International Organization*, 41(2).pp.253-281.

Smyth, Henry D.(1973), "The Need for International Safeguards" in Mason Willrich (ed.) *International safeguards and Nuclear Industry,* London: The John Hopkins University Press.pp.3-21

Srinivasan M.R.2003, "View from India: Bottling the Nuclear Genie". *IAEA Bulletin,* 45(2).pp.36-37.

Stephen D. Krasner 1983 (ed.), *International Regimes,* Ithaka: Cornell University press.

Stoessinger, John G. 1959, "The International Atomic Energy Agency: The First Phase", *International Organization*, 13(3).pp.394-411.

Szaz P. and Fischer D. (1985) *Safeguarding the Atom: A critical Appraisal,* London: Taylor and Francis.

Szaz, Paul C.1973, "International Atomic Energy Agency Safeguards" in Mason Willrich (ed.) *International Safeguards and Nuclear Industry,* Baltimore: John Hopkins University Press. pp.73-142

Tao, C. Vincent and Truong, QS. (2004), "Development of Geospatial Technology for Nuclear Information Management" in Keeley, James F. and Huebert, Rob (eds.) *Commercial Satellite Imagery and United Nations Peacekeeping* ,Hants UK: Ashgate Publishing Company.pp.69-77

Tate, Mc Morris 1990, "Regime Building in the Non-Proliferation System", *Journal for Peace Research*, 27(4), pp.399-444

Taylor, Paul 2003, *International organization in the age of globalization,* New York: Continuum.

Thorium energy undated: "Energy from Thorium: A Chronology of Nuclear History [online: web] Accessed 13 May 2006, URL:http://thoriumenergy.blogspot.com/2006/05/chronology-of-nuclear-history-with.html

The Hindu (i), *The Hindu*, New Delhi, 8 July 2006, p.14

The Hindu (ii), *The Hindu*, New Delhi, 5 February 2006, p.1

Virally,Michael 1981, "Definition and Classification of International Organisations: a Legal Approach," in Abi-Saab, Georges,(ed.) *The Concept of International Organisation,* Paris: UNESCO. pp.50-66.

Wikipedia, undated [online: web] Accessed 2 May 2006,URL http://en.wikipedia.org/wiki/International_Atomic_Energy_Agency

Williams, Lawrence (2003), The IAEA Safety Standards Set the Global Reference", *IAEA Bulletin,* 45(2).pp57-58.

Woodliffe,John(1987), "Nuclear Weapons and Non-proliferation: The Legal Aspects" in Pogany, Istvan(ed.), *Nuclear Weapons and International Law*, Hants, UK: Avebury.

Young, Oran R., 1982, "Regime Dynamics: The Rise and Fall of International Regimes", *International Organization*, 36(2).pp.277-297